Learning to use space:
A study into the SL2 acquisition process of adult learners of Sign Language of the Netherlands

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Learning to use space: A study into the SL2 acquisition process of adult learners of Sign Language of the Netherlands

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List of abbreviations and sign language acronyms

Below we provide a list of abbreviations, followed by a list of sign language acronyms that are used in this thesis.

General abbreviations

CA	constructed action
CDS	child directed sign
Coda	child of deaf adults
EC	European Credit
ELAN	EUDICO Linguistic Annotator (annotation tool developed by the Max Planck Institute for Psycholinguistics, Nijmegen)
BM	benchmark
FFI	form-focused instruction
FonF	focus on form
FonFs	focus on forms
FonM	focus on meaning
HS	handshape
IRR	inter-rater reliability
ISLA	Instructed Second Language Acquisition
L1	first language
L2	second or additional language
LOC	location
M1	first modality
M2	second modality
M2L2	learners of a second language (L2) in a second modality (M2)
NUL	non-utilized localization
OR	orientation of the hand
SASS	Size and Shape Specifier
SL2	sign language as a second or additional language
SL2-learner	sign language learner with a spoken language background
SLA	second language acquisition

STT-captionist	speech-to-text captionist
T1, T2, etc.	Test 1, Test 2, etc.
TL	target language

Abbreviations referring to local organizations

DSRG	Deaf Studies Research Group (*Lectoraat Dovenstudies*)
ISLDS	Institute for Sign, Language & Deaf Studies (*Instituut voor Gebaren, Taal & Dovenstudies*)
NGc	*Nederlands Gebarencentrum* (Dutch Sign Centre)
UUAS	Utrecht University of Applied Sciences (*Hogeschool Utrecht*)
RCSI	Research Centre for Social Innovation (*Kenniscentrum Sociale Innovatie*)
VLLT	*Vereniging Leraren Levende Talen* (Association of Teachers of Modern Languages)

Sign language acronyms

The following list contains the acronyms of all sign languages mentioned in this thesis. Some acronyms are based on the English name of the sign language (for example, Greek Sign Language), others are based on the local name of the sign language (for example, Nederlandse Gebarentaal). In the latter case, the local name is mentioned as well.

This list contains *deaf community sign languages* (also known as *urban sign languages*), and *shared sign languages* (also called *village sign languages* or *rural sign languages*). Deaf community sign languages have emerged in communities in which the majority of signers are deaf. Shared sign languages, in contrast, have emerged in small communities with a high incidence of deafness, and are often used by both deaf and hearing community members (Nyst, 2012; De Vos & Pfau, 2015). The sign languages in this list are deaf community sign languages, unless otherwise specified.

ABSL	Al-Sayyid Bedouin Sign Language (Israel) – *emerging shared sign language*
AdaSL	Adamorobe Sign Language (Ghana) – *shared sign language*
ASL	American Sign Language
Auslan	Australian Sign Language
BSL	British Sign Language
CTSL	Central Taurus Sign Language – *emerging shared sign language*
DTS	Danish Sign Language (Dansk Tegnsprog)
GSL	Greek Sign Language
HKSL	Hong Kong Sign Language
ISL	Israeli Sign Language – *emerging sign language*
KK	Kata Kolok (Sign Language of Desa Kolok, Bali, Indonesia) – *shared sign language*
ISN	Nicaraguan Sign Language (Idioma de Señas Nicaragüense) – *emerging sign language*
LGSTP	Sao Tome and Principe Sign Language (Gabon) (Língua Gestual de São Tomé e Príncipe) – *emerging sign language*
LIS	Italian Sign Language (Lingua dei Segni Italiana)
LSC	Catalan Sign Language (Llengua de Signes Catalana)

NGT	Sign Language of the Netherlands (Nederlandse Gebarentaal)
NSL	Norwegian Sign Language
NZSL	New Zealand Sign Language
PISL	Providence Island Sign Language (Colombia) – *shared sign language*
TİD	Turkish Sign Language (Türk İşaret Dili)

Transcription conventions

In this thesis, signs are depicted by photographs or represented by (English) glosses. Gloss representations of signs are written in small caps (e.g., SIGN). Following common conventions in sign language literature, the following notation conventions have been used (note that the glossed examples in this thesis do not contain information about non-manual signals, since these signals were not relevant for the phenomena to be illustrated):

SIGN	gloss representing a sign with approximately the same meaning.
SIGN-SIGN	two or more glosses, connected with hyphens, represent a single sign (e.g., BY-CHANCE, used in Chapter 3, Example 2).
SIGN^SIGN	two signs that form a compound (e.g., TEACHING^ASSISTANT, used in Chapter 3, Example 4), or a serial verb construction (e.g., ASK^CALL in Chapter 5).
SIGN++	the sign is reduplicated to indicate plurality (e.g., CHAIR++ in Chapter 3, Figure 3.16).
s-i-g-n	gloss indicating that a concept or name is fingerspelled (i.e., represented by the manual alphabet).
INDEX_x/IX_x	pointing signs are glossed as INDEX or IX. The subscript numbers refer to loci in space or on the signer's body; i.e., they indicate whether the sign is directed towards the signer (IX_1), the addressee (IX_2), towards the signer's other hand ($\text{IX}_{\text{left hand}}$/$\text{IX}_{\text{right hand}}$), or towards a locus in signing space (IX_{3a}/IX_{3b}/$\text{IX}_{3a\text{-high}}$), where the subscript $_{3a}$ refers to a locus at the ipsilateral side of the signing space, and the subscript $_{3b}$ to a locus at the contralateral side of the signing space. If multiple entities are located

at the ipsi- or contralateral side of the signing space, this is indicated by additional numbers (e.g., $\text{IX}_{3a\text{-}1}$ FATHER and $\text{HOUSE}_{3a\text{-}2}$ in Chapter 3, Example 2). Once a locus has been associated with a referent, the name of the referent might replace the subscript number (IX_{house}).

SIGN_x	a subscript next to a gloss representing a noun, adjective, or numeral indicates that the sign is articulated at a non-neutral location in order to establish a location-referent association or to associate the sign with a previously established referent (e.g., HOUSE_{3a}, NEW_{3a} and BEAUTIFUL_{3a}, used in Chapter 3, Example 1).
SIGN_x (verb)	a subscript next to a gloss representing a single argument agreement verb indicates that the sign is articulated at a non-neutral location associated with, or to be associated with, the verb's argument (e.g., FIND_{3a}, used in Chapter 3, Example 1).
${}_x\text{SIGN}_x$ (verb)	subscripts in glosses representing agreement verbs indicate the begin point and end point of the verb's movement path. For instance, ${}_1\text{GIVE}_2$ involves a movement path from close to the signer's body (locus 1) towards the addressee (locus 2), yielding the meaning 'I give you'. If a gloss for an agreement verb candidate is not accompanied by subscripts, the gloss represents the citation form of the verb.
${}_{\emptyset}\text{SIGN}_x$ (verb)	the symbol Ø indicates that the begin point of the movement is articulated at a neutral location, and does not agree with the locus associated with the verb's subject (regular verbs) or object (backward verbs).
ACT-ON	NGT agreement auxiliary (sometimes also referred to as AUX-OP). The gloss can be preceded and followed by subscripts indicating the arguments of the accompanying verb (e.g., ASK ${}_2\text{ACT-ON}_1$ yields the meaning 'you ask me').

$\text{VERB}_{\text{entity}}$	Classifier predicates, both Whole Entity and Handle, are indicated by a gloss representing the verb stem that the classifier combines with (e.g., MOVE, BE-LOCATED-AT, HOLD), followed by a subscript indicating the entity that is denoted by the classifier handshape (e.g., $\text{BE-LOCATED-AT}_{\text{sheet of paper}}$ and $\text{HOLD}_{\text{sheet of paper}}$ in Chapter 4, Figures 4.2ab).
-----	the dotted line indicates that a sign is held in place while the other hand continues signing.

We used the handshape font ‘handshape2002’ created by the Centre for Sign Linguistics and Deaf Studies of the Chinese University of Hong Kong (http://www.cuhk.edu.hk/cslds → online resources → handshape fonts) to represent classifier handshapes.

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My colleagues at the University of Amsterdam welcomed me in their midst, and showed interest in my project. At ISLDS my fellow PhD-student Gardy van Gils has been a source of advice, and overseas there was my dear PhD-friend (Dr.!) Sarah Sheridan who has been supportive and motivating.

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1. Introduction

The teacher was trying to tell me something, but I did not understand what she meant. Was she asking me a question? Her arms were moving, her fingers were moving, her face was moving, her lips silently articulated a word. I did not know where to look and how to make sense of these movements. Fortunately, I recognized some things. I understood 'Hello'. And a point to the chest probably just meant 'I'. Pointing towards me, well, that probably just referred to me. She was telling me her name! And she probably wanted to know my name… What was the sign for 'name' she just showed? How do I have to bend my fingers… and which fingers? Do I have to move to the right or to the left? Oh, the teacher continued... I missed half of her sentence, as I was observing my own hand. Fortunately, the teacher patiently repeated her signs. I guessed that was the sign for 'write', since it looked like a writing movement. She pointed to the whiteboard. She wanted me to write my name on the board!

The experience above is my own. In September 1997, my journey of learning Sign Language of the Netherlands (Nederlandse Gebarentaal, NGT) started in a classroom at Hogeschool Utrecht, Utrecht University of Applied Sciences (UUAS). I was learning a new language in a new modality. Some of the aspects in the process of learning NGT did not differ from learning French, German and English, languages I had learned during secondary education. Instead of words, I learned signs for concepts. I learned how to perform different communicative actions, such as asking questions or ending a conversation. Yet, other aspects of the learning process were unfamiliar to me, due to the different modalities, and therefore posed new challenges. Guided by my teachers and deaf friends, I got a grip on the language, and in 2001 I was awarded my diploma as Teacher NGT. One year earlier, I had started to work as NGT teacher, and in this position I encountered many learners who struggled with the same modality-induced challenges I had previously faced. Yet, there was little scientific literature on the acquisition and teaching of modality-specific features. This sparked my interest to investigate the acquisition of one of these modality-specific features, which appeared to be one of the major challenges for hearing second language learners of a signed language (henceforth: SL2-learners): the use of space.

1.1 Motivation for studying the SL2 acquisition of use of space

Hearing learners with a spoken language background who learn a sign language, have to adjust to a new modality of signal transmission. Instead of perceiving and producing language in the oral-auditory modality (i.e., a spoken language, which is produced with the vocal apparatus and perceived by the ears), they have to perceive and produce language in the visual-spatial modality (i.e., a signed language, which is produced with the hands/arms and face and perceived by the eyes). These two different modalities shape linguistic organization, offering different resources for lexical and grammatical organization to spoken languages on the one hand and signed languages on the other (Meier, 2012).

One of the resources available to signed languages, but not to spoken languages, is the signing space. The signing space can be defined as the three-dimensional space in front of the signer's torso, where the articulation of signs takes place. A signer can associate referents with locations in space, so-called 'loci', and utilize these loci to provide a map-like scene description (spatial representation, Section 2.4.2.1) or to serve syntactic functions (abstract representation, Section 2.4.2.2) (Perniss, 2012; Barberà & Kimmelman, 2017). Learners of a sign language who have a spoken language background are unfamiliar with this spatial resource and have to learn how to place referents in space and how to refer to them. Meier (2012, p. 587) states that "It is in the use of space that we find the most profound modality effects on grammatical organization in sign languages". Indeed, in NGT various grammatical features depend on this spatial resource. It is thus crucial that learners acquire the rules and constraints with regard to the use of space.

Whilst in recent years some research has been carried out on learning and teaching sign languages as a second language, there is still limited scientific understanding of the SL2 language learning process (Rosen, 2019a). In particular with regard to the acquisition of grammatical features, there is a lack of literature to inform practitioners in the field. This thesis aims to partly fill this gap by examining how adult second language learners of NGT acquire modality-specific grammatical features regarding the use of space. In three longitudinal studies, data was collected to gain insight into the acquisition process of pointing signs, classifier predicates, spatial verbs, agreement verbs and signs marked for location. Subsequently, a study was carried out to investigate the effectiveness of pedagogical practices with regard to one of these grammatical features, i.e., agreement verbs. As such, this thesis contributes to the fields of sign language linguistics as well as the field of second language learning. On the one hand, we offer empirical evidence to scaffold the teaching practice; on the other hand, our study adds to the body of knowledge with regard to the effectiveness of form-focused instruction.

1.2 Thesis outline

The aim of this dissertation is to examine how adult learners with a spoken language background who are acquiring a signed language, learn how to use the space in front of the body to express grammatical and topographical relations. Moreover, it aims at investigating the effectiveness of different types of instruction, in particular instruction that focuses the learner's attention on the agreement verb paradigm. To that end, existing data from a learner corpus (Boers-Visker, Hammer, Deijn, Kielstra & Van den Bogaerde, 2016) were analyzed, and two novel experimental studies were designed and carried out. These studies are described in detail in Chapters 3–6. Each chapter has been submitted to a scientific journal, and accordingly, can be read independently.[1] Yet, the order of the chapters follows the chronological order in which the studies were carried out, and the reader will notice that each study served as a basis to inform the next study. As such, some overlap in the sections describing the theoretical background of each study was unavoidable.

[1] Chapters 4, 5 and 6 are longer versions of the submitted papers, given limitations imposed by the respective journals; three of the four papers were co-authored. An overview of the contributions of each author is provided in 'Author contributions' (p. 287).

The thesis begins with a brief presentation of the relevant theoretical background in Chapter 2. First, this chapter provides a short introduction to the disciplines that inform the area of sign language pedagogy. This introduction is followed by a section on the Dutch deaf community and NGT and a section on sign language pedagogy. We then expand on the central topic of ‘use of space’, providing the reader with the necessary background to comprehend the following Chapters 3–6, each of which details one of the studies carried out in the context of this project.

In Chapter 3 (study 1), the grammatical devices subsumed under the term 'use of space' (i.e., pointing signs, spatially modified verbs, and signs marked for location) are explained in detail, followed by a quantitative and qualitative analysis of the production of these features by two learners of NGT, who were followed longitudinally and filmed during their four-year bachelor education. The data, that were part of an NGT learner corpus compiled by the Deaf Studies Research Group hosted by UUAS, comprised recordings of (semi-)spontaneous NGT conversations between the learners and an interlocutor fluent in NGT. Although this study provided interesting and valuable information, naturalistic data suffer from some drawbacks, such as avoidance strategies on part of the learners or the absence of relatively infrequent linguistic items in the data (Granger, 2012). Therefore, we complemented the (semi-)spontaneous data with experimental data obtained from 14 novel learners of NGT, who performed elicitation tasks, developed by the author, during the first two years of their bachelor study at UUAS (cohort 2016-2017). This controlled elicitation study, which targeted two types of spatial constructions, is reported in Chapters 4 (study 2) and 5 (study 3). In Chapter 4, we elaborate on the acquisition of Whole Entity classifier predicates, and in Chapter 5, we report on the acquisition data with regard to agreement verbs. The latter appeared to be difficult to master, while the former seemed to be acquired relatively effortlessly. These results prompted us to design an additional experimental study, reported on in Chapter 6 (study 4), investigating elicited data from four existing classes of novel students of the subsequent student cohort (2017-2018). These learners participated in one of three educational interventions that differed with regard to their level of explicit instruction, that is, an implicit focus on form strategy, an explicit focus on form strategy, or no instruction regarding the target construction (control group). Finally, the main findings of the three studies are summarized and discussed in Chapter 7.

1.3 Supplementary materials

For the interested reader, we provide supplemental materials, all designed for the purpose of this study, which visualize the data (studies 1–3) or provide a detailed step-by-step description of how we arrived at final scores (study 4). These materials might be beneficial for other researchers who wish to apply the methods to their own data or replicate a study.

The supplementary materials to Chapter 3 contain an overview of the entities that were assigned a locus in space, and devices to refer back to these entities, per participant per session (Figure 1.1a). This visualization gives an impression of the amount of information coded per participant, and details the (non-)presence of anaphoric reference and the use of different perspectives.

The supplementary materials to Chapter 4 consist of an Excel document visualizing patterns in the data (Figure 1.1b). This document, designed by the author, gives a detailed overview of each Whole Entity classifier predicate present in the SL2-responses. The use of coloured 'barcodes' and symbols in the presentation of data facilitates the detection of patterns in the data. Along with the document, an explanation of the 'barcode'-system is provided in English and Dutch.

A similar instrument (Figure 1.1c) was designed to visualize the SL2-responses obtained in study 3 (Chapter 5). By means of a 'barcode'-system and top-view representations, patterns in the data can be detected. Again, the explanation on the system of 'barcodes' is provided in English and Dutch.

The supplementary materials to the intervention study (Chapter 6) include a detailed description of the coding process, as well as the Excel document that was programmed to arrive at the final scores. Moreover, the supplementary materials to this chapter include the Excel-files with the scores per item per participant and the (Dutch) teaching manual containing a description of all tasks offered to the participants.

a.

Session: 307-4B

	Observer perspective	Character perspective: 1	Character perspective: other(s)
PT	company Taaltrein ❶ person in team Taaltrein ○ Kentalis (vertical) ❶ Taaltrein (vertical) ❶⊂○ children ⊖○ │ ⊖○ child that wants to play with toy train ○○│○ child that wants to play with toy train and I ⊖ speech therapist and I 1 ⊖ speech therapist (loc 2) ❶○ new child ⊙ wall at the left (✋) ○ mirror-window ❶ observation area ○│○ children in class room ○ mentor ⊙ child that is shy ○⊙ child that does not say anything ❶│○○ children with speech disorder at Taaltrein ⇨ child that is aggressive ❶○│⊙ mentor and I ⊖ child that cannot talk ❶ child that refuses to talk ❶│⊙○ child that cannot talk and child that refuses to talk ○+○ speech therapist and I ⊖● │ ⊖ ⊖ │⊖ child that loves jigsaw puzzles ❶○│⊙│○	PT:2 (other children) ②⊂	P3: drawing (1= child) ③ P3: here (Taaltrein) (1 = parents) ③③ P3: child (1= mentor) ③ P3: puzzle on cupboard (1 = child that loves jigsaw puzzles) ③ P1 (1= new child) ①⊂①⊂ P1 (1= parents) ①① P1 (1= mentor) ① P1 (1= child) ①
Verb	COME (-> Taaltrein) WELCOME (-> Taaltrein) BRING (-> Taaltrein) SEE/WATCH (observation area -> class room) 5x	NEERLEGGEN puzzel (-> op kast) ◆ PAKKEN-EN-AANREIKEN (plek op kast -> kind dol op puzzel) ◆	MEENEMEN (1=ouders, -> huis) ROEPEN (1= ambulant begeleider -> ouders)

Figure 1.1a. Screenshot of supplementary materials visualizing the data obtained in study 1 on the use of spatial devices in (semi-)natural conversation

b.

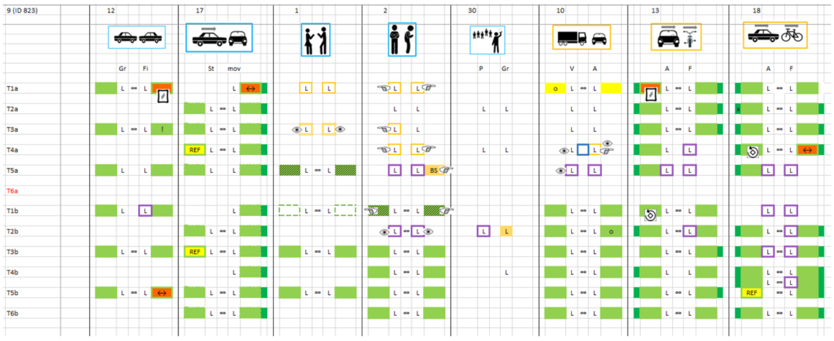

Figure 1.1b. Screenshot of supplementary materials visualizing the data obtained in study 2 on Whole Entity classifier predicates.

c.

Figure 1.1c. Screenshot of supplementary materials visualizing the data obtained in study 3 on agreement verb modification.

The materials are stored in an online repository and are thus available for the interested reader. They can be found using the references/doi's provided in Chapters 3–6, or by scanning the QR-code below (Figure 1.2).

Figure 1.2. QR-code referring to site containing links to supplementary materials.

2. Theoretical background

In this chapter, background information is presented to contextualize the present study and to familiarize readers with the relevant pedagogical and grammatical concepts and terminology. The chapter is divided into four sections: it starts with a brief introduction into the research fields that address sign language pedagogy (Section 2.1). The following Section 2.2 describes the socio-historical background of NGT and its users. Next, a brief overview of the area of sign language pedagogy is given (Section 2.3), followed by an overview of the domain of sign language grammar that will be central to our discussion, the 'use of space' (Section 2.4). Finally, Section 2.5 presents the research questions that have guided this research.

2.1 Intersecting research fields

Studies that address the topic of learning a sign language as a second language can be found at the intersection of three research fields: the field of sign language linguistics, the field of second language acquisition (SLA), and the field of language pedagogy. As aspects of all three fields have informed the present study, we briefly sketch their main goals and impact.

The discipline of *sign language linguistics* was sparked by Stokoe (1960) with his seminal publication on the phonological structure of American Sign Language (ASL).[1] At that time, linguists considered human language as being exclusively produced in the vocal channel. Sign languages, nowadays recognized as full-fledged languages used by deaf (and hearing) individuals, were considered as inferior to spoken languages, lacking any internal structure or grammatical organization. However, since the publication of

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[1] Stokoe's publication is generally considered to be the work that formed "the inauguration of modern linguistic research on deaf sign languages" (McBurney, 2012, p. 921). It must be noted, however, that a few years before Stokoe's publication, Tervoort (1953) defended his dissertation at the University of Amsterdam, which presents an analysis of NGT signs produced by a group of deaf children at the Dutch Sint Michielsgestel school for the deaf, and which also rests on the assumption that NGT is a natural language.

Stokoe's (1960) monograph, researchers all around the world have demonstrated that sign languages are fully comparable to their spoken counterparts at all levels of linguistic description, and fulfill the same communicative and social functions as spoken languages (e.g., Sandler & Lillo-Martin, 2006). Cross-modal comparisons have revealed that many structural properties are shared by both modalities, for instance, modality-independent linguistic universals such as conventional vocabularies, duality of patterning, and productivity (see for an overview Meier, 2002b, p. 2). Yet, there are also interesting differences that can be attributed to the respective transmission channels. Modality-specific sign language characteristics include the use of signing space, the simultaneous layering of information, and the high incidence of iconically motivated structures (e.g., Sandler & Lillo-Martin, 2006; Meier, 2002b; Perniss, Pfau & Steinbach 2007). It is these properties that are of interest in the present study on the L2 acquisition of sign language.

The field of *second language acquisition* (SLA), a sub discipline of applied linguistics that dates from the 1960s as well, is concerned with the processes underlying the learning of a second language (Larsen-Freeman & Long, 1991). More specifically, SLA refers to "the process of learning another language after the native language has been learned" (Gass & Selinker, 2001, p. 5). SLA refers to the acquisition of an additional language in either formal classroom settings or in natural – untutored – settings. Some authors distinguish *foreign language acquisition* from *second language acquisition*, using the former term to refer to acquiring a new language in an instructed environment where the learner's native language is also used, as opposed to learning a new language in an environment in which this new language is used naturally (see Section 2.3.1).

The third field that informs sign language teaching is the field of *language pedagogy*. While the field of SLA is concerned with improving knowledge of how the learning of a second language proceeds, language pedagogy focuses on the (non-)effects of certain teaching practices on the acquisition of (a first or second) language (Gass & Selinker, 2001; Bygate, 2005). However, the two disciplines are closely intertwined, since the body of knowledge accumulated in the SLA-field informs the field of language pedagogy. Instruction that is not compatible with how learners acquire a language is not, or at least less, successful (Ellis & Shintani, 2013).

The research domain of sign language pedagogy can be situated where these three disciplines overlap. Moreover, there is an interaction with the discipline of *gesture studies*. Gestures are visible bodily actions that are used either in conjunction with spoken utterances (co-speech gestures), or as complements, supplements, substitutes or alternatives of speech (Kendon, 2004; Özyürek, 2012). As such, co-speech gestures are an integral part of language (McNeill, 1992, 2005). Sign languages commonly exploit forms and constructions that bear a resemblance to co-speech gestures (Perniss, Özyürek & Morgan, 2015). That is, a part of the lexicon consists of signs that have a gestural counterpart (see Section 2.4.6). However, gestures are, in contrast to signs, usually not conventionalized, and different speakers might therefore produce a different gesture for a certain concept. Studies into sign language pedagogy have to take gestures into account, for two reasons. Firstly, learners might (consciously or unconsciously) use their gestural knowledge to scaffold sign language learning (see Section 2.3.3.3). Secondly, the very existence of co-speech gestures has methodological consequences during different stages of a study (e.g., design, coding and analysis, see Section 7.3.4).

2.2 The Dutch deaf community and Nederlandse Gebarentaal

2.2.1 The deaf community and the signing community

NGT is the sign language used by members of the *deaf community* in The Netherlands. Members of deaf communities "share a common language, common experiences and values and a common way of interacting with each other and with hearing people" (Baker & Padden, 1978, p. 4).[2] As such, the Dutch deaf community is a sociolinguistic minority group embedded within the larger Dutch society, as illustrated in Figure 2.1a. However, as can also be

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[2] Cultural values and traditions may include greeting rituals, parting rituals, attention-getting strategies, ensuring communication, sharing information, behavioral norms regarding eye contact patterns, touching and facial expression, humor, and expression of art (e.g., Padden & Humphries, 1988; Reagan, 1995; Lane, Hoffmeister & Bahan, 1996).

seen in Figure 2.1a, only a part of the larger group of deaf[3] and hard-of-hearing people identify as members of the deaf community. People who do not self-identify as members of the deaf community are mostly people who lost their hearing in their adulthood (for example, due to over-exposure to noise, an accident or sickness), as well as people who were born deaf but who were raised orally, which implies that they prefer to communicate by means of spoken language and lip-reading. There is thus (i) a group of deaf and hard-of-hearing people who identify primarily with the hearing society and do not share the values of the deaf community, and (ii) a group of deaf and hard-of-hearing people who self-identify (and are identified by others) as members of a cultural (minority) group, the *deaf community*. Moreover, there is (iii) a small group of hearing people who identify as members of the deaf community, for example, hearing children of deaf adults (often referred to by the acronym Coda or the term heritage signers (Roy, Brunson & Stone, 2018; Reynolds, 2018)), who are raised with the language, values and beliefs of the deaf community, or life partners of deaf community members. Ladd (2003) refers to these hearing people as 'fringe members' of the community (indicated with the striped pattern in Figure 2.1a).[4]

[3] Within the fields of sign language linguistics and Deaf Studies, many authors use 'Deaf' with a capital D to refer to the group of people who identify as members of the deaf community and who use sign language, as opposed to 'deaf' with a lowercase d to refer to people who "share the condition of not hearing, [but] do not have access to the knowledge, beliefs, and practices that make up the culture of Deaf people" (Padden & Humphries, 1988, p. 2). The orthographic distinction distinguishes deafness as the medical condition of not hearing from Deafness as a cultural phenomenon. Recently, an increasing number of (deaf) scholars (e.g., Friedner & Kusters, 2015; Roy, Brunson & Stone, 2018; De Meulder, Murray & McKee, 2019) chose to give up this binary distinction, and instead use the more encompassing, less politicized, and less context-dependent lowercase 'deaf' to refer to all deaf people. In this thesis, we follow this practice and use lowercase d throughout.

[4] Within the scholarly field (e.g., Baker-Schenk & Cokely, 1980a; Napier, 2002; Leigh & Andrews, 2016), hearing people such as children of deaf parents are – to a point – accepted as members of the deaf community. We did not find any author who explicitly excludes this group from membership (but see Friedner & Kusters, 2015). However, on social media and fora one can find lay people who advocate that hearing individuals can never be considered members of the deaf community (see for an example https://www.quora.com/Is-a-hearing-person-considered-part-of-the-deaf-community-if-they-sign).

To avoid using ‘hearing status’ or ‘nativeness’ as a criterion, some authors (e.g., Johnston & Schembri, 2007; Klomp, in preparation) distinguish the *deaf community* on the one hand and the *signing community* on the other. The deaf community only includes people who self-identify (and are identified by others) as having a deaf identity, whereas the signing community subsumes members of the deaf community as well as deaf people who have acquired sign language, but do not self-identify as deaf community member, and hearing people who know sign language, such as hearing family members or acquaintances of deaf people, professionals who work with deaf people, or sign language students (Figure 2.1b).[5]

There is a paucity of survey data on how many Dutch people are deaf or hard-of-hearing, on how many of them consider themselves members of the deaf community, and on how many hearing individuals use NGT. There are various estimates by different organizations regarding these numbers (for a comprehensive overview, see Klomp (in preparation)). The EUD (2019) estimates the number of deaf NGT-users to be 15,000 individuals, whereas Cokart, Schermer, Tijsseling & Westerhoff (2019) estimate that the size of the signing community (i.e., deaf and hearing NGT-users with different levels of proficiency) is 60,000 people.

Sign languages differ from spoken languages with regard to the way the language is maintained and transmitted to the next generations, since only a small part of deaf children have a deaf parent as language role model.[6] As a consequence, only a small number of deaf children learn a sign language through intergenerational transmission. Instead, the language is commonly transmitted by peers (Lane, 1995). Historically, important cornerstones of the deaf community were deaf clubs and (residential) schools for the deaf, since these were the places where the language could be transmitted from one generation to the other or among peers (Woll & Ladd, 2003; Compton, 2014; Barberà et al., 2019). The role of the deaf schools in the Netherlands will be further discussed in Section 2.2.3.

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[5] Some authors refer to this group as ‘(non-deaf) allies’. The first mention of the term ‘allies’ is attributed to Paddy Ladd by Komesaroff and McLean (2006). However, we were not able to track down Ladd’s publication that Komesaroff and McLean refer to.

[6] The estimated number of deaf children that are born to deaf parents (in the U.S.) is 5% (Mitchell & Karchmer, 2004).

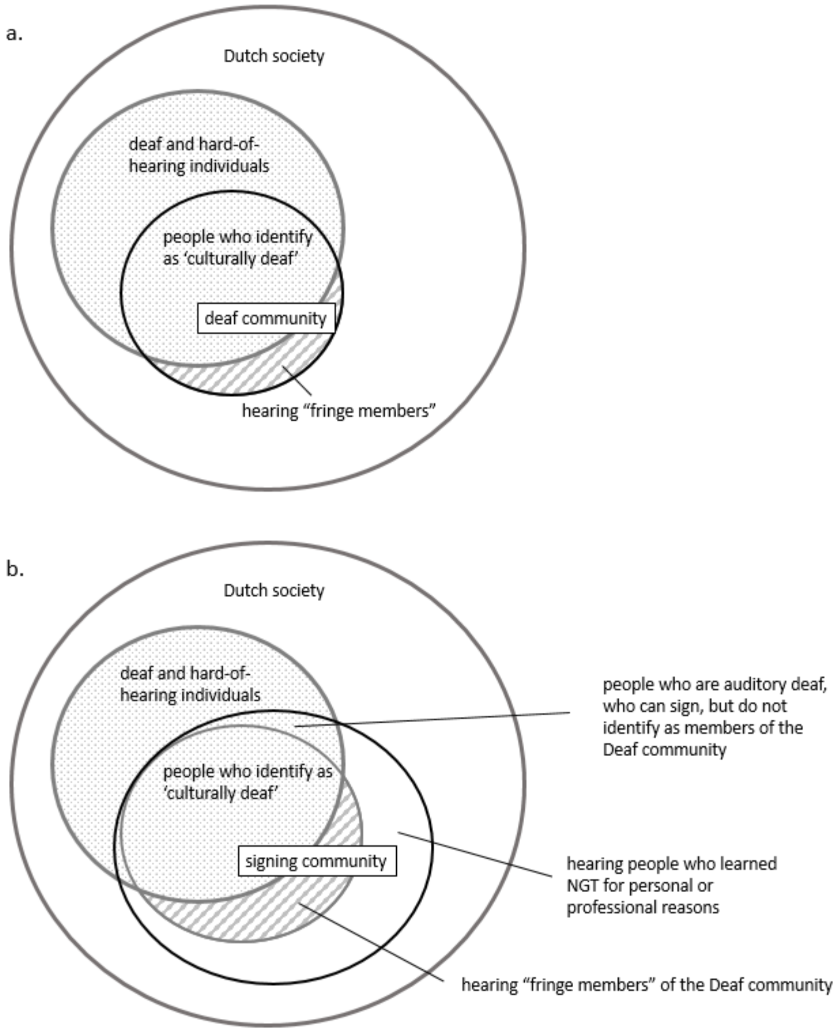

Figure 2.1. Schematic representations of the deaf community (a) and the signing community (b).

2.2.2 NGT versus Sign-supported Dutch

Before we proceed with a short historical background of NGT, we briefly introduce a system of manual communication that is used alongside, and by lay people sometimes confused with, NGT.[7] This system, termed Sign-supported Dutch (*Nederlands met gebaren*, NmG) is commonly used in educational settings, or when deaf people interact with hearing people who are not fluent (enough) in NGT. Sign-supported Dutch follows the grammatical structure (i.e., word order) of Dutch, while simultaneously combining (some of the) spoken words with signs borrowed from the NGT lexicon. Since the grammatical structure of the two languages differs considerably, this often leads to the use of invented signs to represent Dutch functional elements that lack a corresponding NGT sign (such as the invented NmG sign for the copula verb IS (e.g., 'he *is* happy') or the Dutch definite article THE), or to visualize Dutch inflectional morphology. To some extent, grammatical features that are characteristic of sign language (such as the use of space or non-manual markers) can be incorporated (Terpstra & Schermer, 2006). It is important to stress that NmG is not a language, but rather a manual code for Dutch, a secondary representation of Dutch in the manual modality. Notably, some – but not all – deaf people hold NmG in low regard and have negative attitudes towards NmG.

2.2.3 Historical background of NGT

NGT can be considered a relatively young language,[8] which historically was highly concentrated around the five schools for the deaf in the Netherlands. These schools were established between 1790 and 1911. Like other Western European countries, the Netherlands saw a rise of oralism in the late nineteenth century: deaf children were educated through the use of speech

[7] For an overview of different systems of manual communication, see Pfau (2012) and Senghas & Monaghan (2002).

[8] In general, (Western urban) sign languages are considered young languages that emerged during the Industrial Revolution, when groups of people migrated from rural areas to the city. This provided an opportunity for deaf people, who formerly lived in isolation, to gather and create social groups where sign languages could emerge (e.g., McBurney, 2012).

and lip-reading, and the use of signs was prohibited.[9] Often deaf children were physically punished when caught signing. Despite this ban on signing, deaf children used signs secretely on the playgrounds and in the residential dormitories, serving as linguistic role models for their younger peers. From the 1980s onwards, educational approaches within the schools for the deaf gradually changed for the better, with the introduction of Total Communication during the period 1980–1995, whereby signs were recognized as a means of communication and Sign-supported Dutch was used as means of instruction.[10] This was followed by the implementation of bilingual education during the following decade (Van den Bogaerde & Schermer, 2007). Yet, this so-called 'golden age' came to an end at the beginning of the twenty-first century, when the schools for the deaf started to shift away from the bilingual approach towards the use of Sign-supported Dutch or Dutch. This change in language policy was a direct result of an increased number of young deaf children with cochlear implants, and the recommendation of the medical professionals to only use spoken language in the communication with these children.[11] Another development that contributes to the decline in the use of NGT among young deaf children is the current inclusion philosophy, which propagates children to be mainstreamed in regular classrooms.[12] These developments have serious

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[9] Tijsseling (2014) points out that the rise of oralism in the Netherlands was not a direct result of the resolution that was adopted during the International Congress on the Education of the Deaf held in Milan in 1880, in which the use of signs in education was rejected (Lane et al., 1996). In fact, two schools had already introduced the oralist method some decennia before the Milan Congress, and two other schools, founded in 1888 and 1911, respectively, adopted an oralist approach from the start.

[10] Please note that it was not the schools, but the parents of young deaf children, who initiated the use of signs in the communication with their children. When these children entered the schools, their communicative competence was greater than that of the non-sign-exposed children of the previous cohorts (Schermer, 2012a).

[11] A cochlear implant (CI) is a surgically implanted hearing device that stimulates the auditory nerves via electric stimulation. For an elaborate overview of cochlear implants and their implications, see Blume (2010). Often, medical professionals stress the importance of auditory training, and parents do not always receive information that includes the use of sign language as an option.

[12] The Dutch government passed a law in 2012 (Wet Passend Onderwijs, 'law on appropriate education'), which imposes a 'duty of care' for regular schools to offer

implications for the preservation of NGT, since schools for the deaf have traditionally been important sites for language transmission (see Sections 2.2.1 and 2.2.5).

The educational approaches described above have greatly affected the way society and deaf people themselves viewed sign language and deafness. During the 'oral period', both deaf and hearing people had a tendency not to regard the signs used by deaf people as sign *language* in a linguistic sense. Deafness was commonly seen as a 'deficit', not as a positive trait (Van den Bogaerde & Schermer, 2007). The gradual awareness of the existence of a 'deaf identity' and of the fact that NGT is a language in its own right is attributable to different interacting global forces during the 1960s and the 1970s. Firstly, the emerging field of sign language linguistics (see Section 2.1) started to provide evidence that sign languages were natural human languages. Secondly, the civil rights movement during the 1960s empowered deaf people to stand up against systematic social injustice and to claim their rights as a cultural and linguistic minority group (Lane, 1995; Woll & Ladd, 2003; Bauman, 2008). These 'deaf advocacy' practices have resulted in an increase in social acceptance and recognition of sign languages both in academic circles and in society.

Over the last four decades, considerable efforts have been made to promote the use of NGT, to document the language, and to raise its status in society (Van den Bogaerde & Schermer, 2007; Schermer, 2012a; Cokart et al., 2019). Important developments since the 1980s are:

(i) The publication of a basic descriptive grammar (Schermer, Fortgens, Harder & De Nobel, 1991);[13]
(ii) The publication of dictionaries, both in book-form and online;
(iii) Various dissertations on the use and structure of NGT; of particular importance was Schermer's (1990) dissertation, as it is an early investigation into the linguistic status of NGT;
(iv) The standardization and expansion of the lexicon (STABOL-project, see Schermer, 2012b);

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appropriate education for all children per August 2014. One of the basic aims formulated by the government is that "every child will attend a mainstream school, or if that is not possible, a special school" (Government of the Netherlands, 2019).

[13] Currently, two descriptive grammars of NGT are being prepared by Klomp (in preparation) and Bos & De Nobel (in preparation).

(v) The development of national NGT course materials;
(vi) The development of pedagogical materials in NGT (De Klerk, Fortgens & Van der Eijk, 2015);
(vii) The improvement of NGT literacy by teaching sign language as a subject in schools for the deaf;
(viii) The establishment of programs that teach NGT as a subject in tertiary education (e.g., bachelor and master Sign Language Linguistics at the University of Amsterdam);
(ix) The establishment of bachelor and master programs to educate interpreters and teachers of NGT at UUAS;
(x) The installation of chairs for NGT at University of Amsterdam and Radboud University Nijmegen;
(xi) The compilation of a language corpus (Corpus NGT, Crasborn, Zwitserlood & Ros, 2008);
(xii) Increased visibility of NGT in the media;
(xiii) The development of online NGT courses; and
(xiv) The development of tests to assess L1 (Hermans, Knoors & Verhoeven, 2007, 2010) and L2 proficiency (Boers-Visker, Poor & Van den Bogaerde, 2015).

This rather long, but by no means exhaustive, list illustrates the current vitality of the language. Yet, there are concerns about the future of the language (see Section 2.2.5). The next section discusses the state of affairs regarding the (legal) status of NGT (Section 2.2.4), followed by an elaboration on the (global) endangerment of sign languages and the (positive and negative) role of second language learners in this process (Section 2.2.5).

2.2.4 The current legal status of NGT

As discussed above, the efforts undertaken since the 1980s have led to an increased visibility of NGT and the strengthening of its status in society. The use of NGT is generally accepted and valued by the Dutch society.[14] Related to this, the position of deaf people has improved considerably. The right to

[14] Yet, there is still much ignorance among lay people about the fact that NGT is a *language*, and not a simplified form of manual communication or a derivative form of Dutch. Moreover, the misconception that sign language is universal is still widespread (Baker, Van den Bogaerde, Pfau & Schermer, 2016).

use sign language interpreter services, facilitated and covered by the government, is legally secured (although there are limitations regarding the number of hours, depending on the domain). However, despite a number of advocacy campaigns (chronicled in Cokart et al., 2019), NGT has not yet been legally recognized by the Dutch government, in spite of the ratification of The United Nations Convention on the Rights of Persons with Disabilities (UN CRPD) in 2016.[15] However, a legislative proposal ('initiatiefwet') has been brought forward and was sent to the Senate of the Dutch Parliament in September 2019. Legislation would (further) improve social equality and could protect the vitality of NGT.

2.2.5 Loss of vitality and language endangerment

An increasing number of authors has expressed their concerns about the future maintenance of sign languages (De Meulder & Murray, 2017; Braithwaite, 2019; Barberà et al., 2019). The threat of 'language death' is not unique to sign languages: worldwide around forty percent of the (estimated) 7000 languages is endangered (Eberhard, Simons & Fennig, 2019). But while endangered spoken languages are usually threatened by language shift (i.e., speakers shift to another language), most Western urban sign languages are affected by other factors causing disrupted language transmission. These factors include (i) the widespread implementation of cochlear implants, which results in shifted educational policies that support the use of spoken language or systems of manual communication such as NmG; (ii) mainstreaming educational policies, disrupting language transmission from peers; and (iii) a decreasing 'influx' of deaf born children into the community thanks to vaccination campaigns that eradicate illnesses such as rubella. These three factors all contribute to a decline in the number of L1-signers, in communities that were numerically relatively small to begin with.

There is a vast body of literature describing language revitalization programs (for an overview, see Obiero, 2010). Such programs include activities to document the language (publications of dictionaries, descriptive grammars), expansion of the lexicon, improvement of literacy (teaching the

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[15] The UN CRPD contains five articles referring to national sign languages that require their members to accept, facilitate, recognize and promote (the use of) sign languages and to promote the linguistic identity of the deaf community (UN, 2006).

language as subject), implementation of actions that elevate the status of the language, and measures to maintain a critical mass of fluent speakers, either by preventing loss of heritage speakers (i.e., L1-users or 'heritage signers') or by expanding the group of speakers by teaching 'latent speakers' or 'new' speakers of the language, where 'latent speakers' are people who were raised in a linguistic environment but who did not become speakers of that language (Basham & Fathman, 2008), while 'new speakers' are L2-users.

In the case of NGT, most of the efforts undertaken since the 1980s (see Section 2.2.3) indeed include the 'revitalization' actions mentioned above. At present, NGT seems more 'vital' than ever, but paradoxically, the rapid decline in the number of L1-users makes the language extremely vulnerable. It is thus of importance to keep L1-users 'on board' by ensuring that parents of deaf children have access to and the opportunity to learn NGT (De Meulder & Murray, 2017), and to maintain a critical mass by welcoming L2-learners within the signing community.

De Meulder and Murray (2017) argue that L2-learners "can be interpreted in terms of language endangerment, but it could also be seen as a case of language revitalization" (p. 149). On the one hand, L2-signers can play an important role in sustaining NGT. On the other hand, there is a risk of L2-signers outnumbering heritage signers. This could then cause language change, either because L2-signers might create new lexical items, or because they might use syntactic structures that violate phonological or (morpho)syntactic rules of NGT (Hinton, 2011; De Meulder & Murray, 2017). The first can be prevented by creating awareness among L2-users; the latter might be be minimized by effective and efficient sign language pedagogy.

2.3 Learning and teaching a sign language as a second language

This section provides a brief overview of the research area that we will term 'SL2-pedagogy'. In order to avoid terminological confusion, this section starts with a short introduction to familiarize the reader with the terminology used in the remainder of this thesis. This introduction is followed by an historical overview of the (emerging) field of SL2-pedagogy (Section 2.3.2) and an overview of features that relate to SL2-teaching (Section 2.3.3). Finally, Section 2.3.4 presents the current state of affairs of SL2-pedagogy in the Netherlands.

2.3.1 Terminology

In the literature, the term ‘second language learning’ refers to the process of acquiring[16] a language (L2/Ln) other than one’s native language (L1) (Larsen-Freeman & Long, 1991). As such, it concerns a variety of learners in a variety of settings who learn an additional language for a variety of reasons. However, some authors reserve the term ‘second language acquisition’ for settings in which the additional language is acquired in a natural environment where the language is used natively (e.g., a Dutch immigrant acquiring Norwegian in Oslo, by picking up the language from the local Norwegians), whereas the term ‘foreign language acquisition’ is used to refer the acquisition of a language in a classroom setting outside the environment where the language is used natively (e.g., Dutch students learning French in their secondary school classroom in the Netherlands). Importantly, the practice in the (emerging) field of sign language pedagogy is to use the term ‘second language acquisition’ in the broader sense of the word (e.g., Quinto-Pozos, 2011; Woll, 2013; Chen Pichler & Koulidobrova, 2015).

One can distinguish unimodal second language learning from bimodal second language learning (Woll, 2013; Chen Pichler & Koulidobrova, 2015). The term unimodal second language learning refers to the learning process experienced by either a person with a spoken L1 who acquires a spoken L2/Ln, or a person with a signed L1 who acquires a signed L2/Ln. The term bimodal second language learning, on the other hand, refers to the acquisition of a language in another modality. Both people with a spoken L1 who learn a signed L2/Ln, and people with a signed L1 who learn a spoken L2/Ln are bimodal second language learners. Table 2.1 provides an overview of the different settings for both kinds of second language acquisition.[17] For the sake of completeness, simultaneous bilingual language learning, that is,

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[16] Unless otherwise defined, the terms ‘learning’ and ‘acquisition’ are used interchangeably throughout this thesis.

[17] Please note that this table is not exhaustive, since some exceptional cases are not captured, for example the learning conditions experienced by ‘latent learners’, who are raised in an environment where a particular language is used, but who do not become a speaker/signer) of that language.

learning two *first* languages simultaneously, be it in one or two modalities, is included in this scheme in the grey cells.

Recently, some authors have used the labels M1L2 and M2L2 to refer to the unimodal (M1) or bimodal (M2) condition of learning a second language. These labels can, however, be confusing, since they do not specify whether the L2/L1 is a spoken or signed language. In other words, the term M2L2-learner can either denote a person with a spoken language background who learns a signed L2 or a person with a signed L1 who learns a spoken L2. To make this concrete: the term M2L2 applies to a deaf NGT-user who is learning English in secondary school, as well as to a hearing Dutch-speaking student who is learning NGT to become an interpreter. It is thus of importance to specify the exact meaning of these labels before application.

This thesis focusses on the learning process by adult M2L2-learners with a spoken L1 (Dutch), who learn a sign language (NGT) as an L2, in a formal setting. In Table 2.1, this group is represented in the upper part of the right bottom cell. Again, for these learners the visual-spatial modality is a *new* modality. Throughout this thesis, we will use the term *SL2-learners* (sign language as L2) to refer to this particular group of learners. In the following sections, we will present a brief overview of research that investigates how SL2-learners acquire a sign language, and how the learning process for this group can be facilitated. We use the term *(the field of) SL2-pedagogy* to refer to this specific research area.

Table 2.1. Overview of unimodal and bimodal language learning settings.

	UNIMODAL LANGUAGE LEARNING		BIMODAL LANGUAGE LEARNING	
CHILDREN	***Bilingual-unimodal language learning – simultaneous***		***Bilingual-bimodal language learning – simultaneous***	
	Children learning two spoken languages simultaneously	Children learning two sign languages simultaneously	Children learning a sign language and a spoken language simultaneously	
	Bilingual-unimodal language learning –sequential		***Bilingual-bimodal language learning – sequential***	
	Children learning a spoken L2/Ln after the spoken L1 is (partly) acquired, in a naturalistic setting or a formal setting.	Children learning a signed L2/Ln after the signed L1 is (partly) acquired, in a naturalistic setting or a formal setting.	Children learning a spoken L2/Ln after the signed L1 is (partly) acquired, in a naturalistic setting or a formal setting.	Children learning a signed L2/Ln after the spoken L1 has (partly) been acquired, in a naturalistic setting or a formal setting.
(ADOLESCENTS AND) ADULTS	***Bilingual-unimodal language learning – sequential***		***Bilingual-bimodal language learning – sequential***	
	Adults with a spoken L1 learning a spoken L2/Ln in a formal setting (‘foreign language learning’) or a natural setting (‘second language learning’)	Adults with a signed L1 learning a signed L2/Ln in a formal setting (‘foreign language learning’) or a natural setting (‘second language learning’)	Adults with a signed L1 learning a spoken L2/Ln in a formal setting (‘foreign language learning’) or a natural setting (‘second language learning’)	Adults with a spoken L1 learning a signed L2/Ln in a formal setting (‘foreign language learning’) or a natural setting (‘second language learning’)

2.3.2 The field of sign language pedagogy

2.3.2.1 Initial scholarly work: pursuing recognition

Teaching sign languages as a second language is a relatively recent phenomenon, which has developed since the 1970s (Newell, 1994).[18].The inception of the profession is closely intertwined with the scholarly and social recognition of deaf communities and their sign languages (see Section 2.2.3). Deaf people became aware of the value of their languages and started to teach hearing parents, professionals and hearing people who were generally interested to learn the language. The first *Teacher resource text on grammar and culture* and the companion *Teacher resource text on curriculum, methods, and evaluation* appeared in 1980 in the United States (Baker-Schenk & Cokely, 1980a, 1980b). These publications drew upon available linguistic research on ASL and on theories and methods developed in the field of second language teaching combined with the authors' own experiences. The following two decades can be characterized as a period of 'anchoring the profession'. Scholarly publications seeked to establish sign language teaching as a profession in its own right. These articles – all on teaching ASL – centered around three themes: (i) language status and recognition of ASL as a 'foreign language' (e.g., Chapin, 1988; Wilcox, 1988; Jacobs, 1996; Wilcox & Wilcox, 1997; for a comprehensive overview, see Rosen, 2008), which is equally difficult to learn as other (spoken) languages (Kemp 1998a); (ii) description of linguistic and affective factors that are (or might be) obstacles in the learning process (Kemp, 1998b; McKee & McKee, 1992); and (iii) identification of teacher qualifications (Kanda & Fleischer, 1988; Newell, 1995a; Newell, 1995b) and curriculum design (Smith, 1988; Wilcox & Wilcox, 1997).

Notably, these early works emphasized the application of second language methods and approaches in sign language teaching, without questioning whether these approaches would be appropriate to teach visual-spatial languages. A second observation is that these works do not mention the possible (positive or negative) influence of existing gestural repertoires

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[18] Notably, the literature reviewing sign language pedagogy reports on developments in 'the global North' (United States, Canada, Europe) and Australia. Little is known about practices in other countries, due to a lack of literature.

in the learning process. Thirdly, these studies emphasized the socio-cultural differences between the deaf community and the 'hearing world' and the problems that may result from these differences (Kemp, 1998b; Wilcox & Wilcox, 1997). These characteristics mirror the socio-cultural forces that were at play during that period (i.e., recognition of the deaf community as a cultural group) and the focus of linguistic studies, which in an effort to demonstrate that sign languages were fully-fledged languages, largely ignored the relationship between signs and gesture (see McBurney, 2012 for a historical overview of the field of sign language linguistics).

2.3.2.2 Expansion of the research area

After the first wave of publications in the 1980s and 1990s, a decade of low scholarly output followed. Although still ASL-dominated, the field slowly expanded with publications on teaching and learning other sign languages, such as Australian Sign Language (Auslan) (Napier, Leigh & Nann, 2007) and British Sign Language (BSL) (e.g., Mertzani, 2007). The post-2000 publications no longer attempted to prove the value of teaching and learning sign languages, but focused on materials (Napier et al., 2007, Mertzani, 2007), good practices (Schornstein, 2005), or efficiency of methods (Buisson, 2007) instead.

2.3.2.3 Establishing a research field

The last decade has seen a rapid progression of the field. The transition into a more mature field is reflected in the publication of dedicated edited volumes (McKee, Rosen & McKee, 2014; Rosen, 2019b), chapters in general handbooks and encyclopedia on language learning and linguistics (Woll, 2013; Mann, Haug, Kollien & Quinto-Pozos, 2014; Chen Pichler & Koulidoubrova, 2015), an increasing number of journal articles, and numerous conference talks on SL2-learning and teaching at conferences dedicated to sign languages and second language learning, such as keynote presentations on sign language teaching delivered by Jordan Fenlon at TISLR (Fenlon, 2019) and by Krister Schönström at EuroSLA (Schönström, 2019).[19] Published articles cover a range of topics, such as learning opportunities

[19] TISLR is the International Conference on Theroretical Issues in Sign Language Research; EuroSLA is the Conference of the European Second Language Assocation.

outside the classroom (Rosen, 2014; Willoughby & Sell, 2019), errors and teacher feedback (Willoughby, Linder, Ellis & Fisher, 2015), curriculum evaluations (Swaney & Smith, 2017 on ASL curricula), alignment of sign language courses with the Common European Framework of Reference for Languages (CEFR) (Snoddon, 2015), computer-assisted language learning (CALL) (Mertzani, 2011 on BSL; Alexander, Vale & McKee, 2017 on New Zealand Sign Language (NZSL)), language of instruction (Holmström, 2019), individual learner characteristics (Allbutt & Ling, 2016), integrating Deaf culture in the teaching of sign languge (Clark & Lee, 2018), translanguaging and prescriptivism (Snoddon, 2017, 2018), and sign language as a third language (Rosen, 2018). A number of studies report on the acquisition of phonological parameters (Bochner, Christie, Hauser & Searls, 2011; Ortega & Morgan, 2015b; Beal & Faniel, 2018). A positive and much needed development is that an increasing number of studies report empirical evidence on SL2 acquisition processes of a variety of grammatical phenomena, including constructed action (Kurz, Mullaney & Occhino, 2019), use of eye gaze while producing spatial descriptions (Ferrara, 2019), use of Whole Entity classifier predicates in spatial descriptions (Marshall & Morgan, 2015; Ferrara & Nilsson, 2017), and reference tracking in narratives (Bel, Ortells & Morgan, 2015; Frederiksen & Mayberry, 2019).

In the European context, two successive projects organized by the European Centre of Modern Languages, PRO-sign I (2012–2015) and PRO sign II (2016–2019), have resulted in the inclusion of sign language proficiency levels in the CEFR (Council of Europe, 2018, in preparation), the publication of the level-specific descriptors in International Sign as well as in written English (ProSign, 2016), a list of teacher competences (ProSign, 2019), a European Language Portfolio for sign languages (ProSign, in preparation), and an assessment guide (ProSign, in preparation). These projects, which included network meetings, workshops and conferences, have pushed the field forward. A second European project, SignTeach, has created opportunities for exchange and has resulted in a website with good practices and resources (Pyfers, 2017).[20] A third development of importance is the

[20] www.signteach.eu.

establishment of a European Network for Sign Language Teachers (ENSLT), another opportunity for professionalization and exchange.[21]

2.3.3 Issues that arise in the context of SL2-pedagogy

The SL2 learning process poses similar challenges to learners and teachers as spoken languages do, and yet, there are some notable differences that arise when learners with a spoken language background acquire a language in the visual-spatial modality. Issues that are mentioned in the literature can be categorized into (i) sociolinguistic and social issues, (ii) linguistic issues, (iii) the potential influence of gestures, and (iv) lack of a written form of the language (McKee & McKee, 1992; Quinto-Pozos, 2011). These issues, discussed in turn in the following sections, might affect learning.

2.3.3.1 Sociolinguistic and social issues

All language learners face the challenge to accustom themselves with the values and beliefs, politeness conventions, and social expectations of members of the community that use the target language. There are a number of specific cultural factors that learners have to become aware of in the context of sign languages and deaf communities. These factors can be grouped into (i) sociolinguistic features and cultural norms related to the visual experience of the world and (ii) beliefs and attitudes related to the status of minority groups with a history of oppression (i.e., social issues).

Characteristic cultural features related to the visual experience of the world are prolonged eye contact, extensive use of facial expressions and non-manual signals, and physical contact as an attention-getting strategy. The extended use of eye contact, (perceived) 'exaggeration' of facial expressions and physical contact can cause discomfort in some learners (McKee & McKee, 1992; Wilcox & Wilcox, 1997). Some learners experience "exposure insecurity", since the visual modality creates a feeling of "nowhere to hide" (Sheridan, 2018, p.iii).

Social issues that might affect the learning process are related to the minority-status of the deaf community and its history of oppression and marginalization. Firstly, attitudes held by some L1-signers limit the opportunity to acquire sign language in a natural (i.e., untutored) setting. The

[21] www.enslt.eu; ENSLT is the organizer of the three-annual conference Lesico.

unequal social dominance patterns that existed (and sometimes still exist) have resulted in a strong desire among deaf people to socialize among the 'inner group' and a reluctance to welcome the 'outer group' learners in their social circles and/or to adjust their signing rate to the learners' low-to-moderate proficiency (Lane et al., 1996; Kemp, 1998b; Schornstein, 2005). Deaf people who do accept SL2-learners in their social circles often show an (unconscious) tendency to adjust their signing to their hearing interlocutor. This switch to a simplified 'foreign talk register' impedes the acquisition of complex language structures (McKee & McKee, 1992).

Conversely, attitudes on part of SL2-learners towards the deaf community and sign language can also impede acquisition. Some learners are not sensitive to the history of oppression and marginalization of the deaf community and display a paternalistic attitude towards deaf people, disrespect linguistic 'ownership' (e.g., by making up signs themselves), or are insensitive to the fact that they are 'guest' in a community. Obviously, this lack of intercultural sensitivity and cultural awareness blocks learning opportunities. Moreover, some learners approach the task of learning a sign language as being 'easy', which is a common misconception (Jacobs, 1996), resulting in a mismatch between perceptions and the degree of commitment required (McKee & McKee, 1992).

2.3.3.2 Linguistic issues

A second category of issues concerns language features that are distinctively characteristic for sign languages, and therefore unfamiliar to novel SL2-learners. These modality-specific features include (i) use of the body, arms, hands and face as articulators, (ii) simultaneity of structure, (iii) use of signing space, and (iv) iconically motivated structures.

The first challenge SL2-learners encounter is to use manual articulators (hands and arms) and non-manual signals (i.e., facial expressions, head and body movements) for linguistic expression. Learners have to grasp the particular sign language's sublexical phonological structure, that is, the phoneme inventory (consisting of handshape, movement, place of articulation, (relative) orientation, and non-manual features, see Section 2.4.1.1), and existing linguistic constraints. This requires the learners to develop visual discrimination skills to recognize phonological differences (Bochner et al., 2011), and motor skills to produce signs (Mirus, Rathmann &

Meier, 2001; Rosen, 2004). Furthermore, SL2-learners have to acquire skills to coordinate the two manual articulators and to combine these with simultaneously articulated non-manual signals.

This brings us to a second challenge: the acquisition of simultaneous linguistic encoding. The availability of multiple articulators (including the two hands and the face) allows for the simultaneous depiction of multiple referents and/or actions. A signer can, for example, depict a car with one hand, a walking person with the other hand, at the same time taking on a facial expression of relief, experienced by a bystander who realizes that the car just missed the person by an inch. The simultaneous encoding of linguistic information is evident at every level of linguistic structure – phonology, morphology, syntax, and pragmatics – and differs crucially from the highly sequential structure of spoken languages. Again, this requires coordination of the hands and face, as well as knowledge about the linguistic constraints governing the grammatical processes involved.

The third unfamiliar feature is the linguistic use of space. The signing space can be exploited for abstract or concrete spatial representation. In the first case, the signer associates arbitrary loci in signing space with non-present referents, and uses these loci to refer to these referents. In the latter case, the signer uses the signing space to indicate the location, movement and orientation of referents in relation to each other (see Section 2.4.2.1-2). McKee and McKee (1992) report that the use of space is perceived as difficult by both learners and teachers and suggest that learners "lack a schema" (p. 141) for attending to the use of space, since this feature is absent in their L1. Ferrara and Nilsson (2017) observe that learners of Norwegian Sign Language (NSL) struggle with the coordination of their hands and with the placement of signs in the signing space. The authors note that the NSL-learners often fail to depict a scene spatially, relying on lexical signs instead. The tendency to express information sequentially ('SIGN-SIGN-SIGN-approach') at the expense of using the signing space is an SL2 characteristic well-known among sign language teachers.

The fourth characteristic that might affect learning is the omnipresence of iconic structures, both on a lexical and grammatical level (Cuxac & Sallandre, 2007; Taub, 2001). In iconic structures, there is a direct relationship between a linguistic form and its referent (Ortega, 2017). Research on facilitating or hindering effects of iconicity on SL2-learning has predominantly focused on lexical learning. Research with novel (adult) learners has provided evidence that iconically motivated signs are easier to recall than arbitrary signs (Lieberth & Gamble, 1991; Campbell, Martin & White, 1992; Baus, Carreiras & Emmorey, 2013). It is assumed that the direct relationship between the semantic representation and the form of the sign serves as a mnemonic aid. On the other hand, Ortega and Morgan (2015a, 2015b) observed a negative influence of iconicity on the phonological execution of signs. In a sign repetition tasks featuring iconic and arbitrary signs, non-signers were found to be less accurate in the production of iconic signs. The authors argue that the participants, having access to the semantic features of the sign, paid less attention to its phonological form.

2.3.3.3 Gestural resources

The characteristics unique to sign languages described in the previous paragraph are considered challenging for learners, due to their unfamiliarity. Yet, the use of hands, face and torso for communication is not entirely new to SL2-learners. Spoken languages exploit, in addition to the vocal channel, the visual-gestural modality by means of the use of gestures (Özyürek, 2012). One can distinguish different types of gestures.[22] *Emblems* and *pantomimic gestures* can replace or complement speech, while *co-speech gestures* occur in conjunction with speech (Özyürek, 2012). Emblems are conventionalized and culture-specific gestures with a specific meaning, such as the gestures for ‘ok’, ‘good’ or ‘be quiet’. Pantomimic gestures mimic a real-life action, for example picking up a box. Co-speech gestures simultaneously accompany speech and can be subdivided into *representational gestures,*[23] which mimic visual properties of the referent they present, *beat gestures*, which move along with the rhythmic structure of speech, *deictic gestures*, which point to concrete or abstract referents, and *cohesive gestures*, which serve to connect parts of the discourse (McNeill, 1992; Yoshioka, 2005). Figure 2.2 depicts a

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[22] Please note that scholars have proposed different taxonomies and use various terms to categorize gesture-types. A review of different categorizations can be found in Kendon (2004).

[23] This category collapses the iconic gestures and metaphoric gestures defined by McNeill (1992). Iconic gestures refer to concrete objects, actions or persons (see Figure 2.2), while metaphoric gestures refer to abstract notions (e.g., a ‘container-like’ gesture to refer to a genre of films).

spontaneously produced representational co-speech gesture depicting a rollercoaster-cart.

Figure 2.2. Example of a representational gesture depicting the movement of a rollercoaster-cart. The hand represents the object (photo: ©Eveline Boers-Visker).

The class of representational gestures in particular shows a resemblance to signs or sign language structures. Yet, representational gestures are highly context-dependent, created on the spot and lack the sublexical phonological structure of conventionalized signs. These gestures are thus highly variable, although research among a large group of non-signers ('sign-naïve gesturers') has shown that, at least for some concepts, non-signers produce (silent) gestures that are remarkably similar across participants and overlap in form with the corresponding conventionalized signs (Ortega, Schiefner & Özyürek, 2019; Ortega & Özyürek, 2019). Ortega et al. compare these corresponding sign-gesture pairs to spoken language cognates and argue that the "non-signers' gestural repertoire acts as some sort of 'manual cognates' that allows them to scaffold their developing manual lexicon" (p. 10).

These 'manual cognates' can be found at the lexical level (i.e., gestures for actions or objects that resemble sign language lexemes) and at the grammatical level (i.e., gestural constructions that resemble grammatical constructions found in sign languages). We will return to these 'gesture-sign language parallels' in Section 2.4.6.

2.3.3.4 Lack of a written form

A final issue that is of relevance for SL2-pedagogy is the lack of a written form of the language (Quinto-Pozos, 2011; Boers-Visker, 2013), a characteristic that has two important consequences for the teaching practice. Firstly, signs or sentences cannot be written down in the target language, which forces the teacher to choose between using the written form of the surrounding spoken language, refraining from writing at all, or using a notation system such as SignWriting or HamNoSys (see for examples Frishberg, Hoiting & Slobin, 2012). However, none of these systems are able to fully capture the spatial features, or the simultaneity of the language. Secondly, the lack of a standard script limits the availability of authentic teaching materials, that is, materials that were not created for intentional use in the language classroom. Although technological advances opened up new possibilities for the widespread publication of sign language videos, the number of publicly available authentic videos is limited as compared to the written resources available for many spoken languages, and often of limited utility for novel learners due to high signing rates and complexity (Willoughby & Sell, 2019).

2.3.4 Sign language teaching in the Netherlands

In the Netherlands, the first sign classes were offered at the end of the 1970s (Van Veen, 2012; Essink, 2009). Since then, classes have evolved from teaching isolated NGT vocabulary items in the first decade to teaching sign *language*, including grammar (Van den Bogaerde & Schermer, 2007).

At present, two organizations offer teacher qualification training. First, the Dutch Sign Centre (*Nederlands Gebarencentrum*, NGc) offers instruction courses for teachers that prepare (deaf or hearing) participants to teach beginner to intermediate level courses. Secondly, a four-year bachelor education for (deaf or hearing) prospective teachers, as well as a two-year master program for teachers in practice, is offered by the Institute for Sign, Language & Deaf Studies at UUAS. The NGc and UUAS courses differ with respect to admission requirements and level. To enroll in the program at UUAS, students have to meet the Dutch entry requirements for bachelor programs. Students are prepared to teach all levels of NGT to a variety of learners (e.g., parents of deaf children, teachers, people with a general interest in the language, etc.). To that end, they have to demonstrate a minimum level of B2 (CEFR, CoE 2001) as well as a variety of teaching skills in order to graduate. Previous knowledge of NGT is not required to enroll in the program. In contrast, the NGc requires a minimum level of NGT upon admission, but does not seem to impose any requirements regarding previous education.[24]

There is a professional organization for NGT teachers operating under the umbrella of the Association of Teachers of Modern Languages (*Vereniging Leraren Levende Talen*, VLLT). One of the ongoing endeavors of this organization is pursuing official registration of qualified NGT teachers.

2.4 The signing space: functions and spatial devices

Having discussed the socio-linguistic background of NGT and the current state of affairs regarding SL2-pedagogy, we will now turn to discussing the topic of our investigation, the use of signing space in SL2-learners.

Linguistic research has identified a wide range of linguistic universals that hold for both spoken and signed languages (Sandler & Lillo-Martin, 2006), as well as domains of grammar in which signed languages differ from spoken languages. In Section 2.3.3, we foreshadowed the present discussion by presenting some modality-specific linguistic aspects that are unfamiliar to SL2-learners and as such, might pose a challenge. This section elaborates on one of these aspects, the use of space. As will become clear, this area is closely intertwined with two other modality-specific aspects discussed in Section 2.3.3, namely simultaneity and iconicity (Sandler & Lillo-Martin, 2006). Before examining the use of space, it is important to explain the phonological structure of sign languages and to provide a background on sign language lexemes.

[24] The NGc does not provide information about the exact proficiency level that has to be demonstrated upon admission, but states that a prerequisite for admission is that participants must have signing skills and some didactic skills. Prospective participants are tested upon admission (www.gebarencentrum.nl).

2.4.1 Background on sign language phonology and lexicon

2.4.1.1 Sign language phonology

William Stokoe (introduced in Section 2.1) was the first to demonstrate that signs are not holistic forms, but rather are comprised of a finite number of discrete, meaningless, contrastive units (Stokoe, 1960). The phonological building blocks that constitute a sign are (i) handshape, (ii) location/place of articulation, (iii) movement (i.e., path movement and/or hand-internal movement), (iv) orientation[25] and, in some cases, (v) non-manuals. These phonemes, also known as 'parameters', are the smallest contrastive units of the language: a change in one of the parameters can change the meaning of the sign. This is illustrated in Figure 2.3, depicting the NGT signs BROTHER and ALSO. Both signs have identical specifications for the (manual) parameters location, orientation and movement, but differ with regard to the handshape phoneme. As such, BROTHER and ALSO form a minimal pair. The existence of minimal pairs allows linguists to determine which components of a sign are

[25] Two comments on orientation are in place. First, Stokoe (1960) did not consider orientation as a separate phonological category. However, some subsequent researchers have argued that orientation is sometimes contrastive and as such, forms an independent category (e.g., Battison, 1978; Johnston & Schembri, 1999). Others have argued that orientation should be considered a subcategory of the handshape parameter instead of an independent category (e.g., Sandler, 1989; Crasborn & Van der Kooij, 1997; Sandler & Lillo-Martin, 2006), sometimes subsuming handshape and orientation under the label 'hand configuration' (Sandler, 1989). The status of orientation as an independent parameter is thus a matter of debate. In the context of this study, treating orientation as a separate category has been useful, since in the linguistic phenomena under investigation (i.e., Whole Entity classifier predicates (Chapter 4) and agreement verbs (Chapter 5)), the orientation of the hand often contributes meaning to the construction, and an error in orientation may lead to a change of meaning. In a classifier predicate for a car, for instance, the palm of the hand represents the bottom of the car; if the palm of the hand is facing upwards, the meaning is to be interpreted as 'a car lying upside down' (Crasborn & Van der Kooij, 1997). In some agreement verbs, the palm of the hand is facing the syntactic object, and errors may lead to misinterpretations. A second comment is that orientation can be described as either the direction that the palm and fingers are pointing at or facing ('absolute orientation') or by specifying the relation between the relevant part of the hand and the place of articulation (e.g., the radial side of the hand is related to the left side of the chin: 'relative orientation') (Crasborn & Van der Kooij, 1997).

distinctive and thus form the phonetic inventory of a particular sign language.

Figure 2.3. NGT signs BROTHER (left) and ALSO (right) distinguished by the handshape parameter (photo left: Annette Jansen, ©RSCI; photo right: still from instruction materials ISLDS, ©UUAS, used with permission).

Figure 2.4. NGT sign TEACHER, example of an asymmetrical two-handed sign. The signer's left hand is the non-dominant or weak hand (still from ISLDS instruction materials, ©UUAS, used with permission).

Since the manual articulators are paired, it is possible to produce two-handed signs. Two-handed signs can either be symmetrical or asymmetrical (Van der Hulst, 1996). In the former case, both hands act as an active articulator, i.e., they both move; while in the latter case, one hand is not active, but acts merely as the place of articulation (see, for example, the sign

TEACHER in Figure 2.4). Clearly, for two-handed signs, especially asymmetrical ones, the phonological features may have to be specified separately for each hand; also, the placement of the hands with respect to each other ('hand arrangement') or, if applicable, the location where the hands touch each other ('point of contact') have to be specified (Johnston & Schembri, 2007).

Whereas the *phonological inventories* of the sign languages studied to date show remarkable cross-linguistic differences, studies report comparable *constraints on the way phonemes can combine with each other* across sign languages (Sandler, 2012). If, for example, the handshape changes during the execution of a sign, the number of selected fingers cannot change ('Selected finger constraint'). In case of symmetrical two-handed signs, both hands must have the same handshape, location and orientation, and the same or alternating movement ('Symmetry constraint on two-handed signs'; Battison, 1978). In asymmetrical two-handed signs, the non-dominant or weak hand does not move, and its handshape is either identical to the handshape of the dominant hand, or comes from a restricted set of handshapes ('Dominance constraint on two-handed signs'; Battison, 1978).

SL2-learners face the challenge to recognize the phonological representation of lexemes, to learn which handshapes, locations, movements and orientations are distinctive and which are allophones or phonetic variants,[26] and to acquire the constraints on (sequential and simultaneous) combination of parameters and the systematic rules of assimilation.

2.4.1.2 Sign language lexicon

Having discussed the phonological make-up of signs (i.e, the form), this section will briefly introduce the notion of the sign language lexeme. The sign language lexicon can be divided into a 'native lexicon' and a 'non-native lexicon' (Brentari & Padden, 2001). The native lexicon comprises all the lexemes that are developed within a particular language, whereas the non-native lexicon consists of lexemes that are borrowed from other sign languages, the surrounding spoken language, or gestures. The native lexicon

[26] As in spoken languages, there is variation in the way signs are articulated, caused by sociolinguistic variation, due to influence of the preceding or following sign, or due to ease of articulation (Crasborn & Van der Kooij, 2016).

in turn can be divided into a ‘core lexicon’ (also termed ‘established lexicon’ or ‘frozen lexicon’) and a ‘non-core lexicon’ (also known as ‘productive lexicon’). This distinction is unique to sign languages and relates to their spatial and gestural nature (Costello, Fontinea, Hermann, Sapountzaki & Sverrisdóttir, 2017).

The lexemes that constitute the core lexicon have an established form, are subject to the phonological rules and constraints described in the previous section, and their form-meaning mapping may be arbitrary or show a greater or lesser degree of iconicity (Johnston & Schembri, 1999; Costello et al., 2017). Signs from the core lexicon are signs that “you would typically expect to see listed in a sign language dictionary” (Fenlon, Cormier & Brentari, 2017). The NGT signs BROTHER, ALSO and TEACHER in Figures 2.3 and 2.4 are part of the core lexicon.

The non-core lexicon includes two groups of signs: (i) pointing signs and (ii) signs that contain a classifier handshape. Figure 2.5 shows two examples of the latter group. Figure 2.5a depicts two Entity classifier predicates (i.e., both hands represent an entity), and Figure 2.5b shows a sign involving a Handle classifier (the hand depicts how an entity is held or manipulated).

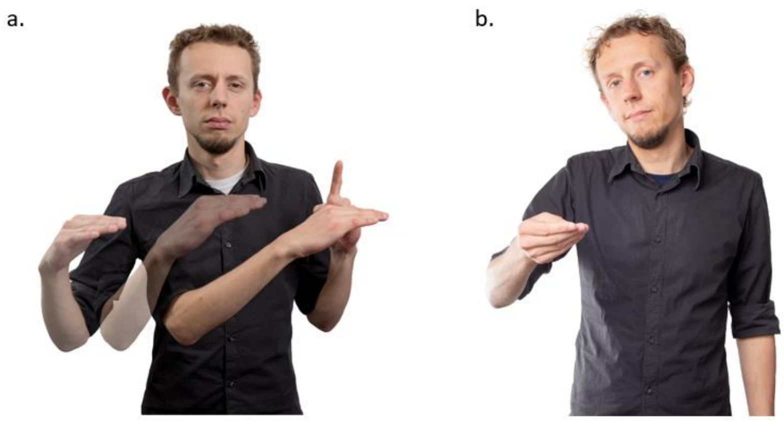

Figure 2.5. Examples of signs containing a classifier handshape, part of the group of non-core signs (photo: Annette Jansen, ©RCSI).

The choice of handshape in these signs varies, depending on the context, hence their membership of the non-core lexicon (Johnston &

Schembri, 1999). The compositional meaning of the construction in Figure 2.5a is something like 'a flat object approaches a thin, cylinder-shaped object and passes this object'. Due to absence of context, the construction is subject to multiple possible readings (e.g., 'The car is passing a person', 'The boat navigates along the mast of a partly sunken shipwreck', 'A sheet of paper is transported along an assembly line along a cylinder-shaped part of the machine', etc.). When used in a particular context, however, the signs expressed on both hands can take on a specific meaning (for the duration of the text). The handshape of the signer in Figure 2.5b signals that something flat is being held. Again, context is needed to interpret the exact meaning of the sign. In a similar vein, context is needed to disambiguate the meaning of pointing signs, the other subgroup of non-core lexemes. A third category of classifiers are the so-called Size and Shape Specifiers (SASSes), in which a static handshape or the movements of the hand(s) shows or outlines an entity's size, shape or dimension.

Signs from the non-core lexicon inherently encode information about the spatial placement of a referent or the size and shape of an object. That is, it is impossible to articulate a sign that represents an entity (e.g., a car, a person, a sheet of paper, Figure 2.5a) without encoding information about its orientation and/or location. Likewise, a sign that denotes the handling of an object (Figure 2.5b) inherently carries meaning about the size and shape of the entity that is handled. Non-core signs are characterized by the fact that they may at times violate the phonological constraints found for sign languages.[27]

Due to their highly variant and context-dependent nature, non-core signs cannot be 'captured' in a citation form. This contrasts with signs from the core-lexicon, for which a citation form can be established. The citation form is "the simplest possible form of a lexeme which still identifies it uniquely and which still conveys what is regarded as its core or essential meaning" (Johnston & Schembri, 1999, p. 142). Notably, citation forms are the forms that are commonly included in sign language dictionaries and

[27] This is apparent in Figure 5a, in which the constraints on two-handed signs are violated. The construction does neither obey the Symmetry condition (both hands move but the handshapes differ) nor the Dominance condition (the two hands have different handshapes but still, none of them functions as place of articulation). Nevertheless this is a well-formed construction as it is morphologically complex.

presumably the forms SL2-learners receive when offered decontextualized lexicon lists.

Figure 2.6 provides an overview of the different parts of the lexicon discussed so far, their characteristics, and the interactions between the parts. The figure visualizes that signs from the non-native lexicon can become part of the core lexicon of a language (e.g., the ASL sign COMPUTER has nativized into the core lexicon of NGT, indicated with ①, and it shows a two-way interaction between the core lexicon and the non-core lexicon. The downward arrow ② refers to a process of lexicalization by which non-core signs come to be conventionalized pairings of form and meaning, and thus core lexemes (e.g., the NGT sign MEET), while the upwards arrow ③ makes reference to a process of 'de-lexicalization' by which a part of a sign (within a specific discourse context) is reinterpreted as a classifier sign (e.g., the weak hand of the NGT sign WRITE being used as a classifier predicate to denote a sheet of paper or book in the subsequent discourse) (Johnston & Schembri 1999; Aronoff, Meir, Padden & Sandler, 2003; Cormier, Quinto-Pozos, Sevcikova & Schembri, 2012; but see Lepic, 2019).

In the context of this dissertation, the distinction between non-core signs and core signs is of importance, since signs from both categories participate in the grammatical use of signing space, albeit in different ways. In the next section, the notion of 'signing space' will be presented, followed by an elaboration on the different devices – featuring both core and non-core lexical elements – for spatial modification.

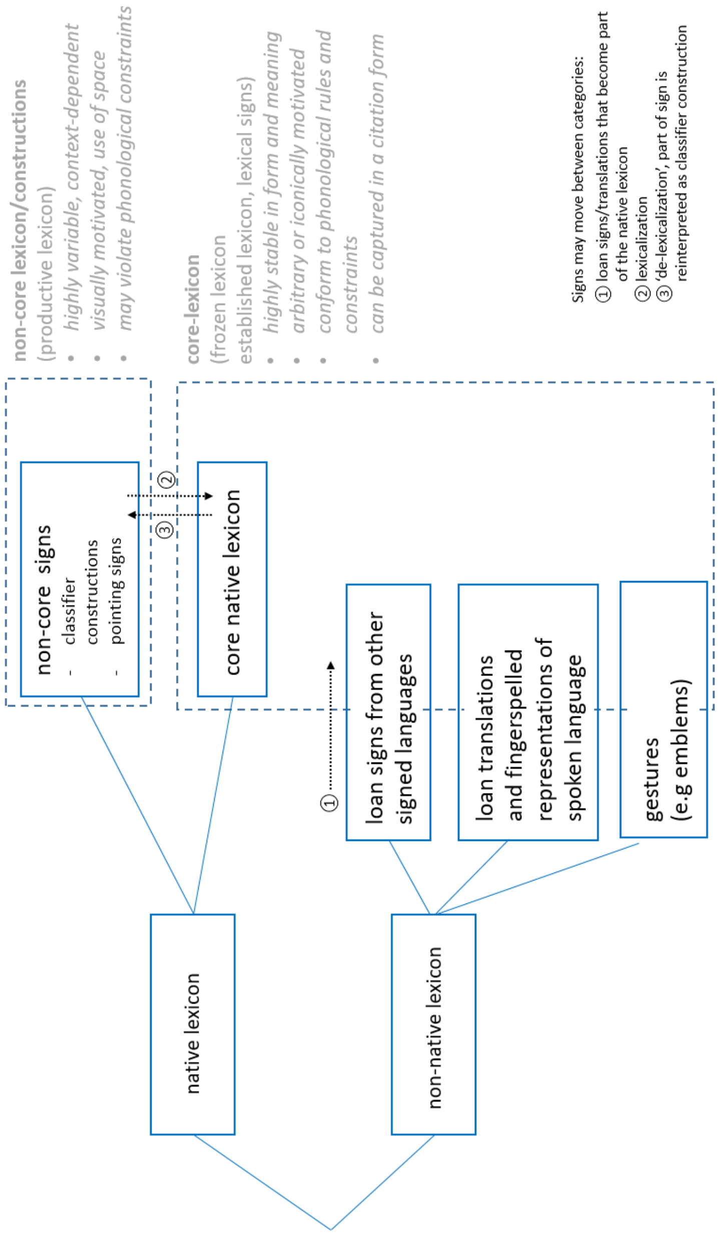

Figure 2.6. Schematic overview of the sign language lexicon (based on Brentari and Padden (2001) and Johnston and Schembri (1999)).

2.4.2 Types of representations

Signers do not use all the space around their body that potentially could be used. The space below the waist and the space behind the signer, for instance, are generally not used. The actual signing space extends from the top of the head to the waist vertically, and horizontally from slightly past the shoulders forward to about an arm's reach (Perniss et al., 2007); signs are articulated within this signing space (Figure 2.7).[28]

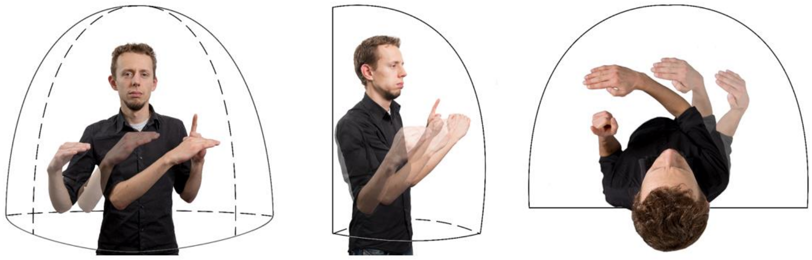

Figure 2.7. The signing space: front view, side view, and top view (photo: Annette Jansen, ©RCSI; inspired by a graphical representation of the signing space in Koenen & Bloem (1992), created by Ruud Janssen).

The signing space is not only used as a location for the articulation of lexical signs, it also plays an integral role in the grammar. Signs can be arranged in space such that the signer, by manipulating the location or the direction of the sign, can signal syntactic relations, spatial layouts, or a combination of both. At discourse level, spatial modification can serve to structure and organize information and to track referents. For now, we will use the term **functions** to refer to these different uses of the signing space.

In order to achieve these functions, signers need to associate referents with locations in space, i.e., the signer needs to establish *location-referent associations* ('localization', i.e., establishment of a locus or loci). This is achieved by (i) articulating signs from the core lexicon at specific location(s) that deviate from the place of articulation specified for the citation form, (ii) using a pointing sign (glossed as INDEX or IX) from the non-core lexicon, or (iii)

[28] For some shared sign languages, such as Adamorobe Sign Language, Kata Kolok and the Sao Tome and Principe Sign Language, a larger signing space has been found (Nyst, 2012; De Vos, 2012; Mineiro et al. 2017).

using classifier signs from the non-core lexicon. These localization **devices** will be discussed in Section 2.4.3.1.

Location-referent associations can be either abstract or spatially motivated. Abstract loci do not correspond to locations in the real world, while spatially motivated loci imply a correspondence between the location of the hands in signing space and the position of objects in the real (or an imagined) world (Emmorey, 2001). Depending on the information the signer wishes to convey, different '**representations**' can be chosen[29]:

1. Spatial representation
2. Abstract representation
    - 2a. Genuinely arbitrary loci
    - 2b. Abstract loci motivated by semantic-pragmatic considerations or considerations regarding discourse organization

These types of representations suit different functions, for which different devices are recruited. The next three subsections will elaborate on both types of representations, the spatial and the abstract one, as well as a third type of use of space, namely use of the immediate environment.

2.4.2.1 Spatial representations (motivated space)

When the signing space is recruited for spatial representation, the loci in signing space associated with entities reflect the locations of entities in the physical world (which can be a real or an imagined world). Such a spatial description can be presented using two types of 'spatial formats' (Emmorey & Falgier, 1999; Emmorey, 2001) or perspectives (Perniss, 2007, 2012), in which the physical environment (such as the scene depicted in Figure 2.8a) is projected onto the signing space either as a 2D map or a small-scale model seen from a fixed vantage point ('diagrammatic space' or 'observer perspective', Figure 2.8b), or as seen from a character mapped onto the

[29] This proposal diverges from the traditional distinction between 'syntactic use of space' and 'topographic use of space' (summarized in Perniss, 2012), as it adds a distinction between 'genuinely arbitrary locations' and 'motivated abstract locations'. As such, the 'taxonomy' proposed here acknowledges the use of space for discourse organization.

signer's body ('viewer space' or 'character perspective', Figure 2.8c). In the latter case, the signing space "reflects an individual's view of the environment at a particular point in time and space" (Emmorey, 2001, p. 154), and consequently, the signing space is conceptualized as 3D, thus encompassing and surrounding the signer's body (Perniss, 2012).[30] In the character perspective, the conceptualized entities in the environment (termed 'surrogates' by Liddell (2003a)) are real-life scaled (Emmorey & Falgier, 1999), and the signer is internal to the event. In the observer perspective, in contrast, the signer describes the event from an external vantage point (Perniss, 2012). The character perspective will be further discussed in the context of constructed action in Section 2.4.5.

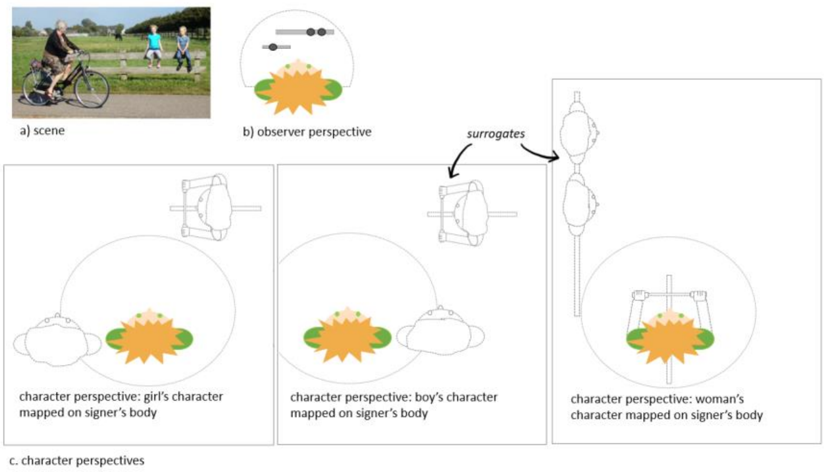

Figure 2.8. (a) Real-life scene; (b) Schematic representation of the diagrammatic space/observer perspective (the placement of the persons, fence and bike are schematically represented by lines and dots); (c) the viewer space/character perspective (the conceptualization of the entities is represented by dotted 'real-life-spaced' persons and objects) (photo: ©Eveline Boers-Visker).

[30] Importantly, the signing space is conceptualized as sourrounding the signer's body. This does not mean that the whole space around the body is actually employed to articulate signs. The space behind the signer's back is not commonly used to articulate signs – with the exception of a few signs that refer to locations on the signer's body, such as KIDNEY or BACK.

Obviously, the function of the spatial representation is to depict how entities are located in relation to each other. Yet, a spatial locus can also be used to signal syntactic relations. A signer can, for example, localize a person at a locus that corresponds to a real-world location (e.g., seated at a desk) and subsequently direct an agreement verb (signaling syntactic relations) towards this locus (example from Perniss, 2012: 416).

2.4.2.2 Abstract representations

In contrast to spatial representations, abstract representations do not represent actual locations in space. Instead, they convey abstract relations.[31] Abstract use of space can serve two functions, namely (i) signal syntactic relations, and (ii) organize and structure discourse.

First, use of space can have a syntactic function, in that loci can be utilized to identify a verb's arguments, or for pronominal reference. A signer may, for example, associate a locus in signing space with a referent 'teacher' and another locus with a referent 'student', and subsequently modify the agreement verb HELP such that the verb's movement starts at the locus associated with the teacher and ends at the locus associated with the student (Figure 2.9), resulting in the meaning "The teacher helps the student". Once established, such loci can be utilized for pronominal reference as well.

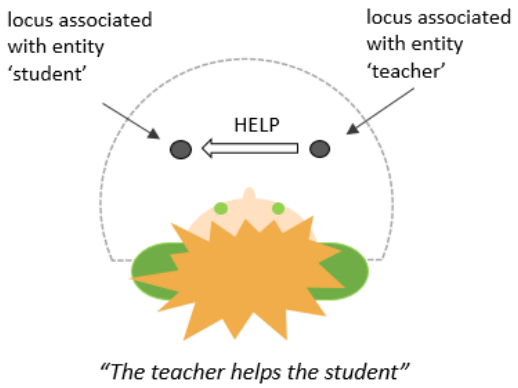

Figure 2.9. Abstract use of space to indicate syntactic relations.

[31] Please note that the abstract use of space is not attested in some shared sign languages, such as Kata Kolok (De Vos, 2012).

Secondly, space can be used to organize and structure discourse, by relating areas in space to certain topics, and articulating subsequent segments of discourse that are related to these particular topics in these same areas (Winston, 1991; Engberg-Pedersen, 1993). As such, a signer can (i) introduce and elaborate on different topics, (ii) compare two or more topics/ideas/entities, (iii) indicate segments of time and events occurring at various points within these segments ('time-mapping', Winston, 1991). An illustrative example of (ii) is provided in Thumann (2013), who describes a signer who has placed Europe at the right side vertical plane in front of him and America at the left side. Subsequently, he provides information about language use on both continents, by directing (some) signs related to language use in Europe towards the locus associated with Europe, and signs related to language use in America towards the locus associated with America. In all these instances, the location of individual signs (e.g., the signs LANGUAGE, SAME, DIFFERENT, AREA) is modified as compared to their citation form.

In contrast to the spatially motivated loci in spatial representation, the loci in abstract representations are arbitrary, that is, they do not represent actual physical relations. One can, however, distinguish loci that are genuinely arbitrary (that is, neither motivated by physical locations nor by any other considerations) versus loci that are motivated semantic-pragmatic or discourse-organizational considerations. Engberg-Pedersen (1993) has demonstrated that in Danish Sign Language (Dansk Tegnsprog, DTS), the choice of loci can be motivated by any of the following factors: (i) semantic affinity between referents, i.e., referents with semantic affinity to each other are localized at the same locus or area; (ii) canonical locations, where the locus is influenced by the real-world location at which a person or object is normally found; (iii) authority or perceived authority, e.g., when establishing a locus for King Willem-Alexander[32] higher in the signing space; (iv) dislike of or affinity with something or someone, e.g., establishing a locus for a person for whom one feels less affinity further away from the body; (v) discourse-organizational considerations, e.g., when juxtaposing loci in order to compare ideas, as described above (Engberg-Pedersen, 1993).

[32] King of the Netherlands (2013 – present).

2.4.2.3 Real space

The previous paragraphs have demonstrated that signers can use the space in front of their body for abstract and spatial representation. In both instances, concepts and entities are mapped onto the signing space. However, when signers are talking about objects and persons present in the immediate environment, they can direct deictic pointing signs and agreement verbs towards these entities.

2.4.3 Morphosyntactic spatial devices

2.4.3.1 Overview of spatial devices

The previous three sections regarding the use of space for spatial or abstract representation and the use of real space have already briefly touched upon the morphosyntactic devices that can be used to establish location-referent associations or to refer back to these loci. An overview of these devices (or 'spatial reference mechanisms') is presented in Figure 2.10. Here, we will only briefly address each device; a more elaborate discussion including signed examples is provided in Chapter 3 of this thesis.

As shown in Figure 2.10, four categories of devices can be distinguished: pointing signs, signs marked for location, verbs, and non-manual devices. *Pointing signs* (usually with extended index finger) can be directed towards present persons and objects (real space) or towards loci in space in both abstract and spatial representations. *Signs marked for location* are signs (e.g., nouns, adjectives, numerals) that are produced at a particular locus which diverges from the place of articuation of the citation form. The category *verbs* can be subdivided into verbs that can move towards or between loci to signal the verb's syntactic arguments (i.e., agreement verbs, see Figure 2.9) and verbs that move between or are located at particular loci to signal locative arguments (i.e., spatial verbs). The latter subcategory includes Entity classifier predicates, the type of non-core productive signs presented in Figure 2.5a. Finally, the category of *non-manuals* subsumes eye gaze directed at a locus, or body-leans or body-shifts towards a locus.

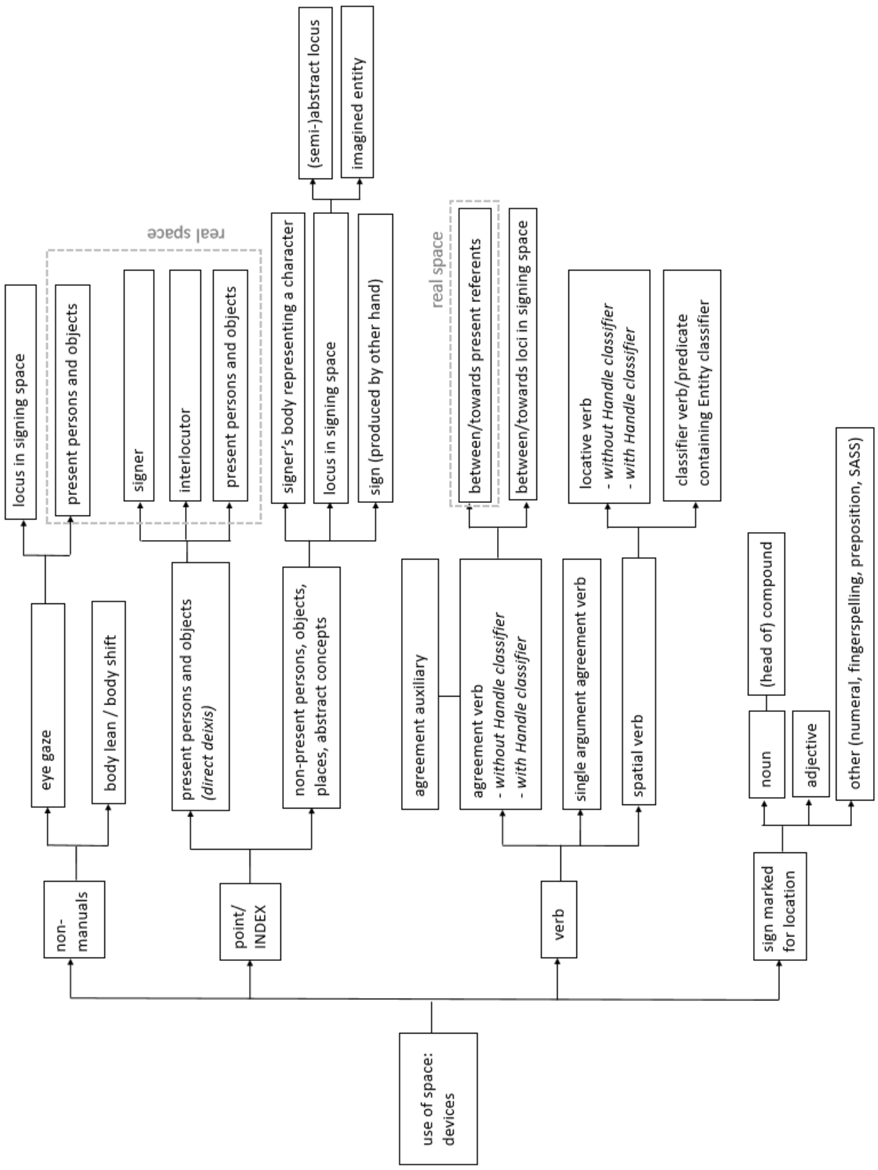

Figure 2.10. Schematic overview of spatial devices to establish and refer back to loci (adapted from Boers-Visker & Van den Bogaerde, 2019 [Chapter 3]).

2.4.3.2 Relation between spatial devices and representation type

The three types of representations discussed above (i.e., spatial representation, abstract representation, and real space) differ with regard to the devices that are typically recruited to establish and refer to loci.

- In *real space*, signers can use pointing signs and agreement verbs or an agreement auxiliary, all of which move towards or between present persons/entities;
- *A spatial representation from an observer perspective* ('diagrammatic space', Figure 2.8b) is associated with the use of Whole Entity classifier predicates (Perniss, 2007), as in Figure 2.5a, pointing signs towards (motivated) loci in signing space, signs for objects (e.g., HOUSE, FLAT, TREE, TOWER) marked for location, and non-manuals;
- *A spatial representation from a character perspective* ('viewer space', Figure 2.8c) is associated with the use of spatial and agreement verbs that contain Handle classifier handshapes (Perniss, 2007), as in Figure 2.5b, pointing signs towards imagined life-sized entities, and non-manuals showing the gaze or body posture of a character (see Section 2.4.5 on constructed action);
- *Abstract representations* are mainly characterized by the use of pointing signs towards (abstract or semantically/pragmatically motivated) loci in signing space, signs marked for location, agreement and spatial verbs and non-manuals. Classifier predicates are occasionally used as well.

The choice of device thus depends to a considerable degree on the information to be expressed. In turn, the information to be expressed determines the choice of representation (spatial or abstract)[33].

2.4.4 Rotation of the signing space

Having discussed the different spatial representations and morphosyntactic devices, this subsection focuses on a related issue, that is, rotation of the signing space. When two signers are facing each other, and one signer produces a spatial description from his or her point of view, the addressee

[33] It should be noted that different perspectives can also be simultaneously combined ('mixed perspectives'), see Figure 2.13 for an example.

has to perform a mental rotation of 180 degrees in order to comprehend the description (Emmorey, Klima & Hickok, 1998). Signers generally use this rotated space ('reversed signing space') when asked to repeat spatial descriptions. The use of a non-rotated, mirrored space (Figure 2.11b) is rare in spatial descriptions and leads to confusion on part of the addressee (Emmorey, 2001).

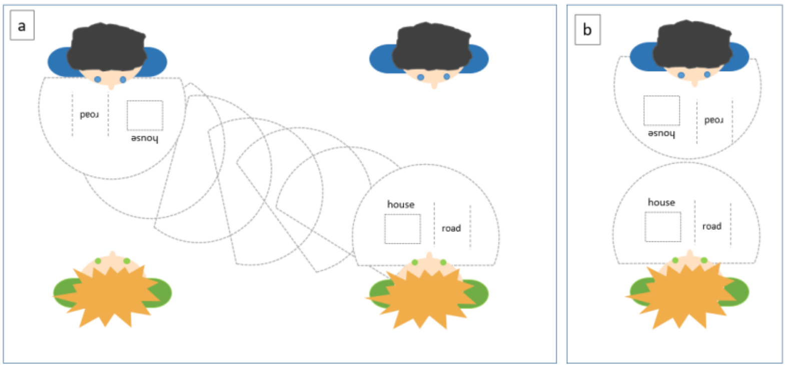

Figure 2.11. (a) 180 degrees mental rotation of the signing space ('reversed signing space') and (b) mirrored signing space (based on Emmorey, 2002).

The example above refers to a spatial description from an observer perspective: landmarks are presented from a fixed location as seen by the signer. The effort to perform a mental rotation is thus on part of the receiver only. When a signer provides a scene description from a character perspective, the environment is described *as seen by this character* (see Section 2.4.2.1, Figure 2.8). Therefore, the signer has to conceptualize how the environment is perceived by a particular character, and the interlocutor must, again, perform a mental rotation to interpret how, according to the signer, the character perceives the environment. Things get more complicated when the signer narrates a scene from the perspective of multiple characters, as these characters will see the same scene from different perspectives, as shown in Figure 2.8. Thus, in narrating a scene from the perspective of two or more characters, the conceptualized environment is constantly changing, depending on the character depicted. This requires the signer to perform mental rotations each time he or she switches to another character, and the receiver to perform rotations to comprehend the message. We will return to this point in the next section.

2.4.5 Constructed action

A last phenomenon that needs introduction is *role shift*, or *constructed action* (CA). This phenomenon is related to the use of space for spatial representation (Section 2.4.2.1). By shifting into the role of a character, the signer can report utterances (‘constructed dialogue’ or ‘reported speech’), thoughts, feelings and actions of that character (Metzger, 1995; see for an overview Lillo-Martin, 2012, and Cormier, Smith & Sevcikova-Sehyr, 2015). Of course, constructed dialogue/reported speech exists in both signed and spoken languages. Yet, in sign languages, constructed dialogue often (but not always) concurs with descriptions of actions, emotions and behaviors of the portrayed character (Metzger, 1995). The latter ‘non-quotative uses’ are observed in speakers as well (Cormier, Smith & Zwets, 2013), albeit to a lesser extent. During CA sequences, the signer uses the real-life-sized viewer space or character perspective (Section 2.4.2.1, Figure 2.8). The signer can use one or more of the following strategies to portray a character:

- Use of pantomime to demonstrate how a character moves or acts, including the use of the hands to show how a character handles or manipulates objects (i.e., Handle classifiers, Figure 2.5b);
- Use of constructed dialogue to report what is being signed;
- Adaption of signing style to mimic the signing style of the character, or to distinguish between two or more characters;
- Use of facial expressions to display the character’s facial expressions (e.g., emotions);
- Use of the torso to mimic the torso movement or posture of a character;
- Use of head turn or eye gaze that mimic those of the character.

There are different ways in which a signer can signal that he or she is taking on the role of a character. There seems to be general agreement that gazing away from the addressee (thus, breaking eye contact) is a crucial and obligatory marker to indicate role shift (e.g., Loew, 1984; Padden, 1986; Herrmann & Steinbach, 2012; Cormier et al., 2015). Other, optional, signals are changes in body position and facial expression.

Engberg-Pedersen (1993) discusses three phenomena related to constructed action ('role shift' in her terms): (i) shifted attribution of expressive elements, (ii) shifted reference, and (iii) shifted locus. *Shifted attribution of expressive elements* indicates that the feelings and attitudes expressed on the signer's face must be attributed to the character, and not to the signer. *Shifted reference* refers to the given that, during CA sequences, pronouns should be interpreted from the character's point of view. The moment a signer takes up a role, the portrayed character is mapped onto the signer's body, and consequently, a point to the chest (IX$_1$) should be interpreted as referring to the character rather than to first person. *Shifted locus* refers to the position of the portrayed character and other characters in the quoted context. The eye gaze of the signer should be interpreted as the eye gaze of the character, directed at the location(s) of the other character(s). This is exemplified in Figure 2.12. Suppose that the scene involving a woman riding a bike and passing two children sitting on a fence (girl on the left, boy on the right) is portrayed by the signer from the viewpoint of the girl. A gaze directed towards the front-right area of the signing space should then be interpreted as a gaze towards the (imaginary) woman, while a gaze directed to the left of the signer should be interpreted as a gaze towards the boy. Likewise, agreement verbs and orientations of the head and body towards loci should be interpreted from the point of view of the character.

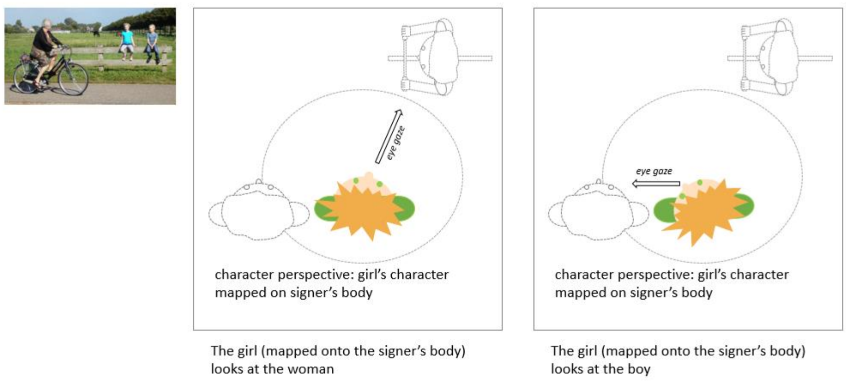

Figure 2.12. Examples of eye gaze of a character portrayed by the signer, i.e., under role shift, directed to the locations of the (conceptualized) other characters. (photo: ©Eveline Boers-Visker).

If the signer took up the role of another referent, say, the woman in Figure 2.12, a rotation of the referent space would occur and consequently, the movement, facial expressions, eye gaze, pronouns, and agreement verbs would have to be interpreted as belonging to or referring to this new character. When describing an event with multiple characters, the signer must switch back and forth between different perspectives, and signal these switches clearly to the conversation partner. In between, the signer can 'return' to the narrator-role (observer perspective) to comment on the situation.

In the example above, the signer takes on the role of characters and the narrator in turn. However, it is also possible to represent two or even three referents simultaneously, using different articulators, i.e., the hands and face ('body partioning', Dudis, 2004). This is exemplified in Figure 2.13, showing a still from an NGT signer narrating the Frog Story.[34]

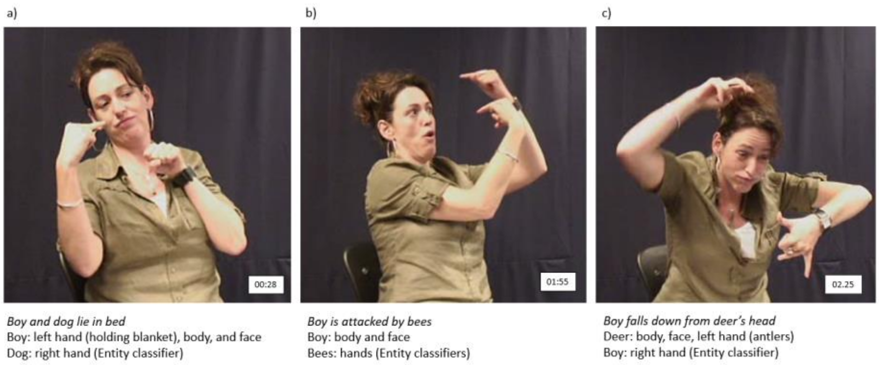

Figure 2.13. Example of signer simultaneously representing two entities on different articulators (stills from Corpus NGT, used under Creative Common license cc by-nc-sa 3.0 nl).

In stills a and b, the body, head, face, and one of the hands depict one referent, while a second referent is depicted by an Entity classifier predicate on the other hand. In still b, one character is mapped on the body, including

[34] The stills are taken from clip 403 from the Corpus NGT (www.ru.nl/corpusngt). The Frog Story (*Frog where are you?*, Mercer Mayer, 1969) is a wordless picture story often used for narrative elicitation.

facial expression, and the other characters (namely, bees) are represented by means of Entity classifier predicates.

Clearly, the use of CA constructions involving multiple perspectives and/or the simultaneous use of different articulators to represent different referents adds an extra layer of complexity, requiring both cognitive and linguistic skills that can be challenging for SL2-learners (McKee & McKee, 1992).

In sum: SL2-learners have to recognize (i) whether a specific type of information is best presented by a spatial or an abstract representation, (ii) which spatial devices should be recruited to express the information, and (iii) when a mental rotation of the space is required, and how it should be performed. For each type of device, learners additionally have to acquire the rules and constraints that govern that device. In case of constructed action (a form of spatial representation), an extra layer of complexity is added, as the locations of referents in sign space are different, according to the point of view of the various characters and the narrator. This has consequences for reference to entities in space, and for the use of pronouns and agreement verbs.

2.4.6 The relationship between gesture and sign

Section 2.3.3.3 briefly introduced the topic of gestures, and discussed different types of gestures that have been distinguished in the literature, namely (i) emblems, (ii) pantomimic gestures, (iii) representational gestures, (iv) beat gestures, (v) deictic gestures, and (vi) cohesive gestures. Sharing the same medium of expression, some types of gestures show similarities to either lexical signs or grammatical constructions that are characteristic of sign languages (Özyürek, 2012).

In Table 2.2 the types of gestures discussed in Section 2.3.3.3 are presented beside comparable sign language constructions.

Table 2.2. Similarities between (manual) gestures and sign language constructions.

Gesture type	Form/function of gesture	Comparable sign language forms or constructions
(i) Emblems	Highly conventionalized gesture that can function as complete speech-act (e.g., 'thumbs up')	Lexical items with identical form: emblem-sign cognates in the native core-lexicon or emblems from the non-native lexicon that have lexicalized into the core-lexicon (see Section 2.4.1.2)
(ii) Pantomimic gestures	Bodily enactments to report an action	Enactments in constructed action sequences (see Section 2.4.5)
	(a) mimics of movement of torso, head and arms	(a) depiction of a character's movement of torso, head and arms
	(b) mimics of use of hands (e.g., hold a box) ('hand-as-hand')	(b) use of Handle classifiers in spatial verbs and (some) agreement verbs
(iii) Representational gestures	Gestures that represent actions, objects, or abstract notions	Lexical signs and grammatical constructions that represent actions, objects or abstract notions
	(a) movement of hands to represent action [enactment]	(a) (iconic) lexical signs (e.g., TYPE, DRINK); Handle classifiers in spatial verbs and (some) agreement verbs
	(b) tracing shape with index finger [tracing]	(b) Size and Shape specifier (SASS)
	(c) use hands to indicate 3D dimensions [modeling]	(c) Size and Shape Specifier (SASS)
	(d) use hand(s)/finger(s) to represent object or person ('hand-as-object') [representing]	(d) Entity classifier
	(e) use hand(s)/finger(s) to represent abstract notion [metaphoric]	(e) metaphoric classifier (e.g., 'container')[1]
(iv) Beat gestures	Rhythmic movements accompanying speech	---

Gesture type	Form/function of gesture	Comparable sign language forms or constructions
(v) Deictic gestures	Pointing gestures (a) pointing gestures to self, interlocutor and other present entities (b) pointing gestures to loci in gesture space (arbitrary loci or imagined referents)[2]	Pointing signs (a) pointing signs to self, interlocutor and other present entities (direct deixis in real space) (b) pointing signs to loci in signing space (arbitrary loci or imagined referents)
(vi) Cohesive gestures[2]	Use of gesture space to maintain discourse cohesion (a) 'anchoring' of a discourse-referent to an area in gesture space, reuse of this area to refer to this entity[3] (b) recurrent use of some physical gesture	Use of signing space, coreference

Notes: [1] Examples of metaphoric classifiers can be found in Thumann (2013); [2] Examples of deictic pointing gestures can be found in Fenlon, Cooperrider, Keane, Brentari and Goldin-Meadow (2019, p. 12); [3] Examples of cohesive gestures can be found in So, Coppola, Licciardello and Goldin-Meadow (2005) for silent gestures, in Zwets (2014) for co-speech gestures directed at imagined referents, and in Parrill and Stec (2017) for abstract referents.

When mapping these gesture-sign correspondences onto the devices presented in Figure 2.10 (see for a visual representation Appendix 2A), it becomes apparent that SL2-learners have different types of gestures at their disposal that might scaffold their learning. Here, we highlight three 'gesture-sign parallels' that are of importance in the studies presented in this thesis: (i) the use of a hand-as-object gesture/Whole Entity classifier (iii-d in Table 2.2), (ii) the use of a hand-as-hand gesture to mimic or represent an action/Handle classifier in agreement verbs and spatial verbs (ii-b/iii-a in Table 2.2), and (iii) the use of pointing signs (v-a/v-b in Table 2.2).

The first parallel of importance is the parallel between hand-as-object gestures and Whole Entity classifiers. Various authors have noted similarities between gestures used by non-signers to depict the motion and/or location of objects or characters, and Entity classifier predicates used by signers (Singleton, Morford & Goldin-Meadow, 1993; Schembri, Jones & Burnham, 2005; Brentari, Coppola, Mazzoni & Goldin-Meadow, 2012; Quinto-Pozos & Parrill, 2015; Janke & Marshall, 2017). These hand-as-object gestures and Entity classifier predicates have in common that the signer's hand depicts the entire entity. The non-signer depicted in Figure 2.2 (Section 2.3.3.3), for example, uses a -handshape (palm oriented downwards) to depict a rollercoaster-cart. Quinto-Pozos and Parrill (2015) have shown that non-signers use such depictive gestures in situations similar to those in which signers employ Entity classifiers, that is, in scene descriptions from an observer perspective (see Section 2.4.2.1). However, non-signers have been shown to draw upon a set of handshapes that is much larger than the discrete set of classifier handshapes employed by signers, and their productions lack consistency (Singleton et al., 1993; Janke & Marshall, 2017, Brentari et al., 2012; Schembri et al., 2005), leading Janke and Marshall (2017, p.10) to conclude that

> (T)he task for learners of sign is not to learn how to represent objects using their hands, but rather to narrow down the set of handshapes that they have potentially available to them to the set of classifier handshapes that is grammatical in the sign language they are learning, and to select from that set accurately and consistently.

An interesting finding reported by Singleton, Goldin-Meadow and McNeill (1995) is that *co-speech gesturers*, in an elicitation task, did not show *simultaneous* use of two hand-as-object gestures to depict two objects in relation to each other. Instead, participants used one hand-as-object gesture or they used another strategy that did not involve hand-as-object gestures. Interestingly, when they did use a hand-as-object classifier in these constructions, this was predominantly for *moving* objects. The absence of simultaneous two-handed hand-as-object gestures in co-speech gesture contrasted with the gesturing of participants who performed the same task without speech ('silent gestures'). The latter participants did use both hands simultaneously to depict the spatial relationship between objects. This research shows that, although not present in co-speech gesture itself, the simultaneous use of both hands (as depicted earlier for a signed construction in Figure 2.5a) is available to novel signers.

A second parallel found in various studies is the one between the use of ‘hand-as-hand gestures’ by non-signers and Handle classifier predicates by signers, to denote how a character handles or manipulates an object (Brentari et al., 2012; Quinto-Pozos & Parrill, 2015). Again, a notable difference can be found in the handshape inventories displayed by both groups. Brentari et al. (2012) noted that non-signers “display a fair amount of finger complexity” as compared to signers (p. 12). Non-signers replicate to a large extent the actual configuration of the hand, while signers have a much smaller, grammatically constrained set of Handling handshapes at their disposal.

The third gesture-sign parallel worth mentioning concerns the use of pointing gestures and pointing signs. Both pointing gestures and signs are used to attract the attention of the addressee to something in the immediate environment (direct deixis). Moreover, both signers and gesturers have been found to point to loci in signing space/gesture space (Zwets, 2014; Fenlon et al., 2019). However, pointing gestures are not conventionalized, whereas pointing signs have entered the sign language grammar (e.g., they function as pronominals, locatives, determiners; but see the discussion below). In a recent study, Fenlon et al. (2019) have demonstrated that pointing signs, as compared to pointing gestures, exhibit more consistency with respect to several formational features, such as handhape, duration, and use of the dominant vs. weak hand. In addition, pointing signs were more reduced in form and more integrated into the prosodic structure of the utterance than pointing gestures. Thus, although pointing signs and gestures are superficially similar, there are subtle differences in form and structural integration. Another difference, reported in Zwets’ (2014) study on NGT signers and Dutch gesturers, is that gesturers used pointing gestures towards ‘an empty location’ (i.e., gesture space) to refer to imagined referents (cf. ‘surrogates’, see Section 2.4.2.1), but not to establish a locus “that has no other purpose than making further reference possible” (p. 191), i.e., pointing signs towards arbitrary, abstract loci. Fenlon et al. (2019), however, report not having found this difference.[35]

[35] Unfortuntately, Fenlon et al. (2019) do not provide numbers on the distribution of the use of pointing signs/gestures towards imagined referents versus pointing signs/gestures towards abstract loci in signing/gesture space.

These studies into non-signers are informative regarding the SL2 learning process, since they provide evidence that novel SL2-learners have a gestural repertoire at their disposal to start out with, which might scaffold the acquisition of particular constructions. As such, gestures may provide a substrate for SL2-learning (Marshall & Morgan, 2015; Janke & Marshall, 2017). At the same time, gestures can be a source of negative transfer, since learners might fail to recognize the "additional layer of linguistic convention" (Quinto-Pozos & Parrill, 2015, p.30) present in sign language constructions, but not in their gestural counterparts. As mentioned previously (Section 2.3.3.2), Ortega and Morgan (2015a, 2015b) provided evidence for negative transfer at the phonological level, showing that novel learners and non-signers produced lexical signs that have an iconic gestural counterpart (e.g., WRITE) less accurately than signs that do not have a gestural look-alike. Presumably, the fact that participants had access to the meaning of the iconic signs made them less attentive to the exact phonological structure. Similar findings are reported by Chen Pichler (2011, p. 110).

Before proceding to the next section, a brief comment is in order regarding the ongoing debate on the appropriate characterization, gestural versus grammatical, of the spatial devices discussed in this chapter. This discussion is best understood in context of the history of sign language linguistics.[36] Before the advent of the field of sign language studies in 1960 (described in Section 2.1), sign languages were regarded as primitive gestural systems. The main focus of initial research (1960–1980) was to disprove this myth, by demonstrating that sign languages are structured similar to spoken languages, and should thus be treated as full-fledged human languages. Signed utterances were analyzed according to the prevalent (structuralist) grammatical framework for spoken languages (i.e.,by describing them in terms of phonemes, morphemes and syntactic structure), arbitrariness was stressed, and the role of iconicity and gestures was largely ignored (McBurney, 2012; Kendon, 2008; Goldin-Meadow & Brentari, 2017). Gesture and sign were regarded as completely distinct categories, with one being linguistic (signs) and the other non-linguistic or paralinguistic (gestures).

[36] For reviews of sign language linguistics in relation to gesture, see Kendon (2008), Goldin-Meadow and Brentari (2017) and Müller (2018).

Within the structuralist (generative) grammatical framework, the spatial structures discussed in this thesis are analyzed as combinations of morphemes:

- Classifier predicates are analyzed as consisting of a movement root with affixes signifying the movement, orientation and location of the entity depicted (e.g., Supalla, 1982; Zwitserlood, 2003);
- Agreement verbs are analyzed as a stem combining with affixes (location and orientation) to indicate the verb's subject and object (e.g., Padden, 1988);
- A subset of pointing signs has a linguistic function and points to a locus in space (referential index, R-locus) that carries linguistic meaning (Lillo-Martin & Klima, 1990; Lillo-Martin & Meier, 2011).

However, in the course of time, some researchers have pointed out that a purely grammatical analysis is insufficient to explain the internal structure of these spatial structures (e.g., Liddell & Metzger, 1998; Liddell, 2003a, 2003b; Dudis, 2004; Schembri et al., 2005; Johnston, 2013a, 2013b; Fenlon, Schembri & Cormier, 2018). According to these authors, the morphemic analysis is problematic, since it is impossible to provide a finite or listable set of 'location morphemes', given the fact that there is an infinite number of possible loci in signing space. Likewise, other gradient aspects of these constructions, such as orientation of the hand or movement properties, are non-listable. To account for this complexity, known as the 'listability problem' (Sandler & Lillo-Martin, 2006), these authors suggest that spatial constructions contain both categorical (linguistic) and gradient (gestural) components:

- 'Classifier predicates' (*depicting verbs, depicting signs*) are analyzed as containing a meaningful handshape (i.e., a morpheme) combined with gestural elements depicting the movement, orientation and location of an entity (Liddell, 2003b);
- 'Agreement verbs' (*indicating verbs*) are composed of a morphemic element (the handshape) combined with gestural elements (location and direction) (Liddell, 2003a);
- Pointing signs are similar to deictic gestures (Liddell, 2000b, 2003a; Johnston, 2013a, 2013b).

In the above list, the terms 'classifier predicates' and 'agreement verbs' are placed between single quation marks, since alternative terms, given between brackets, are used for these phenomena, reflecting the different perspectives. In this thesis, we have chosen to refer to these phenomena with the terms *(Entity) classifier predicates* and *agreement verbs*. However, this does not imply that we take an explicit stance in this debate. For the purposes of this thesis, that is, providing a description of the SL2 acquisition of selected phenomena and investigating the effectiveness of teachings strategies regarding one of them, the gesture vs. grammar issue is irrelevant. SL2-learners have to acquire these phenomena, and the rules governing them, regardless of their linguistic/gestural analysis.

2.4.7 Previous research regarding acquisition and emergence of spatial devices

Research on the SL2 acquisition of spatial devices can be informed by four research areas: (i) previous research on SL2 acquisition, (ii) research on L1 acquisition of sign languages,[37] (iii) research on gestures produced by non-signers (Section 2.4.6), and (iv) research on linguistic structures in emerging sign languages.[38] Some previous research findings regarding spatial devices

[37] Due to limited space, we limit ourselves to a general discussion on the topics. There is a vast amount of literature on L1 acquisition of sign languages. For overviews, the reader is referred to Chen Pichler (2012), Chen Pichler, Kuntze, Lillo-Martin, Quadros and Rossi Stumpf (2018) and edited volumes by Schick, Marschark and Spencer (2006), Morgan and Woll (2002), and Baker and Woll (2008).

[38] Emerging sign languages provide interesting details about the emergence and development of linguistic structures over generations. A well-documented case of an emerging sign language is that of Nicaraguan Sign Language (Idioma de Señas Nicaragüense, ISN), a language that emerged after the foundation of a school for the deaf in Managua in 1977 (e.g., Senghas, 1995; Senghas & Coppola, 2001; Senghas, Kita & Özyürek, 2004; Kocab, Pyers, & Senghas, 2015). Other documented emerging sign languages are Israeli Sign Language (ISL) (Meir & Sandler, 2008; Meir, 2012a), Al-Sayyid Bedouin Sign Language (ABSL) (Sandler, Aronoff, Padden & Meir, 2014), and Central Taurus Sign Language (CTSL) (Ergin, 2017; Ergin, Meir, Aran, Padden & Jackendoff, 2018). The latter two are shared sign languages, while the former two emerged in a community of deaf people. See for an overview article Meir, Sandler, Padden, & Aronoff, 2010.

are discussed in Chapters 3, 4 and 5, and for convenience of the reader, included in the overview presented below.[39]

2.4.7.1 Acquisition and emergence of pointing signs

Research on L1 production data is somewhat complicated by the fact that all young children, regardless of their language background, produce gestural pointing signs to communicate about the world around them. It is thus difficult to determine whether a deictic pointing sign is linguistic (i.e., used as pronomimal, determiner or locative) or gestural.[40] The L1 production of pointing signs is characterized by:

- Substitution of pronouns by proper names (Loew, 1984; Pettito, 1987; Jackson, 1989);
- Reversal errors (i.e., using the form IX_2 ('you') to refer to self) (Petitto, 1987; Jackson, 1989; Pizutto, 1990; but see Hatzopoulou 2008);
- Anaphoric reference to third-person referents without specifying the referent (Loew, 1984; Petitto, 1987; Petitto & Bellugi, 1988);
- Localizing several referents at the same locus ('stacking') (Loew, 1984; Petitto, 1987; Petitto & Bellugi, 1988);
- Using several loci for one referent (Loew, 1984);
- Difficulties in selecting the correct pronoun during CA (Loew, 1984).

Loew (1984) notes that in the L1 data of the child she analyzed, the use of pronouns for present referents appears earlier than the use of pronouns for characters within CA sequences. In early CA sequences, pronouns are simply omitted or replaced by proper names.

Few studies have investigated the use of pointing signs in *second language learners*. Bel et al. (2015) found that advanced SL2-learners of

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[39] In this review, we do not address previous research on the acquisition and emergence of non-manuals, since these devices play a marginal role in the analyses carried out in the studies presented in Chapters 3–6, see also Section 2.5.

[40] Petitto (1987) noticed a period of avoidance of pointing signs referring to self and other people (but not objects and locations), for the course of six months (12–18 months) in two ASL-acquiring children. The author interpreted this period of avoidance as a clear break between prelinguistic gestures (prior to the period of absence) and linguistic forms (after the period of absence). Hatzopoulou (2008), who investigated a child acquiring Greek Sign Language (GSL), did not find evidence for discontinuity, but noticed a decline in pointing signs towards persons between 16 and 20 months.

Catalan Sign Language (Llengua de Signes Catalana, LSC) produced narratives with a high proportion of redundant overt third-person pronouns, as compared to the L1 benchmark, which is an expected pattern in L2-learners.[41] However, these findings were not supported by a recent study by Frederiksen and Mayberry (2019), who found that the eight novice ASL-learners did not reliably overuse nouns and pronouns, nor did they underuse zero anaphora, compared to the L1 benchmark, possibly caused by task simplicity.

Coppola and Senghas (2010) have described the development of pointing behavior in *emerging sign language* ISN. The authors compared narratives produced by homesigners and three successive cohorts of ISN-signers.[42] The homesigners solely produced context-bound pointing gestures intended to draw attention to real-world objects, whereas signers of the successive cohorts showed an increased use of pointing signs directed at loci in signing space. The use of abstract pointing signs to indicate persons (pronominal pointing signs) was preceded by pointing signs in signing space to indicate locations (locative pointing signs).

2.4.7.2 Acquisition and emergence of agreement verbs

There is a substantial body of research on the *L1 acquisition* of agreement verbs (e.g., Meier, 1982, 2002a; Van den Bogaerde, 2000; Casey, 2003; Hänel, 2005a; Morgan, Barrière & Woll, 2006). The picture emerging from these studies is a relatively late onset of agreement production[43] and a protracted period of acquisition. Initially, children produce uninflected verb signs (i.e., the citation form). From age 2;0 onwards, they gradually start to inflect verbs, but only for present, real-world referents (Baker, Van den Bogaerde & Woll, 2008; but see Hänel 2005a for evidence of simultaneous acquisition of

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[41] See Frederiksen and Mayberry (2019) for a discussion on the overuse of referent tracking devices in L2 learners of spoken languages.

[42] Homesigns can be defined as “systems of gestural communication, typically limited to a single family household and the few other communication partners of a single deaf individual” (Coppola & Senghas, 2010, p. 546).

[43] Quadros and Lillo-Martin (2007) point out that verbs that typically require agreement, such as SHOW or HELP, are in general less frequent in (signing or speaking) two-year-olds’ sentences than plain or spatial verbs, which may explain the relatively low frequency of these verbs in the early productions.

agreement with present and non-present referents). For agreement with present referents, the following errors have been observed:

- Omission of agreement where it might be expected given the linguistic context (Fischer, 1973/2009; Meier, 1982; Loew, 1984; Van den Bogaerde, 2000; Pizutto, 2002; Morgan et al., 2006; but see Quadros & Lillo-Martin 2007 for counterevidence);
- Overgeneralization in realizing agreement on plain verbs ('errors of commission') (Fischer, 1973/2009; Meier, 1982; Bellugi, 1988; Casey, 2001);
- Overgeneralization in moving a verb that can agree with only one of its arguments (e.g., the single argument agreement verb WANT) between two loci or towards a locus (Fischer, 1973/2009; Casey, 2001);
- Erroneous agreement (production of forms that agree with the wrong argument) (Meier, 1982; Casey, 2001; Morgan, 2000);
- Reversal errors (Fischer, 1973/2009; Casey, 2001);
- Failure to identify the referent(s) associated with the locus the verb is directed towards or the loci between which the verb is moved (Loew, 1984);
- substitution of agreement with an auxiliary-like element (Morgan et al., 2006).[44]

The use of arbitrary loci in signing space to realize agreement with non-present referents appears much later, starting at 3;6 and continuing until 5;0 (Baker et al., 2008). The following errors have been noted:

- Failure to identify the argument with which the verb agrees (Loew, 1984; Morgan, 1998);
- Erroneous agreement caused by inconsistent or erroneous localization practices (e.g., 'stacking' (see previous Section 2.4.7.1) or use of several loci for the same referent) (Loew, 1984).

Different factors can account for the late onset and mastery of agreement verbs in L1. First of all, the initial use of uninflected forms might be a

[44] Morgan, Barrière and Woll (2006) investigated the acquisition of agreement verbs in BSL. BSL does not have an agreement auxiliary, in contrast to NGT. In case of NGT, use of this element would probably not be considered a substitution, but rather a (perhaps phonologically erroneous) production of the agreement auxiliary ACT-ON (Bos, 1994, 2017[1998]).

reflection of the input provided by the caretakers (Child Directed Sign, CDS). Analysis of CDS has shown that a large proportion of the verbs in the input appear as uninflected forms (i.e., citation forms) (Kantor, 1982; Van den Bogaerde, 2000; Morgan et al., 2006). Secondly, the given that only a subclass of verbs may undergo spatial modification for agreement might be a challenge, since learners have to identify which verbs are agreement candidates and which are not (Morgan et al., 2006). Thirdly, the protracted development of agreement for non-present referents located in signing space, which is characterized by various error types, might be the result of difficulties using abstract spatial loci, rather than being caused by the morphological process of modification itself (Newport & Meier, 1985).

Research on *emerging sign languages* has shown that productive and consistent verb agreement systems develop gradually. Irit Meir and colleagues (e.g., Aronoff, Meir, Padden & Sandler, 2005; Meir, Padden, Aronoff & Sandler 2007; Padden, Meir, Aronoff & Sandler, 2010) analyzed production data of successive cohorts of Al-Sayyid Bedouin Sign Language (ABSL) and Israeli Sign Language (ISL) signers. An interesting pattern described by the authors is the strong tendency of older ABSL- and ISL-signers to use the saggital 'z-axis' (i.e., a straight center axis away from or towards the body), whereas the younger generations of signers – although still showing a preference for the z-axis – shows an increased use of the horizontal 'x-axis', which extends from one side of the signing space to the other (see Figure 2.14).[45] In case of use of the z-axis, the signer's body occupies one of the poles of the axis and represents the verb's subject (hence the term 'body as subject', coined by Meir et al. (2007)), whereas the poles of the x-axis represent abstract loci in signing space.

[45] Interestingly, for ABSL, the status of 'language having developed an agreement verb system' has changed over the course of the years. Arnonoff et al. (2005) did not find evidence for agreement, while in Meir et al. (2010), some evidence for emerging agreement is reported.

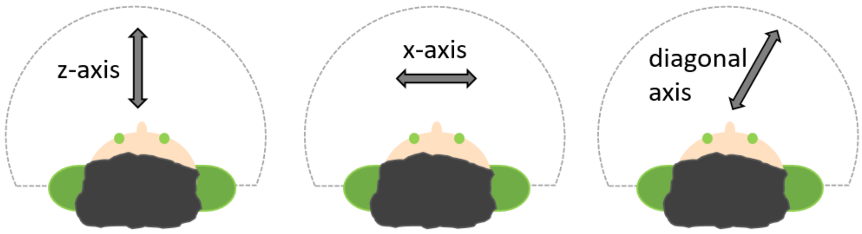

Figure 2.14. Z-axis, x-axis and diagonal axis.

Emerging sign languages give insight into the strategies people use to indicate the verb's arguments when the sign language has not (yet) developed an agreement system. Two strategies that have been observed in emerging sign languages are (i) successive expression of the subject and the object in separate clauses ('successive 1-argument structures', e.g., MAN GIVE, WOMAN RECEIVE, see Chapter 5) (Senghas, Coppola, Newport & Supalla, 1997 for ISN; Meir, 2010 for ABSL and ISL; Ergin et al., 2018 for CTSL) and (ii) a strategy termed 'character assignment' by Ergin et al., in which the signer uses his or her own body as stand-in for the subject, and sometimes the adressee's body as stand-in for the object (e.g., "I am the man, you are the woman, I give you the book"; see Chapter 5) (Ergin et al., 2018; Meir, 2010). Meir (2010) describes a third strategy, namely an instance of use of an auxiliary-like element similar to the one identified in the L1 data by Morgan et al. (2006) (see above). Meir (2010) considers this element as a form "that can be regarded as precursor[s] of verb agreement" (p. 118). We found multiple instances of these strategies, as well as a preference to use the z-axis, in the SL2-data we obtained (see Chapter 5).

2.4.7.3 Acquisition and emergence of Entity classifier predicates

There is a growing body of studies that analyze *L1 production data* on Entity classifier predicates (henceforth: classifier predicates). The picture that emerges from these studies is that children are able to use classifier predicates in appropriate contexts with moving or static objects at a young age (Kantor, 1980; Schick, 2006; Slobin et al., 2003). However, their production is prone to errors, and it takes several years, up to 9;0, to master the system completely (Newport & Meier, 1985; Hoiting & Slobin, 2002; Baker et al., 2008). Reported errors are:

- Substitution of the classifier handshape (Supalla, 1982; De Beuzeville, 2006);
- Omission of components (e.g., manner of movement; Newport & Meier, 1985);
- Sequential production of complex movement patterns (e.g., a straight upward movement followed by an arc instead of an upward arc movement; Newport & Supalla, 1980);
- Failure to introduce referents (Slobin et al., 2003; Tang, Sze & Lam, 2007);
- Omission of the Ground object (Supalla, 1982; Newport & Meier, 1985; Slobin et al., 2003; Engberg-Pedersen, 2003; Tang et al., 2007; Sümer, 2015);[46]
- Failure to produce Figure and Ground simultaneously, instead expressing both objects sequentially (Supalla, 1982; Tang et al., 2007);[47]
- Signing outside the signing space (De Beuzeville, 2006).

Morgan (2002), De Beuzeville (2006), Tang et al. (2007), and Tang and Li (2018) report children employing avoidance strategies such as production of lexical descriptions instead of classifier predicates, role shift, or use of the whole body as stand-in for an animate referent ('whole-body language'). Kantor (1980) notes that children sometimes employ classifiers in simple contexts, but avoid to use classifiers for similar entities in complex environments.

There are only few publications on the use of classifiers in *SL2-learners*. Marshall and Morgan (2015) elicited spatial representations in novel learners of BSL. Ferrara and Nilsson (2017) investigated the use of classifiers by novel learners of Norwegian Sign Language (NSL) in longer stretches of text. Frederiksen and Mayberry (2019) investigated the frequency of referential

[46] The notions of Figure and Ground have not been introduced yet. In two-handed classifier constructions, the Ground object is the stationary, and usually the bigger object. The Figure object is moving (or could move) in relation to the Ground object. See Section 4.2.1.3.

[47] But see Footnote 7 in Section 4.2.3.

devices, including classifier predicates, in elicited short stories, signed by novel signers. Typical errors reported in these studies are:

- Difficulties in choosing the correct classifier handshape (Marshall & Morgan, 2015);
- Difficulties in coordinating both hands in two-handed constructions (Ferrara & Nilsson, 2017);
- Difficulties in planning the scene in relation to the body (Ferrara & Nilsson, 2017);
- (Unappropriate) substitution of classifier entities with signs marked for location (Ferrara & Nilsson, 2017);
- Overuse of classifier predicates to reintroduce referents in a narrative by learners, in contexts where L1-signers do not use classifier predicates (Frederiksen & Mayberry, 2019).

Ferrara and Nilsson (2017) report avoidance strategies similar to those found by Morgan (2002) in L1-learners, that is, resorting to the production of lexical signs instead of using classifier predicates.

Given the fact that non-signers are found to use handshapes to represent referents in gestures (Section 2.4.6), it is not surprising that these forms have been found in early stages of *emerging sign languages*. Goldin-Meadow, Brentari, Coppola, Horton and Senghas (2015) show that users of the emerging ISN and Nicaraguan homesigners both use the hand to represent objects. The set of handshapes used for these representations, however, is more consistent in the ISN-signers than in the homesigners, which suggests that conventionalization has taken place. Aronoff et al. (2003) elicited classifier predicates in ISL-signers, and compared these with the productions of ASL-signers. This comparison is interesting given the respective age of both languages: ISL is a young language, whereas ASL is among the oldest sign languages known. Two interesting results emerged from the analyses. First, the ISL-signers frequently produce what the authors call 'referent projections', that is, they use the body to enact the referent (e.g., move like a cat). In contrast, ASL-signers prefer to use Entity classifier predicates instead. Secondly, a comparison of the classifier predicates used in both languages reveals that ASL classifier predicates have developed to be less iconic and more abstract than ISL classifier predicates. ASL, for example, has two Entity classifiers that have a broad class membership: one to denote a class of 'vehicles' and another to denote a class of 'objects'. ISL, in contrast, does employ a classifier for vehicles, but this class is much smaller than the class of vehicles the ASL vehicle-classifier refers to. The authors attribute these differences to language age.

2.4.7.4 Acquisition and emergence of signs marked for location

Most *L1 acquisition studies* have focused on the acquisition of agreement verbs, classifier predicates or pronominal reference. As a consequence, the spatial modification of signs from the nominal domain is to date underresearched. Nonetheless, examples can be found in Loew (1984), Bellugi (1988) and Pizutto (2002). Pizutto demonstrates a lower use of modified nouns in the production data of three older children acquiring Italian Sign Language (Lingua dei Segni Italiana, LIS), as compared to an adult, and absence of modified nouns in the youngest child (age 3;11).[48] Loew (1984) reports the presence of modified nouns and adjectives from age 3;6 onwards. The following errors are reported in the literature:

- Stacking of two spatially modified signs for two entities in the same locus (Loew, 1984);
- Production of modified signs on a surface (e.g., producing the sign HOUSE on a table) (Loew, 1984);
- Production of modified signs at a similar real-world object (e.g., producing the sign BOWL on a table to indicate that in a story, the bowl was placed on a table) (Loew, 1984).

To our knowledge, to date no studies have specifically targeted the use of signs marked for location in *SL2-learners* or *emerging sign languages.*

Having completed this outline of previous research on the acquisition and emergence of spatial devices, we now turn to the last section of this chapter,

[48] Pizutto (2002) compared elicited productions from four children aged 3;11, 5;5, 5;7 and 5;10 to data from an adult performing the same task. Her calculation included the proportion of unmodified nouns from the subset of nouns that could potentially be modified. It must be noted though that the results are somewhat obscured by the fact that Pizutto seems to include both nouns that are spatially modified to indicate a location (e.g., the location of a television) and nouns that are spatially modified to indicate plurality via changes in their location and movement pattern.

in which we provide an overview of the studies carried out within this project.

2.5 This study

The present study addresses the development of ‘use of space’ in novel SL2-learners of NGT, and the effectiveness of pedagogical practices on one of the features subsumed under ‘use of space’. To that end, it investigates the acquisition of three domains of spatial devices that serve to establish and refer to entities: the domain of pointing signs, the verbal domain, and the nominal domain. The first study (Chapter 3) focusses on all three domains, while the second and third studies (Chapters 4 and 5) each investigate one device in more depth: Whole Entity classifier predicates (Chapter 4) and agreement verbs (Chapter 5), respectively. The fourth study (Chapter 6) examines the effectiveness of different pedagogical practices, which have been shown to be effective for unimodal spoken language L2 acquisition, on the acquisition of agreement verbs. Given the paucity of literature on SL2 acquisition and pedagogy, it is common practice to apply pedagogical practices that have been shown to be effective for learning and teaching spoken languages. It is, however, important to gather evidence on the effectiveness of these practices on the SL2 learning process as well.

As such, this dissertation has two facets: it provides a description of SL2 acquisition processes regarding spatial devices (i.e., the field of second language acquisition, see Section 2.1), and it focusses on pedagogical practices (i.e., language pedagogy).

2.5.1 Aims and objectives

The first aim of this research was to describe the acquisition processes in L2-learners regarding three groups of spatial devices that are subsumed under the term ‘use of space’, namely pointing signs, spatially modifiable verbs, and signs marked for location. The second aim was to explore whether particular pedagogical practices, which have been shown to be effective in spoken language acquisition, would also be beneficial in the acquisition of a sign language structure.

2.5.2 Research questions

In order to achieve these aims, the following questions were set out to answer:

1. Are there developmental stages (interlanguages) in SL2-learners of NGT regarding the acquisition of spatial devices subsumed under the umbrella term ‘use of space’? (study 1 (Chapter 3), study 2 (Chapter 4), and study 3 (Chapter 5))
2. Which features characterize the interlanguage development of the spatial devices?
   - 2a. Which features characterize the interlanguage development of pointing signs? (study 1 (Chapter 3))
   - 2b. Which features characterize the interlanguage development of spatially modified verbs? (study 1 (Chapter 3), study 2 (Chapter 4), and study 3 (Chapter 5))
   - 2c. Which features characterize the interlanguage development of signs marked for location? (study 1 (Chapter 3))
3. In what respects are the interlanguages found in SL2-learners of NGT similar to or different from the interlanguages in L1-learners and in SL2-learners of other sign languages, and which characteristics found in emerging sign languages are also found in the interlanguages of SL2-learners? (study 1 (Chapter 3), study 2 (Chapter 4) and study 3 (Chapter 5))
4. What is the impact of the visual-spatial nature of spatial devices on the acquisition of these devices in SL2-learners of NGT? (study 1 (Chapter 3), study 2 (Chapter 4) and study 3 (Chapter 5))
5. Do pedagogical interventions with different degrees of explicitness, aimed to focus the learners’ attention on the form-meaning mapping of the NGT agreement verb paradigm, facilitate the acquisition of this device in SL2-learners of NGT? (study 4 (Chapter 6))

To answer these questions, we analyzed the SL2 acquisition process of students enrolled in the bachelor programs ‘Teacher NGT’ and ‘Interpreter NGT’, and the associate degree ‘Speech-to-text captionist’ at the Institute for Sign, Language & Deaf Studies at UUAS. Their NGT productions were compared to the productions of L1-signers of NGT (studies 1, 2 and 3) and to the productions of NGT teachers (studies 2, 3 and 4).

Before we proceed, a comment on a methodological choice regarding the analysis of non-manuals is in place. In the studies presented in Chapters 3–6, we excluded non-manual referential devices, which we included in the discussion so far for the sake of completeness. The decision to exclude these devices was motivated by a number of considerations, in particular regarding eye gaze. First, there is only little literature on the use of eye gaze as referential marker in NGT. It would be precarious to analyze SL2-data solely based on linguistic descriptions available for other sign languages, especially since there is disagreement in the literature about the possible interpretations of eye gaze (see Cormier et al., 2015 for discussion). Secondly, eye gaze in SL2-data is often difficult to interpret. It is, for example, difficult to identify whether a gaze directed towards a particular area in the signing space is intentional, or simply follows the hands. Lastly, the camera angle in the first three studies and the fact that learners often looked at the laptop with the stimulus instead of at the interlocutor, made a fine-grained analysis of eye gaze difficult.

With this background, we now move on to the chapters containing the articles reporting on the studies conducted.

3. Study 1: A longitudinal study into the acquisition of spatial devices in two SL2-learners of NGT

3.1 Introduction[1]

In many countries, learning the local sign language as a second language (L2) has become popular in recent years (McKee, Rosen & McKee, 2014). Yet, there is surprisingly little empirical evidence about the developmental stages (i.e., interlanguages, Selinker, 1972) L2-learners pass through when acquiring a sign language. The field of second language acquisition (SLA) has investigated the interlanguages of L2-learners with a spoken language background. In these cases, the first language (L1) as well as the L2 are oral-auditory, utilizing speech sounds to convey the message. Sign languages, on the other hand, use the visual-spatial modality as the channel of communication by producing hand and body movements that are perceived visually. Hence, sign language learners with a spoken language background face the challenge of learning a language in a new modality (M2). Linguists in turn face the challenge of uncovering the developmental stages of the processes that characterize M2 acquisition. Do these processes resemble the learning processes already described for people learning a second language

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[1] This chapter has been published as BOERS-VISKER, E., & VAN DEN BOGAERDE, B. (2019). LEARNING TO USE SPACE IN THE L2 ACQUISITION OF A SIGNED LANGUAGE. *SIGN LANGUAGE STUDIES, 19*(3)*,* 410-452. A number of modifications have been made to the chapter relative to the published article. First, for consistency, terminology was aligned with the rest of the thesis. This included replacement of the term *classifier verb* by *classifier predicate*, *M2L2* by *SL2*, *native signer* by *L1-signer*, and the gloss AUX-OP by ACT-ON. Some of the glosses were modified for reasons of consistency (for example, the gloss PT:1 was replaced by IX_1). Some of the footnotes that served to explain terminology, as well as the footnote containing the notational conventions, were removed, and footnotes 8 and 9 were added. Lastly, some figure captions were made more explicit. None of these modifications affect the results of the study.

The supplementary materials to this chapter can be found in Boers-Visker, E.M. (Utrecht University of Applied Sciences / University of Amsterdam) (2016): A *longitudinal study into the acquisition of spatial devices in two SL2-learners of NGT (dataset).* DANS: https://doi.org/10.17026/dans-zr9-pkx5.

within the same modality? Can we speak of interlanguages in M2 acquisition? Descriptions of stages that sign language learners with a spoken language background (henceforth: SL2-learners) move through are of great importance to inform the field of sign language teaching, which, since the onset of formal instruction during the 1980s, has mostly been based on second language learning theories and teacher intuitions (Quinto-Pozos, 2011).

The present study examines the learning process of two learners, who we followed longitudinally during the course of their four-year interpreter education program, offered at a University of Applied Sciences. The focus of the investigation was the use of morphosyntactic devices to introduce persons, things, and ideas in the signing space and to subsequently refer to these referents. We will provide a quantitative and qualitative description of this particular 'use of space.'

3.2 Theoretical background: language pedagogy

The body of knowledge regarding L2 sign language pedagogy (SL2-pedagogy) is small but growing (Woll, 2013). So far, research on sign language pedagogy and/or learning has focused on both similarities and differences between bimodal learning (i.e., learning a second language in another modality) and unimodal learning (i.e., learning a second language within the same modality) and the role that iconicity plays in sign language learning (Ortega, 2017).

For spoken languages, it is argued that learners pass through a sequence of interlanguages (Selinker 1972) before reaching their ultimate attainment of the target language. These interlanguages are rule-governed and language-specific and have been found for morphological and syntactic structures. That is, learners with different L1 backgrounds who learn a particular L2 (e.g., English) have been found to apply the same (non-target-like) linguistic forms in subsequent stages, for instance, for interrogatives, negation, and grammatical morphemes. Researchers claim that these developmental stages are ordered and obligatory, that is, each learner must pass each stage before transferring to the next one (Larsen-Freeman & Long, 1991). Moreover, Pienemann (1984) found that instruction is only effective if a learner has mastered the preceding stage. This explains why some learners who are not yet ready to acquire a certain structure do not benefit from instruction, while learners who are ‘ready for it’ benefit from instruction (Teachability Hypothesis, Pienemann, 1985). Moreover, premature instruction can be counterproductive, as learners might avoid the construction taught, as they are afraid to make errors (Ortega, 2009). These aspects have important implications for the teaching process: they might alleviate learner-errors (‘errors’ are an unavoidable and necessary stage of learning), and knowledge about sequences might assist teachers in making choices regarding input and expected output and timing of instruction and feedback.

As for sign languages, there is hardly any description of the SL2 acquisition of morphosyntactic structures, let alone studies about the stages learners pass through regarding specific structures, assuming that L2-learners of sign languages, which are full-fledged natural languages, pass through different stages as L2-learners of spoken languages do. Studies into the acquisition of morphosyntactic sign language structures are scarce. Most studies on SL2 sign language acquisition have focused on the learning of single lexical signs (see for an overview Ferrara & Nilsson, 2017). Only recently, a few studies into the acquisition of morphosyntactic features have been carried out (e.g., Marshall & Morgan, 2015; Ferrara & Nilsson, 2017; Boers-Visker & Van den Bogaerde, 2018). These studies (which we will address in more detail in the discussion section) provide useful information but do not follow the learners longitudinally, which is necessary to document the development of particular structures.

In this chapter, we aim to take a first step towards uncovering the stages in the acquisition of the use of space by presenting longitudinal data of two learners of NGT. In the next section, we will introduce the theoretical background that forms the basis for our analysis.

3.3 Theoretical background: using space

Since in sign language linguistics, ‘use of space’ is a broad concept covering aspects of phonology, morphosyntax, semantics, and pragmatics, it is necessary to clarify exactly what we mean by ‘use of space’ in this chapter.

In our study, we focused on the morphosyntactic use of space, defined as follows: *to produce signs at and move signs between one or more specific, often non-neutral, locations in signing space in order to provide information about the exact location of referents or to provide information about relationships between referents*.

The signing space is the space in front of the signer (Figure 2.7, repeated here as Figure 3.1), in which signs are produced. A subset of signs can be produced at either a *neutral* location (the space in front of the body, the torso, the head, or the arm) that does not convey extra meaning besides the meaning of the concept, or at a *specific* location, which adds extra information. Other signs can be positioned at or can move between locations, expressing relationships between the referents associated with these locations. These specific locations are called 'loci'. The process of associating a locus with a referent is called 'nominal establishment' (Sandler & Lillo-Martin, 2006). Once a nominal is associated with a locus, other signs can be directed at that locus for referential purposes.

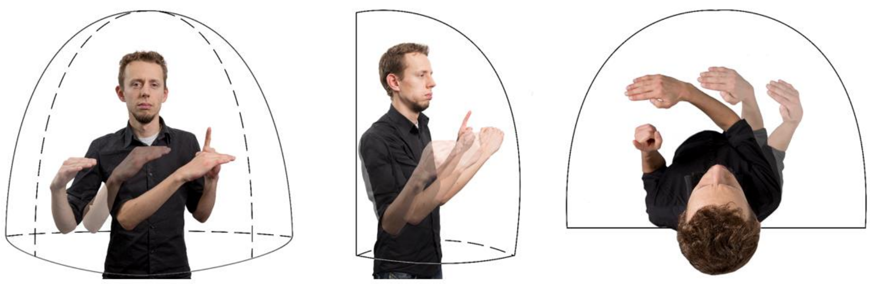


Figure 3.1. The signing space: front view, side view, and top view (photo: Annette Jansen, ©RCSI).

Signers have various devices at their disposal to establish and utilize these spatial loci. In the following sections, we provide a brief description of these devices, which are summarized in Figure 3.2 for the convenience of the reader. This schematic representation (developed by the authors) formed the basis for our coding and analyses.

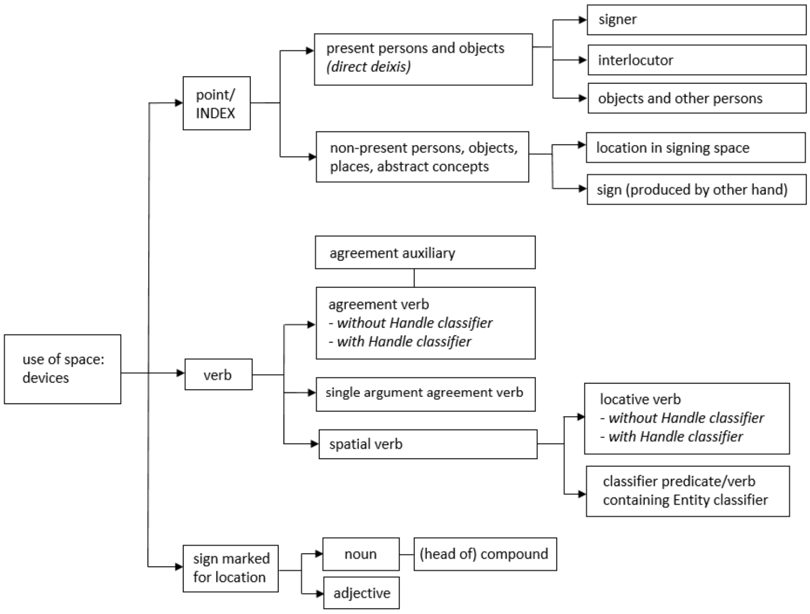


Figure 3.2. Devices to establish and utilize spatial loci.

3.3.1 Pointing

Signers use pointing signs to indicate persons, places, and objects in their direct environment, a phenomenon known as direct deixis. Deictic pointing is very similar – according to some authors, identical – to the pointing gestures used by non-signers to indicate direction, location, and/or objects (Cormier, Schembri & Woll 2013). Signers, however, point at abstract loci in signing space as well. Figure 3.3 illustrates the use of a pointing sign. The location-referent association that is thus established enables the signer to move beyond the here and now (Coppola & Senghas, 2010). Once a locus has been created, pointing signs can be used anaphorically by pointing again to the locus associated with a referent.

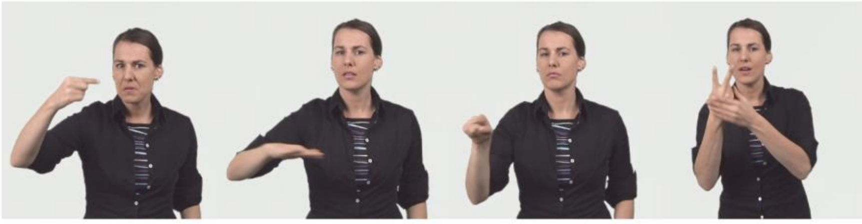


Figure 3.3. Pointing sign used to establish a locus for a non-present referent (stills from http://www.gebareninzicht.nl/).

As schematized in Figure 3.2, we categorized pointing signs into *direct deixis* and *pointing signs to indicate non-present referents*. Within the latter category, we distinguished pointing signs to locations in the signing space (in either the horizontal or the vertical plane)[2] and points to signs that are produced simultaneously with the other hand (see Figure 3.4 for examples).

Figure 3.4. Pointing to a classifier predicate or a lexical sign (stills from http://www.gebareninzicht.nl/).

The linguistic status of pointing signs is a matter of debate, given the fact that non-signers use pointing gestures as well. Some scholars, following Liddell (2000b, 2003a), consider pointing signs used by signers as

[2] In addition to the placement of referents in the horizontal plane, a signer can use the vertical plane to project maps, schemes, or taxonomies.

combinations of linguistic and gestural elements (i.e., gestural deixis), while others attribute linguistic functions to pointing signs, which are taken to serve different grammatical functions (e.g., they serve as determiners, locatives, and – if used anaphorically – as pronouns) (Engberg-Pedersen, 1993; Meier & Lillo-Martin, 2013; Pfau, 2011). We will return to this discussion at the end of Section 3.3.

3.3.2 Spatial modification of verbs

A second mechanism that uses space to create meaning is found in the verbal system. Across sign languages, a subset of verbs can be spatially modified such that they move between locations in space and/or are oriented towards a location or are produced at a specific location. Such modifications enable the signer to provide information about who is doing what to whom, in what direction a referent is moving or is moved to, or where it is located. This phenomenon has been identified in a wide variety of sign languages (for overviews, see Lillo-Martin & Meier, 2011 and Mathur & Rathmann, 2012), including NGT (Bos, 1994, 1995; Zwitserlood & Van Gijn, 2006).

We will explicate spatial verb modification on the basis of the highly influential tri-partite classification system originally proposed by Padden (1988) for ASL. This classification, which has been widely adopted by other researchers and for other sign languages, is based on the observation that verbs can or cannot combine with different kinds of spatial morphemes. It must be noted, however, that not all scholars agree upon this morphological analysis (e.g., Johnston, 1991). Padden (1988) distinguishes three verb classes: *agreement verbs,*[3] *spatial verbs*, and *plain verbs*. Agreement verbs provide information about the subject and/or the object of the verb by modifying the movement trajectory and/or the orientation of the hand(s). Figure 3.5 depicts inflected forms of the NGT verbs GIVE and CALL-SOMEONE. GIVE involves a movement trajectory: the initial position of the hand corresponds to the locus associated with the subject of the verb, whereas the final position of the hands aligns with the locus of the indirect object argument. CALL-SOMEONE agrees with its direct object by orienting the palm of the hand towards the object of the verb (Meir, 2002). Other verbs (for

[3] Initially, Padden (1988) used the term *inflecting verbs*. Later, she adopted Johnston and Liddell's (1987) proposal to rename this category *agreement verbs*, as plain verbs can also display inflection for aspect (Padden, 1990).

example, SEND) combine a movement trajectory and a change in orientation. One can distinguish *regular verbs*, which move from subject to object, and *backward verbs*, in which the direction of movement is reversed (for example FETCH).

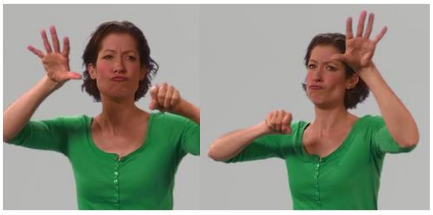
Figure 3.5. Examples of agreement verbs (still from signed story 'Haas wil worteltjestaart', Kentalis Multimedia Haren).

Not all agreement verbs can be marked for both the subject and the object; some verbs can only be inflected for object ('single agreement,' for example, COMPLIMENT in Figure 3.5). This lack of marking can be due to phonological constraints, for instance, when the verb is body-anchored, as is the case for COMPLIMENT (Rathmann & Mathur, 2003). Even if a verb is candidate for 'double agreement' (i.e., the verb can in principle be inflected for both subject and object), signers do not always realize agreement. They can opt to use the citation form (thus not realizing agreement at all) or mark the verb for subject or object only. In the latter case, a verb is *partially modified* (Mathur & Rathmann, 2010). A subset of agreement verbs can embed a Handle classifier: a handshape that denotes how an object is handled or manipulated. GIVE in Figure 3.5, for example, is produced with a flat, closed handshape, signaling a flat object (in this context, a piece of paper).

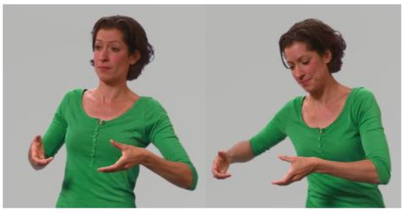
Spatial verbs can also be modified, but this modification does not signal agreement with subject or object. Instead, spatial verbs move between locations, signaling the begin location and/or the end location of a movement. The spatial verb PUT (Figure 3.6), for example, moves between the location where the box was (source) to the location to which the box is moved (goal). In our analysis, we followed Padden (1988) in distinguishing between *locative verbs* and *classifier verbs* (*Whole Entity classifier predicates*). Locative verbs combine with locative morphemes (GO and GRAB in Figure 3.6), and some of them also contain a Handle classifier handshape (PUT in Figure 3.6).

Classifier predicates contain a so-called Entity classifier. Like locative verbs, they signal information about the source and/or goal of the movement by combining with locative morphemes. In addition, the Entity classifier denotes information about the nominal, reflecting characteristics of the referent. We will discuss classifier predicates separately later in this chapter.

GO



GRAB



PUT$_{box}$

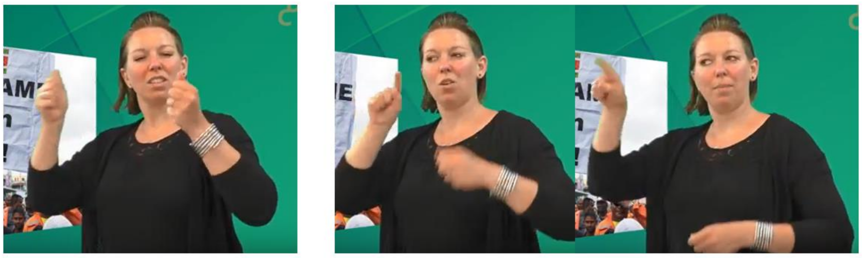
Figure 3.6. Examples of spatial verbs (stills from signed story 'Haas wil worteltjestaart', Kentalis Multimedia Haren).

In contrast to agreeing and spatial verbs*, plain verbs* (for example, the NGT signs EAT, LOVE, and WANT) cannot mark their subject or object referents or begin and end locations by altering their movement trajectory or orientation, nor do they combine with a Handle or Entity classifier. Plain verbs can inflect for manner (e.g., "to eat fast" or "to eat a lot"). However, some plain verbs can be produced in a non-neutral location. The sign BE-PRESENT in Figure 3.7, for example, is produced at a non-neutral, specific location, namely the location of the person the verb agrees with. Padden (1990) argues that these verbs do not take agreement morphology. Zwitserlood and Van Gijn (2006) and Costello (2016) disagree; they classify these cases as examples of spatial agreement. In our analysis, we treated these particular ‘localized plain verbs’ as instances of agreement verbs, using Costello’s (2016) label ‘single argument agreement’. Not all plain verbs are candidates for de-localization. Body-anchored signs, such as EAT and LOVE, cannot undergo this type of spatial modification (Padden 1988).

Figure 3.7. Example of single argument agreement verb BE-PRESENT (stills from http://www.gebareninzicht.nl/).

3.3.3 Agreement auxiliaries

An alternative way to express agreement is the use of *agreement auxiliaries*. Agreement auxiliaries are attested in some, but not all, sign languages and are generally void of semantic content; their only function is to indicate the grammatical role of the arguments by means of a change of path movement, similar to what we described for agreement verbs (Steinbach & Pfau, 2007; Sapountzaki, 2012). Agreement auxiliaries are generally used to express agreement in the context of plain verbs, but they may also accompany uninflected agreement verbs (Morgan, Barrière & Woll, 2006), or they may be coupled with a partly inflected or fully inflected agreement verb, resulting in (partial) double agreement marking (Cokart, 2013). NGT does employ an agreement auxiliary, which is often glossed as ACT-ON or AUX-OP (Bos, 1994, 2016[1996]; Cokart, 2013). ACT-ON involves a -handshape moving between the loci associated with the subject and the object (Figure 3.8).



PROTEST ACT-ON$_{president}$

"They are protesting against the president."

Figure 3.8. Example of agreement auxiliary ACT-ON (stills from broadcast DoofCentraal)

3.3.4 Classifier predicates

In the previous paragraph, we mentioned Whole Entity classifier predicates,[4] which can be considered a subclass of spatial verbs. Classifier predicates behave differently from other spatial verbs. Use of classifier predicates or constructions enables the signer to give a detailed description of the location, movement path, and/or manner of movement of an argument of the verb, as well as the relative location of two referents in relation to each other (Schembri, 2001). The classifier morpheme (i.e., the handshape) denotes characteristics of the referent and generally refers to a class of referents sharing the same characteristics.

In the examples in Figure 3.9, the -classifier signals that the referent belongs to the class of vehicles (e.g., car, bus, truck) while the -classifier in the leftmost and the rightmost pictures denotes an upright vehicle (e.g., bicycle, motorcycle, moped). In Figures 3.9b and 3.9c, the signers use two-handed constructions in which the referent is put in relation to some other referent – another car in Figure 3.9b and a person in Figure 3.9c – yielding the meanings "car passes another car" and "bike circumventing standing person," respectively.

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[4] Traditionally, the denoting handshapes in these verbs have been labelled 'classifiers' and the verbs 'classifier verbs' or 'classifier predicates.' Researchers have proposed a variety of terms as alternatives for the term 'classifier verbs', including polymorphemic verbs (Engberg-Pedersen, 1993), polycomponential verbs (Slobin et al., 2003), and depictive constructions (Cormier et al., 2012). See for an overview Schembri (2001, p. 56).

Figure 3.9. Examples of Whole Entity classifier predicates (stills a and b from signed story ‘Wat een sof!’; still c from http://www.gebareninzicht.nl/)

A vast body of work has been devoted to the description and analysis of classifier predicates, which have been observed in almost all sign languages studied to date (Schembri, 2001; Zwitserlood, 2003, 2012). The use of classifier predicates to indicate the location of referents is unique to sign languages, although experimental evidence suggests that some naïve non-signers also use classifier-like gestures to express motion events (Singleton, Morford & Goldin-Meadow, 1993; Schembri, Jones & Burnham, 2005). Yet, the classifiers used by signers are highly conventionalized, in contrast to the classifier-like constructions used by gesturers. Besides constraints on the selection of possible handshapes, there are conventions for how the parts of the spatial scene are mapped out (Morgan, Herman, Barrière & Woll, 2008).

3.3.5 Spatial modification in the nominal domain

The third category of devices (Figure 3.2) are signs marked for location. Within the nominal domain, a subset of signs can be spatially modified, that is, they are articulated in a non-neutral location as opposed to the neutral ‘citation form’ in front of the signer’s body. The sign PERSON in Figure 3.7 is an example of a spatially modified noun. Other nominal elements, such as adjectives, adverbials, and numerals, can be spatially modified as well, to agree with the head noun (Engberg-Pedersen, 1993; Costello, 2016).

By de-locating a sign, the signer can signal information about the actual location of an object in space in relation to the signer or to other objects and thus create an iconic representation of the environment described. Another function of this kind of modification is to establish a relationship between a referent assigned to a locus and subsequent signs articulated at the same locus. In Example 1, the modified signs NEW and BEAUTIFUL are articulated at the same locus as the sign HOUSE, thus creating an attributive association between the signs.

Example 1
YESTERDAY IX_1 $HOUSE_{3a}$ NEW_{3a} $FIND_{3a}$ / $BEAUTIFUL_{3a}$
Yesterday I found a new house, it is beautiful

Not all signs are candidates to be marked for location. Signs that are body-anchored cannot be de-located, as the phonological specification of these signs prevents incorporation of a locus marker.

So far, this chapter has focused on devices to establish and refer to loci. The following section will discuss perspective shift, a phenomenon that is closely related to use of space.

3.3.6 Perspective shift

The fact that in sign languages, the signer's own body is also present in the signing space provides the opportunity to take up the role of a character in an event. An event can be described from an external viewpoint (observer perspective) or from the vantage point of a character in that event (character perspective) (Perniss, 2012). In the case of *observer perspective*, an overview of an event is given as if a neutral narrator observes a situation from a distance, and referents are established at fixed locations. In *character perspective*, the character is mapped on the body of the signer, and referents are projected in signing space as seen by the character. Both types of perspective are described by several researchers and assigned different labels (see for an overview Perniss, 2012).

When describing an event, a signer can alternate between observer perspective and the perspective(s) of one or more characters, including himself. If a signer shifts into a character's role, the signer's body is representing the body of the character, which enables the signer to convey the character's actions, feelings, thoughts, and utterances. This phenomenon is called *role shift* (Mandel, 1977) or *constructed action* (Roy, 1989; Liddell & Metzger, 1998; Metzger, 1999). The event's description from the point of view of the character portrayed has consequences for the use of space: all instances of pronouns, verb agreement, and other spatial devices during this referential shift are interpreted from the character's vantage point. A point to the chest should be interpreted as referring to the person whose character is being conveyed, instead of a point referring to the signer himself. Similarly, a regular agreement verb directed from the body of the signer towards a third-person referent signals that the portrayed character, and not the signer, is the grammatical subject (Lillo-Martin, 2012; Morgan, 2002). If the signer alternates between multiple characters, there will be a sequence of different perspectives; the spatial configuration displayed by the signer changes along with each perspective shift (Janzen, 2005).

In sum: signers have different devices at their disposal to place and refer back to referents in the signing space; Figure 3.2 summarizes these devices. The chosen perspective influences locations towards which the pointing signs or verbs are directed or the location at which de-located signs are articulated (i.e., the chosen perspective influences the interpretation of the morphemes attached).

To conclude this section, it is important to mention that some researchers reject the interpretation of spatial loci as being morphemic. The idea that the spatial loci incorporated into pointing signs, spatially modified verbs, and nominal signs marked for location should be treated as morphemic was first challenged by Liddell (2000a, 2000b). Liddell states that agreement verbs, which he calls *indicating verbs*, are fusions of linguistic and gestural components – just like pointing signs. The modifications of signs is, in his view, not the result of a morphological process; instead, he argues, the movement can be explained as 'gestural pointing' (see also De Beuzeville, Johnston & Schembri, 2009; Cormier, Fenlon & Schembri, 2015). As a result, different terminologies are used in the literature, which reflect different opinions on the appropriate analysis of the components. In any case, the employment of spatial modification is constrained by rules. Learners have to learn to master these conventions, irrespective of the discussion whether the phenomena should be considered purely linguistic or containing gesture-influenced elements. We have chosen to adopt the 'morphemic approach' and the corresponding terminology for the purpose of the present study, without making theoretical claims about the appropriateness of the terminology.

3.4 Method

The study reported here draws on data collected in a longitudinal cohort study carried out between 2009 and 2015 by the Deaf Studies Research Group (DSRG) of Utrecht University of Applied Sciences (UUAS, Hogeschool Utrecht). Randomly selected students (n = 43) of four successive cohorts, who participated voluntarily, were followed during their four-year undergraduate study for either interpreter or teacher of NGT at UUAS. In order to compare the learner SL2-data to the production of L1-signers, we analyzed the production data of L1-signers who performed the same task.

3.4.1 Participants

For this particular study into the use of space, we transcribed and coded the data of two hearing female SL2-participants, referred to here with the pseudonyms Anna and Charlotte. Both SL2-participants were 19 years old when they enrolled in the program. The two SL2-participants neither had deaf acquaintances nor prior knowledge of NGT at the onset of their study and this research. Both participants had learned three foreign (spoken) languages in secondary school and had Dutch as their L1.

The three L1-participants (referred to as Nina, Peter, and Tess) performed the same task. Their mean age was 31 years. Two have deaf parents, and one has hearing parents. All have been using sign language since early childhood.

3.4.2 Procedures

The SL2-participants were interviewed by a skilled (deaf or hearing, see Appendix 3B) signer every ten weeks. These six- to ten-minute interviews covered everyday topics that were of interest to the participant, such as family, work, and hobbies. The interviews were not scripted, nor were subthemes determined in advance. When necessary, the interviewer encouraged the participant to expand their descriptions by asking follow-up questions. We obtained permission from the three L1-participants to analyze an existing recording of them performing the same task. The recorded interviews were transcribed and annotated.

The transcription was done in ELAN[5] (Crasborn & Sloetjes, 2008) by two annotators and trained student assistants. Utterances of both interviewer and participant were marked on separate tiers and provided with a (free) translation. Subsequently, each sign produced by the participant was represented by a Dutch gloss on two tiers representing the dominant hand and the non-dominant hand. The eight transcriptions made by the student assistants were checked and corrected by annotator 1 (first author). The other recordings were fully transcribed by annotator 1 (*n* = 8) and annotator 2 (*n* = 13).

Both annotators were hearing, fluent SL2-signers who had received linguistic training. To ensure consistency of transcription, they used a codebook created for this purpose and organized meetings to discuss uncertainties. If needed, a linguist and/or a deaf informant were consulted. After each meeting and subsequent consultation, the codebook was adjusted and refined. Inter-rater reliability was calculated for the glosses of three interviews (10 percent of the set), resulting in satisfactory inter-rater reliability figures of 86 percent, 93 percent, and 86 percent.

Once the utterances had been glossed, they were identified as analyzable or not. Incomplete utterances were excluded, as well as clarification requests, sign negotiation, frozen routines, and minors. Routines are signs or utterances that are memorized or fossilized (Lillo-Martin, Quadros, Berk & Hopewell-Albert, 2015), and minors are short utterances of which "no productive morphosyntactic structure can be presumed" (Van den Bogaerde, 2000, p.51). For this study, we considered as minors short back-channeling responses or evaluations about what was uttered, produced in isolation, such as NICE, EXCITING, GOOD. The last category to be excluded were exact imitations of an utterance of the interviewer. A schematic representation of the process of exclusion can be found in Appendix 3A.

An overview of the recordings, their length, the number of utterances and the number of included and excluded items, the number of analyzable signs, and the total amount of time each participant was signing is provided in Appendix 3B.

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[5] ELAN is developed by the Max Planck Institute for Psycholinguistics, The Language Archive, Nijmegen, The Netherlands (https://tla.mpi.nl/tools/tla-tools/elan/).

3.4.3 Coding

The analyzable utterances were coded by annotator 1 for the occurrence of devices to create and utilize spatial loci. Each instance of a sign being produced at a non-neutral location, as well as signs being directed towards non-neutral locations, was assigned a code corresponding to one of the categories displayed in Figure 3.2. An additional code was added if the sign was repeated for clarification. These repetitions were removed from the dataset at a later stage in order to prevent overestimation of participants' performance. Moreover, extra codes were added to indicate whether a sign was modified according to the viewpoint of a character or from an observer perspective. Additional tiers were created to categorize the nature of pointing signs (e.g., establishment, reference, repetition, etc.) and to provide extra information about the verbs produced.

To avoid overestimation of use of space, we were conservative in coding instances of ambiguous spatial modification. An ambiguous form resembles the citation form, which makes it hard to identify whether the sign is modified or not. When a sign corresponded to the citation form, and the participant did not explicitly establish the referent(s) prior to or after producing the sign, or the context did not signal congruence with the referents, we classified the form as unmodified. If the participant did establish the referent(s) prior to or after producing the apparent citation form, and the locations of the established referent(s) were congruent with the location(s) attached to the verb, point, or nominal, the signs were coded as modified, with an additional code 'congruent', following Cormier et al. (2015).

During the coding, a logbook was kept describing coding decisions, uncertainties, and typical (learner) behavior. Uncertainties were discussed with two sign language linguists, and codes were adjusted if needed. After finishing the process, all transcriptions and codes were re-examined. Furthermore, a subset of the data (10 percent) was re-coded to check consistency with regard to the coding, resulting in intra-rater reliability scores of 83 percent (interview 303-2B) and 84 percent (307-1D).

In the next section, we will present the most interesting findings. We will start with a quantitative analysis, followed by a qualitative analysis.

3.4 Results

3.4.1 Quantitative analysis

First, we calculated the occurrence of spatial modification within the categories of pointing, spatially modified verbs, signs marked for location, and classifier predicates. We separated out the latter since classifier predicates behave differently from other verbs. Figures 3.10a and 3.10b illustrate the distribution of these categories as a percentage of the total number of signs of each particular recording per L2-participant. The numbers on the x-axis indicate the year of the curriculum, each year (1, 2, 3, 4) being divided in four ten-week periods (A, B, C, D). Unfortunately, both datasets are incomplete. Anna could not be recorded in periods 2D and 3A, while Charlotte did not participate during periods 4C and 4D. Furthermore, we had to delete Charlotte's session 3A, since the interviewer initiated a discussion that evoked language that could not be compared to the other language samples. Figure 3.10c shows the distribution of the categories as shown by the L1-participants.

As can be seen from Figure 3.10, Charlotte showed a pattern that appears quite inconsistent in comparison to Anna. The first recordings were made after 16 weeks of instruction (approximately 100 instruction hours; see Appendix 3C for information about the NGT curriculum). During this first session, both SL2-participants already modified signs for location, although it must be noted that the spatially modified verbs used by both participants in this first session were all verbs that have a gestural counterpart (PUT-DOWN$_{box}$, LIFT$_{plate}$, PUT-IN-BAG$_{cake}$, HAND-OVER$_{box}$, TAKE-PHOTOS$_{in\text{-}a\text{-}direction}$). It is not until the end of the first year that the SL2-participants started to produce agreement and spatial verbs that were not iconically motivated (Anna modified the sign ASK in session 1D, while Charlotte modified VISIT in session 1C and CALL, HELP, SUPPORT, and DIRECT-ATTENTION-TO in session 1D). We will return to that in the next section.

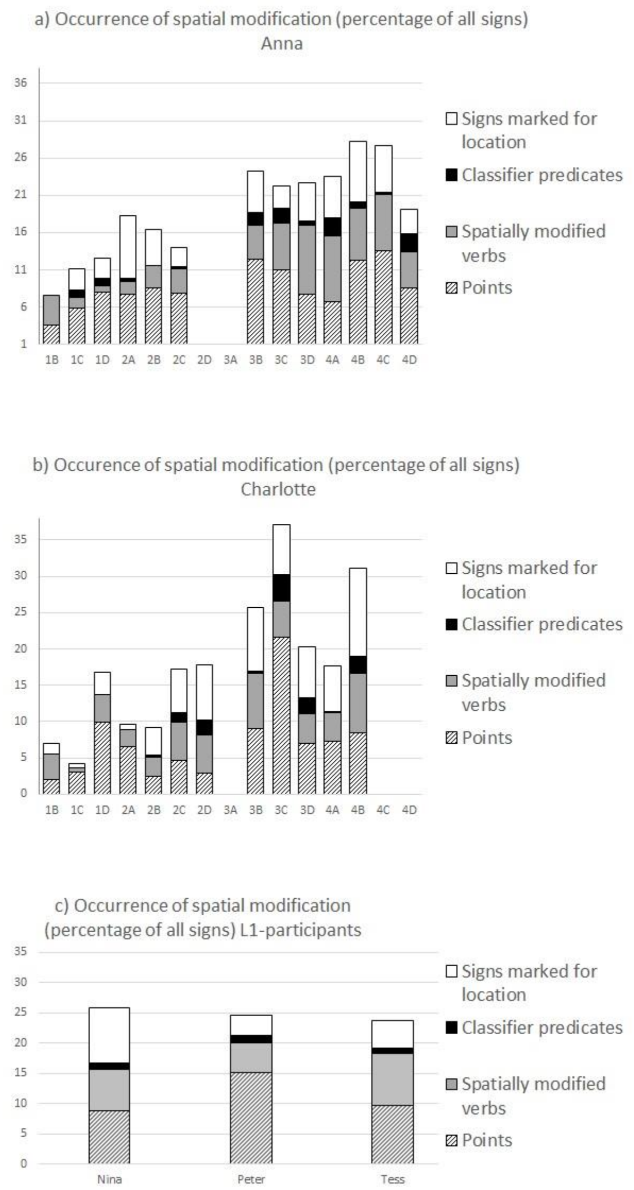

Figure 3.10. Distribution of pointing signs, spatially modified verbs, classifier predicates, and signs marked for location produced by Anna (10a), Charlotte (10b), and L1-participants Nina, Peter, and Tess (10c).

The L1-signers modified approximately 25 percent of the uttered signs. Peter and Nina seemed to favor one particular device; Nina produced a lot of signs marked for location, whereas Peter produced more pointing signs.

The portion of classifier predicates was small in both L1- and L2-partipants. Classifier predicates were absent in the SL2-participants' initial sessions.

Although the charts above show some general patterns, they do not provide much detailed information, reflecting only the main categories. When we take a closer look at each category, some interesting findings emerge.

3.4.1.1 Verbs

First of all, we examined in detail the verbs produced by the participants. We computed the number of spatially modified verbs as a percentage of all verbs produced. We considered a sign to be spatially modified in cases in which the sign was produced (i) moving from or towards a meaningful location, (ii) moving between two meaningful locations, or (iii) at a meaningful location. We considered a location meaningful when the location was associated with a referent prior to or after uttering the modified sign (Examples 2 and 3), or when the context sufficed to understand the location-referent association (Example 4). In Example 4, Nina did not mention the referent, but the context as well as the high location (3b-high) in the signing space was sufficient to understand that she referred to the teachers she worked with.

Example 2

IX$_{3a-1}$ FATHER BY-CHANCE VIA NETWORK HOUSE$_{3a-2}$ NEW$_{3a-2}$ FIND$_{3a-2}$

Her father found a new house by chance, through his network (Peter)

Example 3

IX$_{1}$ PERFORM-RESEARCH$_{3a}$ COMPUTER$_{3a}$ INTERNET$_{3a}$ TYPE$_{3a}$

I did some research on my computer, using internet (Nina)

Example 4
TEACHING^ASSISTANT LEVEL-LOW LEVEL / $IX_{3b\text{-high}}$ [teachers] $PREPARE_{3b\text{-high}}$ $_{3b\text{-high}}GIVE_1$
A teaching assistant has a lower level, they [the teachers] have to prepare and give it to me (Nina)

The category 'plain-not modified' includes plain verbs that are not capable of showing agreement, as well as verbs that could be spatially modified but that were produced in citation form (*candidates for spatial agreement*). Figures 3.11abc present the results of this count.

Remarkably, the L1-participants produced fewer spatially modified verbs than the SL2-participants in their last sessions. When examining the figures from the last year and a half (from session 3B onwards), we see that Anna modified 24 to 44 percent of the verbs (mean 33 percent) and Charlotte 21 to 38 percent (mean 31 percent). The L1-participants on their part produced 25 to 28 percent spatially modified verbs.

Another notable observation is that Anna produced a high number of modified verbs during her first session, followed by a sharp decrease in the second session. Looking closer at the particular verbs during this first session, we see that they all were iconically motivated and have a gestural counterpart. In order to gain a better understanding of degree of similarity between these particular signs and their gestural counterparts, we asked sign-naïve gesturers (n = 6) and L1-signers (n = 4) to produce signs/gestures in the same context as Anna did (see Appendix 3D for an example). The outcomes of this experiment revealed that the signs Anna produced resemble the signs produced by the L1-signers and differ from the gestures produced by the sign-naïve gesturers. Thus, it is plausible to assume that Anna indeed used spatially modified signs during the first sessions, and that we did not overestimate her performance by miscoding (that is, coding gestural behavior as instances of sign modification). The fact that Anna limited herself to iconically motivated modified verbs can be either coincidental, or she might have used her gestural experience to bootstrap her learning process, resulting in a relatively fast acquisition of verbs that have iconic features, as compared to the non-iconically motivated verbs.

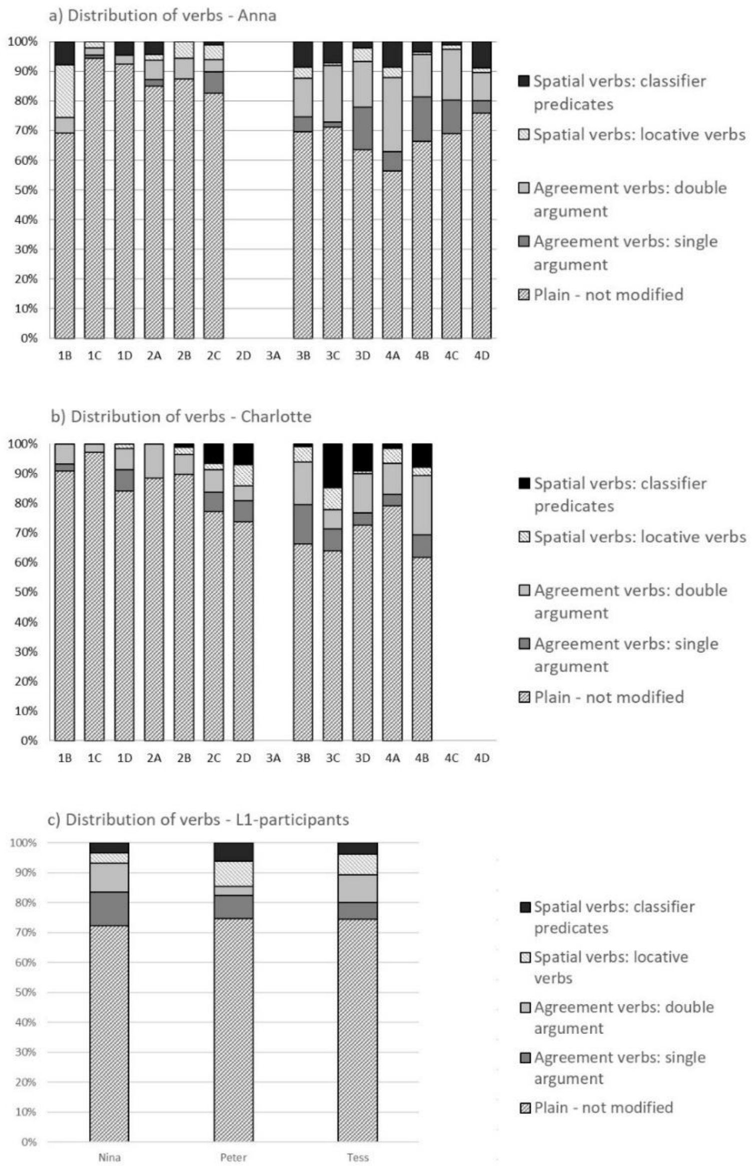

Figure 3.11. Distribution of verbs (plain, spatial, and agreement verbs) produced by Anna (11a), Charlotte (11b), and L1-participants Nina, Peter, and Tess (11c).

As pointed out previously, the proportion of classifier predicates was relatively low in both SL2-participants and L1-participants (0.2 to 5.5 percent of the verbs for Anna and 0 to 3.6 percent for Charlotte; 3.4 percent, 6.1 percent and 3.7 percent for the L1-participants, respectively).

Finally, we analyzed the data for the occurrence of the agreement auxiliary ACT-ON, which both SL2-participants barely used. For Charlotte, we coded one instance, while Anna produced seven instances during three sessions in years 3 and 4. A similar pattern was observed in two out of three benchmark-participants. These participants produced 2, 2, and 17 uses of act-on (5, 7, and 25% of the signs in the category 'verbs and agreement carriers', respectively).

3.4.1.2 Pointing signs

Besides the additional coding process regarding verbs, we performed supplementary coding for pointing signs. On a separate tier, each pointing sign was coded for whether the point served to establish a location-referent association (establishment), to refer to a previous established referent (maintenance), or was repeated for some reason. Within the latter category, we distinguished sentence-final repetitions (i.e., pronoun copy),[6] repetitions of the pointing sign directly following the referent (illustrated in Figure 3.12),[7] and other mid-sentence repetitions.

Figure 3.12. Example of repetition of pointing sign directly following the referent.

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[6] In the case of pronoun copy, the sentence subject is repeated at the end of the sentence by means of a pointing sign (INDEX) (Bos, 1995).
[7] Both participants gave permission to be identifiable in these pictures.

Furthermore, we added additional codes if a pointing sign was produced from the vantage point of a character (either self-reference or reference to a fictive addressee in a constructed action context). Figure 3.13 presents the proportions of different pointing types.

Figure 3.13 shows that Anna initially used pointing signs to point to herself and an (imagined) environment from a character perspective (constructed action). This disappeared after session 1C and re-emerged a full year later (session 2C). Charlotte, on the other hand, initially only produced pointing signs for establishment of referents at arbitrary locations in the signing space, yet she did not refer back to these referents.[8] Although Anna did use a few pointing signs for reference in session 1, the general picture is that both SL2-participants showed a dramatic increase in the number of referential pointing signs from session 1D onwards (i.e., after approx. 30 weeks of instruction).[9] In Anna's session 3C, we saw a large proportion of referential pointing signs and a relatively low proportion of pointing signs for establishment. This can be explained by the topic of the conversation, namely, a detailed explanation of the relationship between three persons.

The L1-participants' data reflect their differences in signing style. Nina produced longer stretches of constructed action, and Peter predominantly used the neutral signing space to talk about persons and objects.

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[8] Points to abstract signing space in the first sessions include both points to third-person referents (e.g., man, friend) and points to objects or locations (e.g., chairs, Spain, shop).

[9] Note that Anna 'switches' from use of character perspective and establishment of some loci that are not used for further reference to abstract reference, and Charlotte switches from establishment of loci that are not used for further reference to abstract reference. Notably, both participants localize and refer to more than 10 different persons, locations and abstract entities in session 1D.

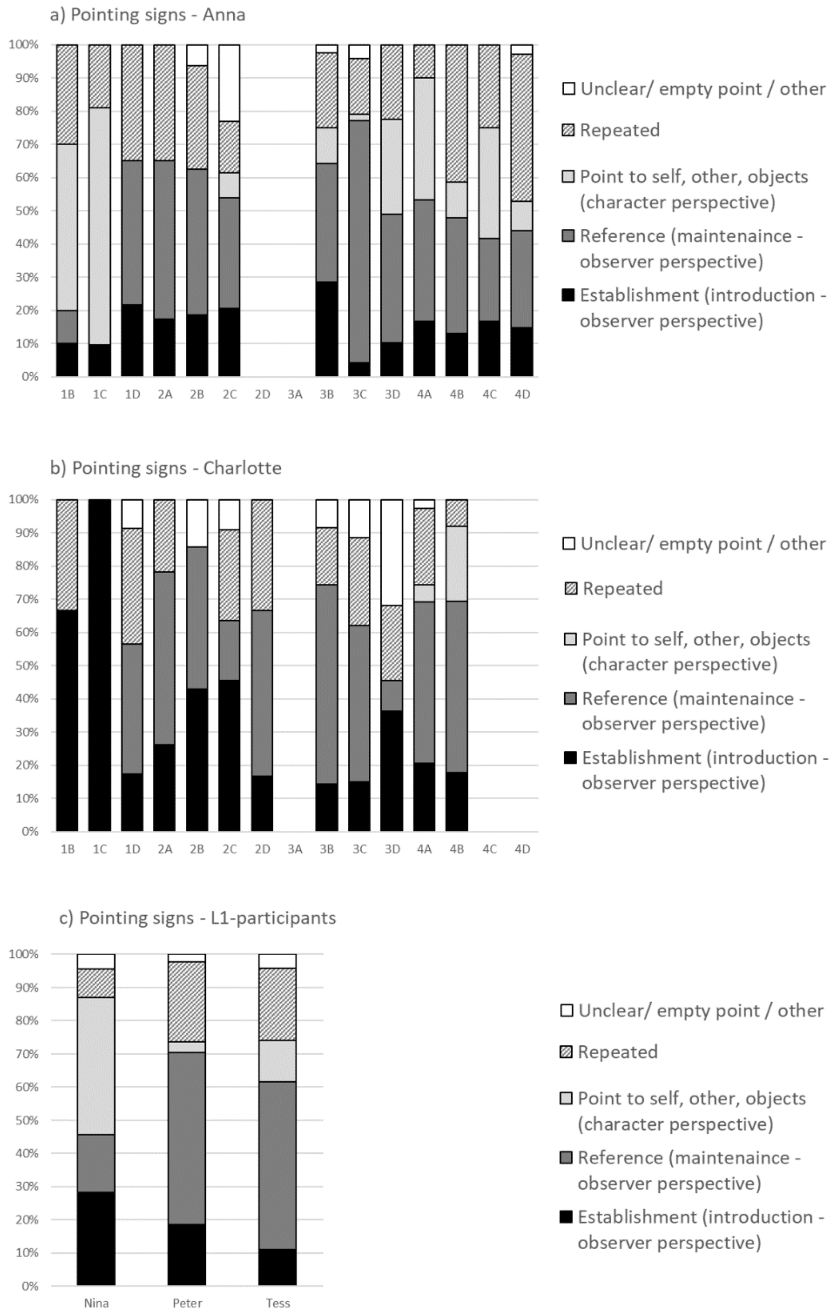


Figure 3.13. Distribution of pointing signs produced by Anna (13a), Charlotte (13b), and L1-participants Nina, Peter, and Tess (13c).

3.4.2 Qualitative analysis

In the previous section, we quantitatively described the learning process of the SL2-participants regarding use of space. The following is a brief synopsis of the extended logbook, in which we noted remarkable L2-behavior regarding use of space.

3.4.2.1 Pointing signs

When we considered the pointing behavior of both SL2-participants, we noticed a number of instances of *stacking* during the first and second years, that is, using the same location in space for more than one referent (Loew, 1984). Loew found this behavior, illustrated in Figure 3.14, in children acquiring sign language as an L1.

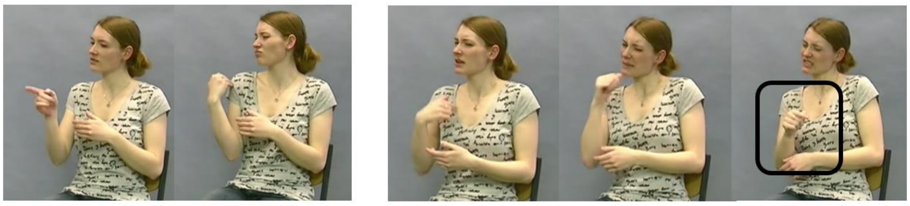
course Statistics | subject Mathematics | subjects Biology and History

"The course Statistics is really difficult, you have to calculate a lot. The course has not started yet, so I am curious. I do like mathemetics, but maybe this will be difficult at university level. The courses Biology and History are finished already […]"

Figure 3.14. Example of stacking.

Another striking observation is the misuse of pronouns during constructed action. In some cases, but not always, Anna struggled with using the correct pronoun when reporting speech or actions from other persons. An example, judged as non-target-like by our deaf informants,[10] is shown in Figure 3.15, in which Anna intended to sign 'you' but instead pointed to an abstract location in signing space. We observed this behavior until the beginning of year 4.

[10] One of the reviewers raised the question that an alternative interpretation (e.g., "he informed me that I missed him") could be possible too. However, the Dutch mouthings that accompany the pointing signs point to one possible interpretation ("I miss you").



IX$_{person}$ LET-KNOW$_{1}$ IX$_{1}$ MISS *IX$_{3b}$

He let me know that he missed me / “He let me know: “I miss you”

Figure 3.15. Misuse of pronouns during constructed action.

3.4.2.2 Verbs

We found that the SL2-participants started to modify non-iconically motivated agreement verbs intentionally at the end of year 1. In their first year, they produced many verbs that would have been candidates for agreement in their citation form; however, this decreased in the following years. We noted a few reversal errors (e.g., $_{3}$OBSERVE$_{1}$ instead of $_{1}$OBSERVE$_{3}$), but the majority of the agreement verbs in the observer perspective were produced correctly. In character perspective, we saw Anna struggle to produce the correct inflections after a shift of reference.

We did not observe cases of overgeneralization, that is, instances of plain verbs that were spatially modified.

As noted in the previous section, both L1- and SL2-participants rarely used classifier predicates. Initially, the SL2-participants did not produce classifier predicates at all. We noted the first use of classifier predicates in their data after eight months (Anna) and 18 months (Charlotte). It is noteworthy that the first classifier predicates to emerge in Anna’s data were restricted to the -classifier for a moving person and the -classifier (palm facing down) to represent a crowd of people. The first instances of the -classifier occurred several times, but Anna did does not vary the location and movement; she seemed to encode a prototypical event schema (viz. “the person approached me”). Charlotte started to produce classifier predicates much later and, like Anna, she initially produced the -classifier to represent a crowd and the -classifier to depict standing and walking persons. However, in contrast to Anna, Charlotte immediately produced the

-classifier in different, less prototypical, variations. She produced the -classifier as well, to indicate the location of several podia. During years 3 and 4, both SL2-participants produced a variety of classifier predicates. However, Charlotte had issues with selecting the appropriate classifier handhapes, as well as with producing the correct phonological form. The stills in Figure 3.16a show an example of the selection of an inappropriate classifier handshape. Instead of depicting a row of chairs, she selected the classifier for a row of standing people. In addition, she struggled with phonology, producing three rows of stairs with a slightly downward movement, which should be upwards. The classifier predicates denoting sitting persons in Figure 3.16b had an incorrect orientation (viz. legs up in the air). Both examples were rejected by our deaf informants. Charlotte struggled with the selection of appropriate classifier handshapes and the spatial configuration of classifier predicates until the beginning of year 4.[11]

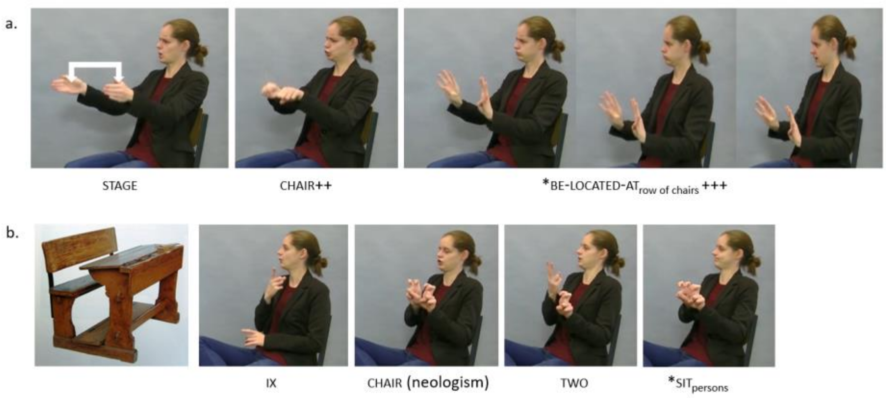


Figure 3.16. Examples of L2-participant struggling with handshape selection and spatial configuration of Whole Entity classifier predicates.

Both SL2-participants used classifier predicates to describe the actual layout of a scene (for example, to provide a description of a classroom or an interpreter setting), as well as classifier predicates that should be interpreted

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[11] At the end of year 3 (session 3D), six of the seven classifier predicates were either inappropriate, phonologically incorrect, or lacked a referent. In the last session (session 4B, after 3.5 years of instruction), still two out of eight classifier predicates were off-target.

metaphorically (Sandler & Lillo-Martin, 2006). In the latter case, the movement or location of the classifier predicate was not meant to encode the real physical activity, but beared a metaphorical meaning. The location of the referent denoted by the right hand in the construction, which is translated as “he supported me” in Figure 3.17, for example, was (as the context revealed) not literally behind the signer.[12] We noted this non-literal, metaphorical use during the sessions recorded in years 3 and 4. Once metaphorical classifiers appeared in the data, both participants showed creative use of the constructions, that is, they modulated handshapes according to their needs and added repetitions or multiple movements (e.g., “join different groups” or “two people taught the group”).[13]

Figure 3.17. Examples of metaphorical use of classifier predicates.

[12] The construction is related to the Dutch idiomatic expression “he stands behind me,” meaning “he supports me when I need support.”
[13] One could argue that the constructions are lexicalized forms that are de-lexicalized during the discourse. However, we do not have evidence that the forms displayed by the students are lexicalized forms in NGT.

3.4.2.3 Signs marked for location

Whereas the classifier predicates posed difficulties for the SL2-participants, they seemed to acquire signs marked for location quickly and without much difficulty. From the middle of the second year, Anna started to utilize the possibility to create a compound[14] by attaching the sign PERSON or AREA to a noun (for example TEACHER^PERSON). The fact that Anna marked the second part of the compound (and sometimes the first part, too) for location and used this strategy to localize signs that can exist without the added segment (i.e., the NGT signs TEACHER, DENTIST, or WITCH can exist without the added segment PERSON) signals intentional use of this strategy. Charlotte started to use this strategy in year 3, although she produced one example as early as session 1B.

While we did not find examples of overgeneralization in agreement verbs, we did notice overgeneralization in spatially modified nouns and adjectives. Figure 3.18 shows an example: Anna produced the sign SINTERKLAAS (i.e., a Dutch mythological figure like Santa Claus), a compound consisting of the sign BEARD followed by the sign SCEPTER, which is produced next to the signer's body and cannot be spatially modified. However, Anna detached the second part SCEPTER from the original location and produced it at the location where the referent was situated.

SINTERKLAAS (BEARD^SCEPTER)

Figure 3.18. Example of overgeneralization of spatial modification of a (compound) noun.

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[14] Some scholars consider these examples as derivation instead of compounds (e.g., PERSON is considered an agentive suffix) (Sandler & Lillo-Martin, 2006). However, such an analysis is not applicable to NGT, as the compound members in these examples do appear as free forms in the language, while affixes do not appear as a free form (Meir, 2012b).

3.5 Discussion and conclusion

In this chapter, we address the acquisition of ‘use of space’ as shown by two learners of NGT, who were followed during their four-year bachelor study. We operationalized the umbrella term ‘use of space’ by coding the participants’ utterances for the employment of pointing signs, spatially modified verbs (agreement verbs, locative verbs, classifier predicates, single argument agreement verbs, and agreement auxiliaries), and spatially modified signs from the nominal domain. In addition to quantitative data, we present a qualitative description of the SL2-participants’ acquisition process.

The most remarkable result to emerge from the data is that the learners seemed to struggle the most with using appropriate classifier predicates, as well as with producing correct verb inflections in cases in which an agreement verb is uttered in a constructed action context. In contrast, both learners produced spatially modified signs from the nominal domain (that is, spatially modified nouns, adjectives, and quantifiers) quite effortlessly in their signing. They employed pointing signs and locative verbs as well as agreement verbs in the early stages of their SL2 acquisition. Considering the examples in the data, it might be that learners use their gestural inventory as a stepping stone into the acquisition of spatially modified forms. With regard to pointing signs, we found examples of stacking, a behavior also found in children. One of the participants showed difficulties in applying the correct pronouns while describing a scene from the vantage point of another character. The last finding worth noting is the observation that both participants hardly ever overgeneralized verb inflection, but we did find examples of overgeneralization in the category ‘signs marked for location.’

For the convenience of the reader, we summarize the key findings in Table 3.1.

Table 3.1. Key findings of study into the SL2 acquisition of the use of space.

Device	**Key findings**
Pointing signs	Used from the start; Onset use of pointing signs for reference at the end of year 1; Stacking behavior during years 1 and 2; Occasional misuse of pronouns during reported speech/constructed action.
Spatially modified verbs (agreement verbs, spatial verbs) and agreement auxiliaries	Used from the start, initially predominantly 'acting out' a scene; First 'deliberate' modifications of non-iconic agreement verbs at the end of year 1; Overgeneralization hardly occurs; Use of agreement auxiliaries is scarce.
Classifier predicates	Not used during the first eight to 18 months; First verbs to appear: -classifier for standing person and -classifier for a crowd; One L2-participant struggles with selecting the correct classifiers and phonological parameters up to year 4 Creative metaphorical use of classifier predicates in years 3 and 4.
Signs marked for location (nominal domain)	Appear at an early stage in the data; Seem to be acquired fast and relatively effortlessly; Onset of compounds with the aim to localize referent in years 2 and 3; Occasional overgeneralization.

Our study provides insights into the acquisition of use of space by adult learners of a signed language and supports some previous findings in the literature. Our data concerning classifier predicates are in line with the findings of Ferrara and Nilsson (2017), who found that learners of Norwegian Sign Language, who were asked to describe the layout of an area, struggled with the selection of the appropriate classifier signs and with producing the correct phonological parameters. In comparison to their instructors, these learners used fewer classifier signs, and they produced "a scaled down version of the areas they described, instead of depicting the areas as if they were moving through them, which is what their instructors tended to do" (p. 22). Marshall and Morgan (2015) also report that the production of classifiers is challenging for novel learners; learners displayed problems in using the conventional BSL handshapes, and the researchers noted omissions and substitutions. Although this last study is less comparable to our study (as it uses an elicitation task prompting short answers), it corroborates that production of classifier predicates poses challenges to learners. Although some sign-naïve gesturers have been reported to use classifier-like constructions while describing the spatial layout of a scene (Singleton et al., 1993; Schembri et al., 2005), the challenge for learners lies in discovering how to apply classifier predicates in a conventionalized manner. Our study demonstrates that it may take several years of instruction for SL2-learners to correctly produce classifier predicates within longer stretches of discourse.

There are a number of limitations to our study. First, the investigation concerned only two SL2-participants, and although the challenges they encounter confirm other findings and the intuition of sign language teachers, their signing may not be representative of all SL2-learners. Furthermore, in order to capture more detailed information about the rapid acquisition during the first year, it would have been beneficial to collect more samples and with shorter intervals. A third limitation is the fact that the interviews were not scripted, nor were there specific prompting questions. This led to a range of different topics and may have resulted to the avoidance of certain phenomena by the learners.

The current study is a first step towards shedding light on the interlanguages that SL2-learners construct. To gather more detailed information of the phenomena described, a larger number of participants, a larger number of samples with shorter intervals, and additional methodologies (e.g., elicitation tasks) is needed.

Despite these limitations, our research may serve as a basis for future studies on the SL2 acquisition process, in particular regarding the question of how instructors can support learners in this process. In order to take this next step, an understanding of the SL2 acquisition process is necessary, and our study has gone some way towards enhancing our understanding of the acquisition of the different devices subsumed under the term 'use of space.'

Acknowledgements

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4. Study 2: A longitudinal study into the acquisition of classifier predicates in fourteen SL2-learners of NGT

4.1 Introduction[1]

All learners of a new (second, third or *n*) language at some point have to acquire the grammatical structure of this new language in order to communicate successfully. There is ample evidence that learners of spoken languages use their existing linguistic knowledge (from their L1 or other previously learned languages) as a sort of scaffolding to build up their knowledge of the target language (TL). If two languages are closely related, the learner might transfer words (item learning) as well as grammatical rules (system learning) from the L1 to the TL. This transfer can be facilitative as well as intrusive and inhibitive (Hammerly, 1991). If two languages are typologically distant (e.g., the 'near-zero relation' between English and Chinese), the learner has to put a lot of effort in figuring out the phonology and the grammatical rules of the language. As a result, the degree of relatedness between languages influences the ease of acquisition (Ringbom & Jarvis, 2013).

While the characteristics and challenges of L2 acquisition of spoken languages have been thoroughly investigated, there is surprisingly little research available regarding sign language learning, given the fact that worldwide thousands of individuals learn sign languages as an L2. Sign languages are expressed in the visual-spatial modality, which allows the signer to exploit potentials that spoken languages do not offer. As a result, sign language grammars could be considered 'distant' from spoken language grammars, and consequently, it might be hard for learners with a spoken language background to master the language. Alternatively, the fact that sign

[1] A shorter version of this chapter has been submitted to a scientific journal. The supplementary materials to this chapter can be found in Boers-Visker, E.M. (Utrecht University of Applied Sciences / University of Amsterdam) (2018): A longitudinal study into the acquisition of classifier predicates in fourteen SL2-learners of NGT (dataset). DANS: https://doi.org/10.17026/dans-zma-xmch.

languages comprise a considerable amount of iconicity at the lexical as well as grammatical level might facilitate the learning process.

Jacobs (1996) and Kemp (1998a) assert that learning American Sign Language is a challenge that is often underestimated by learners. Anecdotal evidence from sign language teachers suggests that at the outset of the learning process, learners experience a fast learning curve (presumably due to the iconicity of a considerable number of lexical items), but once the intermediate level is reached, the curve flattens, and learners seem to struggle in mastering the grammatical rules of the language. Transfer of the grammatical properties of the spoken L1 into the TL seems to be widespread and persistent. Yet, there are hardly any studies on the acquisition of grammatical features by L2-learners of sign languages (SL2-learners) that would provide information about the areas that need extra attention in class.

In this chapter, we describe a longitudinal study into the acquisition of classifier predicates, a typical modality-specific phenomenon that is unfamiliar to SL2-learners. In our study, 14 novel learners of Sign Language of the Netherlands (Nederlandse Gebarentaal, NGT) were followed over a period of two years. The study provides insight into the stages learners go through, the difficulties they encounter, and typical learner behavior they display.

4.2 Theoretical background

4.2.1 Classifiers and classifier constructions

Almost all sign languages studied to date employ linguistic elements that are referred to as *classifiers* (Zwitserlood, 2012).[2] Sign language classifiers can be defined as "morphemes with a non-specific meaning, which are expressed by particular configurations of the manual articulator (or: hands) and which represent entities by denoting salient characteristic" (Zwitserlood, 2012, p. 158). A classifier signals that the referent has certain salient characteristics, such as size and shape, or that the referent belongs to a category of semantically related items (Cormier, Quinto-Pozos, Sevcikova & Schembri,

[2] Sign languages that employ no, or at least not the full range of classifiers include Adamorobe Sign Language (Nyst, 2007) and Providence Island Sign Language (Washabaugh, 1986).

2012). The classifier cannot be used on its own; rather, it is generally assumed to be a bound morpheme that combines with certain roots, in particular verbs of motion and location (Supalla, 1986; Zwitserlood, 2003), forming a classifier predicate.

An example of a classifier predicate is shown in the rightmost still in Figure 4.1, where the hand represents a car moving with high speed from the left to the right. The classifier morpheme, that is the -handshape representing a car, combines with a movement root, which enables the signer to depict the movement path (straight line from right to left) and the manner of movement (with high speed). Classifier predicates are highly productive, in contrast to the so-called core, frozen or established lexicon, which includes lexical signs that are “highly stable and standardised in form and meaning” (Cormier et al., 2012, p. 336). That is, a classifier predicate does not have a stable and standardized meaning, but its meaning is compositional and determined by the context.

Figure 4.1. NGT sentence containing items from frozen lexicon (YESTERDAY, WOMAN, FRIGHTENED, CAR) and productive lexicon (classifier predicate MOVE$_{car}$) (photo: Annette Jansen, ©RCSI).

Classifiers that combine with verbal roots, namely predicate classifiers, are also attested in spoken languages (e.g., Athabaskan languages; cf. Allan 1977),[3] and this is actually what motivated the use of the term ‘classifier’ for sign languages (Frishberg, 1975; Supalla, 1978; McDonald, 1982). However, the analysis of meaningful handshapes as ‘classifiers’ on a par with spoken

[3] Allan (1977) analyzed Navajo as a predicate classifier language, in which a predicate can contain a meaningful element that denotes a feature of the referent (e.g. round object, flat object, etc.).

language classifiers is not uncontroversial, and this has led to the introduction of alternative terminology reflecting the different views regarding the linguistic analysis of this phenomenon.[4] Some researchers believe that the handshape units are morphemic, but should not be considered classifier-morphemes (e.g., Engberg-Pedersen, 1993). Others reject the morphological status of the handshape unit entirely, and instead consider this unit a gestural element that fuses with linguistic elements (i.e., the verb) (e.g., Liddell, 2003b). As we aim to describe the acquisition process for the phenomenon rather than its grammatical status, we do not take a stance regarding this, admittedly interesting, discussion, but rather adopt the term 'classifier', as it is commonly used among researchers and teachers.

4.2.1.1 Whole Entity classifiers and Hande classifiers

Different classifier types have been distinguished in the literature (Zwitserlood, 2012; Schembri, 2003), two common types being 'Whole Entity classifiers' and 'Handle classifiers'.[5] Whole Entity classifiers directly represent (part of) a referent, while Handle classifiers indirectly denote a referent by showing how it is being held or manipulated. Figure 4.2 illustrates the difference between these two categories. The same object, a sheet of paper, is referred to by a -handshape (palm oriented downwards) in Figure 4.2a, representing the flat surface of the sheet itself (i.e., Whole Entity classifier), but by a -handshape in Figure 4.2b, representing the act of holding the sheet by a (in this case) human agent (i.e., Handle classifier). In both classifier predicates, the handshapes signal that the referent belongs to a certain class, the class of 'flat, thin objects', and it combines with a stem (BE-LOCATED-AT and HOLD, respectively), yielding the classifier predicates BE-LOCATED-AT$_{\text{sheet of paper}}$ and HOLD$_{\text{sheet of paper}}$.

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[4] E.g., spatial-locative predicates, polymorphemic predicates/verbs, productive signs, depicting signs, depicting constructions, etc. (see Schembri 2003 and Zwitserlood 2012 for overviews).

[5] Other types that have been distinguished, but that will not be addressed here (for an overview, see Zwitserlood (2012)), include Size and Shape Specifiers (SASSes) and Bodypart classifiers. SASSes provide information about the size and shape of a referent by tracing the outline of the referent or by indicating the referents' physical dimensions (Supalla, 1982). Bodypart classifiers represent parts of the body of a human or an animal (e.g., the hands represent human feet) (Zwitserlood, 2012).

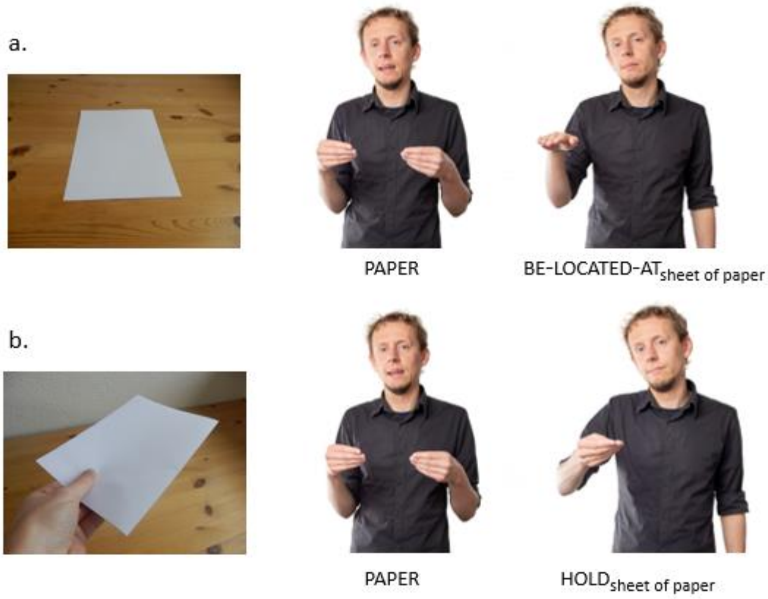

Figure 4.2. Whole Entity classifier (a) versus Handle classifier (b) referring to the same object (photo: Annette Jansen, ©RCSI).

In this study, we focus on the acquisition of Whole Entity classifiers. These classifiers combine with verb stems that denote the *motion* or *location* of a referent in space. The Whole Entity classifier in Figure 4.2a combines with a verb of location ('The sheet of paper lies on the table'), the one in Figure 4.1 with a verb of motion ('The car drives by'). In both examples, the handshape unit (the classifier) signals that the entity it refers to belongs to a class of objects that are semantically related (e.g., class of vehicles in Figure 4.1) or share a property (e.g., class of 'objects with flat surface' in Figure 4.2a). In order for the classifier predicate to be interpreted, the signer must specify the referent using a noun previous to (or, in rare cases, immediately after) the classifier predicate, unless the referent can be inferred from the context (Zwitserlood, 2012).

4.2.1.2 Two-handed classifier constructions

A striking feature of sign languages is that signers have at their disposal two manual articulators, the two hands, which (to some extent) can act independently from each other. This modality-specific resource is commonly employed in classifier constructions. Figure 4.3 shows a signer producing two

Whole Entity classifiers simultaneously. Both classifier predicates encode the class the referent belongs to (a vehicle and a 'long, thin object', respectively), the movement (or absence thereof), the orientation, and the location of the referent. Moreover, the simultaneous use of both hands allows the signer to provide information about the spatial layout of a scene involving two referents, i.e., their position in relation to each other, leading to a spatial description with the broad interpretation "a vehicle stops in front of an upright standing, thin object".

Figure 4.3. Two-handed classifier construction: view from front and from above (photo: Annette Jansen, ©RCSI).

Of course, in a specific context, the construction can take on a more specific meaning. Let's assume that the signer in Figure 4.3 has introduced a woman waiting at a taxi stand, and a taxi (left hand, -classifier) approaches the woman (right hand, -classifier) and stops to pick her up. In Table 4.1, we detail the meaning contribution of each component, and we show how the different components are combined in the complex classifier construction, which receives the interpretation "A taxi stops in front of the woman".

The fact that a signer adds information by means of the *simultaneous expression* of two articulators is reflected in the right bottom cell. The use of two Whole Entity classifiers results in a complex construction containing numerous spatial details. In this particular example, two cells in the topmost row are empty, as one of the referents is standing still. However, if the woman was moving, too, the relevant path and manner information would be added in these cells, and consequently, the right bottom cell would add this information to the scene description.

The 'orientation' column of Table 4.1 reflects two often taught conventions: (i) the front of the finger (usually) represents the front of the human being; (ii) the fingertips (usually) represent the front of the vehicle (in case of classifier predicates representing standing human beings and vehicles, respectively).[6]

Table 4.1. Meaning components of the two-handed classifier construction in Figure 4.3.

	Handshape	**Orientation**	**Movement path (length and contour)**	**Manner of motion (and speed)**
Left hand (depicting woman)	Member of class of humans	Standing upright, facing forward *(as the front of the index finger represents the front of the human)*	Ø	Ø
Right hand (depicting taxi)	Member of class of vehicles	Facing to the left *(fingertips represent the front of the car, palm of the hand represents the bottom)*	Progressing in a straight horizontal line from the left to the right	With normal speed, ending with a hold indicating that the taxi stops
Combination of hands		The taxi approaches the woman from the right (not from the left or diagonally); the taxi stops in front of the woman (not behind her or next to her); the distance between the woman and the taxi is small/moderate (not far) The woman and the taxi are in the same plane		

[6] It must be noted that these conventions about an intrinsic front and back can be violated when the exact orientation of the referent is considered not relevant by the signer (e.g. Wallin, 1990).

4.2.1.3 Figure and Ground

In the context of complex spatial expressions, the notions of *Ground* and *Figure* are important. The Ground object is stationary (being located at rest or fixed) and serves as reference point, whereas the Figure object is moving (or could move) in relation to the Ground object (Talmy, 1975). The Ground object is usually the bigger or backgrounded entity, while the Figure object is usually the smaller entity or the entity that is the focus of attention (Zwitserlood, 2012). In the construction depicted in Figure 4.3, the Figure (the vehicle) moves in relation to the Ground (the 'long, thin object'). Research on different sign languages suggests that in the majority of cases, the Ground is localized previous to the Figure (Özyürek, Zwitserlood & Perniss, 2010; Zwitserlood, 2012). Özyürek et al. (2010) describe a 'canonical structure of locative expressions' found in many sign languages (but not in the language they analyzed, Turkish Sign Language (Türk İşaret Dili, TİD)): the Ground object is introduced first and held in space, while subsequently, the Figure object is introduced. As a result, both Figure and Ground object are expressed simultaneously, as depicted in Figure 4.4. Learners thus have to learn the Ground-before-Figure rule, and, if applicable for the sign language they acquire, the simultaneous expression of both Figure and Ground.

Figure 4.4. Example of Ground (classifier denoting two standing women) being introduced before Figure (classifier denoting car); the dotted line indicates that the hand is held in space while another sign is articulated by the other hand (photo: Annette Jansen, ©RCSI).

4.2.1.4 Variability in choice of classifier

The challenge for learners lies in the fact that learning to use classifiers is not just about learning and applying a set of simple rules. First of all, Zwitserlood (2003) points out that there may be variability in the choice of a classifier. In NGT, for example, a standing person can be depicted using a -handshape (as above) or a -handshape, depending on the characteristics the signer wants to focus on. In the former case, the finger represents the person as a whole, while in the latter, the fingers represent the legs. Secondly, if a signer considers the orientation of an entity as unimportant, he may choose to leave the orientation of the classifier predicate unspecified (Zwitserlood, 2003). In our study, for instance, one of the prompts displays an animal on top of a car. Most signers focus on the fact that the animal is on top of the car and place the vehicle classifier randomly in space, ignoring front/back aspects. A third source of variability is ease of articulation. In NGT, vehicles (cars, trucks, bikes) are depicted with a -handshape. However, in some configurations (orientations), the use of a -handshape would require awkward bending of the wrist or the elbow. In such contexts, NGT-signers use a phonetic variant, the -handshape, which is easier to articulate (Van der Kooij, 2002; Zwitserlood, 2003); see Figure 4.4.

4.2.1.5 Classifier-like constructions in gestural behavior

There is a rich literature on *co-speech gestures*, that is, spontaneous movements of the hands/arms/body performed by speakers while producing speech (Özyürek, 2012), and *silent gestures*, that is, gestures performed by speakers who are asked to depict a scene in the absence of speech. Some sign-naïve individuals who are asked to describe objects in a motion or static event are reported to use their hands to represent objects. These 'hand-as-object gestures' resemble the classifier predicates used by signers (Singleton, Morford & Goldin-Meadow, 1993; Schembri, Jones & Burnham, 2005; Brentari, Coppola, Mazzoni & Goldin-Meadow, 2012; Janke & Marshall, 2017). However, sign-naïve gesturers employ a broad array of handshapes and lack consistency, whereas signers employ classifier handshapes from a limited and conventionalized set of values, which they use consistently (Brentari et al., 2012; Schembri et al., 2005; Janke & Marshall, 2017). Singleton, Goldin-Meadow and McNeill (1995) found that *co-speech gesturers* used classifier-like gestures predominantly for *moving* objects.

These findings suggest that SL2-learners could draw on their gestural repertoire to scaffold their learning, by using their existing (gestural) knowledge to build new knowledge upon.

4.2.2 Alternative devices

Besides the use of classifier constructions, there are alternative devices to encode the spatial relationships between referents. As these devices will be part of our analysis, we briefly introduce them here. Alternatives include using a spatial preposition (e.g., ON, BEHIND) and directing a pointing sign (glossed as INDEX) towards a location in signing space. Moreover, certain lexical signs can be localized directly in the signing space by means of displacement in relation to their citation form, that is, by combining them with a locational morpheme indicating the location in space (i.e., a 'sign marked for location'). Similarly, a SASS (Size and Shape Specifier, see footnote 5) can be produced at a specific location in signing space. Finally, a signer can produce non-body-anchored verbs (e.g., BE-AT, SIT, WAIT) at a specific location to indicate the location of the referent. These strategies can be employed as an alternative to or in combination with a classifier construction.

Table 4.2 summarizes the features discussed so far.

Table 4.2. Overview of relevant features of classifier constructions.

Context of use	Whole Entity classifiers can be used to depict the location and motion of referents; Manipulation of objects cannot be conveyed by means of a Whole Entity classifier.
Handshape unit	The handshape refers to a class; Members of the class share salient characteristics or are semantically related; There are conventions about which class a referent belongs to; There is (some) variability in the choice of a classifier – some depictions require the use of a phonetic variant; There is a distinct set of possible handshapes, inventories are language-specific.
Manipulation by the hand(s)	Location, orientation, movement path, and manner of motion can be manipulated; Sometimes one or more of these elements are absent (movement path, manner of movement); Physical constraints prevent the expression of some configurations; There is a distinct set of possible movements.
Conventions regarding part of the hands (intrinsic features)	Sometimes certain parts of the hand represent certain features of the referent (e.g., the palm of the hand represents the bottom of a car).
Specifying the referent	The referent must be introduced by a noun in order to specify which member of a class of referents is depicted.
Figure-Ground	Ground-before-Figure rule; Simultaneous expression of Ground and Figure.
Alternative devices	Alternative devices include spatial prepositions, INDEX, direct localization of noun, SASS or particular verbs; Alternative devices can be used in combination with classifier predicates.

4.2.3 Acquisition of Whole Entity classifiers

A growing body of studies has analyzed the acquisition of classifiers in L1-signers. The picture that emerges from these studies is that children are able to produce and comprehend classifier constructions at a young age (Schick, 2006; Slobin et al., 2003). That is, they use classifier predicates in appropriate contexts with moving or static objects. However, their production is prone to errors, and it takes several years to master the system completely. The prolonged developmental time course, with full mastery at around 9 years of age (Baker, Van den Bogaerde & Woll, 2008) is attributed to the complexity of classifier constructions. Reported errors are:

- Substitution of the classifier handshape (Supalla, 1982; De Beuzeville, 2006);
- Omission of meaning components (e.g., manner of movement; Newport & Meier, 1985);
- Sequential production of complex movement patterns (e.g., a straight upwards movement followed by an arc instead of an upward arc movement; Newport & Supalla, 1980);
- Failure to introduce referents (Slobin et al., 2003; Tang, Sze & Lam, 2007);
- Omission of the Ground object (Supalla, 1982; Newport & Meier, 1985; Slobin et al. 2003; Engberg-Pedersen 2003; Tang et al., 2007; Sümer, 2015);
- Failure to produce Figure and Ground simultaneously,[7] instead expressing both objects sequentially (Supalla, 1982; Tang et al., 2007);
- Signing outside the signing space (De Beuzeville, 2006).

Morgan (2002), De Beuzeville (2006), Tang et al. (2007), and Tang and Li (2018)[8] report children employing avoidance strategies such as production

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[7] Sümer (2015) warns that the conclusions from early studies (e.g., Newport & Supalla, 1980; Supalla, 1982) might be colored by the fact that these studies compared children's data to assumed adult patterns. The assumption that adult signers produce Figure and Ground simultaneously does not hold for all sign languages (e.g.,TİD; Özyürek et al., 2010) and all situations.

[8] Tang and Li (2018) investigated the acquisition of classifier predicates in relatively late exposed children, who received Hong Kong Sign Language (HKSL) input on a daily basis in a co-enrollment environment.

of lexical descriptions instead of classifier predicates, role shift, or use of the whole body as stand-in for an animate referent ('whole-body language'). Some children employ Entity classifiers in particular contexts, while deleting or modifying the same construction in a more complex environment (Kantor, 1980).

What we know about the acquisition of classifiers in SL2-signers is largely based on a few recent studies. Marshall and Morgan (2015) report that novel learners of British Sign Language are aware of the need to use classifier predicates to represent objects, but have difficulties in choosing the correct classifier handshape. Handshape errors comprised omissions and substitutions. The location feature, on the other hand, did not cause much difficulty. This contrasts with findings by Ferrara and Nilsson (2017), who report that learners of Norwegian Sign Language experienced more difficulties in producing orientation and location features, than with handshape. When producing two-handed classifier constructions, they struggled with the coordination of both hands in relation to each other and they misjudged the space needed. The learners often resorted to the production of lexical signs instead of classifier constructions, which resulted in productions resembling the order of their spoken L1, or they used signs marked for location where a classifier would be expected. Boers-Visker and Van den Bogaerde (2019, see Chapter 3) analyzed production data of two SL2-learners over the course of four years and compared these data to the productions of L1-signers performing the same task. One of the SL2-learners showed errors in handshape selection as well as errors in location and orientation until the 4th year in a four-year program. These findings confirm the perception of ASL teachers, reported in McKee and McKee (1992), that "even students at the most advanced level […] have serious deficiencies in using classifiers effectively in their expressive ASL" (p. 142).

We can conclude from these studies that learners, both L1 and SL2, find it difficult to master the system of classifier constructions. This may be due to the fact that classifier constructions form a complex system characterized by a variety of linguistic conventions that have to be learned.

4.2.4 Research questions

As mentioned above, there is a paucity of empirical data on the SL2 acquisition of signed languages to inform the practice of teaching. The present chapter contributes to filling this gap by describing the acquisition of classifier handshapes denoting a variety of entities in two-handed classifier constructions in novel SL2-learners by answering the following questions:

1. Are there developmental stages in novel SL2-learners of NGT regarding the different Entity classifier handshapes that denote different classes of entities?
2. Is there a developmental pattern in novel SL2-learners of NGT regarding the production of two-handed Entity classifier constructions?
3. Are there typical error patterns that characterize the learner productions?

In the remainder of this chapter, we provide a qualitative and quantitative analysis of the acquisition process regarding two-handed classifier constructions in SL2-learners, and we discuss the implications of these findings for the teaching practice.

4.3 Methodology

4.3.1 Participants

In this study, we elicited two-handed classifier constructions from 14 hearing learners of NGT enrolled in a four-year undergraduate program offered by the Institute for Sign, Language & Deaf Studies (ISLDS), hosted by Hogeschool Utrecht, University of Applied Sciences (HU, UUAS). The institute trains students for the professions of sign language interpreter, sign language teacher, or speech-to-text captionist (STT-captionist). Students can enroll in these programs without previous knowledge of NGT. During the first and second year, eight NGT courses are offered, with a total study load of 55 European Credits (ECs) for teachers and interpreters and 30 ECs for SST-captionists. NGT instruction adopts an immersion approach, that is, the language of instruction and in teaching materials is NGT from the very start. During the first course, classifier constructions are not explicitly taught, but occur frequently in the input (teaching materials and teacher input). During the second course, teaching materials explicitly target classifier constructions. However, in both courses, little explicit rule explanation is provided. For an overview of the NGT curriculum, see Appendix 4A.

At the beginning of the first year of the program, the entire cohort (2016-2017; n = 89) was invited to participate voluntarily in this study. This invitation was accepted by 22 students (25%). However, 8 participants gave up prematurely. The remaining 14 participants, all female with a mean age of 23 years and with Dutch as L1, were followed over a period of two years, with the exception of two participants who quit the program after year 1. Table 4.3 details the background of the participants.

Table 4.3. Background information SL2-participants.

SL2-learner (ID)	Program	Age	Prior knowledge of NGT[1]	Other foreign languages
1	Teacher	21	No	English
2	Teacher	18	No	English, German
3	Teacher	19	No	English, German
7	Teacher	19	No	English, Spanish
9	Teacher	20	No	English
10	Teacher	20	No	English, French, German, Spanish
4	Interpreter	17	No	English, French, German
5	Interpreter	20	No	English, Spanish
8	Interpreter	17	No	English, French, German
12	Interpreter	18	Limited	English
13	Interpreter	19	Limited	English
14	Interpreter	40	Limited	English, French, Spanish
6	STT-captionist	48	No	English, French, German
11	STT-captionist	30	No	English, Sinhala

Note: [1] Data on previous knowledge were self-reported. Participant 12 had a deaf friend, participants 13 and 14 had followed a beginner NGT course.

In addition, we assessed how a baseline group of L1 NGT-users (n = 4) and a group of ISLDS sign language teachers (two L1-signers, two SL2-signers) performed on the same task. Tables 4.4 and 4.5 provide information about these two groups.

Table 4.4. Background information L1-signers.

L1-signer (ID)	Age	Age of onset NGT acquisition	Hearing status parents	Use of NGT on a daily basis
N4	53	3,5	Hearing	Yes
N5	49	From birth	Deaf	Yes
N6	37	8 months	Hearing	Yes
N7	33	1	Hearing	Yes

Table 4.5. Background information teachers.

teachers (ID)	Age	Hearing status	Age of onset NGT acquisition	Deaf relatives
D1	31	Hearing	19	No
D2	43	Hearing	27	No
D3	29	Deaf	1	No
D4	54	Deaf	3	No

4.3.2 Materials

The present study is part of a longitudinal study investigating SL2 acquisition of a variety of grammatical features of NGT. A series of six tests was constructed, each consisting of 30 prompts and 5 distractors. However, not all of the 180 prompts are relevant for the present study. In fact, three of the six tests (tests 1, 3, 5) included 22 and the other three (tests 2, 4, 6) 13 prompts featuring two or more entities that could be mapped out using a two-handed classifier construction (‘classifier-prompts’). That is, a total of 105 prompts targeted the production of a classifier construction. The remaining prompts served to elicit other NGT structures that which will not be discussed here.[9]

The ‘classifier-prompts’ represented different combinations of objects from the following categories: upright humans (standing or moving), sitting humans, vehicles (cars, trucks and bicycles; standing or moving) and animals

[9] For reasons of time and concentration, the number of items per session could not exceed 35 (including foils). In order to track both the acquisition of classifier predicates and other NGT-constructions, we distributed the ‘classifier-prompts’ and the items targeting other NGT-structures over the tests.

(standing). The prompts were designed in a way that would allow us to identify whether certain features (or combination thereof) appear earlier in the learners' productions than others and whether certain construction types are more error-prone than others.

The six tests included comparable prompts, so for each target-construction (e.g., two standing persons or a person standing on top of a car), six (or three) similar photos, drawings or video clips were created or searched on the internet (see Appendix 4B for examples). We deliberately chose to create six different tests to prevent test-fatigue on the part of the learners (as the test was administered 15 times during a two-year period). In each session, the order of the prompts was randomized. During the test construction phase, we collected data from adult L1 NGT-users and from a sample of the target population (first year ISLDS-students, cohort 2015-2016) to ensure the appropriateness of the stimuli and tasks. Accordingly, some problematic prompts were adapted or deleted.

In sum, the final test set included six tests, consisting of 30 prompts and 5 foils each. A total of 22 prompts targeted the production of two-handed classifier constructions. Some of these stimuli (n = 13) were included in all tests, the remaining 9 prompts only appeared in sets [1,3,5]. For each type of prompt, six different, though comparable, photos or video clips were assembled. Participants were tested 15 times, meaning that the six tests were repeated after the first cycle.

4.3.3 Procedure

4.3.3.1 Procedure SL2-participants

The experiment involved 15 sessions, preceded by a short baseline session (pre-test) filmed during the very first day the SL2-participants entered the program.[10] The SL2-participants received instructions in spoken Dutch that they would see short video clips, photos and drawings on a laptop and were asked to describe what they saw using NGT, not focusing on details like colors, race, clothing, accessories. During the first year, twelve 15-minute

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[10] The baseline session was recorded before first NGT-classes were offered, and therefore, the productions of the participants who enrolled without prior knowledge of NGT are gestural productions.

sessions were scheduled on a two-weekly/three-weekly basis; the remaining three sessions were recorded with 10-week intervals during year 2. The sessions took place in a quiet, well-lit (class)room at UUAS.[11] The responses were filmed with a video camera located in front of the participant. The test was self-paced, and the participants were allowed to view the video clips several times. Furthermore, they were allowed to skip prompts for which they were insecure how to represent them in NGT. During the sessions, the author or her assistant were present in the room. Both author and assistant are hearing and fluent SL2-signers.

4.3.3.2 Procedure benchmark (L1-participants and teachers)

The L1-participants were filmed on one occasion, at home, at work, or at UUAS. In two cases, a deaf colleague of the author was present in the room; in two cases, the hearing author was present in an adjacent room. The six sets of stimuli were recorded in one session of one hour or in two half-hour sessions. Instructions were offered in NGT. The task itself was identical to the task the SL2-participants performed.

The teachers were filmed at UUAS. Instructions and examples were provided in NGT by the author, who subsequently left the room. Like the L1-signers, the teachers signed the six sets of stimuli in one or two sessions. Both the SL2-participants and the L1-participants were unaware of the exact purpose of the study.[12]

4.3.4 Transcription and coding

All data were transcribed in ELAN, a software package developed by the Max Planck Institute of Psycholinguistics in Nijmegen (Crasborn & Sloetjes, 2008), using a code book developed by the author. All manual activity produced with the dominant and/or the non-dominant hand was annotated with a Dutch gloss. In the pilot phase, the author transcribed a subsample of the

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[11] There were two exceptions: in session 6, we had to film four participants in the language lab for pragmatic reasons. In session 7, we had to resort to a restaurant in order to film one of the participants.

[12] To prevent participants from collecting information about the study, papers and presentations reporting the experimenter's previous studies into the use of space were removed from the internet.

data, followed by a revision of the code book. Subsequently, a second coder, a research assistant, was trained. To identify any inconsistencies, part of the data (6 sessions, 4% of the dataset) was transcribed separately by both annotators. The two annotators were quite consistent in their transcriptions, with a satisfactory agreement-rate between 87–93% (mean 91%).

In a successive stage, the total data set, comprised of 2798 SL2-responses and 880 L1/teacher-responses, was coded by the author for (i) the presence of classifier predicates and their formational features; (ii) the coordination of both hands, in case two classifier predicates were produced (i.e., in two-handed classifier constructions); and (iii) the use of alternative devices. Responses were categorized according to the categories set out in Table 4.6.

Table 4.6. Overview of codes to categorize responses.

<table>
<tr><th colspan="2">Coding categories</th></tr>
<tr><td rowspan="3">Classifier(s) present</td><td>Two-handed construction, produced simultaneously</td></tr>
<tr><td>Two-handed construction, produced sequentially</td></tr>
<tr><td>Construction containing one classifier predicate:
- One classifier predicate produced, other object expressed lexically
- One classifier predicate produced, other object indicated with an alternative locative device
- One classifier predicate produced, other object indicated with a locative gesture*
- One classifier predicate produced, other object omitted*</td></tr>
<tr><td rowspan="4">Use of alternative devices</td><td>Use of alternative devices (INDEX-sign, localized lexical sign or SASS)</td></tr>
<tr><td>Use of locative gesture(s)*</td></tr>
<tr><td>Whole-body language*</td></tr>
<tr><td>Lexical expression</td></tr>
<tr><td rowspan="2">No response</td><td>Prompt passed*</td></tr>
<tr><td>Missing value*</td></tr>
</table>

Note: categories marked with an asterisk appeared in the data of the learners only.

When one or more classifier predicates were produced, the formational features of the individual classifiers (handshape, location, orientation, movement) were analyzed and coded, and in case of a two-handed construction, the location and orientation of the hands in relation to each other. In case one or more parameters did not meet the specifications of the target item or the referent was unclear, additional codes (Table 4.7) were added. In case a production was ambiguous (i.e., the production could be a gestural production), an extra code was added.

For the convenience of the reader, an overview of the expected Entity classifiers for the different entities, drawn from the benchmark-data, is provided in Figure 4.5. The classifier handshapes on the left are so-called unmarked handshapes, these are easy to articulate. The marked handhapes on the right, in contrast, are motorically more difficult (Boyes Braem, 1990).

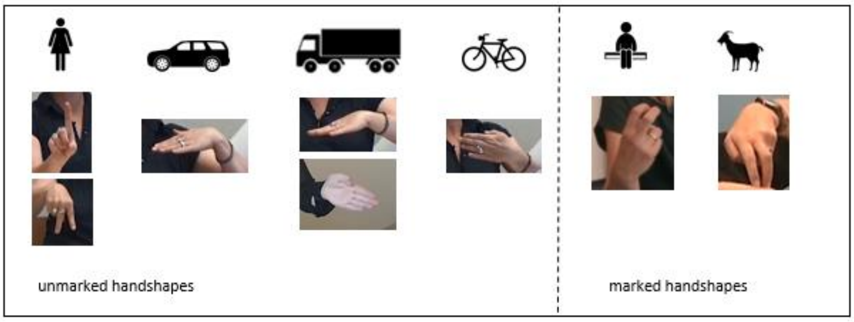

Figure 4.5. Overview of expected Entity classifiers for the entities featured in the prompts.

As in the transcription process, we ran a pilot trial to revise and elaborate the coding scheme. Moreover, we recorded examples of idiosyncratic signing and typical learner productions (e.g., overgeneralizations, omissions, substitutions) in an extensive logbook. The productions of the L1-signers and the teachers served as a benchmark during the coding process. In case of uncertainty with regard to the appropriateness/well-formedness of a construction produced by a SL2-signer, at least two L1-informants were consulted.

Table 4.7. Overview of codes to categorize substitution or underspecification errors.

Coding categories		
(i) errors in formational features of individual classifier predicates	Orientation	Violation of the convention regarding 'back' and 'front' of the object
		Violation of the convention regarding 'bottom' and 'top' of an object
		Production of a classifier with the palm facing down instead of a classifier with the palm facing to the side and vice versa
	Handshape	Applying a non-existing (self-created) classifier handshape
		Applying a handshape referring to another class of objects
(ii) errors in placing or orienting the hands in relation to each other (two-handed constructions)	Orientation (two-handed constructions)	The orientation of the classifier handshape was wrong/underspecified with regard to the classifier handshape representing the other object
	Location (two-handed constructions)	Mirroring the scene (i.e., the produced description scene is mirrored with respect to the scene depicted in the prompt)
(iii) error in identifying the referent	Referent	Referent is not mentioned
		Referent is unclear

4.4 Results

4.4.1 Benchmark-data

We will first discuss the descriptions produced by the teachers and L1-signers (henceforth, 'benchmark-participants'). The benchmark-participants produced in 75–100% (mean 93%) of the trials one or two classifier predicates (see Figure 4.6). The percentage of two-handed classifier constructions (either simultaneous or sequential) ranged from 53–100% (mean 84%). Signers N4 and N5 produced a relatively high number of alternative devices or lexical productions.

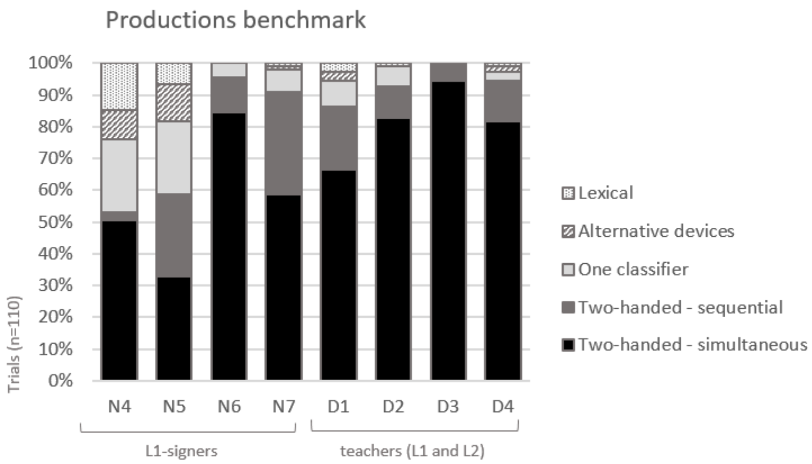

Figure 4.6. Distribution of classifier constructions produced by the benchmark-participants (all prompts).

It is important to note that in this study, all benchmark-participants produced at least some sequential classifier constructions. This is unexpected given the often-held assumption that the classifiers referring to the two entities should be produced simultaneously ('canonical structure of locative expressions', see Section 4.2.1.3). This has consequences for the analysis of the SL2-productions. We performed an item-analysis on the benchmark-data to identify the responses each prompt (*n* = 24/48) induced (Figure 4.7).

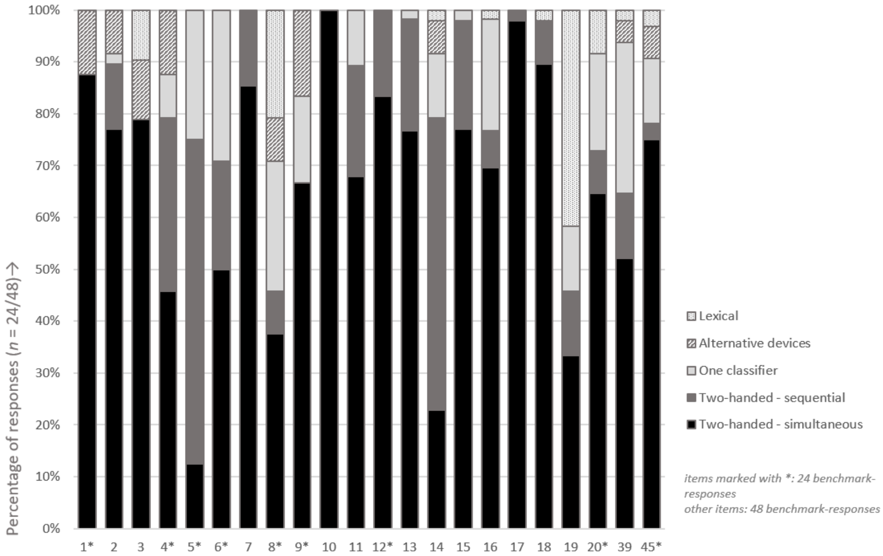

Figure 4.7. Analysis of descriptions per prompt (*n* = 24 or 48) produced by benchmark-participants.

From the graph above, we can see that some prompts (e.g., 3, 8, 19 and 20; see Appendix 4C for an overview of the prompts) induced a relatively high number of lexical expressions, instead of the targeted classifier constructions. Furthermore, we observe that a relatively high number of the responses to prompts 4, 5 and 14 were produced sequentially. This can probably be explained by the fact that these three prompts all contain more than two objects, that is, there were more entities than articulators. The benchmark-participants solved this problem by either dropping one of the two objects that had been introduced first, and then using this hand to sign the third object (resulting in a sequence of two simultaneous constructions, see Figure 4.8b) or by dropping both objects and sequentially signing the third object (Figure 4.8c).

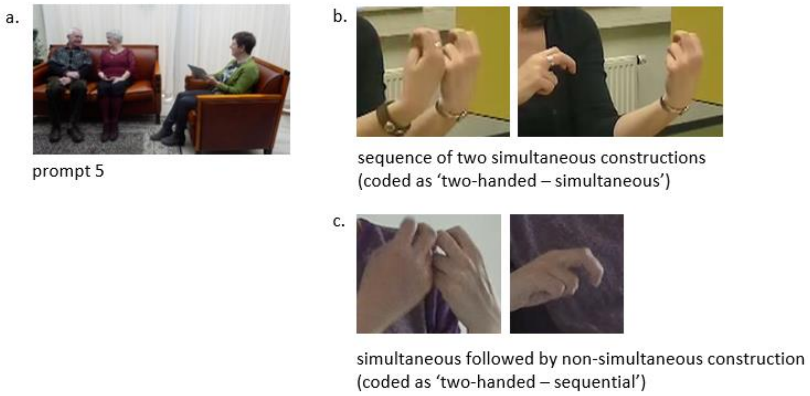

Figure 4.8. Examples of options to depict a prompt involving three objects (a) by using either (b) a sequence of two simultaneous constructions (i.e., one hand remains in space) or (c) a simultaneous construction followed by a non-simultaneous construction (photo left: ©Eveline Boers-Visker).

Furthermore, we noticed that prompts 1, 10 and 17 scored high on simultaneous constructions. Prompt 10 (featuring a car and a truck, both static) was produced with a simultaneous classifier construction in all cases, while prompt 17 (two cars colliding) induced a simultaneous construction in all cases but one (98%; 100% for tests 1–4 and 6). Prompt 1 (two standing persons) was produced by means of a simultaneous construction in all instances in which a classifier construction was used (in other cases, an alternative device was produced). These three prompts provide an opportunity to explore the differences between the signing of the L1-signers and teachers on the one hand, and the SL2-signers on the other.

4.4.2 SL2-data: Developmental stages

The SL2-data were analyzed per participant, per prompt, and per session. Due to limited space, we can only present a representative selection of graphs.

4.4.2.1 Distribution of strategies over time

The graphs in Appendix 4D show the SL2-descriptions during year 1. A surprising observation is that 12 out of 14 SL2-participants (henceforth: participants) produced some descriptions featuring one or two classifier predicates after two weeks of instruction. Yet, the instruction offered during this period did not target classifier predicates. It must be noted that in the graphs in Appendix 4D, erroneous and correct productions are not separated. We will return to this further on in this section.

A second observation is somewhat expected: all participants except one produced *locative gestures* during the first year. After the first semester, the use of gestures decreased, and after session 9 (i.e., after 22 weeks of instruction), the gestures were no longer produced. The decline of gestural behavior coincided with an increase in the production of classifier predicates at the start of the second semester (session 7). Whereas the percentage of two-handed classifier constructions (either simultaneous or sequential) ranged between 0 and 58% (mean 28%, SD 20) during session 5b, we observe an increase to an average of 47% (SD 22, range 14–82%) four weeks of instruction later, during session 7. Towards the end of the first year, during session 11 (22 prompts, 13 participants), the participants produced an average of 77% of two-handed classifier constructions (SD 31, range 36–100%).[13] These numbers approach the percentages observed for the benchmark-participants, who produced a mean of 83% (SD 21, range 45–100%) of two-handed classifier constructions for the prompts tested in session 11.

4.4.2.2 First appearance of classifier predicates

As pointed out in the previous paragraph, the SL2-participants used classifier predicates at an early stage and without having received explicit instruction. Table 4.8 shows the onset of the (correct) production of classifier predicates referencing the targeted entities. The numbers refer to the session during which the participant produced at least one appropriate classifier predicate for a particular group of entities (e.g., car, standing person, etc.) to place the object in space.[14]

[13] It must be noted that in these calculations, the three participants with previous knowledge of NGT (participants 12, 13, 14) are included. If we exclude these participants, the numbers remain similar (mean 75%, SD 25, range 36–100).

[14] In some cases, participants attempted to use a classifier predicate in an earlier session, but failed to produce the formational parameters (handshape, location, orientation) correctly.

Table 4.8. First appearance of classifier predicates denoting different classes of entities in the sessions, per participant (numbers refer to sessions, shaded cells indicate per participant the first classifier predicate to appear in the data).

object → **participant ↓**	**person standing** ()	**car**	**truck**	**bicycle**	**person sitting**	**animal**
1	1	6	Ø	3	Ø	Ø
2	3	1	2	2	11	8
3	3	5	3	2	6	6
4	5	3	3	2	9	9
5	7	2	6	2	7	9
6	9	1	1	1	10	1
7	5	1	4	1	6	9
8	6	2	5	1	9	10
9	9	1	2	1	Ø	Ø
10	6	2	6	6	10	10
11	7	1	5	2	10	Ø
12	1	3	3	1	2	7
13	1	1	5	1	7	9
14	2	1	1	1	8	9

When we examine the first correct appearances, we notice that the first classifier predicates produced correctly denote bicycles and cars. Interestingly, the majority of the participants produced a classifier predicate for a truck only at a later stage. This is surprising considering the fact that trucks are, like bicycles and cars, members of the 'vehicle-family'. The classifiers for a sitting person and for animals were produced relatively late (or not at all). Notably, the latter classifiers involve marked handshapes (see Figure 4.5) – in contrast to a /-classifier for a bike/car – which may be more difficult for learners to comprehend and produce. Furthermore, both classifier handshapes denote a part of the body (i.e., the bended legs of a person and the legs of the animal) while the classifier handshapes for standing persons and vehicles represent the whole object. It may well be the case that the representation of an object as a whole is conceptually easier than the representation of part of an object.

To investigate whether the addition of meaning components would be harder for SL2-learners, our tests contained prompts featuring objects with and without movement. One could argue that an object that moves is more complicated to encode than a static object, since the corresponding classifier predicate contains more formational elements. However, as can be seen in Table 4.9, the percentage of participants that started producing classifiers referencing moving objects is higher than the percentage of participants that first produced classifiers referencing static objects.

Table 4.9. Onset of classifiers referencing moving/static objects in SL2-responses.

Classifier for:	**First classifier used refers to moving object**	**First classifier used refers to static object**	**Classifiers to refer to moving object(s) and static object(s) appeared in the same session**
car (*n* = 14)	36%	29%	36%
truck (*n* = 13)	46%	31%	23%
bike (*n* = 14)	93%	7%	0%

4.4.3 SL2-data: Characteristics of the learner-output

In the previous section, we demonstrated that some classifier predicates were produced at an early stage, while others appeared much later. However, none of the participants showed a consistent pattern during these early sessions. That is, some objects were depicted with a classifier predicate while other similar objects were not, and the participants used both conventionalized classifier handshapes and self-invented ‘classifier-like constructions’ within one session and even within one trial. Moreover, they produced different orientations for the same objects within one trial.

A quantitative analysis of the errors, or ‘learner characteristics’, is presented in Figure 4.9 (see Appendix 4E for a distribution of correctly and erroneously produced classifiers as well as non-classifier productions). The errors we identified included orientation errors (OR), handshape errors (HS), mirroring the scene, and failure to mention the referent/failure to identify referents clearly (see Section 4.3.4, Table 4.7).[15]

[15] Please refer to supplementary materials (see Section 1.3) for a detailed overview of the (patterns of) errors in the data.

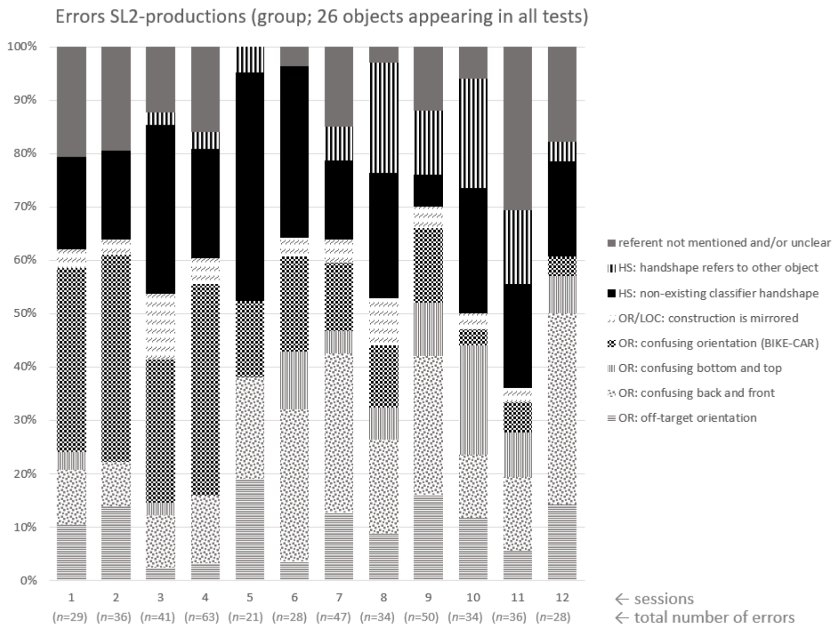

Figure 4.9. Distribution of errors produced by the SL2-participants (the total number of produced errors is indicated between brackets beneath each bar).

What follows is a description of errors displayed in Figure 4.9 (Sections 4.4.3.1 and 4.4.3.2) and other learner characteristics (Sections 4.4.3.3–7).

4.4.3.1 Orientation of the hand

A recurrent error in the first sessions was the failure to discriminate between the classifier for a car/truck and the classifier for a bicycle (error type *OR: confusing orientation (BIKE-CAR)*). In NGT, the orientation of the hand distinguishes four-wheeled vehicles (car/truck/van; palm facing down) from two-wheeled vehicles (bicycle/motorbike; palm facing sideward). This confusion, exemplified in Figure 4.10, appeared in the data of 12 out of 14 participants, in particular during the first four sessions.

Figure 4.10. Failure to distinguish between bicycle and car by means of hand orientation (photos left: ©Eveline Boers-Visker).

Other, less frequent, errors were violations of the conventions regarding the top/bottom and front/backside of objects (error types *OR: confusing bottom and top* and *OR: confusing back and front*), resulting in descriptions in which objects appeared to be placed upside down or moving backwards (Figure 4.11).

Figure 4.11. Failure to encode correct orientation of objects by means of fingertip/palm orientation (top left photo ©Peter Stam; photo bottom left: ©Eveline Boers-Visker).

During the first sessions, productions were often characterized by uncertainty, hesitation, and self-correction. With regard to the orientation of the hand(s), we identified multiple examples of participants signing a response, looking at their hands, and slightly modifying the orientation of one of the hands to optimize the depiction. Furthermore, we noticed that some learners, while signing a construction in which one object is positioned on top of another, realize that they omitted the Ground object while signing the Figure object and subsequently 'shuffle' the Ground object under the Figure object (exemplified in Figure 4.12).

CAR BE-LOCATED-AT$_{car}$ BICYCLE BE-LOCATED-AT$_{bicycle}$

Figure 4.12. Example of shuffling the Ground object under the Figure (rightmost still).

A notable difference between some SL2-participants and the benchmark-participants is the off-target phonology displayed by some learners in responses involving a car or truck seen from the front. To represent a car or truck in this position, NGT-signers use the -classifier instead of a -classifier (see Section 4.2.1.4). The use of the phonetic variant enables the signer to articulate the classifier without awkwardly bending the wrist or arm. However, some learners consistently selected the -classifier, while twisting their hands and bodies to display the correct configuration (see Figure 4.13).

Figure 4.13. Failure to use the phonetic variant () to represent vehicles, leading to scene descriptions that are physically difficult to articulate.

4.4.3.2 Handshape

With regard to the choice of handshape, we identified two types of errors: selection of the wrong handshape (error type *HS: non-existing classifier handshape*) or selection of a handshape belonging to another class of referents (error type *HS: handshape refers to other object*; e.g., selecting the handshape for a bike to depict an animal). Examples are shown in Figure 4.14. It is remarkable that the learner-solutions for depicting the sitting person and the animal involved attempts to denote the whole object, while the conventionalized handshapes represent parts of the body (legs). Notably, the learner-solutions were not idiosyncratic, that is, we noticed different learners coming up with the same solutions to represent an object, e.g., a flat handshape to represent a standing person or a bened finger to represent a sitting person.

So far, we have discussed the errors regarding the formational features handshape and orientation, as displayed in Figure 4.9. Other errors shown in Figure 4.9 are *mirroring the scene* and *failure to indicate the referent or to identify the referent clearly*. Both errors frequently occur in the SL2-data.

In addition to the error-analysis displayed in Figure 4.9, we investigated characteristics regarding movement, scene-depiction, and the use of alternative devices. In the remainder of this section, we will discuss these findings.

Figure 4.14. Erroneous handshape selections displayed by SL2-participants.

4.4.3.3 Movement

The SL2-participants regularly omitted movement in their descriptions. However, they did not differ from the benchmark-participants in this respect. Both groups of participants tended to focus on the location of the objects and – apparently – considered the movement unimportant. Prior to the onset of classifier constructions, some SL2-participants denoted the movement of an entity either by tracing the path with an index finger or by modifying the lexical verbs HOLD-STEERING-WHEEL and PEDAL-BICYCLE (see next section).

4.4.3.4 Use of lexical expressions and other alternative devices

Not surprisingly, the participants produced the lexical expressions STAND and SIT prior to the onset of the corresponding classifier predicates. This alternative strategy to express location was also utilized by two of the benchmark-participants. However, in some cases, the SL2-participants attempted to depict the posture of the person by means of changing the orientation of the sign (Figure 4.15a). Although both verbs can be modified for location (see Section 4.2.2), the change of orientation to display the direction a person is facing is considered off-target by our L1-informants. Another lexical strategy used by the SL2-participants was the modification of the lexemes HOLD-STEERING-WHEEL and PEDAL-BICYCLE to express the path movement of a car or a bicycle (Figure 4.15b). This strategy, which can be considered an instance of overgeneralization, was not attested in the benchmark-data and is considered ungrammatical by our L1-informants.

Figure 4.15. Examples of overgeneralization of modification of lexical verbs. In (a), the participants attempt to show the orientation of an entity by modifying the orientation parameter of the lexical verbs STAND and SIT, respectively; in (b), the participants attempt to show the movement of an entity (i.e., to express 'drive') by modifying the direction of the lexical verbs HOLD-STEERING-WHEEL and PEDAL-BICYCLE, respectively.

In addition to the modified verbs above, we identified multiple instances of nouns that were marked for location. Notably, some SL2-participants produced the nouns CAR and BIKE at specific off-center locations to localize these objects, a strategy that – although acceptable – was not used by the benchmark-participants. Moreover, we found examples of overgeneralization of marking nouns for location, that is, learners occasionally attempted to localize signs that cannot be marked for location (due to the fact that they are body-anchored). Examples are shown in Figure 4.16ab. The body-anchored lexemes MAN and TRUCK are detached from the body and articulated in the signing space to indicate the location of the entities.

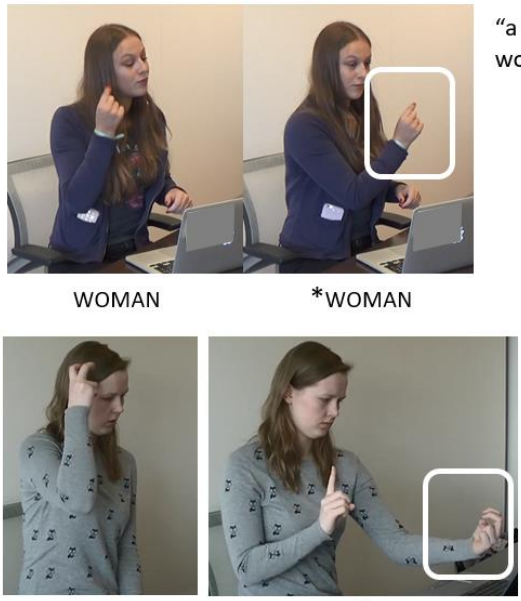

Figure 4.16. Examples of overgeneralization of the localization of nouns. The body-anchored signs WOMAN (a) and TRUCK (b) are erroneously detached from the body and articulated in signing space.

Finally, in the first two sessions, some learners used whole-body language to express the location and orientation of human entities.

In comparison to the benchmark-participants, the SL2-participants frequently combined two localizing devices in one description. That is, they produced a relatively high percentage (2–63%, mean 26%) of responses containing a classifier construction *in addition to* an INDEX-sign or sign marked for location. The benchmark-participants only supplied 5–15% (mean 10%) of such combinations.

4.4.3.5 Planning scenes

Similar to Ferrara and Nilsson (2017), we found examples of SL2-learners experiencing problems in setting up a scene. Examples include (i) picking the wrong hand to depict the first object (e.g., using the left hand to depict the object on the right), resulting in a switch of hand(s) during the depiction; (ii) misjudging the distance between the hands, resulting in a depiction of two objects nearly touching each other; (iii) placing an object too high in space in relation to the other object (exemplified in Figure 4.17a, the prompt depicted two cars on the same horizontal plane colliding); and (iv) misjudging the size of the signing space (Figure 4.17b, the participant runs out of space and literally ‘bumps into her own body’). Figure 4.17c shows an example of an SL2-participant trying to resolve the problem that her own left arm (depicting a car) is blocking the description by letting the right hand (depicting a walking person) ‘jump’ over the wrist.

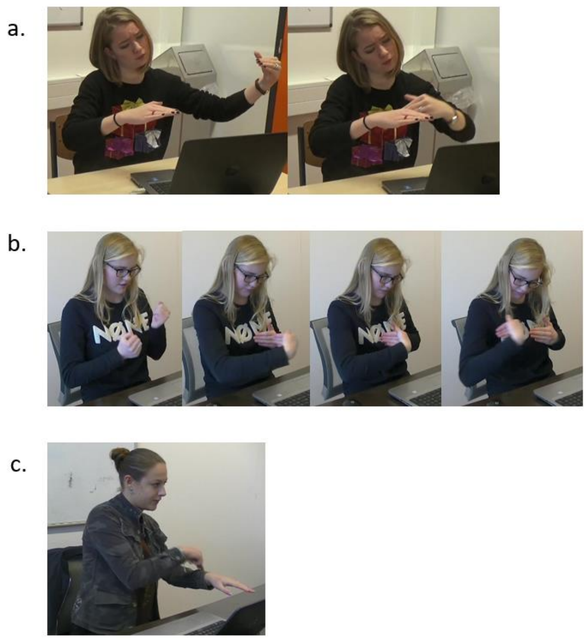

Figure 4.17. Examples of issues regarding planning the description. In (a), the participant places the left hand too high in space in relation to the right hand; in (b), the participant misjudges the size needed and finds her own body blocking the depiction; in (c), the participant’s left arm is blocking the depiction.

4.4.3.6 Simultaneity

In Section 4.2.3, we discussed that studies on the L1 acquisition of classifier constructions found that children often omit the Ground object or fail to produce the Ground and Figure object simultaneously, signing a sequential construction instead. Classifying such productions as deviant is based on the assumption that constructions featuring a Figure and a Ground are signed simultaneously by default. However, our benchmark-participants demonstrated multiple examples of sequential constructions (see Section 4.4.1). In order to investigate whether the findings reported in the L1 literature also apply to SL2-learners, we specifically assessed the SL2-responses to prompts 1, 10, and 17,[16] since the benchmark-participants consistently produced simultaneous classifier constructions for these prompts (see Section 4.4.1 Figure 4.7). Data reveal that nine out of 14 SL2-participants produced at least one sequential construction for either prompt 10 (featuring a truck and a car positioned next to each other) or prompt 17 (featuring two cars colliding). Prompt 1 (two standing persons facing each other) was signed sequentially by one participant in the first session. These responses provide evidence that this learner behavior, found in L1 acquisition, is sometimes also attested in L2 acquisition of NGT.

4.4.3.7 Stacked referents

Lastly, we discovered an interesting pattern in the data regarding objects placed on top of each other. In Figure 4.18, we plot the first appearance of a two-handed classifier construction (be it simultaneous or sequential) depicting a car and a bicycle relative to each other on the horizontal plane (e.g., a bicycle approaches a car) and the same objects stacked on top of each other (i.e., relative to each other on the vertical plane). In 11 out of 14 participants, depictions employing the horizontal plane emerged in the data prior to depictions employing the vertical plane. The remaining three participants showed onset of using both planes during the same session. Yet, a different pattern emerged for the prompts featuring a standing person positioned next to/on top of a car or truck. As can be seen in Figure 4.18, for these prompts, only four of the 14 participants produced the horizontal-plane construction first, while six participants produced the stacked prior to

[16] To be precise, prompt 17 of tests 1–4 and 6, see Section 4.4.1.

the horizontal-plane constructions.[17] Overall, of the four combinations, the production of the 'bicycle-car horizontal plane combination' appeared early in the first semester and prior to the other constructions, while the other three combinations largely appeared at the end of the first semester and during the second semester in the majority of participants.

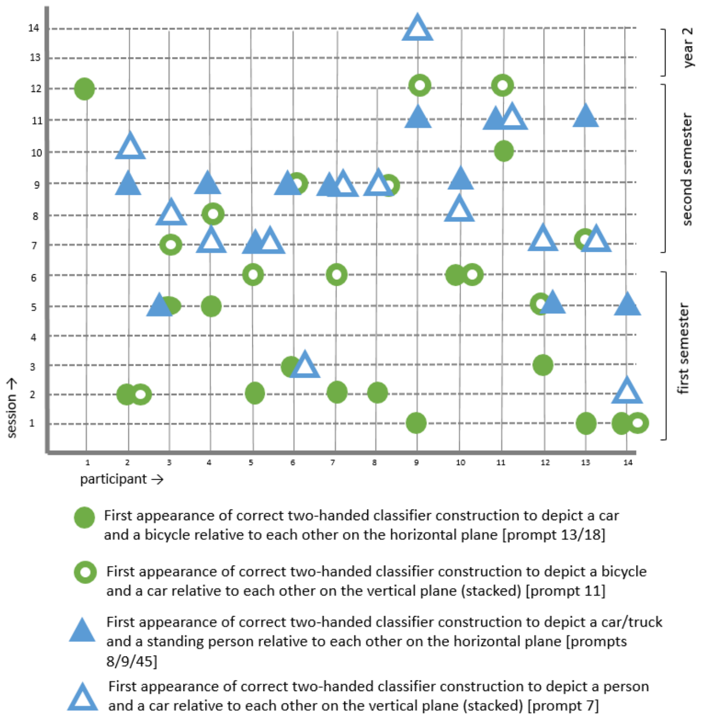

Figure 4.18. Onset of constructions depicting objects relative to each other on the vertical plane (i.e., stacked constructions), as compared to constructions depicting objects relative to each other on the horizontal plane.

[17] Recall that participants 12, 13 and 14 had previous knowledge of NGT.

4.5 Discussion

In this study, we aimed at better understanding the developmental stages that L2-learners of NGT pass through in their acquisition of classifier constructions, and at providing insights into typical learner characteristics. Below, we relate our findings to other studies and highlight novel findings.

4.5.1 Findings in relation to other studies into SL2 acquisition of classifier predicates

Recapitulating the findings from Section 4.4, we observed that after a year of instruction, all SL2-participants succeeded in producing two-handed classifier constructions in order to depict the targeted scenes. The majority of the SL2-participants (11 out of 14) applied a two-handed classifier construction in 80% or more of the responses. This outcome, in combination with the observation that the first classifier predicates appeared already after a short period of (untargeted) instruction, might lead to the conclusion that classifier predicates are not very difficult to acquire. These findings contrast with previous results reported by Ferrara and Nilsson (2017), Boers-Visker and Van den Bogaerde (2019, see Chapter 3), and Marshall and Morgan (2015), who claim that classifier predicates are difficult to acquire. The different outcomes could be attributed to differences in task type. Marshall and Morgan investigated a different set of objects, and both Ferrara and Nilsson (2017) and Boers-Visker and Van den Bogaerde (2019) examined the use of classifier predicates in extended spatial descriptions, while our study consisted of prompts that elicited short (mono-clausal) descriptions.

Marshall and Morgan (2015) reported that the selection of the appropriate handshape caused difficulties, whereas the learners reported in Ferrara and Nilsson (2017) experienced difficulties in the production of orientation and location. Our study shows that the learners, when experiencing difficulties, struggle with both handshape and orientation. Movement, on the other hand, does not cause much problems.

Our data corroborate previous results obtained by Ferrara and Nilsson (2017) regarding difficulties the participants encountered in coordinating the hands to depict a scene. Our participants demonstrated similar difficulties, resulting in misplacement of classifier predicates or a need to switch hands during the depiction.

4.5.2 Findings in relation to L1 acquisition

Our data are in agreement with observations in the L1 literature regarding (i) handshape substitutions (Supalla, 1982; De Beuzeville, 2006), (ii) errors and difficulties regarding the expression of Figure and Ground, (iii) sequential realization of constructions that are expected to be expressed simultaneously (e.g., Supalla, 1982; Tang et al., 2007), (iv) failure to specify referents (Slobin et al., 2003; Tang et al., 2007), and (v) use of whole-body language (Tang et al., 2007; De Beuzeville, 2006).

Literature regarding L1 acquisition suggests that classifier predicates are hard to learn because of their complex structure. One could argue that a moving object is more difficult to depict than a static object, since it includes an additional meaning component (i.e., movement). Yet, we did not find evidence that scenes containing movement were harder to depict, or more error-prone, than static scenes. On the contrary, the first classifier predicates referencing moving objects were produced prior to or during the same session as classifier predicates referring to static objects, suggesting that it is not harder, but easier for SL2-learners to combine a classifier handshape with a movement root. We will return to this in the following discussion on the possible influence of gestures.

4.5.3 Findings in relation to literature on gestures

In Section 4.2.1.5, we discussed the resemblance between 'hand-as-object gestures' produced by sign-naïve individuals, and Entity classifier predicates. The existence of these gestures suggests that novel learners use gestures as substrate' to build their knowledge upon (Marshall & Morgan, 2015; Janke & Marshall, 2017). The early appearance of classifier predicates in our study indeed suggests that learners might have used their gestural knowledge to bootstrap their acquisition. One could thus argue that the early appearance in the data is an artefact of the coding process, that is, a result of miscoding gestures as classifier productions. This, however, seems implausible, given the results of the baseline session conducted prior to the start of the program. Recall that 11 of the 14 participants had no prior knowledge of NGT, and as such, their productions during the baseline test can be considered as 'silent gestures'. Yet, only four participants produced a classifier-like gesture to denote a car or bike (both moving) during this pre-test, while, after two weeks of instruction, more than twice as many participants produced an Entity classifier for the same objects. This is evidence that almost all of the participants have used their gestural knowledge, however, some of them at a slightly earlier point. At this point, we can only speculate about why only four of the participants applied this at a slightly earlier point. Our data suggests that the challenge for the learners lies in acquiring the rules and conventions that govern Entity classifiers, but not gestures. Janke and Marshall (2017) hypothesize that the challenge for learners is not the acquisition of classifiers as a phenomenon per se, but rather to "narrow down the set of handshapes that they have potentially available to them to the set of classifier handshapes that is grammatical in the sign language they are learning" (p. 10). The present study points in the same direction, that is, the challenge seems to lie in the acquisition of the appropriate classifier handshapes and the 'default orientations' (e.g., the difference in the default orientation of the NGT classifier for a bike and a car), as well as learning the conventions regarding Figure and Ground.

Another finding that supports the idea of 'gesture as substrate' or 'transfer' is the observation that Entity classifiers for moving objects appear in the data earlier or at the same time as classifiers for static objects. In Section 4.2.1.5, we mentioned that Singleton et al. (1995) reported that co-speech gesturers produce classifier-like elements for moving objects, but not for static objects. This gestural behavior could account for the observation that our learners produce classifiers for moving vehicles, *despite the fact that these classifiers consist of more meaningful components*. If the presence of more components resulted in a more complex construction (as suggested in the L1 literature), one would expect these structures to appear later, or to cause more difficulties – contrary to what we observed.

The 'positive transfer' of gesture could explain the relative ease in acquiring a structure that is absent in the mother tongue of the learners. That is, despite the language distance between the students' L1 and the TL, some structures, notably iconic sign language structures that have 'gestural cousins', are acquired relatively fast and with less effort than one would expect.

4.5.4 Novel findings

Our study, being the first systematic and longitudinal investigation into the SL2 acquisition of classifier predicates and two-handed classifier constructions, adds substantially to our understanding of the SL2 acquisition of these constructions.

With regard to developmental stages, our investigation shows that classifier predicates representing vehicles (bicycles, cars) appeared early, followed by classifiers for standing persons. Classifiers representing sitting persons and animals appeared much later. Possible explanations for this observation are (i) markedness of the handshape involved, and (ii) the fact that the hand/fingers represent a part of the entity. As shown in Figure 4.5, classifier handshapes for sitting persons and animals are marked, in contrast to the classifiers for vehicles and standing persons. Marked handshapes are more difficult to articulate (Boyes Braem, 1990), which leads to a prolonged acquisition period in L1 acquisition. This explanation is in line with findings reported by Schick (1990) regarding the L1 acquisition of classifier handshapes. As for the second explanation, the fact that classifier predicates denoting sitting persons and animals do denote parts of the entity (i.e., the legs), whereas the other entities represent the entity as a whole, might account for the difference in acquisition. The self-invented classifiers shown in Figure 4.14 suggest that learners have a natural tendency to represent an entity as a whole (e.g., by using a bent finger to denote the posture of a sitting person)

The observation that the depiction of a construction featuring a car and a bicycle on the horizontal plane precedes a stacked (vertical) combination is interesting and has, to our knowledge, not been described before. The fact that a learner who has discovered that classifiers can be used to position objects in relation to each other in the vertical plane, apparently does not automatically conclude that the same classifiers can also be placed *on top* of each other, might suggest that during the first stages of acquisition, learners do not (fully) decompose these constructions. An alternative account would be that stacked constructions are less frequent in the input the learners received. Yet, this explanation is not satisfactory since one could argue that a learner, once he or she has discovered a rule, should be able to apply this rule to new constructions, even though he or she has not encountered the construction in the input.

A third novel finding is the failure to use the -classifier as an alternative for the -classifier, resulting in physically difficult and off-target scene descriptions (see Section 4.4.3.1).

4.6 Conclusion

In this longitudinal study, 14 novel learners of NGT were repeatedly presented with a task that was designed to elicit two-handed classifier constructions. Given different articulators, a comparable linguistic construction is not present in the mother tongue of the learners, and one might therefore predict that it is difficult to acquire. Yet, our data demonstrate that, after a year of instruction, the production of classifier predicates representing objects that people encounter in their daily lives (cars, bicycles, trucks, persons, and animals) did not pose a significant challenge for the majority of the participants. In fact, most learners demonstrated early on during the learning process that they understood that an object can be positioned in space by a handshape representing that object. The biggest challenge for them was to acquire the rules governing the (default) orientation and handshape, as well as the coordination of both hands in relation to each other in space. In particular, the classifier predicates denoting sitting persons and animals posed challenges, and appeared late in relation to the other classifiers. This implies that learners would benefit from explicit instruction directed at these particular classifier predicates. A second pedagogical implication is that, given the difficulties experienced by our participants regarding the coordination of the hands in space, instruction regarding the use of both hands in relation to each other might be beneficial.

Acknowledgements

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For reasons of copyright, the prompts presented in this chapter were re-produced. We thank Jacques Visker and Dorieke van Luit for their help. The prompt at the top left of Figure 4.11 was produced by photographer Peter Stam and is used with permission. Figures 4.1-4 depict deaf signer Tobias de Ronde and are produced by Annette Jansen.

5. Study 3: A longitudinal study into the acquisition of agreement verbs in fourteen SL2-learners of NGT

5.1 Introduction[1]

Learning a new language involves acquiring vocabulary, grammatical rules, and social conventions. To facilitate this task, learners use their existing knowledge of their mother tongue (L1) as well as previously learned second language(s) as a sort of scaffolding upon which they build their new knowledge. Target language (TL) features that are similar to L1 patterns will be easier to detect and acquire than features that are unfamiliar to the learner (Ringbom, 2007). Given this, one could argue that for sign language learners with a spoken language background (henceforth: SL2-learners), the TL-patterns might be particularly difficult to acquire, since sign languages employ an entirely different modality of signal transmission, the visual-spatial modality. The visual-spatial modality affords the signer to make use of resources that are not available in spoken languages, for instance, to use the space in front of the body (the 'signing space') to encode grammatical relations. This rule-governed use of signing space is new to SL2-learners and might therefore be difficult to master. However, since there is a paucity of studies addressing the acquisition of sign language as a second language, the characteristics of SL2-learning in general, and of modality-specific features in particular, are not well understood. The aim of our study is to broaden our understanding of the acquisition of one of these modality-specific phenomena: the system of verb agreement. To that end, we report quantitative and qualitative findings obtained in a two-year study in which we followed 14 novel learners of Sign Language of the Netherlands (Nederlandse Gebarentaal, NGT).

[1] This chapter has been submitted to a scientific journal and is currently under review. The supplementary materials to this chapter can be found in Boers-Visker, E.M. (Utrecht University of Applied Sciences / University of Amsterdam). (2018): A longitudinal study into the acquisition of agreement verbs in fourteen SL2-learners of NGT (dataset) DANS: https://doi.org/10.17026/dans-x6z-4nvb.

This chapter is organized as follows: first a brief overview of the system of sign language (specifically NGT) agreement is given, including a note on its L1 acquisition. Then the methodology is outlined, followed by a quantitative and qualitative analysis of the results. Finally, we discuss our results in light of finding from first language acquisition and sign language typology; we also sketch the limitations of our study and its implications for the teaching practice.

5.2 On the nature of spatial agreement in sign languages

5.2.1 Verb classes

Research on various sign languages has revealed that in almost all established sign languages, similar systems of 'directional' or 'agreement verbs' exist (Lillo-Martin & Meier, 2011; Mathur & Rathmann, 2012). Agreement verbs may undergo changes in the direction of movement and/or the orientation of the hands to mark the subject and/or object of the verb. The phenomenon is illustrated in Figure 5.1 by means of the NGT verb HELP. The form in Figure 5.1a is directed from a location (locus) to the right of the signer's body, which has previously been associated with the referent 'my brother' (see Section 5.2.2), towards the signer's body, yielding the meaning "My brother helps me". The verb in Figure 5.1b moves from a locus in front of the signer's body to the locus associated with the brother, meaning "I help my brother" (note that HELP is characterized by a hand-internal change: closing of the hands during the movement).

Figure 5.1. Examples involving spatially modified forms of the NGT agreement verb HELP (photo: Annette Jansen, ©RCSI).

However, not all verbs can be modified in this way to mark their arguments. In her seminal work on American Sign Language (ASL) morphology and syntax, Padden (1988) distinguished three verb classes:

1. The class of *agreement verbs,*[2] exemplified in the previous paragraph, includes (di)transitive verbs that can mark agreement by changing the movement path and/or orientation of the hand(s) to indicate the verb’s (indirect) object and subject. It has been argued that, semantically, all agreement verbs involve (concrete or metaphorical) transfer (Meir, 2002). In *regular agreement verbs*, the initial point signals the subject and the end point the object. Examples from NGT are HELP (Figure 5.1), ASK and SEND. A small subset of verbs, known as *backward verbs*, moves in the opposite direction, that is, from object towards subject locus (e.g., NGT FETCH (in the sense of ‘fetch / pick up person from a location’) and INVITE). Besides verbs that inflect for both subject and object, a small subset of verbs inflects for object only (e.g., NGT OPPRESS and FIND) – this subset is

[2] Initially, Padden (1988) termed this class ‘inflecting verbs’. Later, Padden (1990) adopted the term ‘agreement verbs’ to account for the fact that plain verbs can inflect for aspect.

sometimes referred to as *single agreement verbs*, as opposed to the *double agreement verbs* mentioned before (Mathur & Rathmann, 2012)[3]
2. Verbs from the class of *spatial verbs* move between, from or towards loci in signing space associated with locative arguments. Examples are the NGT signs GO-TO, MOVE-HOUSE and COME. The class of spatial verbs also includes the so-called 'classifier predicates'
3. The class of *plain verbs* includes verbs that cannot be spatially modified, either because they do not denote transfer (class 1) or change in location (class 2) (e.g., NGT CELEBRATE, EXERCISE, MAKE), or because they are body-anchored, that is, phonologically specified for a location on or close to the signer's body (e.g., the NGT SAY, UNDERSTAND and LOVE) (Meir, 2002; Pfau, Salzmann & Steinbach, 2018).

These different types of verbs have been attested in almost all sign languages studied to date (Rathmann & Mathur, 2002), although alternative classifications have been proposed (e.g., Quadros & Quer, 2008). As for NGT, properties of the agreement system have first been studied by Bos (1990, 1993, 2017[1998]), who confirmed the distinction between modifiable and non-modifiable verbs. More recently, Zwitserlood and Van Gijn (2006) offered a formal account of NGT agreement, and Legeland (2016) and Couvee and Pfau (2018) studied agreement phenomena based on corpus data.

Clearly, the NGT agreement system – beyond the fact that it is realized in space – presents the learners, who have Dutch as L1, with unfamiliar grammatical characteristics: (i) the fact that verb classes exist that behave differently when it comes to the realization of agreement, and (ii) object agreement. A third potentially challenging characteristic will be addressed in the next section.

[3] Note that some researchers argue against analyzing spatial loci as grammatical morphemes signaling subject and object, arguing instead that spatial modification results from the incorporation of gestures. That is, spatially modified verbs are considered blends of a verb stem and gestural points, and are thus referred to as 'indicating verbs' (e.g. Liddell, 2000b, 2003a; Schembri, Cormier & Fenlon, 2018). See Pfau et al. (2018) for recent discussion of various theoretical approaches.

5.2.2 Localization

As previously discussed, agreement can be realized by changing the underlying (citation) form of certain verbs according to spatial loci. These loci are either actual loci of present referents (signer, addressee, other person physically present) or arbitrary loci in signing space that are associated with non-present referents. The process of establishing a location-referent association is called *localization*. There are several devices to localize a non-present referent. First, a signer can produce a noun followed by a pointing sign (INDEX) towards a locus (as in Figure 5.1). Second, instead of using INDEX, a signer can also localize a referent by means of the agreement verb itself. In Example 1a, for instance, the direct object DOCTOR is not explicitly localized, but becomes associated with locus 3a by means of the spatially modified verb CALL. Thirdly, some nouns that are articulated in neutral space can be signed at a particular locus (e.g., PERSON, see Example 1b), instead of combining the citation form with INDEX. Finally, referents can also be localized non-manually, by means of eye gaze towards a specific locus. Once a referent has been associated with a locus, this locus can be used for further reference (i.e., pronominal reference and verb agreement).

Example 1

a. IX_1 DOCTOR ${}_1CALL_{3a}$
I call the doctor.

b. IX_1 SISTER $PERSON_{3b}$ ${}_{3b}HELP_1$
My sister helps me.

Canonically, the locus for second person is positioned right in front of the signer, and the loci for (present or non-present) third-person referents at the ipsilateral and contralateral side (loci 3a/3b). While the locus for first person is fixed, there is in principle an infinite number of loci for non-first person referents (Liddell, 2003a; Padden, 1988), which in turn implies that the paradigm of potential agreement markers on verbs is extremely rich – and thus clearly different from the Dutch paradigm (which features three subject markers). In other words: what we glossed as '3a' in Figure 5.1 is not a single fixed marker for third-person agreement (Wilbur, 2013), but rather a context-specific instantiation of that marker.

5.2.3 Optionality of agreement

A factor that may complicate the acquisition process is that it has been shown, based on corpus data, that NGT verbs that are licensed to carry agreement markers do not always actually encode the agreement relation (Legeland, 2016). Signers can opt to use the unmodified citation form and/or employ other devices instead to encode the verb's arguments (see Section 5.2.4). Furthermore, a verb can be *partially inflected*, signaling only one of the arguments, mostly the object argument.[4]

5.2.4 Alternative strategies for identifying the verb's arguments

As indicated in the previous section, signers do not always use verb modification to identify the verb's arguments. Alternative strategies to express who is doing what to whom that are relevant in the present context are (i) character assignment/constructed action, (ii) insertion of an agreement carrier, and (iii) the use of successive 1-argument structures. All three strategies will be briefly explained.

Firstly, the signer can take on the role of a character, a strategy termed *character assignment* in Ergin et al. (2018). In case of character assignment, the signer explicitly impersonates a character, and accordingly, verb modification from or towards the signer's body should be interpreted as signaling that character rather than the signer.[5] In Example 2, the signer identifies herself explicitly with the subject referent (the woman) and directs the verb from her own body (to be interpreted as the woman) towards the object locus (associated with the man).

Example 2

IX$_1$ WOMAN. IX$_{3a}$ MAN. PRESENT $_1$GIVE$_{3a}$

I am a woman, there is a man. I give the man a present.

Secondly, a signer can use a functional element that serves as agreement carrier. NGT features two types of agreement carriers. The first,

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[4] Similar observations, based on corpus data, have been made for Australian Sign Language (De Beuzeville, Johnston & Schembri, 2009) and British Sign Language (Fenlon, Cormier & Schembri, 2018).

[5] This phenomenon is otherwise known as constructed action (see chapter 2.4.5). In this chapter, we follow Ergin et al. in the use of the term 'character assignment'.

the *agreement auxiliary* ACT-ON is a semantically empty sign that is inserted to encode the agreement relation by moving between the loci associated with arguments (Bos, 1994, 2016[1996]). ACT-ON commonly accompanies plain verbs, as in Example 3a, adapted from Bos (1994: 39), but may also co-occur with agreement verbs. Agreement auxiliaries are attested in some, but not all sign languages (see for an overview Sapountzaki, 2012). Secondly, in a *serial verb construction*, one of the two lexical verbs carries the agreement (Bos, 2016[1996]; Couvee & Pfau, 2018). In Example 3b, the agreement verb CALL is not semantically required, but is inserted, as the verb SAY cannot be modified to mark agreement (adapted from Bos, 2016[1996]: 238).

Example 3

a. IX$_1$ PARTNER IX$_{3a}$ LOVE $_{3a}$ACT-ON$_1$
My partner loves me.

b. WHY NOT HONESTLY SAY $_2$CALL$_1$ PALM-UP
Why didn't you tell me (that) openly?

A third strategy to denote who is doing what to whom is to produce *successive 1-argument structures* (Ergin et al., 2018). In the Nicaraguan Sign Language example in Example 4, the signer distributes the arguments over two subsequent clauses: the giver and given object appear in the first clause, the receiver in the second clause (Senghas, Coppola, Newport & Supalla, 1997: 555). However, the signer does not display the scene from the perspective of one of the characters.

Example 4

MAN CUP GIVE WOMAN RECEIVE
The man gives the cup. The woman receives it.

Finally, SL-learners who lack specific vocabulary could also use their gestural repertoire in order to get the message across. Gestures are visual actions of the hands, body and face that accompany (co-speech gestures) or replace speech (e.g., pantomime) (Özyürek, 2012).

5.2.5 L1 acquisition of verb agreement in sign languages

At present, only relatively few studies are available that investigate the acquisition of a sign language as a second language by hearing learners, in particular studies that address the SL2 acquisition of agreement verbs. In contrast, there is a substantial body of literature on the L1 acquisition of sign language agreement (e.g., Hänel, 2005b; Meier, 1982, 2002a; Morgan, Barrière & Woll, 2006; Van den Bogaerde, 2000). The picture emerging from these studies is a relatively late onset of agreement production and a protracted period of acquisition. Initially, children produce uninflected verb signs. From age 2;0 onwards, they gradually start to inflect verbs, but only for present, real-world referents (Baker, Van den Bogaerde & Woll, 2008). Agreement with non-present referents, that is, the use of arbitrary loci, first appears much later, starting around age 3;6. Errors observed are overgeneralization (i.e., realizing agreement on plain verbs), erroneous agreement (production of forms that agree with the wrong argument), and omission of agreement where it might be expected given the linguistic context.[6] The fact that verb agreement and the establishment and maintenance of abstract loci in space (localization) are related might account for the observed prolonged period of acquisition (Newport & Meier, 1985).

5.3 Methodology

The current investigation aimed to describe the development of the NGT verb agreement system in SL2-learners and to document possible interlanguage phenomena (errors, omissions, etc.) in the expression of agreement. To that end, we recruited SL2-learners and L1-signers of NGT (Section 5.3.1) from whom we elicited NGT sentences by means of various visual or written stimuli (Sections 5.3.2 and 5.3.3). Their productions were then transcribed and coded for the use (or non-use) of various grammatical and lexical strategies (Section 5.3.4).

[6] Recall that – at least in some sign languages – agreement is not obligatory, and syntactic relations can be expressed using other devices. However, when the linguistic context does not disambiguate the identity of the referents and the verb remains unmodified, the linguistic context calls for agreement.

5.3.1 Participants

In order to investigate sign language acquisition in novel learners, we recruited students who were enrolled in the bachelor programs ‘Interpreter NGT’ and ‘Teacher NGT’ or the associate degree ‘Speech-to-text captionist’ offered by the Institute for Sign, Language & Deaf Studies (ISLDS), hosted by the Hogeschool Utrecht, Utrecht University of Applied Sciences (UUAS). We invited all first-year students of cohort 2016-2017 (*n* = 89) to participate in our longitudinal study. 14 of the 22 students who signed up completed the first year, and 12 of these 14 participants were followed during the second year as well. As can be seen in Table 5.1, the majority of the SL2-participants did not have prior knowledge of NGT.

Table 5.1. Background information SL2-participants.

L2-learner (ID)	**Program**	**Age**	**Prior knowledge of NGT[1]**	**Other foreign languages**
1	Teacher	21	No	English
2	Teacher	18	No	English, German
3	Teacher	19	No	English, German
7	Teacher	19	No	English, Spanish
9	Teacher	20	No	English
10	Teacher	20	No	English, French, German, Spanish
4	Interpreter	17	No	English, French, German
5	Interpreter	20	No	English, Spanish
8	Interpreter	17	No	English, French, German
12	Interpreter	18	Limited	English
13	Interpreter	19	Limited	English
14	Interpreter	40	Limited	English, French, Spanish
6	STT-captionist	48	No	English, French, German
11	STT-captionist	30	No	English, Sinhala

Notes: [1] Data on previous knowledge were self-reported. Participant 12 had a deaf friend, participants 13 and 14 had followed a beginner NGT course.

Furthermore, we analyzed data from three L1-signers[7] as well as four NGT teachers who performed the same task, to serve as benchmark. All teachers worked at ISLDS. In Tables 5.2 and 5.3, we present the background information of the benchmark-groups.

Table 5.2. Background information L1-signers.

L1-signer (ID)	Age	Age of onset NGT acquisition	Hearing status parents	Use of NGT on a daily basis
N5	49	From birth	Deaf	Yes
N6	37	8 months	Hearing	Yes
N7	33	1	Hearing	Yes

Table 5.3. Background information teachers.

teachers (ID)	Age	Hearing status	Age of onset NGT acquisition	Deaf relatives
D1	31	Hearing	19	No
D2	43	Hearing	27	No
D3	29	Deaf	1	No
D4	54	Deaf	3	No

5.3.2 Elicitation materials

A series of six tests (T1–6) was developed to assess the participants' mastery of verb agreement (and related devices). Each test contained 7 (tests 1, 3 and 5) or 15 (tests 2, 4 and 6) prompts (i.e., a total of 66) that were designed to elicit verbs that can be spatially modified to signal the verb's subject and object. Six target verbs were elicited by means of images (photo or drawing; see Figure 5.2ab for examples), six by means of an image combined with a (Dutch) sentence (see Figure 5.2c), and three by a Dutch sentence only.

[7] Unfortunately, we had to remove the data from a fourth L1-signer from the set, as this signer mainly used Sign-supported Dutch to express the particular targets aimed to elicit verb agreement. As a consequence, 81% of the responses did not include verb agreement.

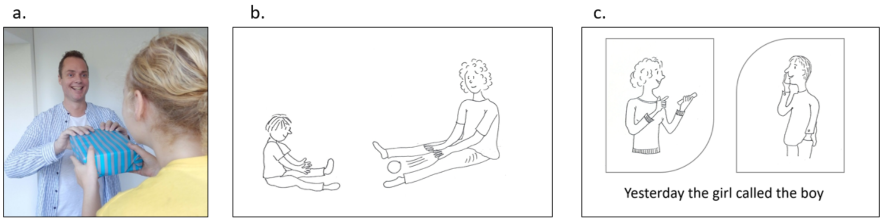

Figure 5.2. Examples of stimuli aimed to elicit the target verbs: (a) photo to elicit GIVE, (b) drawing to elicit ROLL$_{ball}$, (c) and drawing combined with sentence to elicit CALL-BY-PHONE.

Table 5.4 provides an overview of target verbs per elicitation strategy. Note that ASK, GIVE and SEND were each elicited by two stimuli.

Table 5.4. Overview of target verbs per elicitation strategy.

Elicitation strategy	**Target verbs**
Image only	GIVE (2), GIVE$_{reciprocal}$, THROW$_{ball}$, ROLL$_{ball}$, TAKE-AWAY
Image + sentence	ANSWER, ASK (2), CALL-BY-PHONE, FETCH, VISIT
Sentence only	SEND (2), HELP

All target verbs were present in the teaching materials the participants did receive during the first year. 13 of the 15 prompts aimed to elicit constructions with a third-person subject and a third-person object (which we refer to as '3→3 forms'; e.g., 'The boy asks the teacher'), the remaining two constructions with a third-person subject and a first-person object (referred to as 3→1 forms'; e.g., 'My brother sent me a package'). The selection includes one target verb (GIVE) that can combine with a so-called Handle classifier, a handshape that denotes shape characteristics of the direct object. Appendix 5A provides an overview of the targeted verbs.

5.3.3 Procedure

The SL2-participants were filmed 12 times during the first year of their education and three times during the second year (see Appendix 4A/5B). The tests were administered individually in a quiet room at the university. Participants sat in front of a laptop, and were asked to sign an NGT sentence in response to a prompt (i.e., image, sentence or combination, as described in Table 5.4) that appeared on the screen. After signing a response, they continued to the next test item by clicking the mouse. The test was self-paced, and participants were allowed to skip items they felt not capable of signing. The first author or a research assistant was present while the participants performed the task.

The L1-signers and teachers performed the same task, with the difference that their responses to the six tests were filmed in a single or at most two sessions.

5.3.4 Transcription and coding

The dataset, comprising 1966 SL2-responses and 330 L1/teacher-responses, was transcribed using ELAN, a software package developed at the Max Planck Institute for Psycholinguistics (Crasborn & Sloetjes, 2008), by the first author and a trained research assistant, both hearing fluent (SL2-)signers. Part of the data (8 sessions, 4% of the dataset) was transcribed by both transcribers to identify and solve disagreements. For all sessions, the level of inter-rater reliability was sufficient, with 85–97% (mean 93%) agreement between transcribers.

Subsequently, the data were coded by the first author for occurrence of (target-like or erroneous) agreement and use of alternative strategies. The coding scheme, illustrated in Figure 5.3, included five main categories: verb agreement, character assignment, use of agreement carrier, lexical solution, and absence of verb. In case of verb agreement, the verb was tagged fully or partly agreeing, and additional codes were added to indicate whether the object and/or subject were assigned a locus in space and whether the start- and/or end location of the verb aligned with this locus. As for agreement carriers, we distinguished between the agreement auxiliary ACT-ON and serial verb constructions. Within the category 'lexical', we labeled whether the verb was an unmodified agreement verb or a plain verb (e.g., replacement of target verb ASK by plain verb TALK), and whether the participant used successive 1-argument structures or pantomime/gestures.

The coding process was complicated by the fact that the SL2-participants occasionally created neologisms on the spot, or erroneously selected the wrong agreement verb (e.g., signing ANSWER instead of ASK, while mouthing[8] the word 'ask'). Since our goal was to identify and analyze productions of verb agreement, these neologisms and erroneously selected signs were assigned the labels agreement verb, character assignment, or agreement carrier, if applicable, with an extra code that would allow us to trace back whether these tokens are neologisms or erroneous signs. The right column in Figure 5.3 provides an overview of the types of verbs that were included in each main category.

During the coding process, an extensive logbook was kept to record specific learner behavior and errors.

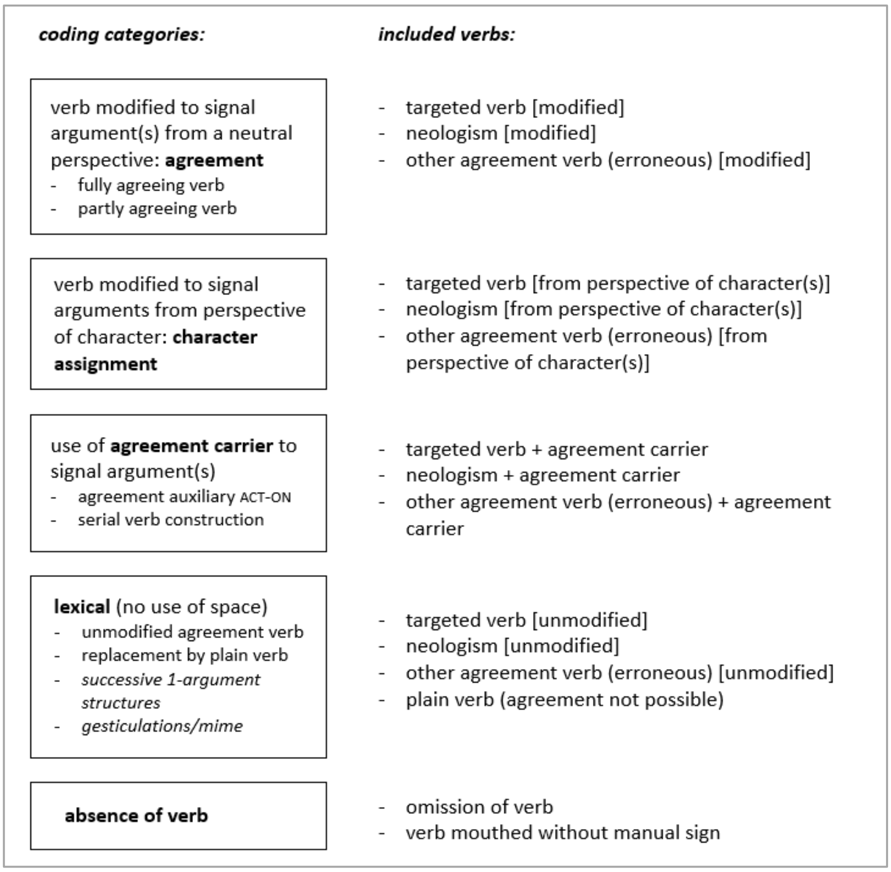

Figure 5.3. Coding scheme including five coding categories.

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8 Mouthings are silently articulated words from the surrounding spoken language that accompany signs; they are omnipresent in NGT (Bank, 2014).

5.4 Results

We now turn to the results from the elicitation tasks, regarding the participants' production of agreeing verbs and alternative strategies to convey who is doing what to whom. First, we examine the benchmark-data that served as baseline (Section 5.4.1), followed by a quantitative (Section 5.4.2.1) and qualitative analysis (Section 5.4.2.2) of the SL2-data.

5.4.1 Analysis benchmark-data

We analyzed the data obtained from three L1-signers and four teachers, which, in the following, we will refer to as 'benchmark-group'. Figure 5.4 shows the distribution of responses of each respondent, as percentage of the total of responses (*n* = 66, six tests).

The benchmark-participants produced an agreement verb or agreement carrier in 64–89% of the responses (mean 74%). In 9–30% of the responses, they presented the scene from a character perspective (mean 24%). A small percentage of their responses (2–5%, mean 2%) contained either an unmodified agreement verb (4 instances) or a plain verb replacing the targeted agreement verb (6 instances).

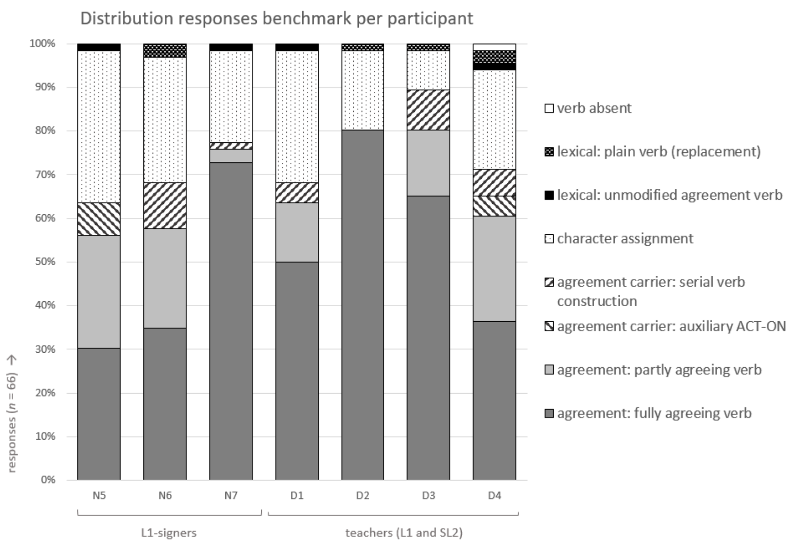

Figure 5.4. Distribution of the responses in the benchmark-group.

Figure 5.5 presents an overview per individual prompt. Based on this graph, we can distinguish three categories of responses. First, some stimuli mainly evoked character assignment – this concerns five items (28-GIVE, 29-GIVE, 30-THROW, 33-TAKE-AWAY, 36-ROLL), all of which express concrete transfer and were image-only items. The second category includes prompts that elicited the production of an agreement verb or agreement carrier in 90–100% of the responses (mean 96%; categories fully agreeing verb, partly agreeing verb, and agreement carrier collapsed). This category includes the items 24-ANSWER, 26-ASK, 27-CALL-BY-PHONE, 31/32-SEND, 34-FETCH, 35-HELP, 37-VISIT, and the reciprocal 38-GIVE$_{\text{rec.}}$. With the exception of the latter verb, these verbs all express metaphorical transfer (Meir, 2002) and, again with the exception of 38-GIVE$_{\text{rec.}}$, were all elicited using a sentence-only or a sentence-image prompt. The third category comprises prompts that evoked mixed responses. In our set, one item (25-ASK) generated both character assignment and verb modification.

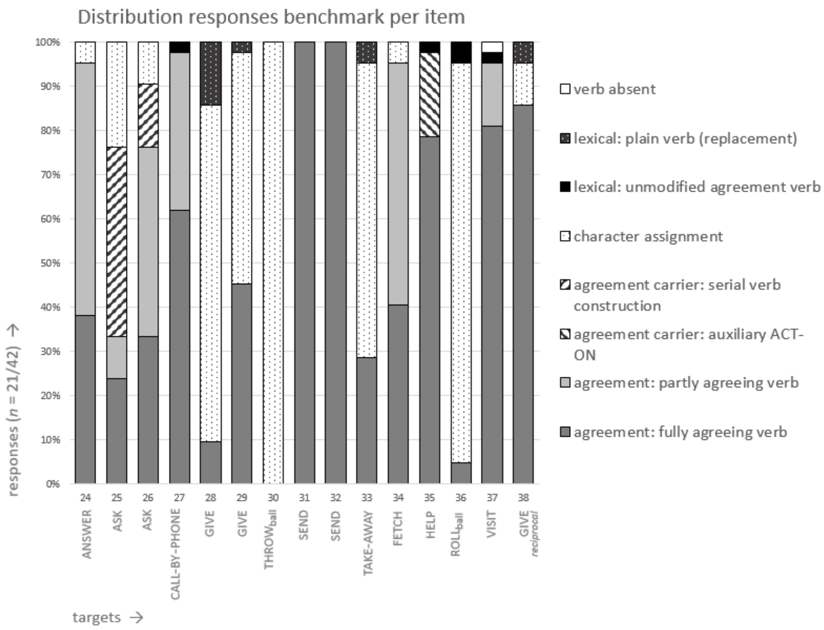

Figure 5.5. Distribution of responses per item in the benchmark-group.

5.4.2 Analysis SL2-learners

5.4.2.1 Group performance

Figure 5.6 shows the data obtained from the SL2-participants during the first year of their education.[9] Session 6 is not included, since some participants (*n* = 5) could not participate in that session. The graph on the left details the categories of responses produced by the complete group. The graph on the right shows the performances of the 11 participants who did not have previous knowledge of NGT. That is, participants 12, 13 and 14 (see Appendix 5A) are not included.

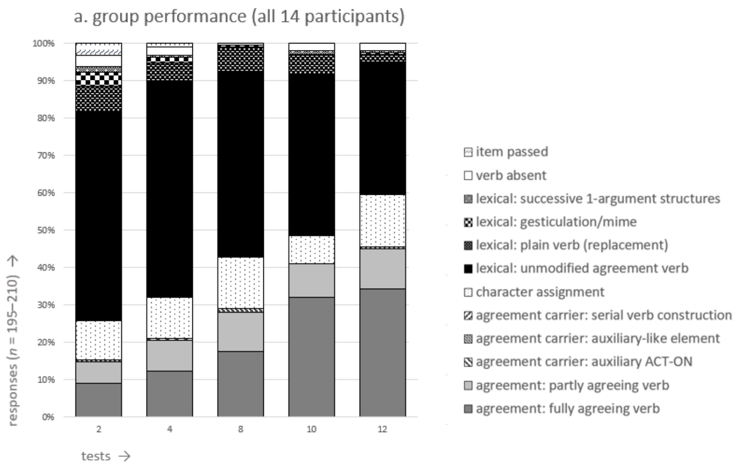

Figure 5.6a. SL2 group performance during year 1 (all participants).

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[9] In this analysis, we focused on the data obtained during the first year, since some learners did not participate (fully) during year 2. Therefore, data collected during the second year could only be used for the qualitative analysis; the graphs detail five of the 12 sessions (sessions 2, 4, 8, 10, 12) in which the complete sets of targets (*n* = 15) was presented. Recall that the other sessions contained only seven targets (see Appendix 5A).

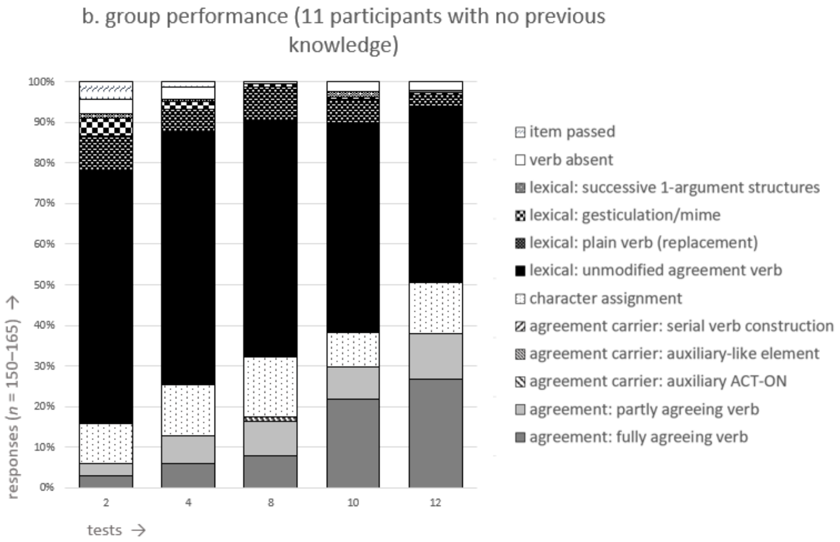

Figure 5.6b. SL2 group performance during year 1 (participants with no previous knowledge of NGT).

Figure 5.6b reveals that, although the use of partly or fully agreeing verbs increased across sessions, after a year of instruction, learners with no previous knowledge produced unmodified verb forms in a considerable number of the responses (almost 50%).

In Appendix 5C, we provide the SL2 group data per prompt, following the three categories introduced in Section 5.4.1. In the following, we will discuss the SL2-responses on the items that evoked character assignment (category 1) and verb modification (category 2) in the benchmark. Furthermore, we will compare the use of alternative strategies across the two groups.

5.4.2.1.1 Items that evoked character assignment in the benchmark-group

As discussed in Section 5.4.1, five out of 15 prompts evoked a high percentage of scene descriptions seen from a character perspective in the benchmark-group. Not surprisingly, these particular stimuli prompted character assignment in the SL2-learners as well, but with lower frequency. It has to be acknowledged, however, that a sign language scene description from the perspective of a character closely resembles a gestured (pantomimic) scene description from the perspective of a character. That is, when asked to gesture a scene, non-signers produce gestures that have similar or identical forms as the signs (cf. So, Coppola, Licciardello & Goldin-Meadow, 2005). Consequently, the items that evoked character assignment do not provide clear evidence that a learner actually masters the verb agreement system.

Still, these items revealed an interesting SL2-feature. Closer examination of the five category 1 items showed that in four of them, the SL2-participants tended to 'overuse' the neutral space at the expense of taking up the role of a character. This is exemplified in Figure 5.7, showing two signers who have localized the argument(s) in the neutral space by means of a classifier predicate articulated on the non-dominant (left) hand, and subsequently direct the agreement verb towards this classifier predicate. The L1-signers we consulted judged these constructions as well-formed in principle, but without exception, they added "…but, this should be presented using character assignment" – which is not what the SL2-learners do.

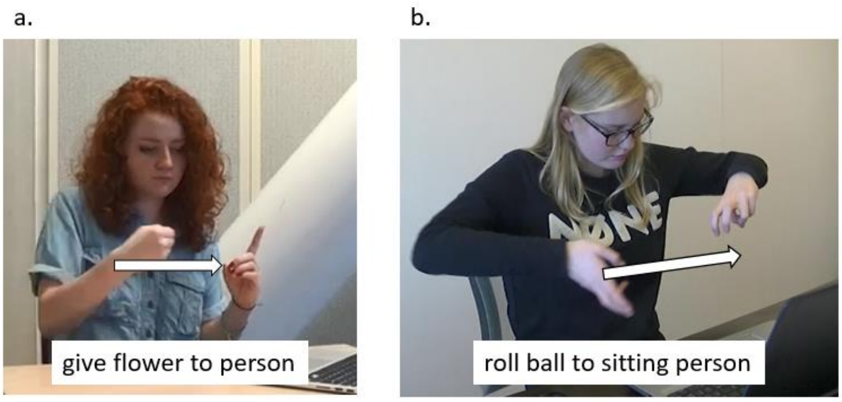

Figure 5.7. SL2-participants directing an agreement verb towards a classifier predicate.

5.4.2.1.2 Items that evoked modified verbs in the benchmark-group

In contrast to the category 1 items, the category 2 items could not be produced using gestures or pantomime, due to their non-iconic nature. As a consequence, these items provided a better opportunity to gain insight into the actual mastery of the agreement system. The SL2 group responses on the nine category 2 items are displayed in Figure 5.8.

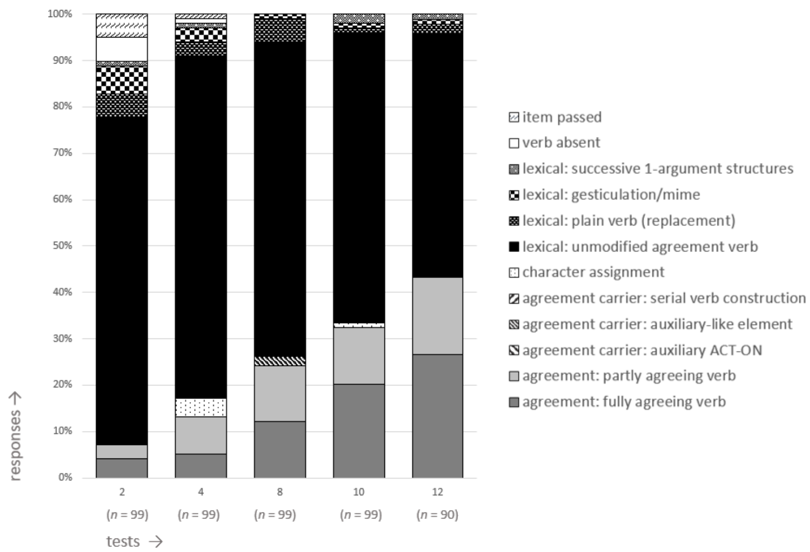

Figure 5.8. SL2-performance (11 participants with no previous knowledge) on items that evoked 90–100% agreement verbs or agreement carriers in the benchmark-group (targets included are 24-ANSWER, 26-ASK, 27-CALL-BY-PHONE, 31/32-SEND, 34-FETCH, 35-HELP, 37-VISIT, 38-GIVE$_{rec.}$).

Figure 5.8 demonstrates that the group percentage of responses containing a (fully or partly agreeing) agreement verb is only 43% percent at the end of the first year – as compared to 90–100% in the benchmark-group. The non-iconic nature of this category, that is, the fact that the verb meanings involve abstract rather than concrete transfer, is reflected in the responses: like the benchmark-group, the SL2-respondents hardly used character assignment on these targets, using either an uninflected or modified verb instead.

5.4.2.1.3 Use of alternative strategies

A comparison across groups regarding the use of alternative strategies (see Section 5.2.4) reveals some differences. First of all, the groups differed with regard to the use of agreement carriers. During the first year, the SL2-participants did not use the agreement carrier ACT-ON at all (except for one participant, who produced a gestural auxiliary-like element twice in session 8). The benchmark-group did produce ACT-ON, but only with the verb HELP (see Figure 5.5). Moreover, the benchmark-group frequently produced the serial verb construction ASK^CALL (or CALL^ASK) (targets 25 and 26), whereas the SL2-participants never used serial verb constructions. Admittedly, this finding is not surprising given that neither ACT-ON nor serial verb constructions had been explicitly taught prior to testing. Still, both strategies were regularly present in the input the learners received. Conversely, the benchmark-group did not produce successive 1-argument structures, while some participants in the SL2-group did (e.g., 'give-receive' structures like the one presented in Example 4) – despite the fact that such structures had not been offered in the input.

Not surprisingly, some SL2-participants provided responses containing mime and gestures when they did not know the lexical sign for a particular verb meaning. Yet, this avoidance strategy accounted for only a small proportion (4%) of the responses during the first sessions. Other strategies employed by the SL2-participants to compensate for the lack of vocabulary knowledge were: mouthing the verb, creating neologisms, replacing the verb, or simply omitting the verb from the sentence.

5.4.2.2 Individual patterns and strategies

Having presented the group results, we shall now zoom in on the behavior of individual participants as well as learner strategies associated with certain verb types or verbs.

The results obtained from an analysis per participant are provided in Appendix 5E. The graphs detail the distribution of responses during year 1 (sessions 2, 4, 8, and 12; 14 participants) and the first session of year 2 (session 13; 9 participants). Clearly, different learners employed different strategies in order to perform the task at a point in time at which the targeted structure was not mastered yet. To give just three examples: participant 1 tended to replace the target verb by a plain verb, participant 6 used gestures, and participant 8 used successive 1-argument structures. Furthermore, it can be seen that six out of 14 learners (participants 4, 6, 10, 12, 13, and 14) showed high rates of verb modification (fully or partly modified verbs or character assignment) at the end of year 1 (session 12; 73–100%, which is actually close to the benchmark). It must be noted, however, that three of these six participants had previous knowledge of NGT. In contrast, participants 1, 2 and 11 displayed a strikingly low production of the target structure in session 12, with success rates between 7–20%. All participants (*n* = 9) who were filmed after 3 months in their second year (session 13) showed an increase in verb modification, with the exception of participant 11. This divergence can be explained by the fact that this participant, who followed the STT-captionist program, received less in-class instruction than the participants who followed the teacher or interpreter education.

In the following, we first address whether different verb types possibly present us with different learner behaviors, that is, whether certain verbs were spatially modified earlier and more consistently than other verbs (Section 5.4.2.2.1). Subsequently, we describe a selection of typical learner strategies we noted repeatedly in the data (*omissions, overgeneralizations, simultaneous productions of* GIVE *and* RECEIVE, Sections 5.4.2.2.2–4). Besides telling us something about the behavior of L2 learners who acquire a language in a different modality, the recurrent patterns are of interest for practitioners in the field and have – to the best of our knowledge – not been documented before for SL2-learners.

5.4.2.2.1 Verb types

First, we asked whether verbs that express concrete transfer (category 1 verbs like GIVE and THROW) were mastered earlier, for the simple reason that the movement component in these verbs is iconic (e.g., the act of giving involves a movement of the hand from the giver to the receiver). Indeed, we observed that at the end of year 1, the percentage of modified forms was higher for these verbs than for abstract-transfer verbs (e.g., CALL-BY-PHONE and VISIT), with the exception of SEND, which yielded 80–90% modified forms. Remember, however, that SEND was the only verb meant to elicit '3→1 forms' (see Section 5.5.3 for discussion). Notably, this verb was already modified by almost half of the SL2-participants at an early stage (item 32, session 4).[10] It

[10] Interestingly, the other prompt containing the verb SEND, prompt 31, did not evoke the production of a modified verb in any of the participants during this session, and evoked a lower degree of modification in general during the first year. This can be explained by the fact that prompt 31 is more complex than prompt 32 in that it contains a dual object (i.e., 'me and my brother') while the object in prompt 32 is singular.

thus seems that iconicity helped the SL2-learners in the acquisition of spatial modulation – in contrast to what has been demonstrated for L1-learners (Meier, 2002a). Yet, we have to keep in mind that the category 1 verbs were also those that were elicited by an image only, and while the image does not depict the movement, this may still have motivated the use of spatial modulation.

An item-analysis of the nine category 2 items (Appendix 5C) revealed further interesting findings. First of all, the highly frequent verbs ASK and ANSWER were produced in a modified form in respectively 40% and 30% of the responses at the end of year 1 (session 12). This percentage may be higher than that for other abstract transfer verbs, but it was still surprisingly low, considering the frequent use of these (modified) verbs in the input from the teachers. Returning to the category 2 verb SEND, additional analyses revealed that the SL2-participants showed a high tendency to modify this verb without establishing a locus for the third-person subject – which is clearly different from the elicited '3→3 forms' (see Appendix 5D). The benchmark-group, in contrast, established a locus in space for the third-person subject prior or after modifying the verb SEND in all cases.

Second, it is worth investigating whether the two backwards verbs in the sample (TAKE-AWAY and FETCH) were particularly challenging for the learners, as the mapping of grammatical role onto begin/end point of the movement is reversed. However, no clear results emerged, as the two verbs behaved differently, which – again – is likely due to the fact that the transfer semantics is more concrete in TAKE-AWAY than in FETCH. At the end of year 1, productions for both verbs showed modified forms, but while TAKE-AWAY involved 20% agreement with abstract loci and 70% character assignment, FETCH involved 20% agreement with abstract loci and 80% unmodified forms or gestural behavior. In fact, the distribution observed for FETCH is very close to that observed for the regular agreement verb HELP.

5.4.2.2.2 Omissions

Three types of omissions were observed in the data. The first, and most common, type of omission was locus omission. During the analysis, we noted an interesting difference between the benchmark-participants and the SL2-

participants with regard to the use of established loci.[11] In the SL2-dataset, we identified multiple instances (*n* = 78) of 'unutilized loci'. That is, the learner assigned a locus to one referent or both referents, but did not subsequently use these loci for verb modification. This is exemplified in Figure 5.9, where the signer does establish loci on the right and left side for the referents 'two brothers' and 'two sisters', respectively, but then does not employ these loci for modifying the agreement verb HELP. Remember from Section 5.2.3 that corpus data suggest that agreement is not always spelled out on verbs that can be modified. One might therefore argue that the observed locus omissions are actually target-like. Still, we think that for the learners analyzed here, this argument does not hold because such omissions (a) were not present in their input, and (b) were not observed in the benchmark-data.

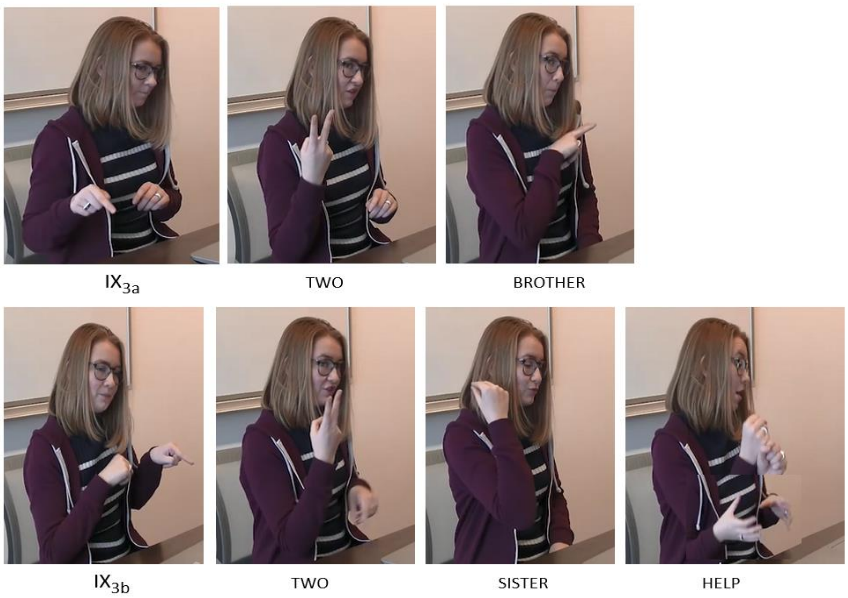

Figure 5.9. Example of unutilized loci: the established loci IX_{3a} and IX_{3b} are not used for the modification of the agreement verb HELP.

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[11] In addition to the established loci (either used for further reference or 'unutilized'), we also noticed some examples of stacking, that is, localizing both subject and the object referent at the same locus (cf. Loew, 1984).

Interestingly, three learners consistently produced HELP with a movement towards their own body, that is, they produced a movement from a location in front of their body towards their body following the x-asis (see Figure 2.14), in contexts where a '3→3 form' (following the y-axis and using loci associated with the verb's arguments) would be expected. In these productions the learners thus omitted loci. Since these learners produced this form consistently, we assume that these were not instances of erroneous agreement, but rather phonological mistakes, that is, the learners produced an unmodified form with an incorrect movement component.[12]

A second type of omission is clearly modality-specific, as it concerned the non-dominant hand. In her attempt to modify the verb HELP, the signer in Figure 5.10 executes the movement path with only one hand, while the other hand (her right hand) is already placed at the end locus corresponding to the object, that is, we observe partial omission of the movement component.[13]

Figure 5.10. Execution of correctly modified movement path with only one hand (partial omission).

[12] Some learners directed other verbs with a third-person subject and object (VISIT, GIVE, CALL-BY-PHONE, ANSWER) towards their own body, which implies a first-person object. Note that for the concrete transfer verb GIVE, in particular, this movement is counter-iconic. In contrast to HELP, we did not find a recurrent pattern regarding these four verbs. Possibly, the forms we identified are forms of erroneous agreement, but it is equally possible that these are actually incorrectly articulated unmodified verbs.

[13] We observed multiple instances of partial omission of the movement component in the intervention study (Chapter 6) as well.

A third type of omission concerns orientation. As explained in Section 5.2.1, in some signs, the orientation of the hand(s) signals (object) agreement. In the sign SEND, e.g., the fingertips are oriented towards the object (a first-person object in Figure 5.11a). The learner depicted in Figure 5.11b attempts to sign SEND-EMAIL$_1$ (‘send to me’). The path and hand-internal movement (opening of thumb and index finger) are present, but she fails to orientate the fingertips towards the locus of the object (‘me’).

Figure 5.11. Omission of orientation component in modified verb SEND$_1$ (photo left: Annette Jansen, ©RCSI).

5.4.2.2.3 Overgeneralization

Another type of error we observed in the data is overgeneralization; that is, erroneous application of the agreement mechanism. The learner in Figure 5.12b, for instance, uses a variant of the verb ASK that cannot be spatially modified (variant 1 in Figure 5.12a) but modifies it by directing the movement and fingertips towards the object (herself). Instead, the learner should have used variant 2 in Figure 5.12a, which can be modified to signal agreement by modifying the movement path.[14]

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[14] Another type of overgeneralization, which is beyond the scope of this article but is worth mentioning, was observed in the verb SEND. Analysis revealed that 11 learners combined the verb SEND with a Handle classifier, a handshape denoting how an object is held. Such a classifier is commonly observed with the verb GIVE (and at the end of the first year (session 12), 62% of the GIVE-items indeed contained a

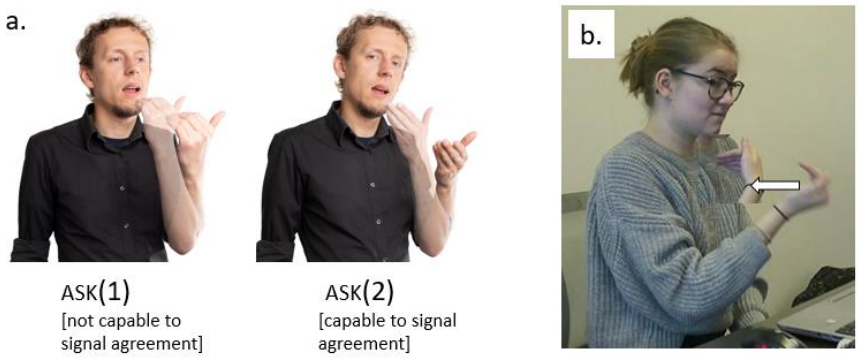

Figure 5.12. Overgeneralization: plain verb ASK(1) used in spatially modified form (photo left: Annette Jansen, ©RCSI).

5.4.2.2.4 Simultaneous production of give and 'receive'

The SL2-data contained multiple striking examples of attempts to express the act of giving and receiving simultaneously, using both hands (see Figure 5.13). In all cases, the dominant hand executes the verb ($_{3a}$GIVE$_{3b}$) while the non-dominant hand (which is stationary at locus 3b) represents the hand of the receiver. We did not find these constructions in the benchmark-data, and they were certainly not present in the input the learners received. In a sense, this strategy is the simultaneous counterpart of the sequential 1-argument structure presented in Example 4, which, as mentioned previously, was also observed in the SL2-productions.

classifier). Use of a Handle classifier with SEND, however, is clearly ungrammatical. We noted 40 such instances of overgeneralization (16% of the responses featuring the verb SEND).

Figure 5.13. Attempts to express the verb GIVE and the act of receiving simultaneously.

5.5 Discussion

The present study was designed to investigate the acquisition of agreement verbs in SL2-learners. The study yielded some interesting findings that – to the best of our knowledge – have not been documented before, such as omission and overgeneralization errors and use of the non-dominant hand in ways not observed in the benchmark-group (Entity classifier, 'receive' construction). The quantitative calculations indicate moderate to low production of instances of verb agreement after a year of instruction (204 in-class hours), that is, a large proportion (almost 50%) of agreement verbs were produced in the unmodified citation form. This is in sharp contrast with the benchmark-group (consisting of L1-signers and teachers), who produced an unmodified agreement verb in less than 1% (4/462) of the responses. This allows us to tentatively conclude that verb agreement is difficult to acquire for SL2-learners. Strikingly, the same SL2-participants were quite successful in producing other constructions that make use of the signing space, i.e., classifier constructions (see Chapter 4).

5.5.1 Impact of L1

Beyond the fact that Dutch, the L1 of the learners in our study, also marks subject agreement on verbs, the learners could not fall back on characteristics of their L1 when acquiring the spatial agreement system of NGT. The observation that – at least some of – the SL2-learners failed to notice modified verb forms in the input might thus be related to the fact that for them, this type of spatial morphological marking was entirely unfamiliar. It is important to note that, during the first year, the students did not receive explicit rule explanation concerning agreement verbs. Still, numerous examples of modified forms of the verbs targeted in the present study were offered in the input, and negative evidence was regularly provided in the form of recasts and – occasionally – explicit feedback.

A first challenge the learners are faced with is the co-existence of different verb classes. The existence of a considerable number of non-modifiable (plain) verbs likely confuses the learners and leads to the incorrect classification of verbs: an agreement verb classified as plain verb, and thus produced in an unmodified form, or a plain verb wrongly considered as agreement verb, and thus produced in a spatially modified form. Our data show that the first type of misclassification was very common (but see Figure 5.12b for the other type), and that even concrete transfer verbs frequently remained unmodified. Of course, we cannot be sure whether the learners really misclassified a particular verb or whether they simply failed to apply the agreement mechanism. Importantly, it is not the case that the learners would be unable to use the signing space for localization. Data analysis showed that they commonly did establish loci for the referents involved in an event, that is, they were aware of the fact that space can be used in this way. Yet, oftentimes these loci remained unutilized, which suggests that the copy mechanism that underlies spatial agreement is difficult for the learners.

The fact that NGT verbs, in contrast to Dutch verbs, agree with their object does not seem to impede learning. If the learners were indeed struggling with object agreement, then one would expect partly agreeing productions to be more likely to agree with the subject. This, however, was not the case. In fact, the begin locus (which is the subject locus in regular agreement verbs) was more likely to be omitted. In these cases, the movement generally started in front of the signer's body (see also Section 5.5.3). Interestingly, this pattern aligns with an object marking preference reported for many sign languages (e.g., Meir, Padden, Aronoff & Sandler, 2007; Padden, 1988). However, it is unlikely that the learners were aware of this kind of optionality, as fully agreeing verb forms are ubiquitous in the input they receive from teachers and learning materials.[15]

5.5.2 Comparison to L1 acquisition of spatial agreement

Our conclusion that the acquisition of verb agreement poses challenges corroborates with the prolonged path of acquisition observed in L1-learners (Baker et al., 2008). Like L1-learners, the SL2-participants often produced unmodified (citation) forms, using lexical expressions or pronouns instead. In addition, L1-learners have also been reported to overgeneralize, that is, to occasionally spatially modify plain verbs (e.g., Hänel, 2005b; Meier, 2002a). Meier further pointed out that children show more reliable use of object

[15] They might, however, occasionally encounter non- or partly modified forms in interactions with members of the deaf community or in NGT-materials that can be found online.

agreement, which is also what we found (note, however, that Meier focused on agreement with present referents).

Still, there are some important differences. First, as mentioned in the previous section, our SL2-learners were obviously capable to make use of abstract loci in space, but still left verbs unmodified (remember that most verb forms we elicited involved non-present referents). In contrast, L1-learners have been reported to modify verbs for present referents well before starting to use abstract loci (Loew, 1984; but see Hänel, 2005b). In Loew's (1984) study, children occasionally produced an apparently agreeing verb, but failed to identify the argument with which the verb agrees – which is the opposite of what we observed. Second, Meier (1982) showed that iconic properties of certain agreeing verbs did not facilitate the acquisition of verb agreement, that is, GIVE was not acquired earlier than e.g., ASK. Once again, this is different from what our data suggest, as concrete transfer verbs were more likely to be modified than abstract/metaphorical transfer verbs.

However, the comparison should be exercised with due caution, since the present study examined short responses without context, while studies on L1 acquisition generally investigated language use in natural contexts or examined longer stretches of text (e.g., narratives).

5.5.3 On the special status of first person

Despite the fact that we only elicited two verb forms with a first-person argument (an object), two interesting observations can be made regarding the use of first-person forms, or rather the use of the signer's body. First, as pointed out in Section 5.5.1, when producing partly agreeing forms, the learners were more likely to omit the (third-person) subject locus than the object locus. In this case, they started the path movement in front of their body, that is, at the first-person locus. While the produced forms were thus not target-like, they still followed a strategy that has been referred to as 'body as subject' (Meir et al., 2007). That is, even outside of character assignment, mapping a third-person subject onto one's body is considered a default strategy. Among other things, Meir et al. (2007) hypothesized that this may explain the primacy of object marking over subject marking across sign languages (subject agreement is more likely to be omitted, and there are verbs that can only agree with their object). Of course, the learners were not aware of this mapping strategy, but their experience with a visual-spatial language may still led them to realize that "[w]hen we use our body and hands to conceptualize an event, the body can represent only one argument, thus forcing us to separate one argument from all other aspects of the event" (Meir et al., 2007: 561) – and this argument is the subject (this insight has recently been formalized by Oomen (2017) for NGT verbs).

Second, we also witness the special status of the first-person locus when it comes to the end point of the path movement, i.e., the object locus in regular agreement verbs. Remember that we observed that the target-like '3→1 form' SEND appeared earlier in the SL2-productions than the '3→3 forms'. Obviously, the presence of a first-person object blocks the 'body as subject' strategy, but the signers still successfully mapped the first-person argument onto their body (i.e., the locus in front of their body).[16] This finding aligns with the phases emerging sign languages have been observed to go through. Padden, Meir, Aronoff & Sandler (2010) noted that in two emerging sign languages (Israeli Sign Language and Al-Sayyid Bedouin Sign Language), the oldest signers preferred to move a sign along the sagittal axis, i.e., from or towards the body (the '1→3 form' and the '3→1 form' – remember that the former was not elicited in the present study). Only as the languages matured, verb modification from one side of the signing space to the other, i.e., along the horizontal axis increased (the '3→3 form'; also see Meir, 2012a).

Taken together, the correct use as well as the overuse of the first-person locus (for subjects and objects) observed in the SL2-learners are in line with what has been described for the synchronic ('body as subject') and the diachronic (preference for sagittal axis, see also Section 2.4.7.2) use of that specific locus, that is, of the signer's body.

5.5.4 Limitations

We are aware that our research has some limitations. First of all, some of the selected target verbs (e.g., GIVE, ROLL$_{ball}$, TAKE-AWAY) did not provide clear evidence that the learner understood the system of verb agreement, since

[16] Remember that there were also three signers who consistently produced the verb HELP in the '3→1 form', i.e., with movement towards their body (while the target was the '3→3 form'). In Section 5.4.2.2.2 (omissions), we speculated that this might be a phonological error. In principle, however, these examples might also exemplify the preference for the sagittal axis.

these verbs, and the way they were elicited (i.e., by images), are likely to evoke character assignment. While character assignment is in principle target-like – and was indeed also used by the benchmark-group for these verbs – it is not easily distinguished from a gestural rendition (i.e., enactment), and these target verbs were therefore less suitable for demonstrating understanding of the verb agreement system. In fact, the gestural enactments we observed sometimes resembled NGT signs, which was problematic during the coding process. Although we were very conservative in our coding, this could have led to an overestimation of the learners' performances.

A second limitation concerns the specific agreement forms our stimuli elicited. Remember that the target-items featured only '3→3 forms' and '3→1 forms', and that the latter were limited to one verb (SEND). That is, we did neither elicit constructions with a second-person subject/object nor constructions with a first-person subject. These gaps have practical reasons. First, the study presented here is part of a larger project on the SL2 acquisition of the use of space, with many more stimuli targeting other construction types. Second, first- and second-person forms are not easily elicited by images, which in general, is the preferred elicitation strategy. It is possible that other forms of the paradigm (e.g., person combinations like '1→3' or '3→2') would yield further interesting results – no matter whether they align with or differ from the results reported here. We hope to include such forms in future research.

Despite these limitations, we believe that the present study, being the first longitudinal study to investigate the acquisition of verb agreement in SL2-learners, contributes to our knowledge of SL2-learning and serves as a stepping stone for future studies.

5.5.5 Implications for teaching practice

The results of our study have important implications for the teaching practice. Clearly, at the end of year 1, the SL2-learners were still struggling with the spatial modification of those verbs that allow it. Even forms that were offered in modified form repeatedly and explicitly in the input, such as ASK and ANSWER, remained unmodified in the productions of some of the learners. This is striking, as other spatial predicates (i.e., classifier predicates) were picked up from the natural input at an early point (see Chapter 4). This indicates that learners might need additional explicit rule explanation with regard to the verb agreement system. The challenge will be to offer such explanation at the appropriate point in time, such that it will help rather than impede the acquisition process (cf. Hammerly, 1991).

At the same time, teachers should be aware of the learners' tendency to overuse neutral space at the expense of character assignment. What we observed here, is a sort of trade-off that was challenging for the learners: once they correctly applied spatial modification, they sometimes failed to employ the character assignment strategy, which is judged more appropriate by our L1-consultants. This implies that, in addition to teaching the rules for verb agreement, the choice of strategy also requires attention in the curriculum.

5.6 Conclusion

In this chapter, we provided a quantitative and qualitative description of the acquisition of the NGT agreement verb system by SL2-learners. From our investigation, we can conclude that, at least for some learners, the regularities underlying this system were difficult to master, in spite of the fact that the input provided by the teachers contained numerous examples of spatially modified verbs. The difficulties to master the agreement system might be due to the different modality. It is, for instance, likely that the fact that in sign languages, different verb classes co-exist – with only a subset of verbs showing agreement – impedes the process of recognizing the rules governing the verb agreement system in the input.

We are currently in the process of investigating whether different pedagogical practices (e.g., input flood and/or explicit focus on form) may aid learners in their learning process (Boers-Visker & De Graaff, submitted; see Chapter 6). The research reported here provides useful information with regard to the timing of these interventions as well as the methodology.

Acknowledgements

We want to thank the SL2-learners and L1-signers who participated in this study and who granted permission to use screenshots of their performances *in this publication. We are grateful for the assistance and contributions of Jamie Knecht, Karin Vinke, Christiaan Plug, Adde Woest, Yfke van der Woude, Christina Bloed, Tobias de Ronde, and Marijke Scheffener. Figures 5.1, 5.11, and 5.12 depict model Tobias de Ronde and were photographed by Annette Janssen. Figure 5.2a depicts models Ronald Akkerboom en Lize Boers.*

6. Study 4: A study into the effects of two Focus on Form interventions on the acquisition of agreement verb modification

6.1 Introduction[1]

Language teachers in foreign language classrooms face many challenges. They often have to teach heterogeneous learner populations with a variety of motivations and aptitudes, and they must bring students to higher language levels in a limited number of in-class hours. The limitations on instructional time and energy call for efficient and effective pedagogical practices. It is therefore not surprising that the effectiveness of various pedagogical practices in second or foreign language (L2) classrooms has gained much attention within the field of Instructed Second Language Acquisition (ISLA). One of the domains of investigation is the domain of form-focused instruction (FFI), which investigates the facilitating effects of pedagogical practices that are used to draw the learners' attention to the form of linguistic features either implicitly or explicitly (Spada, 1997).

The vast body of literature on the effects of FFI reports on spoken languages. To date, there are no publications that report experimental investigations into the facilitating effects of FFI on learning a *signed* language. In the absence of empirical evidence obtained from sign language learners, sign language curricula often adopt principles from spoken language instruction (Rosen, 2010). However, it is unknown whether the different transmission channels of both types of human languages (i.e., the oral-auditory modality of spoken languages vs. the visual-spatial modality of signed languages) cause modality effects in the learning process, and thus to

[1] A shorter version of this chapter was submitted to a scientific journal. The supplementary materials to this chapter can be found online in Boers-Visker, E.M. (Utrecht University of Applied Sciences / University of Amsterdam) (2018): A study into the effects of two Focus on Form interventions on the acquisition of the agreement verb modification (dataset). DANS: https://doi.org/10.17026/dans-24h-xsp8.

what extent results obtained for spoken languages learning processes can be generalized to sign language acquisition.

The current study aims to fill this gap by providing evidence on the effects of two form-focused interventions (namely input flood and explicit instruction) in novel learners of Sign Language of the Netherlands (Nederlandse Gebarentaal, NGT). As such, it not only informs scholars and practitioners in the field of sign language pedagogy, but it also contributes to the cumulative body of evidence within the FFI research domain by adding a language in another modality to the sample of languages investigated within this domain.

6.2 Theoretical background

6.2.1 Form-focused instruction

Form-focused instruction can be described as an approach involving "attempts to intervene directly in the process of interlanguage construction by drawing learners' attention to or providing opportunities for them to practice specific linguistic features." (Ellis, Basturkmen & Loewen, 2001, p. 407). This approach takes an intermediate position on a continuum with a 'focus on meaning' (FonM) approach at the one end and a so-called 'focus on formS' (FonFs) approach at the other end (Long, 1991). Within the latter approach, the emphasis is on teaching isolated linguistic forms based on structural syllabi with no or few opportunities to use the language in communicative contexts, whereas the former approach involves language learning through meaningful communication only, leaving no room for interventions aimed to shift the learners' attention to linguistic forms (i.e., the non-interventionist position). Form-focused instruction combines these approaches by complementing meaning-focused input with pedagogical practices to shift the learners' focal attention to the form-meaning mapping of linguistic constructions. These pedagogical practices aim to promote 'noticing', that is, registering forms in the input so as to store them in memory, which is considered to be a prerequisite for acquisition (Schmidt, 1994).

In the literature, this form-focused approach has been defined and operationalized differently by various authors. In Long's (1983, 1988) view, the form-focused approach, which he termed ‘focus on form’ (FonF), is restricted to brief, incidental and implicit reactions as a response to problems that arise during a communicative exchange. He asserts that FonF is incidental and reactive and, consequently, is never pre-planned.[2] Spada (1997) uses a broader definition of the construct. In her view, form-focused instruction (FFI) is not merely incidental and reactive but can “include the direct teaching of language (e.g. through grammatical rules) and/or reactions to learners' errors (e.g. corrective feedback).” (p. 73). For both authors, form-focused instruction needs to occur in a communicative context. In contrast to Long’s FonF-approach, Spada’s FFI-approach does include predetermined form-focused activities that are proactive in nature. However, Spada excludes traditional instruction involving the presentation and practice of discrete forms (Ellis, 2001). However, such forms are encompassed in the expanded definition offered by Ellis (2016), who defines focus on forms as “a set of techniques deployed in a communicative context by the teacher and/or the learners to draw attention implicitly or explicitly and often briefly to linguistic forms that are problematic for the learners.” (p. 411). In his view, focus on form can be preplanned or incidental, pre-emptive or responsive, interactive or non-interactive, and can occur within or outside the task. However, in Ellis’ reconceptualization, focus on form still “occurs in activities where meaning is primary” (p. 411). There is room for ‘FonFs-episodes’, such as rule presentation outside the performance of a communicative activity. For the purpose of this study, we adhered to Ellis’ (2016) broader definition.

Since the 1990s, there has been extensive research on the effects of various focus on form techniques and activities (henceforth ‘pedagogical practices’) on (spoken) second language learning in both classroom and laboratory settings (Ellis, 2001).[3] These pedagogical practices vary in terms of explicitness, obtrusiveness, targetedness, locus of responsibility (i.e.,

[2] In later work, Long (2015) acknowledges that focus on form can entail explicit grammar instruction in response to a problem that arises during communication as well, and as such, is not completely restricted to incidental learning.

[3] An exhaustive review of the rich literature on this topic is beyond the scope of this article. For reviews, we refer the reader to Doughty and Williams (1998), Ellis (2001), Pawlak (2006), Spada (2011), Loewen (2011). A research-timeline is presented in Nassaji (2016). Meta-analyses have been conducted by Norris and Ortega (2000), Russell and Spada (2006), Spada and Tomita (2010), Lee and Huang (2008), Li (2010), and Lyster and Saito (2010).

teacher or learner-initiated), and anticipation (i.e., place on the proactive-reactive continuum) (Doughty & Williams, 1998; Williams, 2005). For each of these features, the pedagogical practice can be ranged along a continuum reflecting the degree to which the practice is characterized by this feature. Given the context of our study, we restrict this discussion to the degree of explicitness. Figure 6.1 shows an implicit-explicit continuum along which various pedagogical practices presented in the literature are situated (e.g., Doughty and Williams, 1998; Ellis, 2016; Ellis, Basturkmen & Loewen, 2002).[4] Note that this continuum, according to the definition provided by Ellis (2016), includes practices that can be characterized as FonFs-practices, being clearly explicit and that therefore would be excluded by authors who adhere to a more restricted definition of FFI (e.g., Doughty and Williams, 1998). Figure 6.1 includes *activities* (grey boxes) and *corrective feedback* (white boxes). We will first discuss the activities, followed by the various techniques, to provide corrective feedback.

At the implicit end of the continuum, two input enhancement techniques can be found. An *input flood* exposes the learner to an input enriched with multiple examples of the target form (Trahey & White, 1993). These forms are not made visually salient, in contrast to forms in *visually enhanced texts,* in which typographical manipulations such as underlining, bolding, different fonts or colors are deployed to increase the saliency of the target feature (Alanen, 1995; LaBrozzi, 2016). Both forms of structured input can be combined with follow-up activities in which the target form is *useful* or *essential* to complete the task. Importantly, none of the activities at the implicit side of the continuum involve rule presentation or directions to pay attention to form. Being highly implicit, structured input might be insufficient for some learners to notice the target form.

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[4] In this continuum, the pedagogical practices are characterized as 'implicit' or 'explicit' according to their ability to induce awareness of the linguistic structure. A composite of various characteristics such as degree of saliency, degree of obtrusiveness, and presence/absence of metalinguistic rules contributes to the degree of explicitness. However, we acknowledge that the notions 'explicit' and 'implicit' are difficult to define and that this schematic depiction does not capture the complex nature of this dimension.

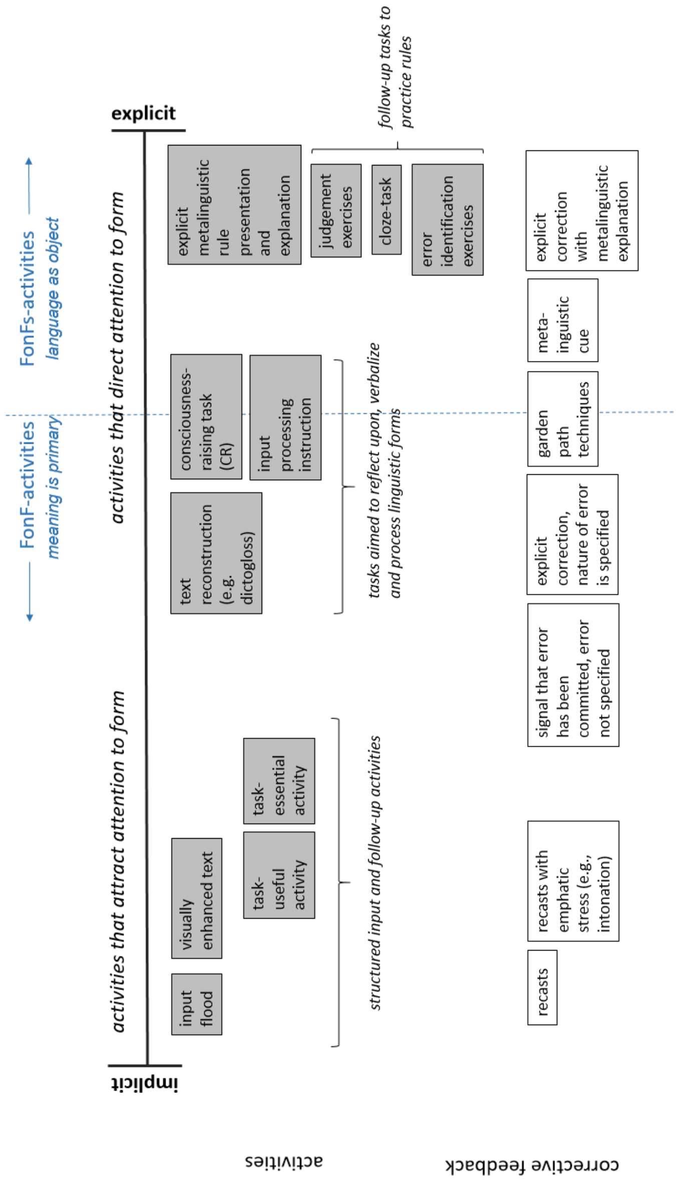

Figure 6.1. Focus on form practices placed along an implicit-explicit continuum (based on Doughty and Williams (1998), Ellis (2016), and Ellis, Basturkmen and Loewen (2002)).

More towards the explicit end of the continuum, one can find collaborative output-tasks that aim to direct, rather than attract, the learners' attention to the language form. This might be accomplished by *text reconstruction* tasks, which require the learner to produce forms of the target language form featured in the source text (e.g., dictogloss). *Consciousness-raising tasks* combine meaning-focused use of the target language and metalinguistic knowledge, "in the sense that learners develop knowledge about the feature and tend become more aware of the feature in communicative input afterwards" (Fotos, 1994, p. 325). To accomplish this, the grammatical structure is used as task content, which requires the learners to produce the particular forms, as well as to verbalize the rules that govern these forms. In contrast to text reconstruction and consciousness-raising tasks, *input-processing tasks* do not require the learners to produce output. Input processing "involves those strategies and mechanisms that promote form-meaning connections during comprehension" (VanPatten & Cadierno, 1993, p. 46). After receiving the metalinguistic rule explanation, learners are asked to respond to the informational content of an input text, e.g., by selecting a drawing that best represents what was heard or read. As visualized in Figure 6.1, both input-processing tasks and consciousness-raising tasks include metalinguistic elements that situate these activities "close to, if not over, the form - formS limit" (Doughty & and Williams, 1998, p. 240).

At the end of the continuum, explicit rule explanation (either deductive or inductive) can be found, as well as follow-up tasks to practice, such as cloze-tasks or judgement exercises (i.e., recognition of grammaticality). Notably, these tasks are not embedded in communicative activities.

The bottom row of Figure 6.1 situates different forms of corrective feedback on the continuum. *Recasts* (i.e., reformulations of (a part of) the learner's utterance in which an erroneous form is replaced by the target language form) are considered the most implicit form of corrective feedback. Since recasts do not overtly signal that the learner has made an error, learners might not be aware of the corrective nature of the teacher's utterance. Somewhat less implicit are recasts within which the teacher places emphatic stress on the reformulated element, for example by a rising intonation. However, in contrast to the feedback-options that occupy the explicit half of the continuum, the error is still not overtly indicated (Ellis, Loewen & Erlam, 2006). Explicit corrective feedback can be unspecified (i.e., signaling merely that an error has been made) or specified (the error is signaled and located). When *the garden path strategy* is applied, the lessons are organized such that students are induced to make an error, which is immediately corrected by the teacher (Herron, 1991). This strategy includes metalinguistic explanation afterward and thus 'crosses the FonFs-line'. The most explicit forms of feedback are the provision of a metalinguistic cue ("mind the tense") and signaling the error followed by a metalinguistic explanation.

A vast body of research has investigated the effectiveness of FFI-practices in relation to one another. Most studies point in the direction of an advantage for *explicit* over *implicit* practices (Norris & Ortega, 2000; Spada & Tomita, 2010), and there is accumulating evidence that a combination of various options might be the optimal approach (Pawlak, 2017).

Other research has addressed the interaction between FFI and other 'mediating variables' (Pawlak, 2017), such as the nature of the structure being taught, the influence of the learners' L1, individual learner factors, and timing of instruction. Regarding the latter, some have argued that instruction will promote acquisition only if it occurs when a learner is developmentally ready for it (Pienemann, 1984; Baten & Keßler, 2019). With respect to the nature of the structure being taught, it is hypothesized that some linguistic features are more amenable to instruction than others. These mediating variables must be taken into account in the selection of a linguistic target for FFI.

In the next section, we will introduce the linguistic feature under investigation, NGT agreement verbs, and we will present arguments for the suitability of this feature for an FFI-investigation.

6.2.2 Verb agreement in sign languages

The visual-spatial modality offers resources for linguistic expression that are not utilized by spoken languages. One of these resources is the use of the space in front of the body (the 'signing space') for grammatical purposes (Meier, 2012). One of the grammatical systems that use spatial distinctions is the system of verb agreement. Across sign languages, agreement verbs are (di)transitive verbs that may change in the direction of movement and/or the orientation of the hand(s) to mark the subject and/or object of the verb. This is illustrated in Figure 6.2a. The signer associates a location (locus) in space with the referent 'my brother' by means of a pointing sign, and subsequently modifies the verb SEND-EMAIL such that it moves between this locus and his own body, yielding the meaning "my brother sends me an email". The begin location of the verb thus agrees with the locus of the brother (the object), and the end location of the verb agrees with the locus of the signer (the subject). The form in Figure 6.2b is reversed and moves from a locus in front of the signer's body to the locus associated with the brother, meaning "I send my brother an email".

Figure 6.2. Examples depicting two spatially modified forms of the NGT agreement verb SEND-EMAIL (photo: Annette Jansen, ©RCSI).

Modifying the verb's movement path based on spatial loci enables the signer to express who is doing what to whom. Notably, however, only a subset of verbs can be spatially modified in this way. In all established sign languages, three verb types can be distinguished: (i) plain verbs that cannot undergo spatial modification (e.g., NGT verbs EAT and PRACTICE), (ii) spatial verbs that that move between loci associated with locative arguments (rather than subject/object) (e.g., GO), and (iii) agreement verbs, as exemplified above (Padden, 1988).

Within the class of agreement verbs, two subclasses can be distinguished: *regular verbs* which move from the location of the subject towards the location of the object (as in Figure 6.2), and *backward verbs* which move in the opposite direction (e.g., NGT INVITE). Most of these verbs can move between two loci ('double agreement verbs'), but some verbs mark only the (in)direct object ('single agreement verbs'). In the current study, we focused on the group of (regular and backward) double agreement verbs, and the remainder of this section is therefore dedicated to this group of verbs.

Double agreement verbs can thus be modified to align with the loci associated with the subject and object. However, it has been found that signers do not always employ both loci. The following options are attested:

(i) Full agreement: the verb is marked for both subject and object (i.e., in regular verbs the begin point agrees with the locus of the subject, and the endpoint agrees with the locus of the object);

(ii) Partial agreement for object: the verb is marked for the object locus only;

(iii) Partial agreement for subject: the verb is marked for the subject locus only;

(iv) Agreement omission: the verb is produced in citation form; in this case, alternative devices such as word order or agreement carriers are used to indicate the verb's subject and object. In NGT, two agreement carriers can be used: the agreement auxiliary ACT-ON (i.e., a semantically empty sign that moves between the loci associated with the verb's arguments), and serial verb constructions (e.g., a construction featuring the verbs SAY and CALL, in which the latter carries the agreement) (Bos, 1994, 2016[1996], 2017[1998]).

Agreement can thus be realized by changing the underlying form of the verb (or agreement auxiliary) according to spatial loci. These loci are either actual loci of present referents (signer, addressee, another person physically present) or arbitrary loci in signing space that have been established for non-present referents. The establishment of a location-referent association is called localization. Localization can be realized by means of (i) a pointing sign (INDEX/IX) towards a location (see Figure 6.2), (ii) the articulation of a noun (e.g., PERSON) at a particular locus ('sign marked for location'), (iii) eye gaze towards a particular locus, or (iv) the agreement verb itself ('localize-by-verb'). In the latter case, the referent is not localized prior to the articulation of the verb, but the end or beginning point of the movement of the verb *serves* to associate the referent with the locus.

Once a referent has been associated with a locus, this locus can be used for further reference (i.e., pronominal reference and verb agreement). Notably, there is an infinite number of loci the signer can choose to localize a non-present referent (Padden, 1988; Liddell, 2003a), that is, a signer can choose any location (within the boundaries of the signing space) to localize a non-present referent. However, often loci at the ipsilateral and contralateral side of the signer are picked out for third-person referents ('canonical loci 3a and 3b', see Figure 6.3a). Figure 6.3b depicts the full paradigm for singular agreement. Figure 6.3c and 6.3d show examples of agreement with a non-present (6.3c) and a present (6.3d) referent.

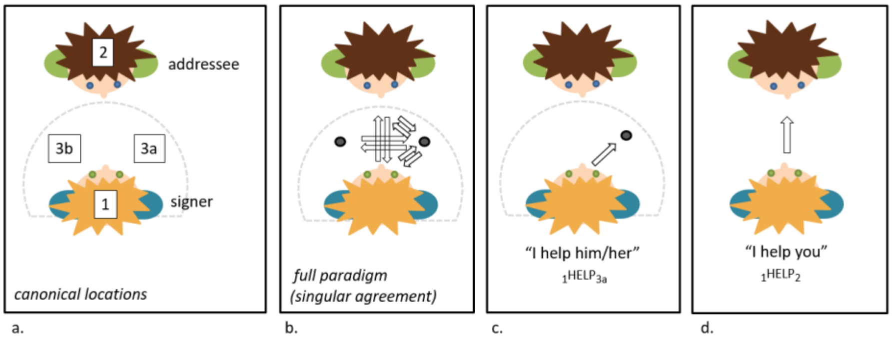

Figure 6.3. Schematic representations of canonical loci (a), the full paradigm for singular agreement (b), and two specific examples of agreement with non-present (c) and present referents (d).

The agreement verb system presented above has no analog in the L1 of Dutch learners who learn NGT as a second language. Three crucial features are unfamiliar to them: (i) the use of space to localize referents and mark grammatical roles, (ii) the existence of different verb classes, and (iii) the fact that verbs can agree with the object referent.

There is virtually no research on the sign language L2 acquisition (SL2 acquisition) of the verb agreement system, with the exception of two recent studies by Boers-Visker and Van den Bogaerde (2019, see Chapter 3) and Boers-Visker and Pfau (submitted, see Chapter 5). Boers-Visker and Van den Bogaerde (2019) observed that two learners of NGT, who were followed longitudinally in a semi-natural context, produced agreement verbs at an early stage, but that initially, this concerned all verbs that were "iconically motivated and have a gestural counterpart" (p. 429). The first modified forms that were non-iconic appeared only after a year of instruction. Boer-Visker and Pfau (submitted) report on the acquisition of agreement verb forms in 14 novel NGT-learners, who were followed over the course of two years. The authors make a similar observation that verbs with iconic counterparts ('verbs that express concrete transfer' such as GIVE) are mastered earlier than 'abstract-transfer verbs' such as VISIT. The authors conclude that the system of verb agreement seems difficult to master. After a year of instruction, even high frequency verbs like ASK and ANSWER appeared in unmodified form in 60% and 70% of the responses, suggesting that the learners failed to notice these omnipresent forms in the input.

The failure to notice agreement (i.e., modified verbs) in the input, evidenced by these studies, combined with the given that (i) the relevant forms are non-salient (i.e., they are irregular in the input), (ii) the forms are not that important for successful communication (e.g., alternative strategies like using word order suffice), and (iii) the structure has no analog in the learner's L1, motivated us to select this particular structure for our study (cf. Harley, 1993).

6.2.3 Purpose of this study

The present study investigates the effects of two FFI interventions on the acquisition of the NGT agreement verb system in novel SL2-learners of NGT. We set up an experiment to determine the effects of two different teaching strategies involving pedagogical practices with different degrees of explicitness. Learners in explicit condition A received an input flood combined with explicit rule explanation, while learners in implicit condition B received only an input flood. A control group (condition C) neither received instruction nor was exposed to material containing the target structure group (defined as a 'true control group' by Norris & Ortega, 2000, p. 446) and served to investigate the extent to which maturation or practice effect contributed to the (potential) observed effects. We set out to answer the following research questions:

1. To what extent does an explicit focus on form intervention, involving explicit rule explanation regarding the NGT agreement verb, combined

with corrective feedback and an input flood of agreement verb forms promote the acquisition of the NGT agreement verb system?
2. To what extent does an implicit focus on form intervention, involving an input flood of NGT agreement verb forms promote the acquisition of the NGT agreement verb system?
3. Is there a difference in the performances between the group that participates in the implicit intervention and the group that participates in the explicit intervention?

Our overall expectation was that learners who participated in an FFI-intervention (implicit or explicit) would perform better on the post-tests than the learners in the control group. Secondly, we expected that the learners in explicit condition A would benefit more from the intervention than the learners in implicit condition B, given the supremacy of explicit pedagogical practices reported elsewhere (see Section 6.2.1) However, there was also a possibility that the input flood in itself would be sufficient for the learners to notice the different agreement verb forms, and that the input-flood-only learners in condition B would perform equally as well as the learners receiving explicit instruction in condition A.

In order to assess these assumptions, we formulated and tested the following hypotheses:

H_{1a} The groups who participated in any of the two FFI-interventions (A-explicit or B-implicit) will show higher means of scores on the immediate post-test and delayed post-test than the control group.

H_{1b} The group who participated in the explicit intervention (A) will show higher means of scores on the post-test and delayed post-test than the group who participated in the implicit intervention (B)

Prior to conducting the study, we received approval from the Ethics Committee of the Faculty of Humanities of the University of Amsterdam, as well as from the management of the Institute for Sign, Language & Deaf Studies (ISLDS) to carry out the study.

6.3. Method

6.3.1 Instructional setting

The participants in the study were enrolled in the first year of a four-year bachelor program that educates students to become either interpreters or teachers of NGT. The program is offered by the Institute for Sign Language & Deaf Studies (ISLDS) and is hosted by Utrecht University of Applied Sciences (UUAS). Most students enroll in this program with limited or no knowledge of NGT. During the first year, four NGT courses are offered. (The total study load is 840 hours, with 204 in-class hours for full-time students). The language of instruction is NGT, and all teaching materials are in NGT. During the first semester, the curriculum is primarily meaning-focused, although there are tasks with a predetermined linguistic focus. From the second semester on, some NGT-features are explicitly brought to the learners' attention by means of explicit rule explanation. Importantly, prior to and during our study, the program did not include any explicit rule explanation *on the agreement verb system*. Nevertheless, various forms of the paradigm (see Figure 6.3b) appear both in the teaching materials and in the input of the teachers.

The present study was carried out during the first half of the second semester and was integrated into an existing NGT course. It is assumed that at the onset of the study the majority of learners had reached level A2 as described in the European Framework of Modern Languages (CoE, 2001).[5]

6.3.2 Participants

Data were collected from 54 SL2 NGT-learners (51 female) in four existing classes that were offered an authentic first-year NGT course (NGT-C) in 2017-2018. Each class was randomly assigned to one of the conditions that differed with respect to FFI-practices. Table 6.1 details the group and teacher characteristics. As can be seen from this table, 78% (*n* = 42) of the participants reported having minimal or no previous knowledge of NGT prior to enrollment.

[5] Since the first NGT proficiency test was administered at the end of course NGT-C, we do not have exact data reporting the level of proficiency at the onset of our study.

Initially, all students (n = 63) in the four classes agreed to participate. During the study, six participants dropped out of the program, one participant withdrew permission, and the data of two participants had to be excluded due to technical issues. We obtained permission from the remaining participants (n = 54) to analyze their performances, to use screenshots of their performances (optional), and to use the materials for other studies (optional).

Table 6.1. Group characteristics.

	A (input flood + instruction) class 1	A (input flood + instruction) class 2	B (input flood, no instruction)	C (control group)
Number of participants at outset (*n* = 63)	*n* = 11	*n* = 16	*n* = 18	*n* = 18
Number of participants that completed study (dataset; *n* = 54)	*n* = 9	*n* = 15	*n* = 18	*n* = 12
Previous knowledge[1]	no/minimal: 4 basic: 2 advanced: 3	no/minimal: 12 basic: 2 advanced: 1	no/minimal: 15 basic: 2 advanced: 1	no/minimal: 11 basic: 0 advanced: 1
Mean age [range]	32 [22–48]	20 [17–24]	21 [18–26]	21 [18–26]
Part-time/full-time students	part-time (6 tasks)	full-time (7 tasks)	full-time (7 tasks)	full-time (7 tasks)
Strand (interpreter/ teacher)	interpreter	teacher	interpreter	interpreter
Mean attendance (7 tasks) [range]	65% [50–86%]	62% [29–100%]	75% [14–100%]	76% [43–100%]
Teacher characteristics	deaf L1-signer 2 years teaching experience	hearing SL2-signer 11 years teaching experience	hearing SL2-signer 10 years teaching experience	deaf L1-signer 1 year teaching experience

Note: [1] The data on previous knowledge are self-reported. Options included (i) no/minimal knowledge (the participant reported that he or she knew nothing or some isolated signs), (ii) basic (the participant reported having followed one or two basic NGT courses prior to entering the program), (iii) advanced (the student reported having followed more than two courses prior to entering the program or having deaf family members or close friends).

6.3.3 Instrument

6.3.3.1 Instructional materials

To investigate the effectiveness of the FFI-interventions, a series of eight tasks (see Appendix 6A) was designed, tailored for three conditions.

A. For condition A ('input flood combined with explicit instruction'), a series of sentences and short stories, flooded with spatially modified agreement verb forms (n = 300, Appendix 6B), was recorded. The material was enhanced (e.g., by adding arrows to indicate the movement of the verb between specific locations), and explicit rule explanation (including overt use of metalinguistic terminology) was provided both in the materials and by the teacher. [6] The tasks were designed such that the accompanying activities had a focus on meaning. In one of the tasks, for example, the participants watched a short story and subsequently had to match the story to a photo. During the activities, the teacher actively provided corrective feedback regarding the agreement of verb forms.
B. Condition B ('input flood') contained the same recordings and tasks as in condition A, but without the enhancement, rule explanation and corrective feedback.
C. For condition C, comparable materials and tasks were designed, but instead of an input flood of agreement verb forms, students received general NGT-utterances. The materials were recorded by the same signers and were controlled for signing rate, lexical complexity, and grammatical complexity.

Figure 6.4 shows examples of one of the video clips to illustrate the differences among the three conditions. Table 6.2 provides an overview of the characteristics of the three conditions.

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[6] Rule explanation included a description of the realization, distribution and use (Doughty & Williams, 1998) of agreement verb forms and the interrelated system of localization.

"<u>Can you help me?</u> I don't understand how this works" "Do you know how this works? I don't understand it"

Figure 6.4. Examples of instruction materials. Conditions A and B contain the modified verb form $_{2}$HELP$_{1}$ ("you help me"), with added arrows and rule explanation in condition A. Condition C contains the plain verb KNOW.

For each class, a separate website was constructed, containing the NGT video materials needed to carry out the tasks. To control for 'spillover effects' among groups, participants were only granted access to their own class website. Moreover, the video materials were only made accessible (i.e., visible for students) during the (in-class) execution of the task. Additional worksheets were distributed before the task and were collected by the teacher afterward. Lastly, requests by students to incidentally join one of the other classes than their own were rejected. (during the eight-week period that the course NGT-C, in which the study was embedded, was taught).

Each teacher received a manual with instructions,[7] the eight tasks designed for the particular condition (A, B or C) his or her class was assigned to, copies of the worksheets needed for the tasks, an attendance sheet, and technical instructions regarding the website.

[7] The (Dutch) teacher manual can be found online in Boers-Visker, E.M. (2018): *Docenthandleiding lespakket behorend bij 'A study into the effects of two Focus on Form interventions on the acquisition of the agreement verb modification'.* DANS: https://doi.org/10.17026/dans-zq2-awe3.

Table 6.2. Overview of FFI-practices in the three conditions.

	Input flood	Visually enhanced text	Ppresentation of rules regarding agreement verb forms	Use of metalinguistic terminology	Teacher-initiated corrective feedback	Providing answer to student-initiated questions
Condition A	yes	yes	yes	yes	yes	yes (elaborative)
Condition B	yes	no	no	no	no	yes (minimal, as usual)
Condition C	no	no	no	no	no	yes (minimal, as usual)

6.3.3.2 Test materials

To measure the effects of the FFI interventions, two tests were designed: one that served as pre-test (T1)/mid-test (T2) and one, following the same format, that served as post-test (T3)/delayed post-test (T4). The tests featured 25 (T1/T2) and 29 (T3/T4) prompts, respectively, aimed to elicit an NGT sentence containing a modified agreement verb, and 13 distractors (see Appendix 6C). To construct the tests, seven NGT agreement verbs (ANSWER, ASK, SEND-EMAIL, HELP, VISIT, TEASE and FETCH) were selected, with forms being distributed over the agreement verb paradigm (Figure 6.5). Subsequently, two comparable prompts (Dutch sentences) were devised for each verb form.

The seven selected verbs (i) were familiar to the learners, being part of the lexicon of the preceding NGT courses A and B, (ii) have no gestural counterpart, and (iii) allow for the marking of agreement for both subject and object ('double agreement'). All verbs were regular verbs, except for the backward verb FETCH. To assure the equivalency of tests 1/2 and 3/4, we carefully controlled for lexical and syntactic complexity. To ensure that all target sentences could reasonably be produced by the participants, we checked whether the vocabulary they contained had been offered in prior courses.

To be able to investigate the learners' ability to generalize the acquired knowledge to untrained items ('system learning', as opposed to 'item learning'), the tests contained both trained forms and verbs, and untrained forms and verbs. Prompts containing an *untrained form* featured a verb from two forms of the paradigm (namely, 2→3 and 3→2, see Figure 6.5), which had not been offered in the teaching materials (i.e., the verbs that appeared in the teaching materials were distributed over the other forms of the paradigm). Prompts containing an *untrained verb* featured the verbs CATCH (T3/T4), THREATEN (T3/T4) and TEASE (T1/T2 and T3/T4), which had not appeared in the teaching materials. CATCH and THREATEN were deliberately added in the post-tests to investigate system learning. TEASE was not intentionally selected to serve as an untrained verb but moved to this category as a result of the fact that, due to time limitations, one of the tasks (task 8) was not carried out. Coincidentally, TEASE fell into the category of untrained forms as well. All other verbs appeared in the tasks carried out by the learners.

The tests (T1/T2 and T3/T4) were administered to seven NGT teachers working at ISLDS to serve as a benchmark to enable us to compare teacher responses (the 'target-norm' that likely is present in the input)[8] against those of the learners. The teacher responses are presented in Appendix 6D.

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[8] As indicated in Section 6.2.2, it has been shown that NGT verbs that are licensed to carry agreement are occasionally produced in unmodified citation form by L1-signers as well (Legeland, 2016). However, ISLDS-teachers self-report that they deliberately produce fully modified forms in their teaching practice (personal communication, October 2019).

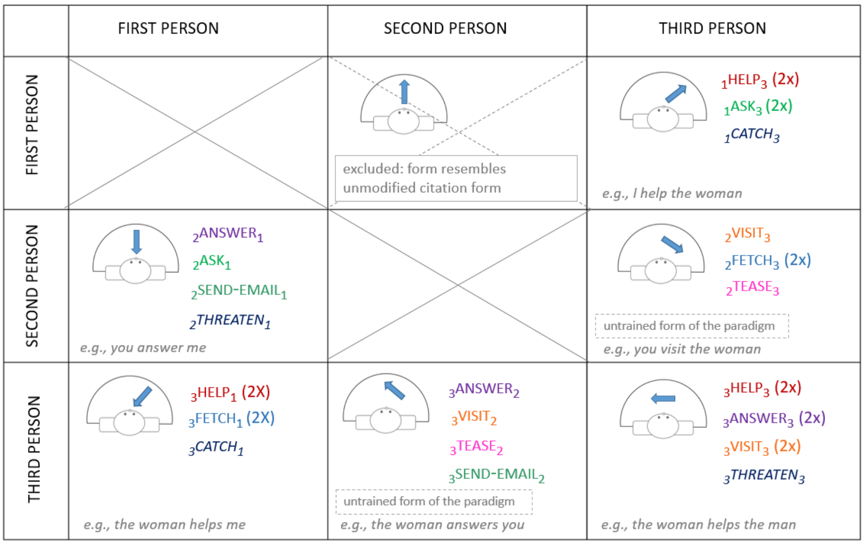

Figure 6.5. Distribution of targeted verb forms. Test T1/T2 contained 25 prompts; test T3/T4 contained 25 prompts and 4 additional prompts featuring the verbs CATCH and THREATEN.

6.3.4 Procedure

The study took place in February–March 2018 and was integrated into an existing NGT course. During the eight-week course, the learners carried out seven (full-time groups) or six (part-time group) of the eight tasks that were designed for this study.

6.3.4.1 Instructional and test procedures

Figure 6.6 presents the research schedule.

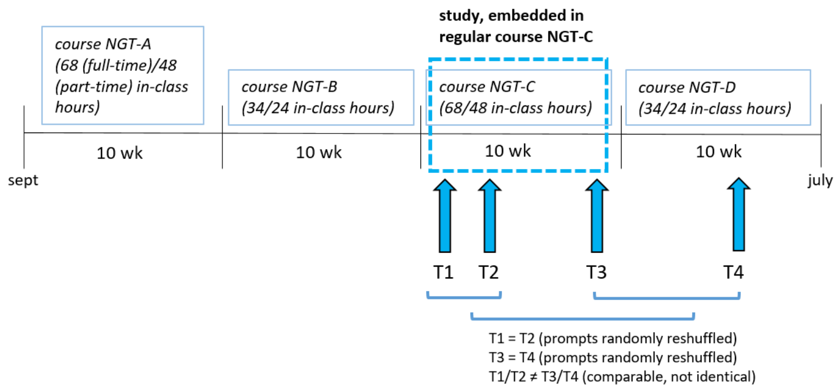

Figure 6.6. Research schedule.

Prior to the study, information sessions were organized to inform the students about the study, and students received (identical) information by email.[9] The students were told that the aim of the study was to examine the efficiency of new teaching materials, but they were not made aware of the linguistic focus of the study, nor did they know that there were different materials for different conditions. Students were told that participating in the study would be voluntary and that there would be no consequences if they opted not to participate.

The teachers were individually instructed by the first author. They were given the teacher manual for their class and instruction in NGT. During the study, the author was in close contact with the teachers to ensure that the interventions were carried out according to the plan. She checked whether the video materials were indeed kept inaccessible for students in between classes and kept track of the progress of the completion of the tasks. The teachers were very cooperative. They actively approached the first author to ask verification questions, and they adapted their teaching schedules to ensure that as many students as possible would be present during the

[9] The student information sessions, as well as the test instructions, were delivered in the students' native language (Dutch).

execution of the tasks. The teachers kept track of the participants' attendance during the execution of the tasks and kept a log in which they noted observations that might be of importance for the study.

Testing took place in the Institute's language lab. A PowerPoint presentation with slides showing one prompt each was projected onto a screen next to the camera. The test was self-paced, that is, participants could progress to the next slide by clicking the mouse. Learners were instructed that they would see sentences in Dutch, which had to be signed in NGT. During tests, learners could not see or hear other participants. The first author was present during testing.[10]

The pre-test (T1) was administered prior to beginning the intervention, during the first week of the course (see Figure 6.6). During this session, the participants completed a questionnaire to obtain information about their background and their declarative knowledge of NGT.

The mid-test (T2) was recorded after three weeks, having completed three tasks featuring 117 verb forms.

During the last week of the course, having completed seven (full-time students) or six (part-time students) of the eight tasks, respectively, the post-test (T3) was administered. As discussed in Section 6.3.3.2, this test featured the untrained verbs THREATEN and CATCH. Since both verbs were unfamiliar to the learners, they were demonstrated in citation form to the participants prior to the test. A sheet with pictures of both verbs (in citation form) was handed out as a mnemonic aid during the test. After completing the test, a debriefing questionnaire was administered to gain insight into the participants' declarative knowledge with regard to the aim of the teaching materials (and consequently, the linguistic feature under investigation).

Delayed post-test T4 was administered six weeks after completion of the study. Notably, the learners continued to follow regular NGT-classes during these six weeks. The (new) teachers were informed about the study and urged not to provide explicit rule explanation on agreement verbs to the groups that had experienced condition B or C.[11]

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[10] On two occasions, individual learners who had missed a session were tested by the teacher.

[11] Teachers were requested not to initiate rule explanation by themselves. Student-initiated questions could be answered, as they would usually do. The teachers

The recordings and questionnaires were labeled with the participant-ID's and kept in a secured database. Neither questionnaires nor recordings contained the names of the participants.

6.3.4.2 Coding

For each participant, the four recordings were collated, and a research assistant identified and labeled the prompts in the software program ELAN (Crasborn & Sloetjes 2008).

Subsequently, the responses were coded by the first author. Each response was awarded up to five points, depending on (i) whether the verb was correctly modified, (ii) whether this modification was partial or full, (iii) whether the verb was the target verb, and (iv) in case of third-person referents, whether the referent was/the referents were localized in space. Scores were calculated as follows[12]:

1. When a verb (target or non-target) was **not modified** or absent, zero points were awarded.
2. When a verb (target or non-target) was modified, yet incorrectly (**misagreement**, e.g., the movement path was reversed), zero points were awarded.
3. For a **correctly modified** verb (target, non-target or neologism), for each of the following criteria one or more points were awarded:
   a. One point when the response contained the target verb;
   b. One point when the begin location (regular verbs) or end location (backward verbs) of the verb corresponded with the location of the subject ;
   c. One point when the end location (regular verbs) or begin location (backward verbs) of the verb corresponded with the location of the object;
   d. For verb forms containing a third-person argument (e.g., "I help <u>him</u>") or two third-person arguments (e.g., "<u>He</u> helps <u>her</u>"), one point was awarded for each correct instance of referent

reported that there were no student-initiated questions on this topic during course NGT-D.

[12] For this purpose, an Excel worksheet was programmed. This worksheet and a step-by-step description of the coding process can be found in the supplementary materials to this chapter, see footnote 1.

localization (depending on the verb form, this could be one or two points).

Moreover, an extra code was supplied in case of ambiguity. A response was labeled *ambiguous* (A) in case the learner produced a verb form that resembled the citation form, and there was insufficient evidence that the form was actually modified. Such an ambiguous form is depicted in Figure 6.7b. In an attempt to localize a third-person referent, the learner had directed several INDEX-signs towards several loci. In this case, it is not clear whether the end point actually marks the object. In example 6.7c, in contrast, the learner had established a clear, unambiguous locus for the third-person referent. In this case, the verb form is likely modified, and not ambiguous, but it is *congruent* with the citation form. The form in Figure 6.7c diverges from the “canonical form” depicted in 6.7d, but is not erroneous since there is an infinite number of locations a signer can choose to localize a referent (see Section 6.2.2).

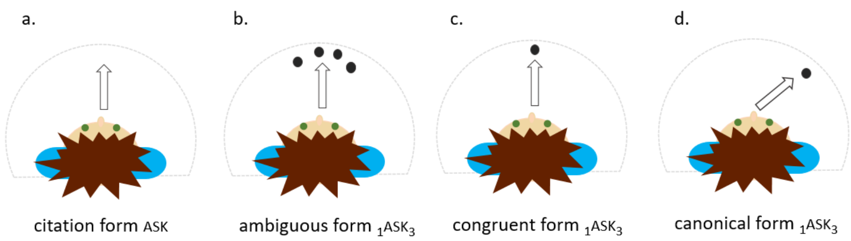

Figure 6.7. Examples of a verb’s citation form (a), an ambiguous form (b), a congruent form (c), and the canonical form (d). The ambiguous form resembles the citation form, and there is insufficient evidence that the verb was modified. In the case of a congruent form, there is evidence that the verb was modified.

Subsequently, for each participant, a cumulative score per test was computed. Two sets of scores were computed: a total score per student per test for the 25 prompts appearing in all four tests (maximum score 103 points), and a score for the four prompts in T3/T4 featuring the untrained verbs THREATEN and CATCH (maximum 16 points). We computed the scores twice: in one set, the ambiguous forms were treated as modified forms (and thus awarded points); in the other set, these forms were treated as unmodified. In the analyses that follow, we took a conservative approach, using the second set, in which the ambiguous forms were not awarded points, as dependent variable ‘test score’ (see Section 6.3.4.3).

Data from 18 randomly selected tests (8% of the overall data) were also independently coded by a second coder.[13] The agreement ratio between the two coders was 89.5%.

6.3.4.3 Analyses

In the analyses, the following variables were distinguished:

a) The independent nominal variable ‘nature of intervention’, distinguishing the explicit condition (A), the implicit condition (B), and the control condition (C) [between-groups];
b) The independent variable ‘test’, distinguishing between pre-test (T1), mid-test (T2), immediate post-test (T3), and delayed post-test (T4);
c) The dependent variable ‘test score’, a continuous variable expressing the participants’ test scores on the tests (variable b) to measure the ability to produce verb forms modified to signal subject and object;
d) The independent variable ‘familiarity – verb’, distinguishing between ‘untrained verbs’ and ‘trained verbs’;
e) The independent variable ‘familiarity – form of the paradigm’, distinguishing between ‘untrained forms of the paradigm’ and ‘trained forms of the paradigm’;
f) The dependent variable ‘declarative knowledge’, an ordinal level expressing the ability to name the linguistic feature under investigation during the debriefing questionnaire;
g) The moderator variable ‘previous knowledge’, an ordinal variable indicating the self-reported knowledge of NGT when enrolling in the program.

For each participant, the scores on the variables were entered into an Excel sheet. Five participants missed a session. These tests (three mid-tests (T2), one post-test (T3), and one delayed post-test (T4)) were coded as missing values. Subsequently, statistical analyses were performed with the statistical package SPSS (IBM SPSS Statistics 25).

[13] Both coders were hearing SL2-signers holding a degree in sign language teaching, and both have received (sign) linguistic training at university level.

First, general trends in the data were explored using graphs. The mean, median and 95% confidence intervals were calculated, and the data were checked for normality and homogeneity of variance. These exploratory analyses revealed that the data were not normally distributed, so the non-parametric Kruskal-Wallis test and Friedman test were performed to test the hypotheses.

The Kruskal-Wallis test (K-W test) was used to test whether the test scores of the three conditions on T1, T2, T3, and T4 differed from one another. The null-hypotheses (i.e., the scores on conditions that do not differ) was rejected for all tests except the pre-test (T1), and follow-up analyses were performed to compare the test scores of the groups pairwise for T2, T3, and T4.

To gain insight into the (absence of) growth in each condition, the Friedman's ANOVA was carried out to compare the scores on T1, T2, T3, and T4 for each group, and post-hoc pairwise comparisons were used to follow up the Friedman's ANOVA. The significance level was set at .05.

6.4 Results

6.4.1 Descriptive statistics

6.4.1.1 Pre-test scores

First, we checked whether certain agreement verbs had already emerged in the interlanguage systems of the participants prior to the study. Figure 6.8 details the values on the pre-test (T1). This figure shows that the distribution of test scores of the complete group (n = 54) was positively skewed and clearly indicates that for most learners, the linguistic feature had not yet emerged, or had just started to emerge, at the onset of the study. The boxplots suggest that control group C performed less well than the other groups. However, the K-W tests revealed that the differences between the groups were not significant (see Section 6.4.2).

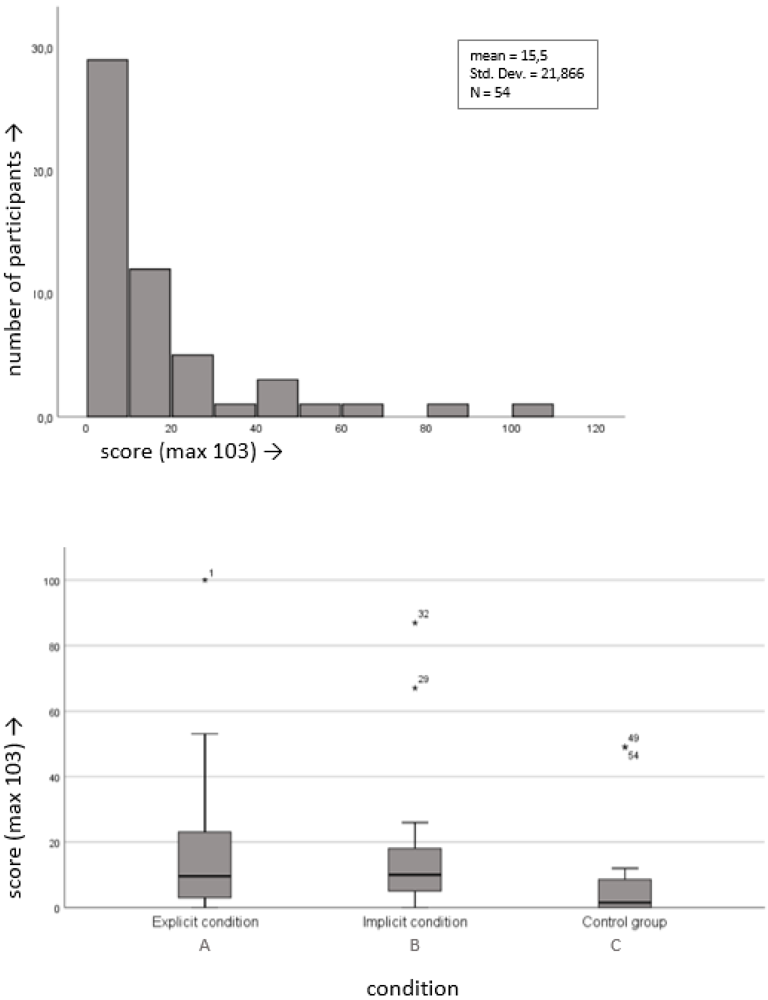

Figure 6.8. Values on the pre-test T1.

6.4.1.2 Familiar items

Subsequently, we calculated the mean scores (*SD* in parentheses), 95% confidence intervals for the mean and the median scores (interquartile range in parentheses) for the 25 prompts that appeared in all tests for each condition.[14] These calculations are presented in Table 6.3.

As can be seen from Table 6.3, the mean scores of the learners in FFI-conditions A and B show sharp increases, in contrast to control group C. This is visualized in Figure 6.9, showing the mean scores of the three conditions for all tests.

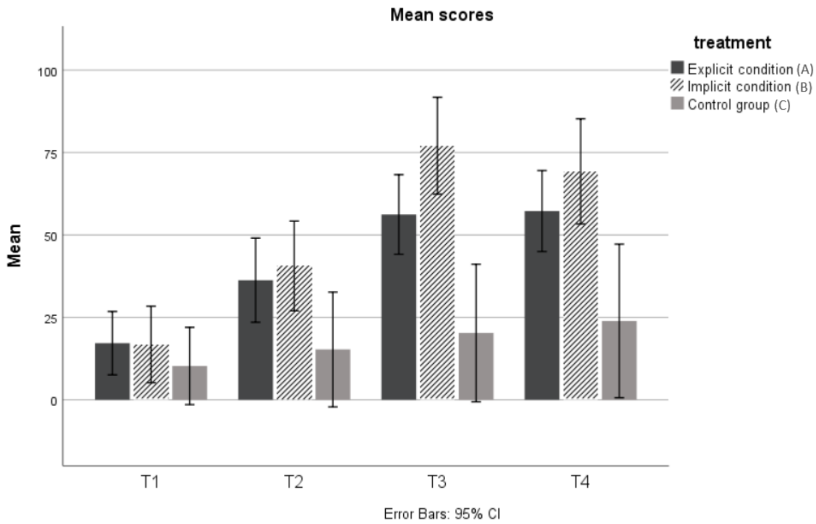

Figure 6.9. Mean scores on all tests for all conditions.

As can be seen in Figure 6.9, all groups show an increase in test scores as the study progresses, however, the gains in the control group are much smaller than the gains in the two experimental groups. The increased scores evidenced in the control group might be attributable to maturation and/or practice effects. Notably, the variance in the control group scores is higher than in the experimental groups, but this is mainly caused by four outlier participants.

[14] Note that the scores of the two classes that participated in explicit condition A were combined in one overall score for this condition.

Table 6.3. Means, Medians and 95% Confidence intervals for each condition for each test (25 familiar items, maximum score 103).

	Pre-test (T1)			**Mid-test (T2)**			**Immediate Post-test (T3)**			**Delayed Post-test (T4)**		
	$\bar{x}$ (SD)	95%-CI mean	Mdn (IQR)	$\bar{x}$ (SD)	95%-CI mean	Mdn (IQR)	$\bar{x}$ (SD)	95%-CI mean	Mdn (IQR)	$\bar{x}$ (SD)	95%-CI mean	Mdn (IQR)
Explicit condition (A) ***N*** **= 24**	17.17 (22.77)	7.55 – 26.78	9.50 (21)	36.27 (28.93)	23.45 – 49.10	28 (49)	56.21 (28.63)	44.12 – 68.30	60 (43)	57.25 (29.07)	44.98 – 69.52	54 (50)
Implicit condition (B) ***N*** **= 18**	16.78 (23.32)	5.18 – 28.37	10.00 (14)	40.59 (26.61)	26.91 – 54.27	42 (38)	77.06 (28.72)	62.29 – 91.83	92 (31)	69.28 (32.06)	53.33 – 85.22	81 (54)
Control group (C) ***N*** **= 12**	10.25 (18.45)	-1.47 – 21.97	1.50 (10)	15.25 (27.39)	-2.15 – 32.65	0 (28)	20.25 (32.85)	-0.62 – 41.12	0 (45)	23.91 (35.09)	0.33 – 47.48	5 (64)

The mid-test scores (T2) show that even after a short exposure (three tasks) to flooded input, the learners in both experimental groups demonstrate evidence of understanding the agreement verb system. The scores on the delayed post-test (T4) indicate that the observed effectiveness of FFI-practices offered in conditions A and B was maintained, although there was a small (non-significant) decrease in the group that participated in implicit condition B from T3 to T4 ('loss of instructional effect').

6.4.1.3 Untrained verbs and untrained forms of the paradigm

As described in Section 6.3.3.2, the test was designed such that the ability to generalize the acquired knowledge could be investigated by (i) analysis of the two forms of the paradigm that did not appear in the instruction materials, and (ii) analysis of the untrained verbs THREATEN and CATCH (two forms each) appearing in the post-tests. The first category also included the verb TEASE, which was not offered due to time restrictions.

Figure 6.10 shows the mean scores on the eight prompts that involved the untrained ‘2→3’ and ‘3→2’ forms of the verb paradigm on the left (maximum score 30) and the mean scores on untrained verbs CATCH and THREATEN on the right (four prompts, maximum score 16). Clearly, both experimental groups were able to generalize the learned knowledge to untrained forms of the paradigm and to untrained verbs.

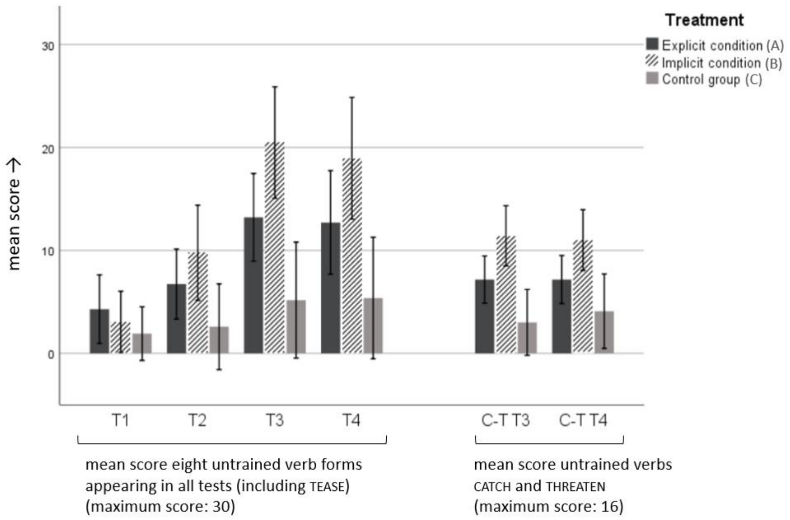

Figure 6.10. Mean scores on untrained verb forms (left) and untrained verbs (left).

6.4.2 Between-group comparison: Kruskal-Wallis test and pairwise comparisons

The statistical analyses were carried out on the dataset with the 25 verbs appearing in all tests (thus excluding CATCH and THREATEN). First, the data were tested for normality and homogeneity of variance.

For explicit condition A, the test scores on the pre-test (T1), *D*(24) = 0.225, *p* = .003, were significantly non-normal, however, the scores on the mid-test (T2), *D*(22) = 0.181, *p* = .058, the immediate post-test (T3), *D*(24) = 0.122, *p* = .200, and the delayed post-test (T4), *D*(24) = 0.112, *p* = .200, did not deviate significantly from normal.

For implicit condition B, the test scores on the pre-test (T1), *D*(18) = 0.278, *p* = .001, and the immediate post-test (T3), *D*(17) = 0.321, *p* < .001, were significantly non-normal; the test scores on the mid-test (T2), *D*(17) = 0.133, *p* = .200, and the delayed post-test (T4), *D*(18) = 0.177, *p* = .141, did not deviate significantly from normal.

For control group C, the test scores on the post-test (T1), *D*(12) = 0.362, *p* < .001, the mid-test (T2), *D*(12) = 0.378, *p* < .001, the immediate post-test (T3), *D*(12) = 0.398, *p* < .001, and the delayed post-test (T4), *D*(11) = 0.301, *p* = .006, were all significantly non-normal.

For all the tests, Levene's test indicated that the assumption of homogeneity of variance had not been violated. For the pre-test (T1), the variances were equal for the three conditions, $F(2, 51) = 0.076$, $p = .927$, as were the data for the mid-test (T2), $F(2, 48) = 0.133$, $p = .876$, the immediate post-test (T3), $F(2, 50) = 0.307$, $p = .737$, and the delayed post-test (T4), $F(2, 50) = 0.280$, $p = .757$.
Since data were not normally distributed, non-parametric tests were used.

Kruskal-Wallis tests were performed on the test scores on T1–T4 for the 25 items appearing in all tests, in order to determine whether there were statistical differences among the means of the groups. These calculations revealed that the scores on the pre-test (T1) were not significantly different from one another: $H(2) = 3.89$, $p = .143$. However, the test scores on the mid-test (T2), $H(2) = 8.62$, $p = .013$, the immediate post-test (T3), $H(2) = 16{,}65$, $p < .001$, as well as the delayed post-test (T4), $H(2) = 11{,}29$, $p = .004$, showed significant differences.

Dunn's Pairwise comparisons with adjusted *p*-values using the Bonferroni correction showed that there were no significant differences among the experimental groups on the mid-test (T2) ($p = 1.000$, $r = .08$), the immediate post-test (T3) ($p = .158$, $r = .30$), and the delayed post-test (T4) ($p = .694$, $r = .19$). However, there were significant differences between the test scores of the experimental groups and the control group: pairwise comparisons between the explicit group (A) and the control group showed significant differences on the mid-test (T2) ($p = .042$, $r = .42$), the immediate post-test (T3) ($p = .027$, $r = .44$), and the delayed post-test (T4) ($p = .039$, $r = .42$). Likewise, pairwise comparisons between the implicit group (B) and the control group showed significant differences on the mid-test (T2) ($p = .016$, $r = .52$), the immediate post-test (T3) ($p < .001$, $r = .76$), and the delayed post-test (T4) ($p = .003$, $r = .62$).

Based on these statistics, the hypothesis that the groups who participate in one of the two FFI-interventions will show higher mean scores on the post-tests (hypothesis H_{1a}) is supported by the data. The participants in FFI-conditions A and B scored significantly higher than participants in the control group on the post-tests. Moreover, there was a significant difference between the experimental groups and the control group after a short period of focused instruction. (However, see Section 6.4.3 for the within-group comparison.) There was no evidence to support the hypothesis that the group who received a combination of input flood, rule instruction and corrective feedback (condition A) performed better than the learners who only received an implicit input flood. Although the learners in the implicit group on average seem to outperform the explicit group, the difference is not significant, and hypothesis H_{1b} is thus rejected.

6.4.3 Within-group comparison: Friedman's ANOVA and pairwise comparisons

In addition to the between-group comparisons (Section 6.4.2), we performed a within-group analysis using Friedman's ANOVA to test whether the scores on the successive tests differed significantly within groups. Again, we used the test scores of the 25 items appearing in all tests.

For the control group, the test scores did not change significantly over time, $\chi^2(3) = 5.06$, $p = .167$.

For the explicit experimental group (A), the test scores did improve significantly over time, $\chi^2(3) = 54{,}99$, $p < .001$. Dunn-Bonferroni post hoc tests were carried out, showing that test scores changed significantly from the pre-test to the immediate post-test ($p < .001$, $r = -.60$), and from the pre-test to the delayed post-test ($p = < .001$, $r = -.61$) after Bonferroni adjustments. The test scores did not change significantly from the pre-test to the mid-test ($p = .16$), and from the immediate post-test to the delayed post-test ($p = 1.00$). The latter indicates that the gain is retained.

The implicit group (B) also showed significant differences between test scores, $\chi^2(3) = 39{,}64$, $p < .001$. Dunn-Bonferroni post hoc tests show a similar pattern: there are significant differences between the scores between the pre-test and the immediate post-test ($p < .001$, $r = -.60$), and the pre-test and the delayed post-test ($p < .001$, $r = -.60$) after Bonferroni adjustments. Test scores did not differ significantly from the pre-test to the mid-test ($p = .45$), and from the immediate post-test to the delayed post-test ($p = 1.00$), which indicates that the gain is retained in this group as well.

6.4.4 Accuracy

The scoring system devised for this study somewhat conceals the qualitative differences among the groups since both non-modified forms and erroneous forms received zero points. Figure 6.11 shows the distribution of non-modified, correctly modified and erroneously modified productions in the raw data. The increase in modified verb forms and the decrease in omissions/plain-verb-productions in conditions A and B can be attributed to the intervention. Interestingly, the proportion of erroneously modified productions ('misagreement') is larger in the explicit group. That is, these learners produce more verb forms that are reversed (namely, movement from object to subject on regular verbs), or verb forms in which the begin and end point of the movement do not match the locations assigned to the subject/object. In some cases, the learners localized the subject and object referents at the same location ('stacking') (Loew, 1984).

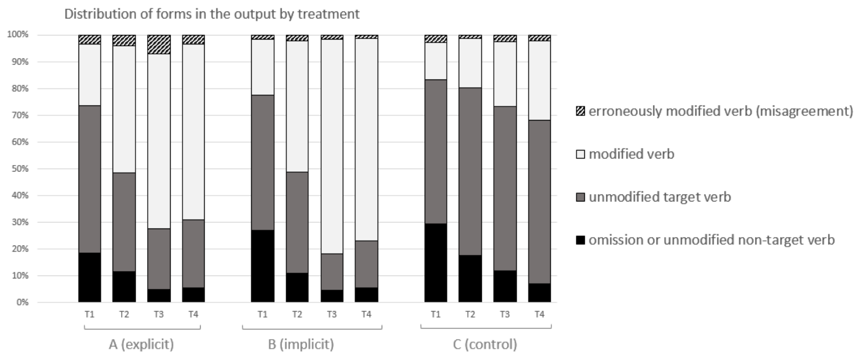

Figure 6.11. Distribution of omissions and unmodified non-target verbs, unmodified target verbs, modified verbs, and erroneously modified verbs (misagreement).

6.4.5 Declarative knowledge

Lastly, we investigated whether the participants could verbalize the feature under investigation. Although the participants in both FFI-groups did not show significant differences in the mean scores of the post-tests, we did find a difference in declarative knowledge. The debriefing questionnaire revealed that 38% (*n* = 9) of the learners in explicit group A were able to identify the linguistic feature under investigation. In contrast, from the implicit group, only one of the 18 participants (5.6%) provided the correct answer, while none of the participants in the control group were able to name agreement verbs as the main goal of the testing and learning materials.

6.5 Discussion

This study addressed the effectiveness of highly implicit and highly explicit pedagogical practices aimed at focusing the attention of novel learners of NGT on the form-meaning mappings within the agreement verb paradigm, as compared to a control group. The results show that both 'input flood combined with explicit instruction' and ‘input flood’ facilitated the acquisition of the agreement verb system (research questions 1 and 2). As a consequence, hypothesis 1a could be confirmed. Moreover, the results indicate that those learners who participated in the implicit condition did not differ in their performance from those who participated in the explicit condition (research question 3), suggesting that the pedagogical FFI-practices offered in these conditions were equally effective in drawing the learners’ attention to the form-meaning mappings. Hypothesis 1b, which stated that the explicit instruction would be more effective than the implicit instruction, was thus not confirmed. Yet, it must be noted that the learners in condition A produced more erroneous forms than the learners in the other groups.

6.5.1 Interpretation of the results

The present study supports previous studies that claim that focus on form aids the learning process. Both experimental groups outperformed the control group. However, the study does not support earlier findings that explicit instruction is more effective than implicit instruction (Norris & Ortega, 2000; Spada & Tomita, 2010). An explanation to account for the observation that both experimental groups benefit equally might be that the NGT verb agreement system, *once noticed*, is rather salient and transparent, i.e., the characteristic that an agreement verb moves between two locations that are associated with the grammatical roles subject and object seems, once grasped, easy to master. If this is indeed the case, then the ‘package’ of multiple strategies offered in condition A may simply be superfluous. The finding that a flooded input sufficed to notice the form-meaning mappings is remarkable, given the observed difficulties to abstract this structure from natural input reported in previous literature (Boers-Visker & Van den Bogaerde, 2019, see Chapter 3; Boers-Visker & Pfau, submitted, see Chapter 5). In Section 6.2.2, we suggested that the failure to detect the structure in natural input might be caused by the inconsistency of the system (i.e., the existence of single and double agreement forms, which may be partly, fully or non-modified). A possible explanation for the remarkable gains observed in the input-flood-only group is that the selection of verbs (double agreement verbs only) and the way they were presented in the materials (fully modified forms in all cases) highlighted the systematic aspects and thus increased the saliency of the system.

A remarkable observation is the high distribution of misagreement in the responses of explicit condition A (Section 6.4.4). Instances of misagreement in this group included verb forms that contained a reversed movement path and unclear form-meaning mappings due to errors in the localization process (e.g., pointing to various loci to localize and refer to one single referent). It is unclear why these learners showed higher numbers of erroneous productions.

6.5.2 Choices regarding coding and analysis

Some notes on choices regarding coding and analysis are in place. First, the statistics presented here included the learners who enrolled in the program with previous knowledge of NGT. Three of the six learners with previous knowledge received high scores on the pre-test. However, two students who enrolled in their study without any knowledge of NGT outperformed their peers on this pre-test as well. Running the tests based on the dataset in which the students with previous knowledge are excluded yielded the same results: the two experimental groups show significant gains compared to the control groups, and there was no significant difference between the experimental groups.

A second note concerns the coding decision according to which participants could earn points for localization of third-person referents. One could argue that a third-person locus is not obligatory, since it is possible to localize a referent *by means of* verb modification (localize-by-verb strategy, see Section 6.2.2), and as such, it would be 'unfair' to award points for a non-obligatory feature. Yet, the mechanism of localization is closely tied to the phenomenon of agreement verbs and as such taught to the learners in condition A. To avoid any bias regarding our decision to reward the presence of third-person localization, we re-ran all tests with a dataset without this component (i.e., points were rewarded for producing the targeted verb, and for modifying the begin and end point of the verb only), but this did not alter the outcome. We again found that the FFI-groups significantly outperformed the control group, and there was no significant difference between the experimental groups.

A last comment regarding the coding process concerns phonological mistakes produced by the learners. In the initial coding process, we awarded points for phonological accuracy. However, it turned out to be very difficult to distinguish 'errors' from 'off-target phonology'. As a result, points were awarded in case the learner produced the (modified) target lexeme, even if it contained a phonological error. Notably, we also re-ran the statistical analyses on a dataset including 'points for errorless productions of the target verb', but again, this did not alter the outcome of this study.

6.5.3 Limitations

We are aware that our research has some methodological limitations. First, our sample size is small, which does not allow us to draw firm conclusions. Secondly, the duration of the study was relatively short. Although the results seem to show that offering an input flood and/or instruction affects the rate of acquisition, we do not know whether it affects the ultimate levels of attainment at the end of the four-year program. A third limitation is that one single test instrument was used. For reasons of limited time and resources, it was not possible to apply a multiple measures design, nor could we administer a general language proficiency test to obtain information about the participants' general linguistic proficiency. A fourth limitation was that given the fact that this was a real classroom study, some potentially influential factors were difficult to control, such as participants' attendance while tasks were carried out, provision of relevant metalinguistic information in other ISLDS-courses that students were enrolled in (e.g. the course on interpreter skills), teacher effectiveness, and teacher experience. The control group teacher was relatively inexperienced, as opposed to the highly experienced teacher who taught experimental group B. The last factor beyond our control was the students' exposure to NGT outside the classroom (e.g., students visiting a deaf club). Finally, a limitation lies in the generalizability of the results. The outcome measures obtained in this study were relatively simple, short, single-sentence responses. This highly constrained, discrete-focus linguistic task does not provide information about the learners' ability to employ the targeted feature in longer stretches of discourse or in a natural conversation. As such, focused testing of target features provides limited evidence for the role of explicit FoF/FFI on general language proficiency (Doughty, 2003; Ellis, 2006). A fruitful opportunity for further investigation would be to analyze the NGT proficiency assessments which regularly take place at the end of the course NGT-C, and which coincided with the end of our study. In these 20-minute interviews, learners are prompted to use NGT in a communicative context, and analysis of these 'free constructed responses' could provide useful information about their ability to use the structures in longer, often multilayered contexts.

6.5.4 Implications for teaching practice

The pre-experimental learner responses show that the majority of learners had not discovered the rules that govern the agreement verb system of NGT during the first semester, during which two intensive courses were offered with a 420-hour study load (102 in-class hours, see Appendix 3A/4A/5B). This is surprising given the extensive use of fully modified agreement verbs like GIVE, ASK, ANSWER and HELP during classes,[15] and it suggests that learners need some assistance in noticing the system. The present study shows that a rich input of modified forms covering the full agreement paradigm is highly beneficial. Possibly, the absence of confusing input, such as partly agreeing or non-agreeing verb forms (see Section 6.5.1), has been helpful for rapid rule detection. It might thus be beneficial to start with fully agreeing forms in instruction and learners' materials.

6.6. Conclusions

This chapter has investigated the effectiveness of a highly implicit FFI-intervention (i.e., input flood) versus a highly explicit intervention combining different FFI-practices (input flood, rule presentation, explicit corrective feedback) on the acquisition of agreement verb forms in novel learners of NGT, as compared to a control group. Based on a quantitative and qualitative analysis of elicited learner productions, it can be concluded that learners in

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[15] Students self-reported high attendance-rates of 85% (SD 17) for course A and 81% (SD 18) for course B.

both experimental groups outperformed the learners in the control group on the post-tests. This finding corroborates previous findings for spoken languages (see, e.g., Norris and Ortega 2000), which support the claim that FFI is beneficial for L2 acquisition. Yet, our hypothesis that the learners who participated in the explicit intervention would perform better than the learners who received the implicit input flood was not supported by the data: differences between both groups were not significant.

The current study provides important theoretical and pedagogical insights. Not only does it add to our understanding of the SL2 acquisition process of (NGT) agreement verbs, but it also contributes to the general field of ISLA and FFI by adding a signed language to the pool of investigated languages. It is hoped that this research is a stepping stone for future investigations that strengthen the field of sign language pedagogy with empirical findings.

Acknowledgements

This work would have not been possible without the contributions of students and colleagues at ISLDS: the students who carried out tasks and tests, the teachers who taught the groups, the teachers who signed the test prompts to serve as benchmark and the colleagues who contributed to the design of the materials. We are particularly indebted to Tobias de Ronde, Marte Bol Raap, Marijke Scheffener and Christiaan Plug, for recording and editing the teaching materials and to the management of ISLDS for their permission to carry out this study. We gratefully acknowledge the work carried out by research assistants Irina Hoffer and Door Spruijt. Lastly, we thank Tobias de Ronde for modelling for the photos, taken and edited by photographer Annette Jansen, used in Figure 6.2.

7. General results, discussion, and conclusion

In this thesis, we presented findings based on empirical data collected from students enrolled in the bachelor programs ‘Interpreter NGT’, ‘Teacher NGT’, and the associate degree ‘Speech-to-text captionist’ hosted by UUAS, who were in the process of learning Sign Language of the Netherlands (NGT) as a second language. The main aims of this thesis were:

(i) To improve our understanding of the acquisition of sign language in hearing learners with a spoken language background, in particular with regard to a selection of modality-specific grammatical devices that can be subsumed under the umbrella term ‘use of space’; and

(ii) Investigating whether specific L2 pedagogical interventions, that have been shown to be effective for unimodal spoken language learners, would be equally effective for learners who are acquiring a second language in a new modality.

To that end, we conducted four studies in three phases. First, we analyzed (semi-)natural production data of two learners of NGT, who were followed over the course of four years, to identify which of the grammatical devices regarding ‘use of space’ were problematic for these learners (study 1, Chapter 3, henceforth ‘free production study’). In the second phase, we designed a study to elicit two structures, and analyze their development, which had been identified as ‘problematic’ during the first study: Whole Entity classifier predicates and agreement verbs. Production data of 14 learners of NGT, who were filmed 15 times over the course of two years, were analyzed in detail (studies 2 and 3, Chapters 4 and 5, henceforth ‘elicitation studies’). Quantitative and qualitative analyses of the data revealed that agreement verbs were indeed challenging for these learners. This observation served as basis for the third phase, in which we investigated whether learners would benefit from pedagogical interventions aimed at focusing their attention on the form-meaning mappings of agreement verb forms (study 4, Chapter 6, henceforth ‘intervention study’). The current chapter provides a summary and discussion of the main findings described in Chapters 3–6.

7.1 Summary of findings regarding the acquisition of spatial devices

Section 2.4 provided an overview of spatial devices that are commonly employed in sign languages to localize and refer back to referents in signing space. Spatial devices were grouped into (i) pointing signs, (ii) verbs, (iii) signs marked for location, and (iv) non-manuals. A detailed account of the findings regarding pointing signs, verbs, and signs marked for location was provided in Chapters 3, 4, and 5. Table 7.1 provides a summary of the findings for each category.

Table 7.1. Overview of findings regarding the acquisition of spatial devices.

	Findings study 1 ***Chapter 3, free production study; semi-natural data***	**Findings study 2** ***Chapter 4, elicitation study; Entity classifier predicates***	**Findings study 3** ***Chapter 5, elicitation study; agreement verbs***
Pointing signs	• Used from the start • Onset use of pointing signs for reference at the end of year 1 • Occasional misuse of pronouns during reported speech/ constructed action Redundancy (high number of within-sentence repeated pointing signs)		

	Findings study 1 ***Chapter 3,*** ***free production study;*** ***semi-natural data***	**Findings study 2** ***Chapter 4,*** ***elicitation study;*** ***Entity classifier predicates***	**Findings study 3** ***Chapter 5, elicitation study; agreement verbs***
Verbs: agreement verbs	• Modification of agreement verbs that denote concrete transfer and have an iconic counterpart appear earlier than modifications of agreement verbs that denote abstract transfer • Modification of non-iconic, abstract agreement verbs emerges after approx. one year of instruction • Few examples of reversal errors • No examples of overgeneraliza-tion of plain verbs • Occasional misuse of agreement verbs during constructed action		• Relatively slow acquisition (approx. 50% unmodified verb forms after one year of instruction (approx. 200 in-class hours) • Higher numbers of modified forms of verbs that denote concrete transfer (e.g., GIVE) compared to abstract transfer verbs • Examples of overuse of abstract space at the expense of modifying the verb from a character perspective • No use of serial verb constructions during year 1 • Some use of alternative strategies also found in emerging sign languages: successive 1-argument structures • Examples of simultaneous production of GIVE and ‘ receive’ • Some errors in orientation of the verb (i.e., reversed facing) • Some examples of attempts to spatially modify plain verbs (overgeneraliza-tion) • Multiple examples of overgeneralization of Handle classifier in verb SEND

	Findings study 1 ***Chapter 3,*** ***free production study;*** ***semi-natural data***	**Findings study 2** ***Chapter 4, elicitation study; Entity classifier predicates***	**Findings study 3** ***Chapter 5, elicitation study; agreement verbs***
Verbs: spatial verbs	• High proportion of iconically motivated spatial verbs in initial stages (i.e., to ‘act out’ scenes)		
Verbs: Entity classifier predicates	• Appear relatively late in the semi-natural data (after 8–18 months) • First classifier predicates to appear: classifiers for standing person and crowd • Participant has troubles with selecting correct handshape (i.e., uses handshape belonging to other class of entities) up to year 4	• Appear early in elicited data (after 2 weeks), but these productions are inconsistent and error-prone; sharp increase of target-like classifier predicates after approx. 20 weeks • Good command of classifier predicates (referencing vehicles, standing, moving and sitting persons, and animals) in two-handed classifier constructions at the end of year 1	

	Findings study 1 ***Chapter 3,*** ***free production study;*** ***semi-natural data***	**Findings study 2** ***Chapter 4, elicitation study; Entity classifier predicates***	**Findings study 3** ***Chapter 5,*** ***elicitation study;*** ***agreement verbs***
Verbs: Entity classifier predicates *(continued)*	• Participant has troubles with producing correct phonological parameters (orientation and location) up to year 4 • Occasional use of classifier without mention of referent • Creative metaphorical use of classifier predicates in years 3 and 4	• First classifier predicates to appear: classifiers for a car and a bicycle • Classifiers for sitting persons and animals appear relatively late • Classifiers for moving vehicles appear earlier than or simultaneously with classifiers for static vehicles • Errors in the data include: - violations regarding intrinsic features of parts of the hand (e.g., confusing bottom and top) - confusion regarding the classifiers for car and bicycle - selection of wrong/non-existing handshapes; selection of handshape referencing another class of referents - failure in using phonetic variant  - failure to specify referents	

	Findings study 1 ***Chapter 3,*** ***free production study;*** ***semi-natural data***	**Findings study 2** ***Chapter 4, elicitation study; Entity classifier predicates***	**Findings study 3** ***Chapter 5, elicitation study; agreement verbs***
Verbs: plain verbs		• Overgeneralization of plain verbs HOLD-STEERING-WHEEL and PEDAL-BICYCLE to denote movement of car/bicycle • Attempts to indicate the orientation of humans by manipulation of orientation parameter of plain verbs STAND and SIT	
Auxiliary ACT-ON	• Use of ACT-ON is sparse		• No use of ACT-ON during year 1 • Use of gestural auxiliary-like element

	Findings study 1 ***Chapter 3,*** ***free production study;*** ***semi-natural data***	**Findings study 2** ***Chapter 4, elicitation study; Entity classifier predicates***	**Findings study 3** ***Chapter 5, elicitation study; agreement verbs***
Signs marked for location	• Appear at an early stage in the data • Seem to be acquired fast and relatively effortlessly • Onset of compounds with the aim to localize referent in years 2 and 3 • Occasional overgeneraliza-tion (production of body-anchored signs in signing space)	• Use of signs marked for location and gestures marked for location as alternative device in spatial descriptions • Occasional overgeneralization (production of body-anchored signs in signing space)	

	Findings study 1 ***Chapter 3,*** ***free production study;*** ***semi-natural data***	**Findings study 2** ***Chapter 4, elicitation study; Entity classifier predicates***	**Findings study 3** ***Chapter 5, elicitation study; agreement verbs***
General	• Localization of referents that are not used for further reference (‘non-utilized localization’) • Examples of stacking	• Redundancy (i.e., use of both classifier predicates and alternative devices within the same depiction) • Examples of difficulties in planning scenes (misjudgments; dropping Ground object prematurely) • Some examples of failure to express Figure and Ground simultaneously (in constructions that are produced simultaneously in benchmark) • Placement of classifiers for car/bike relative to each other on the horizontal plane precedes production of both classifiers on horizontal plane (i.e., on top of each other) • Transfer of Dutch word order and prepositions; transitional period with redundant use of prepositional signs	• Localization of referents that is not subsequently used for verb modification (‘non-utilized localization’) • Examples of stacking

In the following subsections, the findings for each category of devices will be discussed.

7.1.1 Pointing signs

The free production study, examining (semi-)natural acquisition data, revealed that pointing signs are used from the start and without much difficulty. Noteworthy findings were (i) the localization of referents in space without further reference, (ii) stacking, and (iii) confusion regarding pointing signs during constructed action.

Points to abstract space are used from the start, but notably, until the end of the first year, referents were commonly assigned a location which, however, was not subsequently used to refer back to that referent. This phenomenon, which we have termed 'non-utilized localization', was attested in all studies, and has, to our knowledge, not been documented in the literature before. This finding indicates that the establishment of location-referent associations and the integration of these locations in subsequent referential signs (pointing signs and agreement verbs) are systems that are acquired separately (see Section 7.1.2.1 on agreement verbs for further discussion). The sharp increase of pointing signs for abstract reference after approximately 30 weeks of instruction is remarkable. The observation that both learners 'switch' from incidental localization that is rarely or not at all utilized for further reference, to establishing loci for multiple referents that are used for further reference, shows that the learners clearly have acquired the linguistic use of this device.

The second pattern, observed in the data of all four studies, is stacking, that is, establishing two or more referents at the same location. Several authors have noticed this behavior in L1-learners of sign languages (Loew, 1984; Petitto, 1987; Petitto & Bellugi, 1988).

The third finding worthy of discussion is the confusion regarding pointing signs during constructed action, which had previously been noticed by Loew (1984), in particular for pronouns. We assume that the fact that CA sequences require the learner to switch back and forth between the role of characters and the narrator-role, each with their own perspectives, confuses the learners. The learner portrayed in Chapter 3 (see Figure 3.15) directs the intended pronoun to a location in signing space, which suggests that she is mixing up observer space and character space, resulting in misuse of the pointing sign.

In sum, the data show that pointing signs emerge at an early stage during SL2 acquisition, even though learners initially do not seem to grasp that loci can be used for reference. Learner data are characterized by incidental occurrences of stacking and misuse of pointing signs during constructed action.

7.1.2 Verbs

7.1.2.1 Agreement verbs

The analyses of the data from the free production study and the elicitation study reveal that, compared to the other spatial devices investigated, agreement verb modification appears relatively late. In both studies, agreement verbs that denote concrete transfer (e.g., GIVE, TAKE-AWAY) are modified earlier than agreement verbs that denote abstract transfer (e.g., HELP, ASK). Notably, the verbs of concrete transfer have a gestural counterpart. In Chapter 3, we hypothesized that we may have overestimated the learners' performances by miscoding gestural enactments as verb modification. However, a comparison between L1-signers and sign-naïve gesturers, who were asked to sign/gesture the information that the SL2-learners had signed, revealed that the SL2-learners had likely used modified agreement verbs, and not gestures (see Section 3.4.1.1). Given the observation that participants' productions resembled the signs, and not the gestures, an alternative plausible explanation is that the gesture-sign parallels in these concrete-transfer verbs have bootstrapped their acquisition. A third explanation to account for the observation that concrete transfer verbs emerge earlier than abstract transfer verbs, is that the situations involving concrete transfer verbs (e.g., 'A man gives a present to a woman') can be produced using constructed action (or: character assignment), while abstract agreement verbs require the use of abstract loci in signing space.[1] As long as the system of localization is not in place, the

[1] Situations that do not require localization are: (i) use of direct deixis (e.g., $_{2}$ASK$_{1}$) and (ii) use of the 'establishment-by-verb-strategy' (e.g., Example (1a) in Section 5.2.2: IX$_{1}$ DOCTOR $_{1}$CALL$_{3a}$).

learners cannot spatially modify verbs according to these loci (Meir, 2010). This might account for the fact that the learners in study 3 failed to produce a modified version of the verb CALL-BY-PHONE when asked to sign the prompt 'Yesterday the woman called her sister', but succeeded to produce a modified verb to express 'The man gives the key to the woman'. The latter production involved a point to the location of the (conceptualized) woman and taking up the role of the man, while the former required the localization mechanism for abstract reference to be 'operational'.

The free production data showed that one of the learners experienced difficulties in modifying agreement verbs correctly in constructed action sequences. In the previous section, we have argued that the shift of reference and perspective during CA caused confusion in the learner regarding the direction of pointing signs. It is likely that the erroneous modification of agreement verbs during CA can be attributed to the added complexity of CA as well. The observation that this particular learner showed this erroneous use of pointing signs and verb modification only during CA sequences, but not in other (non-CA) contexts, points into the direction that the observed difficulties stem from the interaction between CA and the use of reference mechanisms.

Interestingly, the alternative strategies used by the SL2-learners in the elicitation study (e.g., use of successive 1-argument structures, use of auxiliary-like elements) are similar to those attested in data from emerging sign languages (Senghas et al., 1997; Meir, 2010; Ergin et al., 2018; see Section 2.4.7.2). Once the learners had learned to establish loci and had succeeded in incorporating these loci into verbs, these alternative strategies disappeared.

SL2-learners hardly used agreement carriers. In the free production study, the agreement auxiliary ACT-ON was used a few times, mainly in the advanced stages of acquisition (year 3 and 4). Serial verbs were not attested in the SL2-data at all.

7.1.2.2 Entity classifier predicates

When comparing the SL2-production of Entity classifier predicates in the free production study and the elicitation study, several noteworthy findings emerge. Below, we will discuss these findings, focusing on (i) the mixed results yielded by the free production study and the elicitation study, (ii) the

SL2 acquisition process as compared to the L1 acquisition process described in the literature, and (iii) the role of gesture in bootstrapping the learning process.

The findings from the free production study and the elicitation study seem to be contradictory. In the free production study, classifier predicates appear late and prove to be difficult for one of the learners. The learners in the elicitation study, however, already demonstrate understanding of this phenomenon during early stages, and the majority of these learners show a good command of two-handed classifier constructions after a year of instruction. Possible explanations for these observed differences can be found in task type. First, the elicitation task required the use of a limited set of classifiers (i.e., classifiers for vehicles, an upright person, a sitting person, and an animal), whereas the number of entities that could be depicted with a classifier in the free production study was larger, and some of these classifiers referred to categories that are less frequently used (e.g., a podium, an old fashioned school desk). Second, the nature of the free production study allowed the participants more freedom to avoid structures they found difficult, which may account for the absence of these structures during the first recordings.[2] A third difference in task type that might be responsible for the mixed results can be found in the (non-)availability of a representation (e.g., an image) of the spatial scene to-be-described. The learners performing the elicitation task signed a spatial description that was continuously displayed on the screen in front them while they produced the spatial description. The learners in the free production study, in contrast, did not have visual access to the actual scene they were describing. Their spatial descriptions, mostly responses to a probing question by their interlocutor (e.g., "Can you describe that church for me?"), involved extended descriptions of their university, workplace, or places they had visited in the past. From their renditions, it is clear that in these past real-world situations, they had moved through the rooms or areas and thus had occupied different positions. Consequently, their spatial descriptions did not only involve

[2] One could argue that the absence of classifier predicates might result from an absence of discourse contexts that require the use of these predicates as well (i.e., the participants just happen to talk about other things), but this is not the case. Both participants did talk about spatial scenes, but used other spatial devices such as pointing signs.

choices regarding linguistic expression (e.g., which device to use to depict a referent), but also the conceptualization of the scene from a specific viewpoint (see Sections 2.4.2.1 and 2.4.5). The learners in the elicitation study, on the other hand, (i) did not have to remember a spatial scene from the past, and (ii) had to sign a scene presented from a fixed viewpoint. We hypothesize that the requirement to describe a scene from the past and to decide upon a viewpoint adds complexity, and thus cognitive load, at the expense of linguistic accuracy. This might also account for the error-prone descriptions produced by the NSL-learners described by Ferrara and Nilsson (2017).

When comparing the SL2 development of Entity classifier predicates with developmental patterns described for L1-learners (Section 2.4.7.3), similar alternative strategies (or, one could say, 'avoidance strategies') can be observed, such as use of whole-body language or provision of lexical descriptions (Morgan, 2002; De Beuzeville, 2006; Tang et al., 2007). The SL2-learners predominantly resorted to the use of (i) (overgeneralized) lexical items to describe the action (drive, ride bicycle, walk), (ii) (overgeneralized) lexical items to describe existence (stand, sit), and (iii) manual prepositions to describe relative location (ON, NEXT-TO). The errors attested in the SL2-data show parallels with some, but not all errors found in L1-learners. Like L1-learners, SL2-learners substitute handshapes, fail to introduce referents, and fail to produce Figure and Ground simultaneously. However, we did not find evidence for the sequential production of movement patterns (as described in Newport & Supalla, 1980) or the omission of components such as manner of movement (as described in Newport & Meier, 1985). De Beuzeville (2006) argues that examples of 'synthetic incapacity' (i.e., the incapacity to produce manner and movement simultaneously), observed in L1-learners during the production of classifier predicates, show parallels with a phase of 'synthetic incapacity' children go through in their drawing. One characteristic of this phase is that the child fails to synthesize parts, for example by drawing parts separately that should be in contact. The failure to synthesize different movement components evidenced by children might thus be an artifact of cognitive immaturity, and, given the maturity of our participants in this area, should consequently be absent in SL2-learners.

The combinational design of the elicitation study enabled us to compare the acquisition of two grammatical systems, agreement verbs and Entity classifier predicates, within the same group of signers. The early appearance of Entity classifier predicates (Chapter 4) as compared to the late appearance of agreement verbs (Chapter 5) is remarkable. Neither of these two spatial devices occurs in the L1 of the learners, and both have been shown to be acquired relatively late by L1-learners. So, how can we explain the marked difference between the acquisition of these devices in SL2-learners? There are two possible interpretations of this difference.

A first interpretation is that learners use their gestural repertoire to bootstrap their acquisition. As set out in Section 2.4.6, many researchers have found that non-signers use classifier-like hand-as-object gestures to indicate the location of objects (Singleton et al., 1993; Schembri et al., 2005; Brentari et al., 2012; Quinto-Pozos & Parrill, 2015; Janke & Marshall, 2017). In contrast, directional gestures to indicate events of abstract transfer seem to be used less frequently. Casey (2003) reports that non-signers use 'directionality' as response to stimuli showing people interacting with each other. However, it is not clear whether the gestural responses (to prompts aimed at evoking gestures to represent abstract transfer; e.g., scold, warn) that were coded as 'directional' by Casey, actually resembled the form of abstract agreement verbs. One of the examples identified as 'directional' by Casey (2003, p. 551) is the production of a "'stop' gesture produced towards an area of space" (presumably a response to a prompt meant to evoke the verb/act 'to warn'). It seems that these gestures resemble 'acting out' in a particular direction, rather than an abstract movement path between locations in space. Thus, in contrast to the often-reported use of *classifier-like gestures*, there is little evidence that non-signers use *agreement-verb-like gestures* to indicate abstract transfer. This might account for the observation that SL2-learners readily pick up classifier predicates from the input, but not agreement verbs.

A second explanation for the difference in acquisition relates to the different places both categories of signs occupy in the lexicon (Section 2.4.1.2). SL2-learners might fail to notice the modification of begin and end location of an agreement verb because they treat these signs as a signed 'word'. That is, they pay attention to the label ('that sign is a translation for that word'), but not to the spatial modification. Classifier predicates, however, lack an equivalent 'word' in their L1. In other words, if an agreement verb appears in the input, learners can perform a sign-to-word translation. They can use clues from the L2 language, such as word order, to infer the meaning *without paying attention to the specific form of the sign*. Classifier predicates are different in this respect: since they lack an L1 equivalent, the learner is forced to pay attention to the form-meaning mapping. Obviously, the fact that verb agreement in NGT is optional further complicates the establishment of a consistent form-meaning mapping for these verbs.

7.1.2.3 Spatial verbs other than classifier predicates

Spatial verbs denoting movement between locations (e.g., GO-TO) do not seem to pose problems to the learners. In the free production study, one learner initially only uses spatial verbs that have a gestural counterpart (WALK, LOOK-AT, and verbs that show how objects are moved around, for example PICK-UP$_{box}$, HAND-OVER$_{cake}$). Presumably, this early use is bootstrapped by this learner's gestural repetoire. We did not notice specific errors in the use of this category of verbs.

7.1.3 Signs marked for location

Signs marked for location emerge at an early stage, and do not seem to pose much difficulties. During the baseline session of the elicitation study, learners (of whom the majority were actually sign-naïve gesturers at that moment) abundantly produced locative gestures to indicate the location of entities. Presumably, this facilitates understanding of the fact that a lexeme can be produced at a particular location. Errors of overgeneralization involve the detachment of body-anchored signs from the body in order to locate them in signing space.

7.1.4 General observations regarding use of space

A first interesting finding to emerge from the elicitation study is the observation that some learners showed a tendency to 'overuse' the abstract signing space, i.e., observer perspective, in contexts that evoked use of constructed action, i.e., character perspective, in L1-signers (Section 5.4.2.1.1). A similar bias towards the use of observer perspective constructions was observed by Kurz et al. (2019), who analyzed narratives signed by ASL-learners. Ferrara and Nilsson (2017) found that learners of NSL used Entity classifier predicates to describe how entities are located in static environments (i.e., from an observer perspective), whereas their L1 instructors “described locations and entities as they would encounter them from their own perspective” (p. 14-15). The ‘overuse’ of the observer perspective/abstract space is an often-mentioned SL2-learner characteristic. Kurz et al. (2019) suggest that constructions involving an observer perspective “may feel ‘more like ASL’” for learners (p. 14). Indeed, it is plausible that SL2-learners perceive the use of their body to convey actions and viewpoints (i.e., constructed action) as ‘less linguistic’ or as ‘gestural’, leading to an under-use of this mechanism, and an over-use of devices that employ locations in signing space.

Secondly, in Section 7.1.1, it was already mentioned that in all studies we observed the phenomenon of ‘stacking’, a phenomenon found in L1-learners as well.

A third characteristic, which we observed in all studies, is the phenomenon that we termed ‘non-utilized localization’. In the free production study, locations are re-used for reference by the end of year 1. During the early stages, learners use spatial devices merely to introduce referents. The absence of further reference to a previously introduced referent is, however, well possible in natural conversation, given that people can decide to switch to a different topic involving other referents. Yet, we observed multiple examples of non-utilized localization in the ‘agreement verb responses’ in the elicitation study and the intervention study as well. Obviously, the prompts used to elicit sentences containing an agreement verb did not involve a switch of topic. Given the optionality of verb modification, establishing loci in space but subsequently using an unmodified verb is not a grammatical ‘error’ (see Section 5.4.2.2.2), but it is nonetheless qualified as ‘erroneous’ by ISLDS-teachers.[3] Aronoff et al. (2015) and Meir (2010) describe similar examples of localization not used for further reference in ISL and ABSL. Meir (2010) concludes: “Such responses indicate that grammatical use of space may develop at different rates in different grammatical systems. In ISL space is used in the pronominal system before it is being incorporated into the verbal system.” (p. 118).

[3] The team of UUAS NGT teachers was asked to judge the learner-production shown in Figure 5.9 in Section 5.4.2.2.2. Eight teachers judged this construction as ‘erroneous’, one teacher as ‘typical’.

A last learner characteristic to emerge from the data is the frequent occurrence of redundancy regarding the use of spatial devices. Figure 7.1 shows a screenshot of the ELAN annotation of the same prompt, signed by a learner and an L1 signer. The learner combines three spatial devices: pointing signs, a sign marked for location, and Entity classifier predicates. The SL1 signer, in contrast, is much more efficient, and restricts herself to the use of classifier predicates. Clearly, the learner is over-explicit in her signing, yet it remains an open question whether her utterance would be judged acceptable by L1-signers. Another example of redundancy, shown by all learners in the classifier predicate elicitation study, is the use of prepositional signs (ON-TOP, NEXT-TO) *in addition to* the use of classifier predicates. Presumably, we witness here an influence of the learners' native language Dutch, in which use of a spatial preposition is obligatory in similar contexts (i.e., the context in which objects are placed on top of each other).

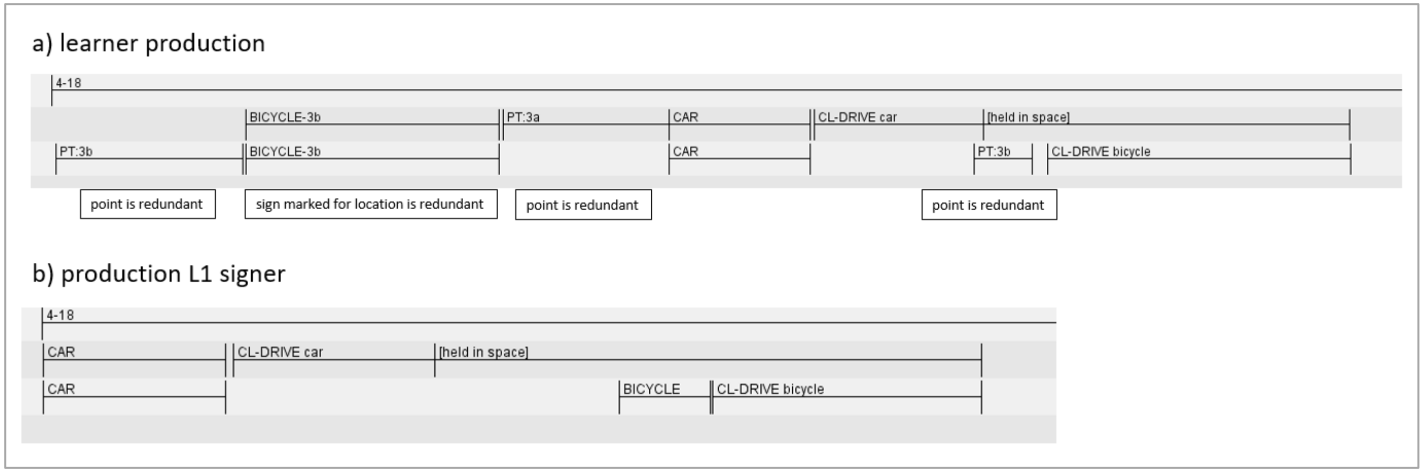

Figure 7.1. Example of redundant use of spatial devices. The learner (a) uses three types of spatial devices (pointing, sign marked for location, and Entity classifier predicates), whereas the L1 signer (b) only uses classifier predicates (Screenshots of ELAN annotations, session 4, prompt 18).

7.2 Summary of findings regarding the effectiveness of pedagogical interventions

Chapter 6 has provided a detailed account on the fourth study, which investigated the effectiveness of an explicit focus on form intervention as compared to an implicit focus on form intervention and a control group. Based on the literature on spoken L2 learning (Norris & Ortega, 2000; Spada & Tomita, 2010), we expected that both experimental groups would outperform the control group, since the learners in the latter group did not receive any instruction aimed at directing their attention to the structure under investigation, the agreement verb paradigm. Indeed, we found that both experimental groups scored significantly higher on the post-tests than the control group.A second expectation was that the group participating in the explicit intervention would outperform the group participating in the implicit intervention on the post-tests. However, contrary to expectation, there were no significant differences between the post-test scores for the group receiving explicit rule explanation and the group receiving an implicit focus on form intervention. Three potential explanations for this unexpected outcome could be: (i) there has been a source of bias that advantaged the implicit group and/or disadvantaged the explicit group (e.g., differences in teacher approaches); (ii) the observation that learners acquired the structure based on a mere input flood is related to the linguistic structure under investigation, or (iii) previous findings for unimodal learners regarding the supremacy of explicit instruction are not applicable to L2 learning processes in the visual-spatial language modality. This would imply that certain L2 learning mechanisms are not universal to all languages.

Although we made every effort to prevent bias (e.g., measures were taken to control for spillover effects, see Section 6.3.3), class-room research always comes with the methodological challenge to keep potentially interfering variables constant (Hulstijn, 1997). In the current research, ‘potentially interfering variables’ might have been the language input provided by the teacher during other class activities, and language exposure outside of the classroom. Since the study was embedded in an existing course, some students might have picked up agreement verb forms from the teachers’ natural input provided during regular class activities. Moreover, some of our learners may have attended gatherings in the deaf community or may have received NGT input during other classes offered as part of their education.

The second line of reasoning that might help us to explain the observation that the input flood group was highly successful in abstracting the system of verb agreement from mere input is related to the nature of this linguistic structure. It seems that the system of agreement verbs is, *once noticed*, rather straightforward and salient for learners. It is important to note, however, that the verbs featured in the learning materials used in this study were all *fully modified double agreement* verbs. By narrowing down the full spectrum of available options – namely, non-modified single or double agreement verb, modified single agreement verb, partly or fully modified double agreement verb – to just the fully modified form, the agreement rule might have become highly salient to the learners. In addition, the rule was reliable (Hulstijn, 1995): the only exceptions to the rule were found in the reversed movement characterizing a limited set of backward verbs. It is conceivable that a similar study offering a mixture of partly, fully and non-modified verb forms would have generated different results.

A last, admittedly more hypothetical, explanation would be that the unexpected outcome is due to the fact that the theoretical assumptions for unimodal spoken language L2 processes are less applicable to bimodal learning because of the difference in mode of transmission. At present, however, we cannot offer any concrete speculations on what specific aspects of the visual-spatial modality could be held responsible for this non-applicability.

Clearly, the SL2-field is in need of more research, on a broader variety of linguistic features, and using a variety of tasks, to get a comprehensive picture of the effect of different pedagogical practices and interventions.

7.3 Methodological considerations

When investigating language acquisition in general, and the acquisition of sign languages in particular, a number of methodological issues need to be considered. In this section, we address some issues that can arise regarding data collection, coding, interpretation of the data, as well as socio-linguistic issues, and we sketch the efforts we have undertaken to deal with these issues properly.

7.3.1 Selection of participants

7.3.1.1 Learners

The learners in this study were prospective interpreters, NGT teachers, and speech-to-text captioners. Consequently, the NGT input they received was not limited to the input provided by their NGT teachers and teaching materials, but also included input from other sources, such as classes on other subjects taught by signers, activities in the deaf community, friendship with L1-signers, etc. To gain insight into their background and possible out-of-class input, we obtained metadata from the participants. During the process of analyzing the data, we carefully considered the possible influence of other input sources.

7.3.1.2 Benchmark: L1-signers

In order to identify interlanguage characteristics of SL2 productions, it is – obviously – necessary to compare these productions to the productions of L1-users of the language. For NGT, empirical research has been conducted on a fair number of grammatical structures, and a language corpus containing productions of 92 deaf signers is available (Corpus NGT, Crasborn et al., 2008). In addition to the available linguistic evidence, we collected data from deaf signers to serve as benchmark in the studies. This pool of participants included both deaf people who where born into deaf families (i.e., 'native signers') and people who learned sign language at an early stage of life ('authentic signers', Jaeger, 2019).[4] Working with a group of authentic signers is not uncommon in the field of sign language linguistics, given the small group of native signers (Van Herreweghe & Vermeerbergen, 2012; Quer & Steinbach, 2019). To decide upon the status of 'authentic signer', authors often use criteria such as (i) exposure to sign language at an early

[4] Another term for this group is near-native signer. We prefer to use the term 'authentic signer' or TAS ('The Authentic Signer') instead of 'near-native signer', since the former is more neutral. An interesting discussion about the concept of TAS and the perceived 'hierarchy' of different signer groups (i.e., native signers, TAS, and hearing/hard-of-hearing signers) can be found in Jaeger (2019).

age, (ii) daily use of the sign language, and (iii) prolonged membership of the deaf community (e.g., Mathur & Rathmann, 2001, p. 7; Van Herreweghe & Vermeerbergen, 2012). All the signers in our benchmark met these criteria.

An additional issue regarding this group of participants is the tendency of some deaf individuals to accommodate their sign language to a hearing interlocutor, be it by using a simplified form of sign language ('foreigner talk'), or by using Dutch-influenced constructions that are grammatically acceptable, but would probably not be produced in a conversation with a deaf/L1 conversation partner. An authentic signer might, for example, use a preposition NEXT-TO to express the spatial relationship between two entities, instead of using an Entity classifier predicate (Van Herreweghe & Vermeerbergen, 2012). To minimize the risk that L1-participants would alter their language because of the researcher's hearing status, two measures were taken: (i) whenever possible, deaf/L1 colleagues of ISLDS were asked to organize and attend the session, and (ii), in case this was impossible, we made sure that the hearing researcher/assistant was not present in the room during the elicitation. However, the possibility remains that the L1-participants' awareness of the fact that this project was carried out by a hearing researcher influenced their signing ('Observer Paradox', Labov, 1969). The relatively high proportion of Dutch-influenced constructions produced by two of the participants in the elicitation study, for instance, may have been due to this effect.[5]

Evidently, surveying the productions of a larger pool of L1-signers would provide a better picture of the target language. One of the limitations of this project is that, due to limited time and resources, the number of L1-signers was rather small.

7.3.1.3 L1-consultants

During this research project, we regularly consulted additional L1-signers, who were not part of the benchmark, for acceptability judgements on SL2 productions. In all cases, these consultants were either native signers (i.e., born to deaf parents) or met the criteria set out in Section 7.3.1.2. All these L1-informants had received some form of linguistic training on NGT.

[5] Notably, both these participants were filmed by a deaf/L1 colleague.

7.3.1.4 The anonymity issue

One of the issues in the current study concerns the anonymity of the participants. All data collected for this project involve video recordings in which participants are clearly identifiable. This required careful handling of the data. Video-data were tagged with a participant-ID, and in a consent form, we obtained permission from the participating students to be identifiable, assuring them that their choice to remain anonymous would not have any consequences for them.

7.3.2 Tasks

One of the strengths of this project is that the obtained data included both (semi-)natural and elicited learner productions. Furthermore, the longitudinal nature of the free production study and the elicitation study enabled us to track the learners' acquisition process.

An obvious limitation of working with natural, free production data from a learner corpus is the lack of control. Learners might avoid certain constructions, or particular linguistic features already acquired might not show up in the data because learners simply did not happen to use them, or because these features do not occur frequently in normal conversation. This caveat should be kept in mind when interpreting the data. A second issue that comes with analyzing natural dialogues, is the high frequency of 'noise', in the form of hesitations, false starts, repetitions, and imitations of (parts of) utterances of the interlocutor. In particular, repetitions and imitations might lead to an overestimation of a learner's performance (e.g., an imitated grammatical construction might not reflect the learner's skills, and repetitions might influence the frequency of occurrence of particular features). As shown in Chapter 3, we attempted to minimize such overestimation by excluding these utterances from the data (see Appendix 3A). A last challenge regarding the use of this dataset was that the transcription of the data is extremely time-consuming. We opted to analyze the data from two learners covering a longer acquisition period, rather than analyzing data from more learners spanning a shorter period. The availability of data covering a four-year period is – to the best of our knowledge – unprecedented in the emerging field of SL2-pedagogy and, as such, provides a unique window on SL2 characteristics at different stages during the acquisition process.

The elicitation study enabled us to elicit structures that were, for reasons stated above, absent or infrequent in the natural data. We developed instruments that allowed us to visually represent the findings abstracted from the data (see Section 1.3 for links to these instruments, which have been made publicly available as supplementary materials). These instruments revealed patterns that otherwise might have gone unnoticed. Yet, such a ‘conversion’ of the data into a convenient visual representation automatically results in loss of details, which should be kept in mind when examining these datasets. In order to detect patterns, and to prevent that we miss developments due to infrequent sampling, we planned two-weekly/three-weekly sessions during the first stage of the study. A drawback from this design is the possibility that data would be obscured by ‘learning from the test’. To investigate whether the performances of our participants would deviate from the performances of their non-participating classmates (in which a learn-from-the-test effect would be absent), we sought opportunities to also test these non-participating classmates at the end of the first year. Unfortunately, despite several attempts, we were not able to recruit a sufficient number of classmates to make comparisons.

The repetitive nature of the elicitation study posed a challenge with regard to the choice of the prompts. We strived to collect photos, drawings, and clips that were comparable, in that they contained similar entities in comparable configurations, so that we would not have to present the learners with exactly the same prompts 15 times. The fact that the tests contained comparable, but not identical prompts, may have influenced the learners’ performance (e.g., they may have focused on other characteristics of the depictions).

A final challenge we faced when designing the tasks was that it is notoriously difficult to elicit the abstract transfer agreement verbs (e.g., ASK, HELP, VISIT) by means of images. To elicit these non-picturable concepts, we therefore had to resort to the use of written Dutch sentences, which might have influenced the results as well.

7.3.3 Test circumstances

For carrying out the study, we could use the facilities of UUAS: the language laboratory, test rooms and cameras. The pilot phase of the elicitation study, however, revealed that use of the language lab came with some downsides that were undesirable. For this reason, we chose to test the participants individually. This minimized the risk of technical failure, the risk that signs would not be visible (i.e., be produced outside the reach of the camera), and the risk that participants would skip items unintentionally. For the intervention study (Chapter 6), however, individual testing was unfeasible. We acknowledge that performing the test in the language lab may have influenced the learners' productions, for example because they were distracted by being unsure if their signing was captured by the camera.

7.3.4 Coding procedures and data analysis

Each linguistic investigation requires decisions on how to define the feature(s) under investigation. In case of SL2 production data, this involves careful considerations regarding the identification of gestural behavior, the interpretation of neologisms, and the interpretation of 'congruent' productions. Moreover, during the coding process certain decisions have to be made regarding how to handle self-corrections, and the variability of answers.

Use of gestures is a common compensation strategy in L2 learning, whether unimodal or bimodal (CEFR, CoE, 2018, p. 79). In SL2 learning, it is often difficult to distinguish between a linguistic representation and a gestural enactment. To prevent over-attribution of linguistic status to gestural productions, we were conservative in our coding. This might, on the other hand, have led to an underestimation of the learners' performances.

A second analytical challenge, related to the gesture issue, is the use of neologisms on part of the learners. SL2-learners can use their gestural repertoire to coin neologisms on the spot, and such neologisms often involve representational gestures that have a sign language parallel (e.g., a Size and Shape Specifier (SASS) that traces the outline or shows the dimensions of an object, see Section 2.4.6). When coding for the presence of linguistic features, it was sometimes difficult to determine whether a learner used an SASS (like a L1 signer would do), or a representational SASS-like gesture.

A third issue involves decisions regarding the coding of 'congruent signs'. In all studies, we encountered examples of signs which had the same form as their citation form, but which, given the context, we assumed to be spatially modified. In Chapter 6.3.4.2, we provided examples of productions that, given the context, in all probability involve spatial modification, and productions that might involve modification or not (i.e., ambiguous forms). In all studies, we were conservative in our coding by labeling ambiguous productions as unmodified.

A fourth issue that required systematic decisions was self-correction on part of the learners. Occasionally, learners provided an erroneous response to a prompt, followed by a correct response – or vice versa. In all cases, we decided to label the response as 'correct', since the learner showed mastering of the target structure.

A fifth issue concerns attested variation the language. In some cases, learners produced 'Dutchisms' that could either result from L1 transfer (i.e., a 'translated' Dutch construction), or be a Dutch-influenced NGT variant; an example of the latter is the use of a preposition instead of a classifier construction (see Section 7.3.1.2, example from Van Herreweghe & Vermeerbergen, 2012, p. 1039). The benchmark productions offered us the opportunity to compare the learner productions with forms produced by L1-signers and/or sign language teachers. Moreover, in case of doubt whether a learner production was an acceptable NGT variant, additional L1-signers were consulted for their judgement on the acceptability of these constructions (Section 7.3.1.3).

7.3.5 Choice of topic

The topic of this research, 'use of space', is clearly a rather broad topic that covers a range of grammatical devices. A drawback of such a multifaceted research domain is that some subtopics could not be studied in depth. However, the inclusion of the whole range of manual spatial devices has enabled us to observe the interconnectedness of the devices as well as the differences in their onset of acquisition. The marked difference in the emergence of Entity classifier predicates and agreement verbs, which our studies revealed, for example, has to our knowledge not been described in literature before.

7.4 Conclusion

Having summarized and discussed the most important results of the acquisition studies and the intervention study, we now turn to a presentation of the main conclusions (Section 7.4.1), followed by a discussion of the practical implications (Section 7.4.2) and the scholarly contributions (Section 7.4.3) of this research. We end with suggestions for future research (Section 7.4.4).

7.4.1 Re-statement of the aims and major conclusions

Our knowledge of SL2 acquisition and SL2-pedagogy is based on very limited data. Therefore, the main aim of this research was to provide a *description of the SL2 acquisition of spatial devices* subsumed under the term 'use of space'. These grammatical devices, grouped into pointing signs, spatially modifiable verbs and signs marked for location, are modality-specific and thus unfamiliar to SL2-learners. The second aim was to investigate to what extent certain *pedagogical practices*, which have been shown to be effective for unimodal spoken language L2-learners, would facilitate the acquisition of one of these modality-specific devices.

The major conclusions that can be drawn from the analyses of the natural and elicited acquisition data are:

i. Different types of devices emerge at different stages; e.g., pointing signs emerge at early stages, while agreement verbs appear later;
ii. The order of emergence of particular devices suggests that the learners use their gestural knowledge to bootstrap NGT acquisition;
iii. Certain characteristics of the NGT SL2-interlanguages show parallels with L1-interlanguages and phases attested in emerging sign languages, described in the literature;
iv. Certain characteristics of the NGT SL2-interlanguages support findings described in the literature on the SL2 acquisition of other sign languages;
v. The erroneous use of spatial devices at advanced stages of the learning process is typically observed in constructed action contexts that exhibit multiple 'layers of complexity'.

The major conclusions that can be drawn from the study on *pedagogical interventions* are:

vi. Interventions aimed at directing or attracting the attention of SL2-learners to the form-meaning mapping of a specific spatial device (agreement verbs) prove to be beneficial to the SL2 acquisition process;

vii. For this particular spatial device, an implicit pedagogical practice, i.e., provision of input containing multiple examples of the target structure, is sufficient for developing the form-meaning mappings and is equally effective as provision of explicit instruction.

These findings will be of interest to both scholars and practitioners. In the next sections, we first discuss practical implications for teachers and curriculum designers, followed by implications for the broader research community.

7.4.2 Practical implications

Given the context of this study, that is, the practice of sign language teaching in the context of tertiary education, the practical importance of investigating SL2-pedagogy is evident. At the outset of this project, the aims and objectives were deliberately chosen for their practical relevance. The findings of this dissertation have practical implications for teachers, test developers, and curriculum developers, as they may inform their expectations regarding learner performances at particular stages (which in turn may have implications for the timing of instruction), characteristics of stage-specific interlanguages (e.g., omissions, overgeneralizations, use of alternative strategies), the relative difficulty of a given construction or discourse context, and the possible role of gestural behavior.

First, the finding that Entity classifier predicates are a spatial device that is easily understood and emerges at an early stage implies that this device can be used and taught during the first stages of the learning process. However, as discussed in Section 7.1.2.2, findings from the free production study suggest that learners might need guidance in using Entity classifiers in elaborate descriptions, and that extra attention should be given to classifiers that are less frequent.

A second implication is that the spatial modification of agreement verb is an area that deserves special attention. In contrast to Entity classifier predicates, the mechanism of verb modification is not easily inferred from natural input, in particular for abstract transfer verbs (i.e., verbs that lack a gestural counterpart). An ‘input flood’ containing multiple examples of modified agreement verb forms has proven to be beneficial to bootstrap acquisition.

A third implication stems from the observation that one of the learners in the free production study showed erroneous use of spatial devices in ‘multi-layered’ constructed action sequences, while she already mastered the same devices in non-CA contexts. This finding demonstrates that the phenomena of ‘shifted reference’ and ‘shifted locus’ (Engberg-Pedersen, 1993, see Section 2.4.5) are less straightforward for learners than might be assumed. Learners are likely to benefit from focused instruction, such as error correction with metalinguistic explanation (see Section 6.2.1).

A fourth practical implication arises from the observation that some learners showed a bias towards using the abstract signing space/observer perspective, whereas L1-signers preferred to encode the same information from a character perspective. As discussed in Section 7.1.4, learners might avoid the use of constructed action because they perceive it as ‘less linguistic’, while teachers might over-emphasize the abstract use of space at the expense of constructed action, because they assume that learners will automatically use their natural (pantomime-based) ability to ‘act out a scene’, whenever the context requires this. This implies that it is of importance to counterbalance input/instruction exemplifying the abstract use of space and/or scenes from an observer perspective, on the one hand, and input/instruction including examples of scenes from a character perspective (i.e., use of constructed action), on the other hand.

Being grounded in praxis, the current study has the potential to directly feed into the sign language curriculum of the ISLDS. The identification of features that characterize the interlanguage development of the various spatial devices, including the timing of their onset, enables the NGT teachers to review he current curriculum. The results of the study have, for example, informed the formulation of a comprehensive set of NGT learning outcomes (Van Loon & Boers-Visker, 2018), which in turn will form the basis for a revision of the NGT curriculum in the near future. Given our results, it is only logical that the flooded materials investigated in the intervention study will be implemented in the future curriculum. Besides the practical applications for the ISLDS NGT curriculum, the outcome of the study informed the set-up of the current subject course 'Sign language pedagogy', part of the UUAS Master program 'Teacher NGT', substantially. In 2019, this course has been re-designed by the author. In the newly designed course, the theoretical background regarding SL2-pedagogy in general, research methodology, and methodological considerations (see Section 7.3) have been implemented.

7.4.3 Theoretical implications

As explained in Section 2.1, this thesis builds on the accumulated body of knowledge derived from the fields of sign language linguistics, second language acquisition (SLA), language pedagogy, and gesture studies. Given the interdisciplinary nature of this study, the findings are of relevance for (subdomains of) each of these fields.

As for the field of sign language linguistics, the findings add to our understanding of sign language acquisition. In particular, they shed light on features that are shared by both L1- and SL2- learners (e.g., the observed errors of omission and overgeneralizations) and features that might be unique for L1-learners (e.g., the sequential production of movement features occasionally observed in children, see Section 7.1.2.2). As such, the evidence offers us the opportunity to disentangle characteristics of linguistic development from characteristics of development in cognitive domains (Ortega, 2013).

The study corroborates previous findings regarding the parallels between SL2 productions and gestural behavior found in co-speech gestures and/or silent gestures of non-signers (Section 2.4.6). In particular for the system of Entity classifier predicates, the longitudinal and systematic collection of data provides a window on gradual conventionalization, which differs per morphological component of the predicate; that is, the movement component is acquired quickly and with ease compared to the handshape component. Some researchers may be tempted to interpret these observations as evidence for the (non-)linguistic status of the components of the construction. It is important to stress, though, that this study was not set up to provide evidence for or against the debate regarding the linguistic status of certain sign language structures (see Section 2.4.6), and that therefore, the data have not been analyzed through this lens. However, our findings strongly suggest that there is a gestural *influence* that scaffolds the learning process.

Lastly, studies on the acquisition of sign language as a second language have the potential to support concepts developed within the fields of SLA and language pedagogy. To claim universality of a certain concept, a theory on learning and teaching languages has to be able to account for data from both spoken *and* signed languages. The finding that SL2-learners benefit from focus on form activities adds to the body of evidence that provision of instruction – that is, an interventionist approach, as opposed to a non-interventionist approach to language teaching – is beneficial for the L2 acquisition process, and as such, strengthens the universality of this theory by adding evidence from a language expressed in the visual-spatial modality. Yet, our findings did not support the approach that explicit rule explanation is more beneficial than an implicit FFI practice, namely an input flood. This *might* imply that there are additional modality-specific forces at work; however, this is just one of various possible explanations (see Section 7.2). Certainly, further research is necessary to shed more light on possible modality-specific influences.

7.4.4 Future research

The findings presented in this dissertation provide a good starting point for further research on the acquisition of spatial devices in SL2-learners of a sign language, that confirm, complement, or challenge some of our findings There are three possible lines of research that could build on the research presented in this thesis, two that elaborate on the findings on the *acquisition of these devices*, and one that further investigates *teaching strategies*.

A first line of research could elaborate on the current findings regarding the acquisition of spatial devices, by investigating (semi-)natural data of larger groups of participants. The recent availability of SL2 learner corpora compiled by different research groups (e.g., Schönström, Dye, Leeson & Mesch, 2015; Boers-Visker et al., 2016; Mesch & Schönström, 2018) provides opportunities to investigate the (semi-)natural production of elaborate spatial descriptions. The corpus data make it possible to identify whether additional discourse features, such as switching between different viewpoints, cause difficulties regarding these structures, as has been hypothesized in Section 7.1.2.2. Similarly, stretches of constructed action could be analyzed to determine whether the observed difficulties to use appropriate pronouns and agreement verbs during CA (Chapter 3) constitute a pattern in the data across corpora.

A second line of research could investigate whether learners who are successful in producing relatively short responses during an elicitation task (Chapters 4 and 5) are also capable to employ Entity classifiers and agreement verbs in a target-like way in longer stretches of text or in natural conversation. To that end, we obtained permission from all participants of the elicitation study to analyze their performance in a 20-minute interview in NGT, filmed during the second semester of their first year of the program, which coincided with the period in which session 10 was filmed. We intend to use these data in a future analysis comparing the performances of the learners in both the interview and session 10/11. Such an investigation would be interesting for two reasons: first, it would offer the opportunity to compare the production of Entity classifiers and agreement verbs produced by the same learners during the same period, but in different contexts – and as such might strengthen the results described in this thesis; second, it would also allow us to investigate whether successful production of the short language samples elicited in the elicitation study predicts successful language use in communicative contexts.[6]

Thirdly, the current findings can serve as a basis for further investigations on pedagogical interventions. Obviously, replication of the fourth study (Chapter 6) with ISLDS-students of successive cohorts would allow for (dis)confirming the current results. A replication of the study with SL2-learners of another sign language would be informative regarding the possible influence of modality. That is, if the mode of transmission is responsible for the unexpected success of the input-flood-only group, then we would expect to find similar results in a study on SL2-learners of another sign language.[7] Furthermore, it is to be hoped that the design of the FFI-study described in this dissertation will serve as basis for future studies on the

[6] There are strong indications that the elicitation task had a predictive function, when considering the participants' levels of proficiency during the completion of their four-year education.
[7] Provided that the phenomenon of agreement verbs exists in that particular sign language.

effectiveness of FFI strategies focusing on other sign language structures to inform the field of SL2-pedagogy.

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Author contributions

Chapters 3–6 have all been submitted to peer reviewed scientific journals. Chapters 3, 5 and 6 are co-authored papers. In what follows, we provide an overview of the contributions of the author of this dissertation (EBV) and the co-authors (Beppie van den Bogaerde (BvdB), Roland Pfau (RP), and Rick de Graaff (RdG)).

Chapter 3

The paper presented in Chapter 3 is a slightly modified version of:

> *Boers-Visker, E. & Van den Bogaerde, B. (2019). Learning to use space in the L2-acquisition of a signed language: Two case studies. Sign Language Studies 19(3), pp. 410-452.*

The establishment of the learner corpus, which constitutes the primary data for this project, was initiated and supervised by BvdB. EBV devised the transcription and coding manual, and the schematic overview of spatial devices (Figure 2.10) that served as basis for the coding. EBV transcribed the data, coordinated the transcription performed by research assistants, and checked for inter-rater reliability (IRR). EBV coded the data for presence of spatial devices. BvdB supervised the transcription and coding process. EBV wrote the first version of the manuscript, BvdB provided critical feedback on the manuscript. RP and RdG provided feedback on the final manuscript.

Chapter 4

A shorter version of the paper presented in Chapter 4 has been submitted to a scientific journal and is currently under review. EBV authored the manuscript. The project (encompassing study 2 (Chapter 4) and study 3 (Chapter 5) was conceived by EBV. EBV designed the materials and the coding manual. This process was supervised by BvdB, RP and RdG. EBV carried out the experiments, archived the data, and transcribed part of the data. EBV coordinated the transcription performed by research assistants and checked for IRR. BvdB supervised the transcription and coding. EBV, BvdB and RP contributed to the interpretation of the results. EBV wrote the first version of the manuscript, RP provided critical feedback regarding the discussion section, and RP, BvdB and RdG commented on the final manuscript.

Chapter 5

The paper presented in Chapter 5 has been submitted to a scientific journal and is currently under review. EBV and RP authored the manuscript. EBV took lead in writing the first version of the manuscript. RP revised the structure of the paper and wrote Section 5.5.3 (On the special status of first person). In order to meet the requirement of the journal regarding the maximum word count, RP took lead in rewriting parts of the manuscript. BvdB and RdG commented on the final manuscript.

Chapter 6

A shorter version of the paper presented in Chapter 6 has been submitted to a scientific journal and is currently under review. EBV and RdG authored the manuscript. EBV conceived and designed the experiment. RdG and BvdB provided critical feedback on the design of the tests, teaching materials, coding manual, and scoring instruments. EBV organized information sessions with participants and teachers. EBV carried out the tests, archived the tests, and analyzed the responses. She devised the Excel scoring sheets and performed the statistical calculations. BvdB supervised the scoring process. EBV wrote the first version of the manuscript. RdG provided critical feedback on the structure, hypotheses, and research questions. RdG, BvdB and RP commented on the final manuscript.

Summary

Learning to use space: A study into the SL2 acquisition process of adult learners of Sign Language of the Netherlands

This dissertation reports on a study on the acquisition of Sign Language of the Netherlands (Nederlandse Gebarentaal, NGT) as a second or additional language in adult learners of NGT with a spoken language background. These learners are bimodal language learners: they acquire a new language in a new modality, the visual-spatial modality, which differs from the oral-auditory modality they are familiar with. Thus, they face the challenge of switching modalities on top of the common challenges that come with acquiring any second language. One of the modality-specific linguistic features that are attested in signed languages, but not in spoken languages, is the use of space to express grammatical and topographical relations. Little is known about how L2 learners of a sign language (henceforth: SL2-learners) acquire the modality-specific linguistic devices related to the use of space, and how these devices should be taught. This thesis contributes to filling this gap by improving our understanding of the SL2 acquisition process of these spatial devices, and by investigating whether specific L2 pedagogical practices, proven to be effective in the L2 acquisition of spoken languages, would facilitate the SL2 acquisition of one of these modality-specific devices, namely agreement verbs.

This dissertation is composed of seven chapters. **Chapter 1** briefly introduces the aims and the outline of the study, followed by a review of the literature on the relevant areas of research in **Chapter 2.** This chapter is subdivided into five parts. **Part 1** introduces the research fields that inform the area of SL2-pedagogy: sign language linguistics, second language acquisition, language pedagogy, and gesture studies. **Part 2** provides information on the Dutch deaf community and the socio-historical background of this linguistic minority, and briefly introduces the history and current legal status of NGT. Despite the positive achievements with respect to social recognition of NGT since the 1980s, there are concerns about the future of the language, given the rapid decline in the number of L1-users and disrupted transmission patterns. It is argued that an influx of SL2-signers can contribute to the maintenance of NGT. **Part 3** deals with the emerging field

of sign language pedagogy, and sociolinguistic and linguistic issues that arise when learners with a spoken language background acquire a sign language. Subsequently, **Part 4** reviews the literature on the linguistic domain under investigation, the *use of space*. Signs can be arranged in space such that the signer, by manipulating the location or the directional movement of the sign, can signal syntactic relations, spatial layouts, or a combination of both. Moreover, space can be used to structure and organize information at discourse level. In order to achieve these functions, signers need to associate referents with locations in space, which are called loci. The process of establishing loci in signing space is called localization. There are several *spatial devices* to localize an entity: pointing signs, spatially modifiable verbs, and signs marked for location. The choice of device depends, to a certain extent, on the information one wishes to convey. A signer can choose to represent information using two types of *representations*, namely a spatial representation and an abstract representation. When a spatial representation is used, the loci in signing space correspond to the actual locations of entities in the physical world. The signer can, for example, denote how two entities are related to each other from the vantage point of an observer (observer perspective or diagrammatic space), or how entities are seen by a character from within the narrative (character perspective or viewer space). An abstract representation, in contrast, does not convey the real-world locations of entities. Instead, loci are chosen arbitrarily, although the choice of loci can be motivated by semantic-pragmatic or discourse-organizational considerations. The type of information and chosen perspective influence the choice of spatial devices. Learners have to learn when to choose which representation, and which spatial devices are appropriate. Another aspect SL2-learners have to familiarize themselves with is the mental rotation that has to be performed when interpreting a spatial description signed by an interlocutor, and the mental rotations that have to be performed in order to depict a scene from the vantage point of different characters. These rotations add an extra layer of complexity, which might be challenging to learners. Part 4 concludes with a review of existing literature on gesture-sign parallels, the L1 acquisition of the various spatial devices, and the development of these devices in emerging sign languages. Finally, **Part 5** introduces the four studies that have resulted in this dissertation, which are presented in Chapters 3 to 6. These studies were carried out in the context of a Higher Education Institute , that is, the four-year bachelor programs 'Interpreter NGT' and 'Teacher NGT' and the two-year associate degree 'Speech-to-text captionist', all offered by the Institute for Sign, Language & Deaf studies (ISLDS), hosted by Hogeschool Utrecht, University of Applied Sciences. SL2-participants in all four studies, of which the majority had no previous knowledge of NGT, were recruited from the student population of these programs.

In **Chapter 3** we report on the first study, a longitudinal study, in which we analyzed (semi-)natural NGT production data of two learners, who were followed over the course of four years. Data comprise interviews that were coded for the occurrence of spatial devices to localize entities, and subsequent use of these loci for reference. These spatial devices were grouped into pointing signs, spatial verbs, agreement verbs, classifier predicates, and spatially modified signs from the nominal domain, such as nouns and adjectives. Data were analyzed quantitatively and qualitatively. Both learners started to use spatial devices at an early stage, but notably, one of the learners, when depicting how objects are handled, used spatially modified verbs from a character perspective that resembled gestural productions observed in non-signers. Presumably, the learner had used her gestural repertoire to bootstrap acquisition. Spatially modified verbs denoting abstract transfer, such as ASK or VISIT, were modified much later, after one year of instruction. Both learners used pointing signs at an early stage, but only to establish a locus for a referent. That is, loci were not re-used for reference. Occasionally, instances of stacking (that is, using the same locus to localize several entities) were observed. Classifier predicates appeared relatively late in the data, and one of the participants produced erroneous forms of this device until year 4. A last finding worth mentioning is the misuse of pointing signs and agreement verbs in constructed action sequences.

The observation that classifier predicates and agreement verbs posed challenges to the learners in the first study, prompted us to conduct a follow-up study into these spatial devices in a larger group of learners, with an increased sample frequency, using an elicitation task. To this end, a series of six tests was constructed, each consisting of 30 prompts and five distractors. Odd-numbered tests 1, 3 and 5 included 22 prompts to elicit classifier predicates, seven prompts to elicit agreement verbs, and one prompt to elicit both, while even-numbered tests 2, 4 and 6 included 13 prompts to evoke classifier predicates, 15 prompts targeting agreement verbs, and two prompts aimed to elicit both structures. Fourteen learners of ISLDS cohort 2016-2017 were recruited to participate in this two-year study. In year 1, 12 sessions were recorded (two cycles of six tests), followed by three sessions in year 2. The results of this project are presented in Chapters 4 and 5.

Chapter 4 reports on the acquisition of classifier predicates in this study (termed ‘study 2’). The prompts consisted of images and short video clips featuring different combinations of objects from the following categories: upright humans (standing or moving), sitting humans, vehicles (cars, trucks and bicycles; standing or moving) and animals (standing). Learners were asked to provide an NGT description of scenes shown in the prompts. The responses were coded for the occurrence of classifier predicates for one or both objects, for the (simultaneous or sequential) production of two-handed constructions, and/or for the use of alternative spatial devices, such as pointing signs or signed prepositions such as ON or BEHIND. In addition to quantitative analyses, qualitative analyses were conducted to identify typical learner behaviors (i.e., characteristics of the SL2-interlanguages). Analyses revealed that the learners in this study, in contrast to the two learners in the free production study (Chapter 3), showed evidence of acquisition at early stages, although these productions were error-prone and inconsistent. After approximately twenty weeks, we observed a sharp increase in target-like productions, and at the end of the first year, most participants produced two-handed classifier constructions in the majority of their responses. We noted that some categories of classifiers (namely, classifiers to denote a bike and a car) appeared earlier in the data than others did. Learner-errors included violations regarding intrinsic features of parts of the hand (i.e., confusing bottom and top), confusion regarding the orientation of the classifiers for car () and bicycle (), use of wrong or non-existing handshapes, selection of a handshape referencing another class of referents, failure to specify referents, failure to select the appropriate -allophone in certain contexts (resulting in awkward bending of the arms), failure to express Figure and Ground simultaneously, and planning difficulties (e.g., literally running out of space). Learners used alternative strategies such as pointing signs, prepositions, and signs marked for location instead of, or in conjunction with, classifier predicates. We observed many instances of redundancy, that is, use of classifier predicates *and* one or more alternative devices. Furthermore, we identified errors of overgeneralization in the alternative devices that were employed, such as attempts to localize body-anchored signs (such as NGT signs MAN or WOMAN) in the signing space and attempts to indicate the movement of an entity or the orientation of an entity by modifying plain verbs (such as PEDAL-BICYCLE or STAND).

The findings of the third study, regarding the production of modified agreement verbs in this group of 14 learners, are reported in **Chapter 5**. The results of this study corroborate the findings from the free production study (Chapter 3), regarding the (relatively) late onset of verb modification. After a year of instruction, approximately 50% of the responses in study 3 contained unmodified verb forms. Again, we observed that agreement verbs that denote concrete transfer and have a gestural counterpart, such as GIVE or TAKE-AWAY, were modified earlier than agreement verbs that denote abstract transfer, such as HELP or ASK. We found learners to employ alternative strategies to denote 'who is doing what to whom', such as word order and successive 1-argument structures ("I give, you receive"). Learners did not use agreement carriers like the agreement auxiliary ACT-ON or serial verb constructions during the first year of the program. An interesting finding concerns the overuse of abstract space ('observer perspective') at the expense of presenting a scene (and consequently, modifying the verb) from a character perspective. Lastly, we noted some attempts to spatially modify plain verbs.

The evidence produced in studies 1 and 3 regarding the relative late onset of target-like use of agreement verbs prompted us to conduct an experiment in the successive cohort of learners (ISLDS cohort 2017-2018) to investigate whether learners would benefit from pedagogical interventions aimed at focusing their attention on the form-meaning mappings of agreement verb forms. Although modified agreement verbs were abundantly present in the teacher input and learning materials that the learners in studies 1 and 3 received, the NGT curriculum did not include explicit rule explanation on the NGT agreement verb paradigm during the first year. Research on unimodal spoken language L2 acquisition has shown that pedagogical practices aimed at attracting or directing the learners' attention to a linguistic structure (focus on form practices or form-focused instruction (FFI)) are beneficial, and that in general, explicit FFI-practices are more beneficial than implicit FFI-practices. We do not know, however, whether these findings also apply the *bimodal* learning process. To learn more about the potential effects of FFI-practices on SL2-learning, we designed an experiment, which is described in **Chapter 6.** The experiment was conducted in four classes of students enrolled in the ISLDS bachelor programs, and was integrated into an existing first-year NGT course. A series of tasks was designed for three conditions: an explicit condition (condition A), an implicit condition (B), and a control condition (C). The learners in explicit condition A received an ‘input flood’ featuring modified NGT agreement verb forms (n = 300), combined with explicit rule explanation and corrective feedback. The learners in implicit condition B received the same flooded input, but without the rule explanation or corrective feedback. Control group C received non-flooded input and tasks, containing general NGT-utterances. To measure the impact of the instructional interventions on the acquisition of the paradigm, the study followed a design involving a pre-test, mid-test, post-test, and delayed post-test. The pre-test and post-test scores show that the learners in both experimental groups benefited from the intervention, that is, both groups showed considerable gains in test scores as compared to the control group. As such, the study provides evidence for the effectiveness of FFI-instruction in general. However, the study does not provide evidence on the supremacy of explicit grammatical instruction: there was no significant difference in post-test scores of the learners who received the explicit intervention and the learners who received the implicit intervention. In Chapter 7, we present possible explanations for this unexpected result; we hypothesize, for instance, that the restricted use of fully modified double agreement verb forms in the flooded materials may have made the paradigm highly salient, and thus easy to abstract from the input even without extra rule explanation.

Finally, the findings presented in Chapters 3–6 are summarized and discussed in **Chapter 7**. The major conclusions that can be drawn from the analyses regarding the *acquisition of spatial devices* are:

i. Different types of devices emerge at different stages; e.g., pointing signs emerge at early stages, while agreement verbs appear later;
ii. The order of emergence of particular devices suggests that the learners use their gestural knowledge to bootstrap NGT-acquisition;

iii. Certain characteristics of the NGT SL2-interlanguages show parallels with L1-interlanguages and phases attested in emerging sign languages, described in the literature;

iv. Certain characteristics of the NGT SL2-interlanguages support findings described in the literature on the SL2 acquisition of other sign languages;

v. The erroneous use of spatial devices at advanced stages of the learning process is typically observed in constructed action contexts that exhibit multiple 'layers of complexity'.

The major conclusions that can be drawn from the study on *pedagogical interventions* are:

vi. Interventions aimed at directing or attracting the attention of SL2-learners to the form-meaning mapping of a specific spatial device (agreement verbs) prove to be beneficial to the SL2 acquisition process;

vii. For this particular spatial device, an implicit pedagogical practice, i.e., provision of input containing multiple examples of the target structure, is sufficient for developing the form-meaning mappings and is equally effective as provision of explicit instruction.

The study has both practical and theoretical implications. On the one hand, it provides valuable information to practitioners in the field; on the other hand, it adds to our understanding of the intersecting fields of sign language linguistics, second language acquisition and pedagogy, as well as the field of gesture studies.

Samenvatting in het Nederlands (summary in Dutch)

De ruimte verkennen: Een studie naar het tweedetaalverwervingsproces van volwassen leerders van NGT.

In dit proefschrift wordt verslag gedaan van een onderzoek naar het verwerven van Nederlandse Gebarentaal (NGT) als tweede taal door volwassen NGT-leerders die een gesproken taalachtergrond hebben. Deze leerders zijn bimodale taalleerders: ze verwerven een nieuwe taal in een nieuwe modaliteit, de visueel-ruimtelijke modaliteit, die verschilt van de oraal-aurale modaliteit waarmee ze bekend zijn. Zij moeten, naast de gebruikelijke uitdagingen die gepaard gaan met het leren van een tweede taal, omschakelen naar een andere modaliteit. Een van de modaliteitsspecifieke linguïstische kenmerken die wel in gebarentalen maar niet in gesproken talen te vinden zijn, is het gebruik van de ruimte om grammaticale en ruimtelijke relaties uit te drukken. Er is weinig bekend over hoe L2 leerders van een gebarentaal (hierna te noemen: SL2-leerders) de taalelementen die samenhangen met dit ruimtegebruik verwerven en hoe deze taalelementen onderwezen zouden moeten worden. Dit proefschrift heeft als doel deze kloof te dichten. Enerzijds door te onderzoeken hoe deze ruimtelijke elementen door SL2-leerders worden verworven. Anderzijds door te evalueren of bepaalde didactische benaderingen die effectief gebleken zijn voor L2 verwerving van gesproken talen, het leren van een van deze modaliteitsspecifieke elementen, directionele werkwoorden, zouden kunnen vergemakkelijken.

Dit proefschrift bestaat uit zeven hoofdstukken. Het doel van het onderzoek wordt geïntroduceerd in **Hoofdstuk 1**, gevolgd door een literatuuroverzicht in **Hoofdstuk 2** waarin achtergrondinformatie wordt gegeven over zaken die relevant zijn voor het onderzoek. Dit hoofdstuk is onderverdeeld in vijf delen. In **Deel 1** worden de onderzoeksvelden gepresenteerd waaraan kennis wordt ontleend: gebarentaalwetenschap, tweedetaalverwerving, taaldidactiek en gesticulaties. In **Deel 2** wordt informatie gegeven over de Nederlandse dovengemeenschap en de sociaal-historische achtergrond van deze linguïstische minderheid. Er wordt kort ingegaan op de geschiedenis van NGT en de huidige stand van zaken wordt geschetst. Ondanks dat er sinds de jaren tachtig veel bereikt is met betrekking tot de maatschappelijke erkenning van het NGT zijn er zorgen over de toekomst van de taal gezien de snelle afname van het aantal L1-gebaarders en het feit dat de manier waarop de taal voorheen werd doorgegeven van generatie op generatie, verstoord is geraakt. Er wordt beargumenteerd dat een instroom van SL2-gebaarders kan bijdragen aan het behoud van de NGT. **Deel 3** gaat over het ontstaan van het onderzoeksveld dat onderzoek doet naar didactiek van gebarentalen en over sociolinguïstische en taalkundige zaken die een rol kunnen spelen wanneer studenten met een gesproken taalachtergrond een gebarentaal verwerven. Vervolgens wordt in **Deel 4** de literatuur over het *gebruik van de ruimte* besproken. Het gebruik van de ruimte kan verschillende functies hebben: de gebaarder kan door de plaats of beweging van gebaren op of tussen specifieke locaties in de gebarenruimte te realiseren aangeven wat de syntactische relaties tussen referenten zijn, waar referenten zich ten opzichte van elkaar bevinden of een combinatie van beiden. Ook kan de ruimte worden gebruikt om informatie te structureren en organiseren op discourse-niveau. Om deze verschillende functies toe te passen moet de gebaarder de referenten koppelen aan een plaats in de ruimte. Deze plaats wordt een locus (meervoud loci) genoemd. Het proces van toewijzen van een referent aan een locus wordt lokalisatie genoemd. Er zijn verschillende manieren om een referent te lokaliseren: door middel van een wijsgebaar, door middel van een werkwoordgebaar of door het gebaar op een specifieke locatie te gebaren (locatief gebaar). Welk van deze *ruimtelijke elementen* (‘spatial devices’) toegepast worden hangt tot op zekere hoogte af van de informatie die de gebaarder wil overbrengen. In de literatuur worden twee soorten ruimtegebruik (*representaties* of *weergaves*) onderscheiden: een ruimtelijke weergave of een abstracte weergave. Bij een ruimtelijke weergave (‘spatial representation’) komen de loci in de gebarenruimte overeen met de werkelijke locaties van entiteiten in de fysieke wereld. De gebaarder kan bijvoorbeeld duidelijk maken hoe twee objecten ten opzichte van elkaar in de ruimte staan vanuit het gezichtspunt van iemand die de situatie vanaf een afstand waarneemt (‘waarnemersperspectief’/’observer perspective’) of vanuit het gezichtspunt van iemand die zich in de situatie bevindt (‘karakterperspectief’/’character perspective’). In een abstracte weergave (‘abstract representation’) daarentegen zegt de keuze van de loci niets over de locaties van entiteiten in de fysieke wereld. De gekozen loci zijn willekeurig (arbitrair), hoewel semantisch-pragmatische of discourse-organisatorische overwegingen wel van invloed kunnen zijn. Het type informatie en het gekozen perspectief zijn van invloed op welke ruimtelijke elementen (classifiers, werkwoordsgebaren, wijsgebaren, etc.) toegepast worden. Leerders moeten leren wanneer welke weergave passend is om bepaalde informatie uit te drukken, en welke ruimtelijke elementen daarvoor geschikt zijn. Een ander aspect waar SL2-leerders bekend mee moeten raken is de mentale rotatie die moet worden uitgevoerd bij het interpreteren van een ruimtelijke beschrijving die door de gesprekspartner gebaard wordt en de mentale rotaties die moeten worden uitgevoerd om een situatie te gebaren vanuit het gezichtspunt van verschillende karakters. Deze rotaties voegen een extra laag van complexiteit toe, wat een uitdaging kan vormen voor de leerder. Deel 4 wordt afgesloten met een overzicht van de bestaande literatuur over gebaar-gesticulatie overeenkomsten, de L1 verwerving van de verschillende ruimtelijke elementen en de ontwikkeling van deze elementen in gebarentalen die aan het ontstaan zijn (‘emerging sign languages’). In **Deel 5** tenslotte worden de vier onderzoeken geïntroduceerd die tot dit proefschrift hebben geleid. Deze onderzoeken, die beschreven worden in hoofdstukken 3 tot en met 6, zijn uitgevoerd binnen de vierjarige bacheloropleidingen ‘Tolk NGT’ en ‘Docent NGT’, en de tweejarige associate degree ‘Schrijftolk’, onderdeel van het Instituut voor Gebaren, Taal & Dovenstudies (IGTD) / Hogeschool Utrecht. De SL2-leerders die hebben deelgenomen aan de vier onderzoeken, van wie het merendeel geen NGT beheerste bij aanvang van de opleiding, studeerden aan deze opleidingen.

In **Hoofdstuk 3** doen we verslag van het eerste, longitudinale, onderzoek, waarin we de (semi-) natuurlijke NGT productiedata hebben geanalyseerd van twee leerders die gedurende vier jaar met regelmaat zijn gefilmd terwijl zij werden geïnterviewd. De opnames werden gecodeerd voor gebruik van ruimtelijke elementen om entiteiten te lokaliseren en het gebruik van deze loci om terug te verwijzen. Hierbij werd een onderscheid gemaakt tussen wijsgebaren, variante werkwoorden, classifierpredicaten en locatieve gebaren zoals zelfstandige naamwoorden en bijvoeglijke naamwoorden die op een specifieke locatie werden gerealiseerd. De opnames werden kwantitatief en kwalitatief geanalyseerd. Beide deelnemers pasten al in een vroeg stadium ruimtelijke elementen toe, waarbij het opvallend is dat een van hen voornamelijk variante werkwoorden gebruikte om aan te geven hoe objecten vastgehouden of gemanipuleerd worden vanuit de rol van een karakter. Deze gebaren leken sterk op de gesticulaties die mensen gebruiken die geen gebaren kennen ('niet-gebaarders' of 'gebaar-naïeve gesticuleerders'). Het is in te denken dat het feit dat de leerder al een 'repertoire' van gesticulaties tot haar beschikking had haar geholpen heeft om deze specifieke iconische gebaren te verwerven. Variante werkwoorden die veel abstracter (dus minder iconisch) van aard zijn, zoals VRAGEN of BEZOEKEN, werden pas veel later, na een jaar instructie, vervoegd. Beide deelnemers gebruikten ook al in een vroeg stadium wijsgebaren, maar alleen om entiteiten te lokaliseren. De loci werden vervolgens niet gebruikt om naar terug te verwijzen. Zo nu en dan localiseerden de deelnemers verschillende entiteiten op een en dezelfde plek ('stacking'). Classifierpredicaten verschenen relatief laat en een van de deelnemers maakte hierin fouten tot en met jaar 4. Het was ook opmerkelijk dat de deelnemers soms moeite hadden om wijsgebaren en directionele werkwoorden correct toe te passen bij het rolnemen (constructed action).

Naar aanleiding van de observatie dat classifierpredicaten en directionele werkwoorden een uitdaging vormden voor de deelnemers aan de eerste studie, hebben we een vervolgstudie uitgevoerd naar het verwerven van deze ruimtelijke elementen. Hieraan deed een grotere groep leerders mee, werd er met een grotere frequentie gefilmd en werden de elementen gericht uitgelokt door middel van een elicitatietaak. Hiertoe hebben we een serie van zes testen ontworpen, waarbij elke test 30 testitems en 5 afleiders bevatte. De oneven testen 1, 3 en 5 bevatten 22 testitems om classifierpredicaten uit te lokken, zeven items voor directionele werkwoorden en één item voor beiden. Bij de even testen 2, 4 en 6 waren er 13 items om classifierpredicaten uit te lokken, 15 items voor directionele werkwoorden en twee items voor beiden. Veertien studenten van IGTD-cohort 2016-2017 werden geworven om deel te nemen aan dit tweejarige onderzoek. In jaar 1 werden 12 sessies opgenomen (twee cycli van zes testen), gevolgd door drie sessies in jaar 2. De resultaten van dit project worden gepresenteerd in de hoofdstukken 4 en 5.

In **Hoofdstuk 4** wordt verslag uitgebracht van het onderzoek naar de verwerving van classificatiepredicaten ('studie 2'). Door middel van foto's, tekeningen en korte videoclips waarop verschillende combinaties van objecten stonden, werden classifierpredicaten uitgelokt. Op de beelden waren combinaties van objecten uit de volgende categorieën te zien: rechtopstaande mensen (stilstaand of bewegend), zittende mensen, voertuigen (auto's, vrachtwagens en fietsen; stilstaand of bewegend) en dieren (stilstaand). De deelnemers werd gevraagd om in NGT te beschrijven wat zij zagen op het scherm. De reacties van de deelnemers werden geanalyseerd en gecodeerd voor het toepassen van classifierpredicaten voor één of beide objecten, voor de (simultane of sequentiële) productie van tweehandige classifierconstructies, en/of voor het gebruik van alternatieve ruimtelijke elementen, zoals wijsgebaren of voorzetselgebaren (bijvoorbeeld OP of ACHTER). Naast kwantitatieve analyses werden ook kwalitatieve analyses uitgevoerd om een beeld te krijgen van typische ‘leerdersgedragingen’ (ofwel, karakteristieken van de SL2-tussentalen). De analyses tonen aan dat de leerders in dit onderzoek, in tegenstelling tot de twee leerders in de ‘vrije productiestudie’ (hoofdstuk 3), al in een vroeg stadium in staat waren om classifierpredicaten toe te passen, hoewel deze producties nog veel fouten bevatten en classifiers niet consistent werden toegepast. Na ongeveer twintig weken was een sterke toename van classifierpredicaten te zien en aan het einde van het eerste jaar produceerden de meeste deelnemers in het merendeel van de uitingen tweehandige classifierconstructies. Sommige categorieën classifiers (namelijk classifiers om een fiets of een auto mee aan te duiden) werden eerder toegepast dan anderen. Veel voorkomende fouten waren het schenden van de conventies met betrekking tot onder/boven en voor/achter, verwarren van de classifiers om een auto () en een fiets () mee aan te duiden, gebruik van verkeerde of niet bestaande classifierhandvormen, het selecteren van een classifierhandvorm die gebruikt wordt voor een andere klasse van objecten, het niet specificeren van de referent, het gebruik van een /-classifier in plaats van de allofoon  in bepaalde contexten (wat resulteert in het onhandig buigen van de armen), het sequentieel toepassen van het Figure-object en het Ground-object, en het verkeerd inschatten van de ruimte die nodig is. Deelnemers pasten ook alternatieve strategieën toe in plaats van of in combinatie met classifiers, zoals wijsgebaren, voorzetselgebaren en locatieve gebaren. Hierbij was vaak sprake van redundantie, dat wil zeggen, het dubbelop gebruiken van classifierpredicaten en een of meerdere alternatieve strategieën. We merkten een aantal gevallen op van overgeneralisatie bij het gebruik van deze ruimtelijke elementen, zoals pogingen om lichaamsgebonden gebaren (zoals MAN of VROUW) in de ruimte te plaatsen, of pogingen om de beweging of de oriëntatie van een entiteit aan te geven door de locatie of beweging van invariante werkwoorden (zoals FIETSEN of STAAN) te veranderen.

De bevindingen van het derde onderzoek naar de productie van directionele werkwoorden door deze groep van 14 leerders worden in **Hoofdstuk 5** gerapporteerd. De resultaten van dit onderzoek bevestigen wat we vonden in de vrije productiestudie (hoofdstuk 3), namelijk dat directionele werkwoorden (relatief) laat worden vervoegd. Na een jaar instructie bevatte nog ongeveer 50% van de uitgelokte NGT-zinnen een onvervoegd directioneel werkwoord. Ook hier vonden we dat werkwoordsgebaren met een 'gesticulatief neefje of nichtje', zoals GEVEN of AFPAKKEN, eerder werden vervoegd dan werkwoordsgebaren die meer abstract van aard zijn, zoals HELPEN of VRAGEN. Om – in het geval van het toepassen van een onvervoegd werkwoord – toch aan te kunnen geven 'wie wat deed tegen wie', pasten de deelnemers alternatieve strategieën toe, zoals woordvolgorde, of 'opeenvolgende 1-argument structuren' ("Ik geef, jij ontvangt"). De deelnemers produceerden tijdens het eerste jaar van de opleiding geen congruentiedragers, zoals hulpwerkwoord OP of seriële werkwoorden. Tijdens dit onderzoek zagen we soms voorbeelden van overgebruik van de abstracte ruimte ('waarnemersperspectief'), ten koste van het gebaren van een situatie (en dus het vervoegen van het werkwoord) vanuit een het perspectief van een karakter (rolnemen). We noteerden ook een aantal voorbeelden van overgeneralisatie, waarbij leerders een invariant werkwoord probeerden te vervoegen.

Het bewijs dat in studies 1 en 3 werd geleverd met betrekking tot de relatief late verwerving van directionele werkwoorden vormde de aanleiding om een experiment uit te voeren in het opvolgende cohort studenten (IGTD-cohort 2017-2018), met als doel te onderzoeken of SL2-leerders profijt hebben van didactische interventies die erop gericht zijn hun aandacht te richten op de vorm-betekenisrelatie van vervoegde directionele werkwoorden. De deelnemers in voorgaande studies 1 en 3 hadden weliswaar een overvloed aan vervoegde werkwoordsvormen aangeboden gekregen – in het taalaanbod van de docenten en in het studiemateriaal – maar het NGT-curriculum bevatte in jaar 1 geen expliciete uitleg over het paradigma van directionele werkwoorden. Onderzoek naar unimodale L2 verwerving van gesproken talen heeft aangetoond dat didactische werkvormen die erop gericht zijn om de aandacht van taalverwervers op de linguïstische structuur te vestigen ('focus on form' of 'form-focused instruction' (FFI)) het leerproces kunnen bevorderen, en dat expliciete FFI-werkvormen in het algemeen effectiever zijn dan impliciete FFI-werkvormen. We weten echter niet of deze effecten ook gegeneraliseerd kunnen worden naar een situatie waarin sprake is van *bimodale* taalverwerving.

Om meer te weten te komen over de mogelijke effecten van FFI-werkvormen op het SL2 taalverwervingsproces hebben we een experiment uitgevoerd, dat in **Hoofdstuk 6** wordt beschreven. Het experiment vond plaats in vier eerstejaars klassen binnen de IGTD bacheloropleidingen en werd geïntegreerd in een bestaande NGT-module. Er werd een reeks oefeningen ontworpen voor drie condities: een expliciete conditie (A), een impliciete conditie (B) en een controle conditie (C). De leerders in de expliciete conditie A deden oefeningen waarbij ze een groot aantal (n = 300), vervoegde werkwoordsvormen aangeboden kregen (een 'input-vloed') gecombineerd met expliciete uitleg over de regels en taalgerichte feedback met betrekking tot directionele werkwoorden. De leerders in de impliciete conditie B kregen dezelfde filmpjes te zien (de 'input-vloed'). Dit werd echter niet gecombineerd met uitleg over de regels of feedback gericht op directionele werkwoorden. Controlegroep C kreeg oefeningen aangeboden met andere NGT-structuren en kreeg dus noch een input-vloed, noch uitleg over regels of feedback gericht op directionele werkwoorden. Om de effectiviteit van de interventies te meten deden de leerders een pre-test, een mid-test, een post-test en een uitgestelde post-test. Vergelijking van de scores op de pre-test en de post-testen toont aan dat de leerders in beide experimentele groepen voordeel hebben gehad van de interventie, dat wil zeggen dat beide groepen bij de na-testen aanzienlijke hogere scores haalden dan de controlegroep. Het onderzoek levert dus bewijs voor de effectiviteit van een FFI-interventie. Het onderzoek levert echter geen bewijs voor de superioriteit van expliciete grammaticale instructie: er was geen significant verschil in post-testscores tussen de taalverwervers in de expliciete interventie-groep en de taalverwervers in de impliciete interventie-groep. In **Hoofdstuk 7** presenteren we mogelijke verklaringen voor dit onverwachte resultaat. We veronderstellen bijvoorbeeld dat de keuze om (i) de werkwoorden in de 'input-vloed' te beperken tot werkwoorden uit de groep 'double agreement verbs' (de groep werkwoorden die vervoegd kunnen worden voor zowel het subject-argument als het object-argument), en (ii) deze werkwoorden alleen in volledig vervoegde vorm ('fully modified') aan te bieden, ervoor gezorgd heeft dat de vorm-betekenisrelatie in het oog sprong. Het kan zijn dat dit ervoor gezorgd heeft dat de input-vloed hierdoor voldoende was om de vorm-betekenisrelatie te doorgronden, zonder dat extra uitleg nodig was.

Tenslotte worden de bevindingen uit hoofdstukken 3–6 samengevat en bediscussieerd in **Hoofdstuk 7**. De belangrijkste conclusies die getrokken kunnen worden met betrekking tot de *verwerving van ruimtelijke elementen* zijn:

i. Verschillende categorieën ruimtelijke elementen worden in verschillende stadia verworven: wijsgebaren worden bijvoorbeeld eerder verworven van directionele werkwoorden;
ii. De volgorde waarin bepaalde elementen verworven worden suggereert dat leerders hun repertoire van gesticulaties gebruiken om de verwerving van NGT 'op te starten';
iii. Bepaalde kenmerken van de NGT SL2-tussentalen komen overeen met in de literatuur beschreven kenmerken van L1-tussentalen en met ontwikkelingsfasen beschreven voor gebarentalen in ontwikkeling;
iv. Bepaalde kenmerken van de NGT SL2-tussentalen komen overeen met in de literatuur beschreven kenmerken van SL2 verwerving van andere gebarentalen;
v. Bij gevorderde leerders worden fouten met betrekking tot het gebruik van ruimtelijke elementen met name waargenomen in contexten waarin rol wordt genomen, waarbij er sprake is van meerdere 'lagen van complexiteit'.

De voornaamste conclusies die getrokken kunnen worden uit het onderzoek naar *didactische interventies* zijn:

vi. Interventies die erop gericht zijn om de aandacht van de SL2-leerders op de vorm-betekenisrelatie van een specifiek ruimtelijk element (directionele werkwoorden) te vestigen blijken het SL2 verwervingsproces te bevorderen;
vii. Voor dit specifieke ruimtelijke element is de impliciete didactische werkvorm, dat wil zeggen het aanbieden van taal waarin de beoogde

structuur veelvuldig gebruikt wordt, voldoende om de vorm-betekenis relatie te verwerven. Dit is net zo effectief als een expliciete benadering.

Het onderzoek heeft zowel praktische als theoretische implicaties Enerzijds biedt het handvatten voor de praktijk, anderzijds voegt het nieuwe kennis toe aan de kennisbasis van de onderzoeksvelden gebarentaalwetenschap, tweedetaalverwerving en taaldidactiek en het onderzoeksveld dat zich richt op gesticulaties.

Samenvatting in NGT (summary in NGT)

De samenvatting in NGT is te vinden op /*the summary in NGT can be found at*:
https://thesiseveline boers.blogspot.com

Curriculum vitae

Eveline Boers-Visker was born in Rotterdam on November 10, 1977. She is married and has two children. After completing her secondary education (VWO), she started studying Communication Sciences at the Catholic University Nijmegen (currently Radboud University) in 1996. After receiving the propedeuse diploma, she enrolled in the newly established bachelor program Interpreter/Teacher Nederlandse Gebarentaal at Utrecht University of Applied Sciences (UUAS; Hogeschool Utrecht) in 1997. She was one of the students who formed the first ‘pilot group’. In 2001 she graduated as Teacher NGT. She had started to teach NGT at UUAS a year earlier, and continues to teach at UUAS until the present. She taught NGT to prospective interpreters and teachers, parents and family members of deaf children, refugees, and teachers of the deaf. In 2005 she obtained her degree as Interpreter NGT at UUAS as well. In 2008 she graduated cum laude for her master degree ‘Teacher NGT’. Around the same time, she joined the Deaf Studies Research Group, led by Prof. Dr. Beppie van den Bogaerde, as a junior researcher. Eveline’s fields of interest combine practical and theoretical aspects: she enjoys teaching sign language, and she is interested in the second language acquisition of sign languages. In 2016 UUAS awarded her a research grant to start a doctorate study on teaching and learning NGT as a second language. Her dissertation is the first longitudinal study on the acquisition of NGT in adult learners.

Appendices

Appendices to Chapter 2

Appendix 2A: Schematic representation of spatial devices combined with types of gestures

Figure A.2A.1 below combines the schematic representation of spatial devices (Figure 2.10, Section 2.4.3.1) with types of gestures used by non-signers (Table 2.2, Section 2.4.6).

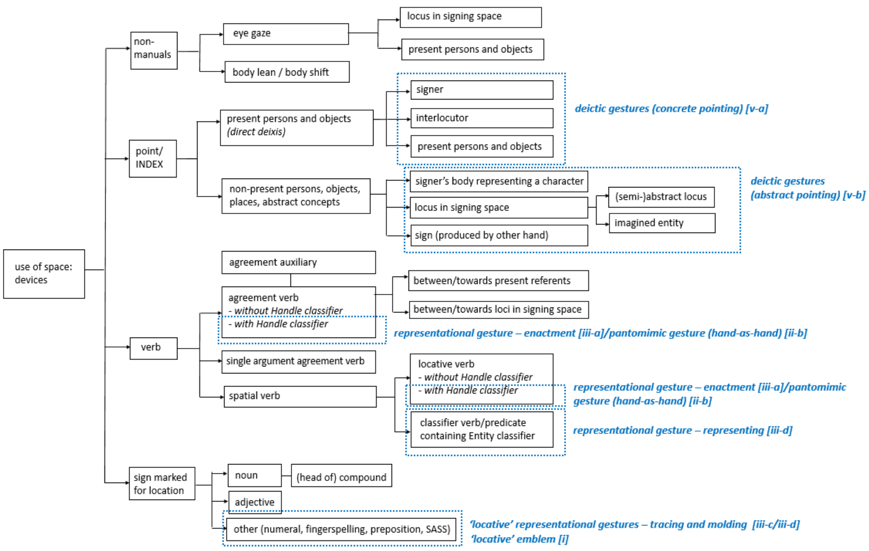


Figure A.2A.1. Different types of manual gestures mapped onto schematic representation of spatial devices.

Appendices to Chapter 3

Appendix 3A: Decision scheme regarding inclusion/exclusion of utterances [study 1]

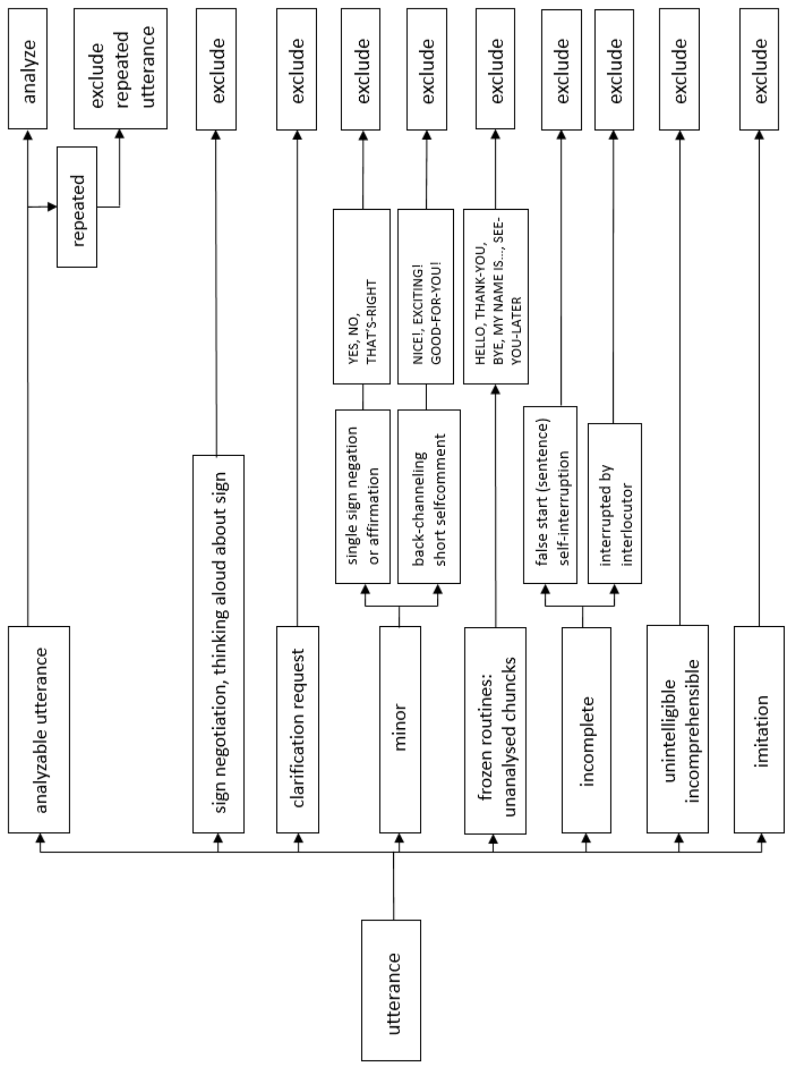


Figure A.3A.1. Decision scheme inclusion/exclusion of utterances.

Appendix 3B: Overview interviews [study 1]

Table A.3B.1. Overview interviews Anna.

Session	Interviewer	Total duration of sample (minutes)	Number of participant utterances (total)	Number of analyzable utterances	Percentage analyzable utterances	Duration analyzable utterances (minutes)	Number of signs in analyzable utterances
303–1B	INT1 (D-L1)	6.35	89	43	48%	3.07	223
303–1C	INT2 (H-L2)	7.47	95	44	46%	4.15	359
303–1D	INT2 (H-L2)	7.05	64	35	55%	3.7	326
303–2A	INT3 (H-L2)	6.18	73	41	56%	3.8	295
303–2B	INT1 (D-L1)	9.69	87	53	61%	3.17	304
303–2C	INT1 (D-L1)	11.15	106	57	54%	5.45	505
303–3B	INT1 (D-L1)	13.39	144	75	52%	7.85	781
303–3C	INT2 (H-L2)	7.32	83	47	57%	5.07	498
303–3D	INT2 (H-L2)	10.49	131	89	68%	6.68	681
303–4A	INT2 (H-L2)	6.34	75	53	71%	4.4	498
303–4B	INT1 (D-L1)	8.44	92	57	62%	5.02	458
303–4C	INT4 (H-L1)	10.1	103	86	83%	7.12	739
303–4D	INT5 (D-L2)	7.11	61	44	72%	4.4	434

Table A.3B.2. Overview interviews Charlotte.

Session	Interviewer	Total duration of sample (minutes)	Number of participant utterances (total)	Number of analyzable utterances	Percentage analyzable utterances	Duration analyzable utterances (minutes)	Number of signs in analyzable utterances
307–1B	INT1 (D-L1)	5.06	58	23	40%	2.22	143
307–1C	INT2 (H-L2)	5.05	64	23	36%	2.3	165
307–1D	INT2 (H-L2)	6.04	41	23	56%	3.8	292
307–2A	INT2 (H-L2)	9.58	99	44	44%	5.02	415
307–2B	INT1 (D-L1)	7.4	89	37	41%	3.45	317
307–2C	INT1 (D-L1)	7.26	80	35	44%	4.07	365
307–2D	INT6 (H-L2)	6.4	58	41	71%	4.83	342
307–3B	INT1 (D-L1)	9.43	86	53	62%	6.03	468
307–3C	INT1 (D-L1)	7.2	85	40	59%	4.87	440
307–3D	INT2 (H-L2)	7.29	89	53	60%	4.52	439
307–4A	INT7 (D-L1)	10.02	72	53	74%	6.95	606
307–4B	INT8 (D-L1)	11.06	68	57	84%	7.93	778

Table A.3B.3. Overview interviews L1-participants

Signer	Interviewer	Total duration of sample (minutes)	Number of subject utterances (total)	Number of analyzable utterances	Percentage of analyzable utterances	Duration of analyzable utterances (minutes)	Number of signs in analyzable utterances
Nina	INT9 (D-L1)	7.76	42	27	65%	6.25	572
Peter	INT9 (D-L1)	6.02	45	25	56%	4.56	624
Tess	INT10 (H-L2)	8.11	45	29	64%	6.47	800

Note: Interviewers 1, 7, 8, and 9 are deaf L1-signers (D-L1), interviewer 4 is a hearing L1-signer (H-L1), interviewer 5 is a deaf L2-signer (D-L2), and interviewers 2, 3, 6, and 10 are hearing L2-signers (H-L2).

Appendix 3C: Overview of NGT curriculum offered by ISLDS

Figure A.3C.1 shows an overview of the NGT curriculum offered by ISLDS in the interpreter program. The NGT curriculum focuses on communicative competences and has adopted an immersion philosophy, using NGT as instruction language.

	Course offered	**Recording study 1**	**Study load (all hours)**	**In-class hours (full-time students)**	**Weeks of NGT instruction**
Year 1	A	1A	280	68	8
	B	1B	140	34	8
	C	1C	280	68	7
	D	1D	140	34	8
Year 2	E	2A	140	34	8
	F	2B	140	34	8
	G	2C	280	68	7
	H	2D	140	34	8
Year 3	minor fulfillment, sign classes optional	3A			
		3B			
	I	3C	280	68	15
		3D			
Year 4	J	4A	280	68	8
	no NGT-classes offered	4B			
		4C			
		4D			

Figure A.3C.1. Overview NGT curriculum ISLDS.

Appendix 3D: Example study 1: investigating signs and gestures

Figure A.3D.1. Examples of learner production and gestures produced by non-signers.

Appendices to Chapter 4

Appendix 4A/5B: Overview of distribution of tests [study 2 and 3]

Year 1 (2016-2017)

Semester 1		
week	**test**	**course**
36	0 [T0]	Course NGT-A 10 EC Study load: 280 hours (68 in-class hours plus self-study hours)
37		
38	1 [T1a]	
39		
40	2 [T2a]	
41		
42		
43	3 [T3a]	
44		
45		exams
46	4 [T4a]	Course NGT-B 5 EC Study load: 140 hours (34 in-class hours plus self-study hours)
47		
48		
49	5 [T5a]	
50		
51	6 [T6a]	
52		
1		
2		
3	7 [T1b]	
4		exams
5		exams

Semester 2		
week	**test**	**course**
6	8 [T2b]	Course NGT-C 10 EC Study load: 280 hours (68 in-class hours plus self-study hours)
7		
8		
9		
10	9 [T3b]	
11		
12		
13	10 [T4b]	
14		exams
15		exams
16		Course NGT-D 5 EC Study load: 140 hours (34 in-class hours plus self-study hours)
17		
18	11 [T5b]	
19		
20		
21		
22	12 [T6b]	
23		
24		exams
25		exams
26		
27		

Figure A.4A.1. Overview ISLDS NGT curriculum and distribution tests study 2 and 3 in year 1.

Year 2 (2017-2018)

Semester 1		
week	**test**	**course**
36		Course NGT-E 5 EC Study load: 140 hours (34 in-class hours plus self-study hours)
37		
38		
39		
40		
41		
42		
43		
44		
45		exams
46	13 (T7a)	Course NGT-F 5 EC Study load: 140 hours (34 in-class hours plus self-study hours)
47		
48		
49		
50		
51		
52		
1		
2		
3		
4		exams
5		exams

Semester 2		
week	**test**	**course**
6	14 (T7b)	Course NGT-G 10 EC Study load: 280 hours (68 in-class hours plus self-study hours)
7		
8		
9		
10		
11		
12		
13		
14		exams
15		exams
16		Course NGT-H 5 EC Study load: 140 hours (34 in-class hours plus self-study hours)
17		
18		
19	15 (T7c)	
20		
21		
22		
23		
24		exams
25		exams
26		
27		

Figure A.4A.2. Overview ISLDS NGT curriculum and distribution tests study 2 and 3 in year 2.

Appendix 4B: Example of a prompt aimed at eliciting two-handed classifier constructions [Study 2]

Figure A.4B.1 shows a set of six images aimed at eliciting two-handed classifier constructions. Although the prompts varied from task to task, all photos display a person riding a bike and at least two sitting persons.

Figure A.4B.1. Example of 'prompt 14' aimed at eliciting a two-handed classifier construction featuring a classifier predicate to denote a bicyle and a classifier predicate to denote a sitting person. There are six images, appearing in a cycle of six tests (T1–T6) (Photos: Dorieke van Luit/ Eveline Boers-Visker)

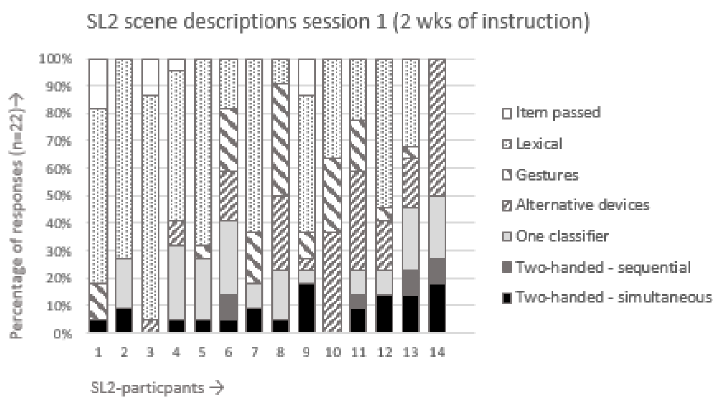
Appendix 4C: Overview of the prompts aimed at eliciting two-handed classifier constructions [study 2]

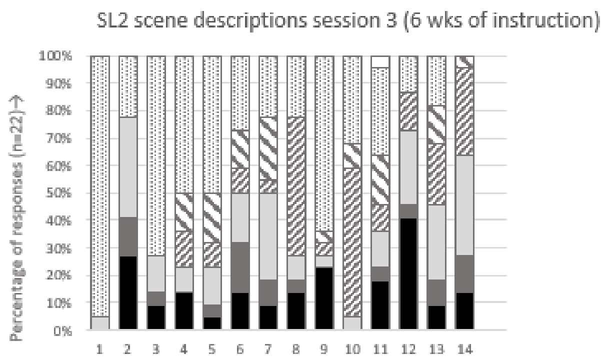
Table A.4C.1. Overview of prompts study 2, aimed at eliciting two-handed classifier constructions.

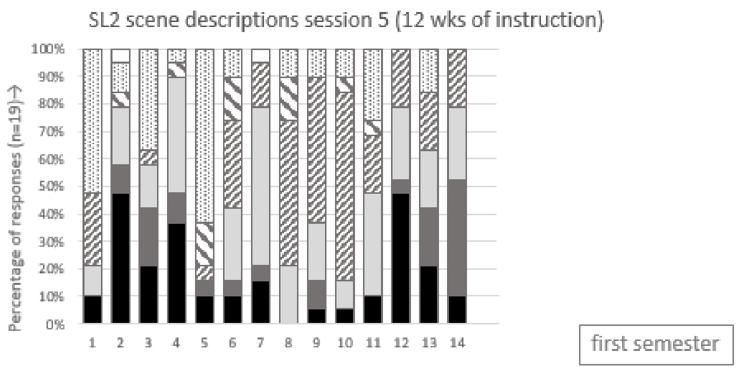
prompt	Included in tests	Objects	Movement (static/ motion)	Scene description
12	T1, T3, T5	car + car	Static	Three cars are parked, the middle car is parked with a 45% angle
17	all tests	car + car	Motion	Car collides with second car [clip]
1	T1, T3, T5	person + person	Static	Two persons facing each other
2	all tests	person + person	Static	Two persons facing different directions
10	all tests	car + truck	Static	A car and a truck oriented in different directions
13	all tests	car + bicycle	Motion	A car and a bicycle approaching each other in a 45–90 degree angle
18	all tests	car + bicycle	Motion	A car and a bicycle driving next to each other (parallel)
9	T1, T3, T5	car + person	Static	A person standing next to a parked car
15	all tests	car + person	Motion	A person crossing the street while a car is waiting
8	T1, T3, T5	truck + persons	Static	Three or four persons standing around truck to clean truck
45	T1, T3, T5	truck + person	Static	A person standing next to a parked truck
19	all tests	bicycle + person	Motion	A person running next to a child on a bicycle
20	T1, T3, T5	truck + person	Motion	A person pulling/pushing a truck, truck moves as a result [clip]
3	all tests	two sitting persons	Static	Two persons sit next to each other

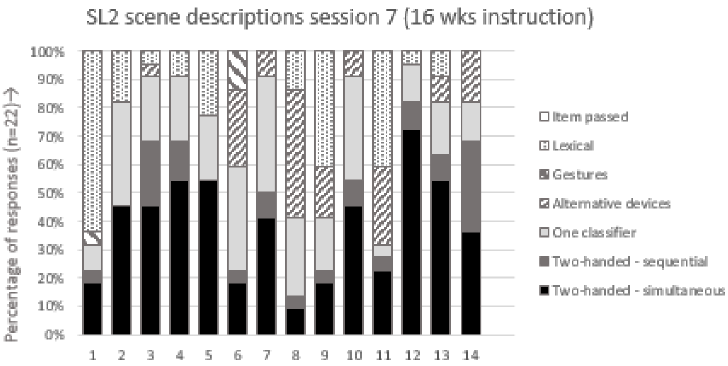
prompt	Included in tests	Objects	Movement (static/ motion)	Scene description
4	T1, T3, T5	three sitting persons	Static	Two persons sit next to each other, a third person is sitting in a 90 degree angle
5	T1, T3, T5	two persons + bicycles	static	Two/three persons sit next to each other, at their left two/three bicycles are parked
14	all tests	two persons + bicycle	motion	Two/more persons sit next to each other on a bench/on the ground, a third person passes by on a bicycle
11	all tests	car + bicycle	static	A bicycle is stacked upon a car
6	T1, T3, T5	truck + sitting persons	static	Multiple persons are sitting on the roof of a truck
7	all tests	car + standing person	static	A person is standing on the roof of a car
16	all tests	bicycle + standing person	motion	A person is standing on the luggage carrier of a bicycle while another person rides the bicycle
39	all tests	car + animal	static	An animal (goat/dog/ape) is standing on the roof of a car

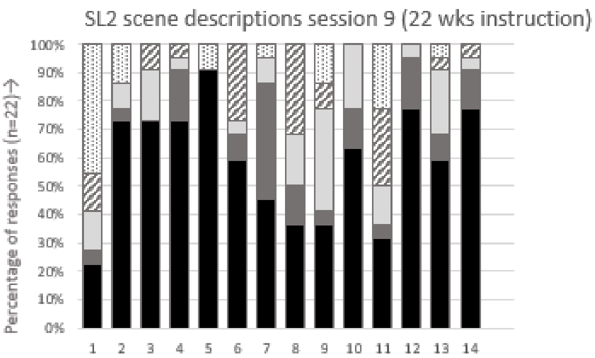
Appendix 4D: SL2-productions of scene descriptions using two-handed classifier constructions per SL2-participant per session during first year of instruction [study 2]

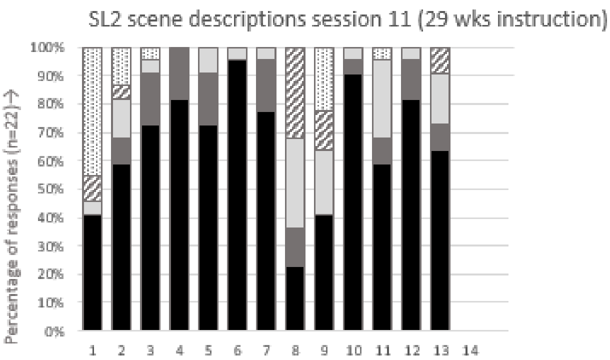












second semester

Appendix 4E: Overview of produced classifiers and errors [study 2]

Figure A.4E.1 presents an overview of the distribution of correctly and erroneously produced classifiers as well as non-classifier productions for the 13 prompts (26 potential classifier predicates per participant) that appeared in all tests. Recall that the even-numbered tests contained 22 prompts, and the odd-numbered tests contained 13 prompts featuring two objects that could be depicted with an Entity classifier predicate. In the graph presented below, the responses to the nine prompts that only appeared in odd-numbered tests (T1, T3, and T5) were left out. For each test, the number of analyzed predicates is indicated. The maximum number is 364 (potential) classifiers (14 participants x 13 prompts x 2 objects). In some cases the number is lower, caused by the fact that some participants missed one or two sessions. Session 6 was only attended by nine of the 14 participants; it is likely that the distribution displayed in this particular bar shows a divergent distribution for this reason.

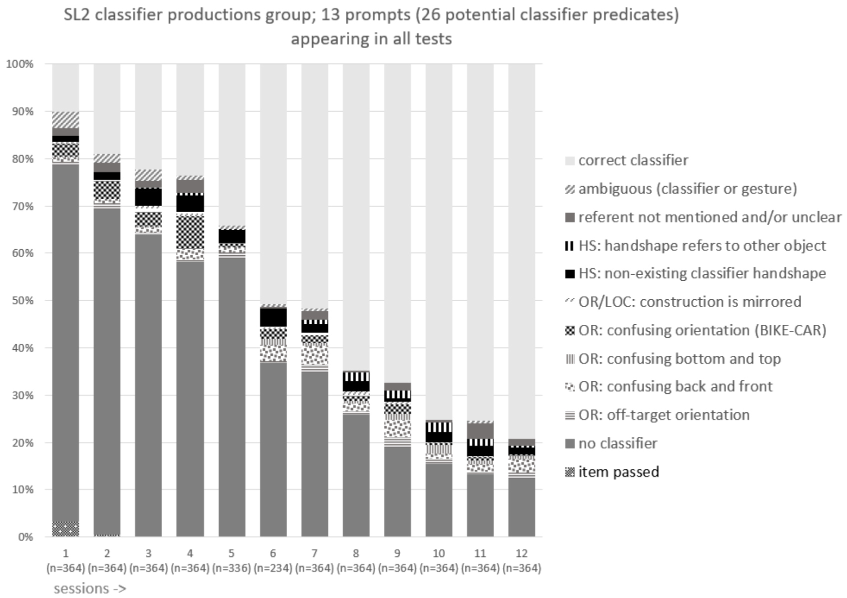


Figure A.4E.1. Overview of production of correct classifiers, erroneous classifiers and omission of classifiers as a percentage of the number of potential classifiers (26 possible classifiers per test). The number between brackets indicates the total number of analyzed classifiers for that test.

Appendices to Chapter 5

Appendix 5A: Overview of the prompts aimed at eliciting agreement verbs [study 3]

Table A.5A.1. Overview of prompts study 3, aimed at eliciting agreement verbs.

prompt	Included in tests	Verb	Verb characteristics	Image or Dutch sentence	Example
24	T2, T4, T6	ANSWER	regular; change in path and orientation	image + sentence	'The teachers answer the students.' (3→3 form)
25	all tests	ASK	regular, change in path	image + sentence	'The child asks the teacher.' (3→3 form)
26	T2, T4, T6	ASK		image + sentence	'The student asks the group.' (3→3 form)
27	all tests	CALL-BY-PHONE	regular, change in path	image + sentence	'Yesterday the woman called her sister.' (3→3 form)
28	T2, T4, T6	GIVE	regular, change in path & orientation, can combine with Handle classifier	image	image of a boy providing a food bowl to a dog (3→3 form)
29	all tests	GIVE		image	image of man giving keys to a woman (3→3 form)
30	T2, T4, T6	THROW$_{b\ all}$	regular, change in path & orientation	image	image of person throwing a ball to a group (3→3 form)
31	all tests	SEND		sentence	'My mother sent me and my

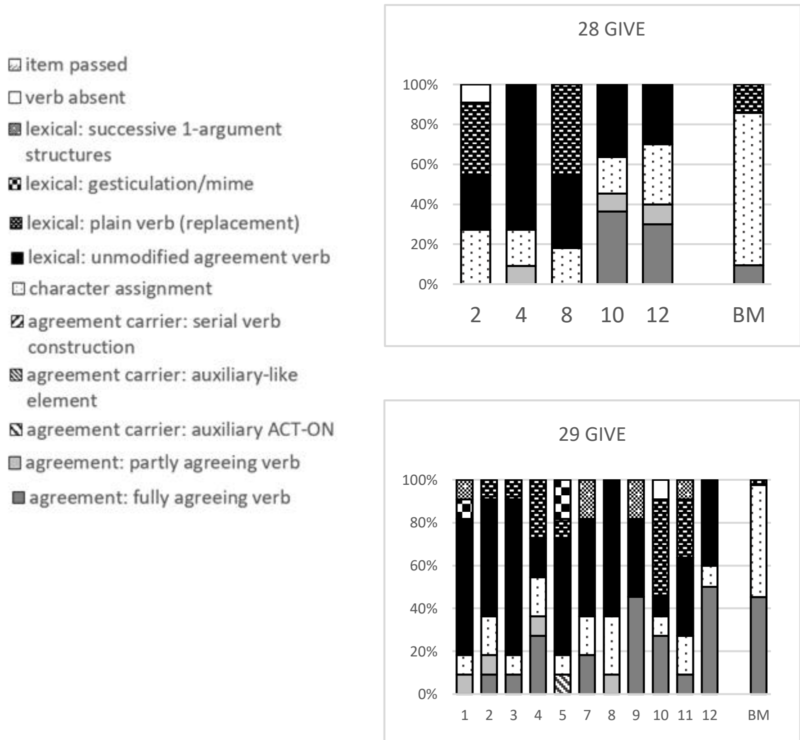
prompt	Included in tests	Verb	Verb characteristics	Image or Dutch sentence	Example
			regular, change in path & orientation		brother a package.' (3→1 form)
32	T2, T4, T6	SEND		sentence	'My brothers sent me a letter.' (3→1 form)
33	T2, T4, T6	TAKE-AWAY	backwards, change in path	image	image of a child taking a toy away from another child (3→3 form)
34	all tests	FETCH	backwards, change in path & orientation	image + sentence	'The man fetches his children from the hospital.' (3→3 form)
35	all tests	HELP	regular, change in path & orientation	sentence	'The two sisters help the two brothers.' (3→3 form)
36	T2, T4, T6	ROLL$_{ball}$	regular, change in path & orientation	image	image of a child pushing a ball towards another child (3→3 form)
37	all tests	VISIT	regular, change in path & orientation	image + sentence	'The family visits grandpa.' (3→3 form)
38	T2, T4, T6	GIVE$_{reciprocal}$	regular, change in path & orientation, can combine with Handle classifier	image	image of two persons giving each other a book (3→3 form)

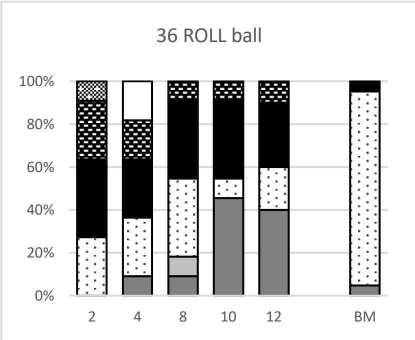
Note: Preceding targets 1-23 aimed at eliciting classifier predicates (study 2).

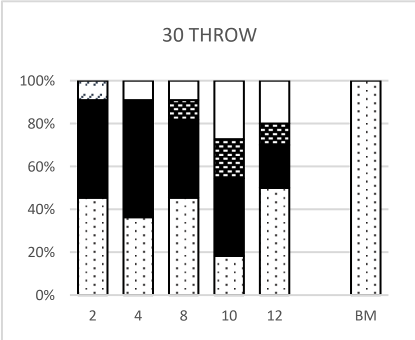
Appendix 5C: Analysis per verb [study 3]

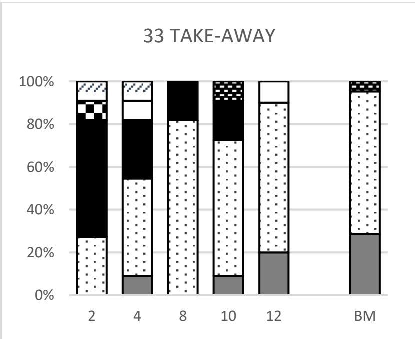
Item-analysis per verb, showing the group productions of 11 participants with no previous knowledge of NGT. The presentation follows the grouping as discussed in Section 5.4.2.1 (i.e., verbs that evoked predominantly character assignment, verb modification, or a mix of both in the benchmark). The bars on the left show the percentage of SL2-responses for each session (sessions are indicated by their session number; not all verbs were included in all tests; test 6 has been removed from the dataset since 5 participants could not attend this session; the target featuring the verb FETCH was not included in session 5 due to time limitations). The right bar (BM) shows the benchmark-responses.

Category 1: prompts that evoked character assignment in the benchmark-group

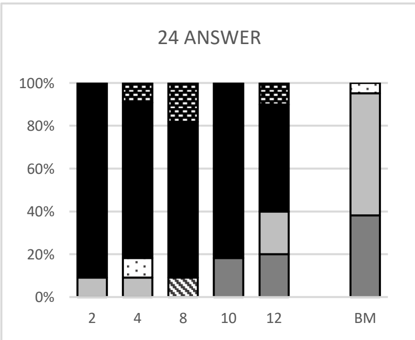


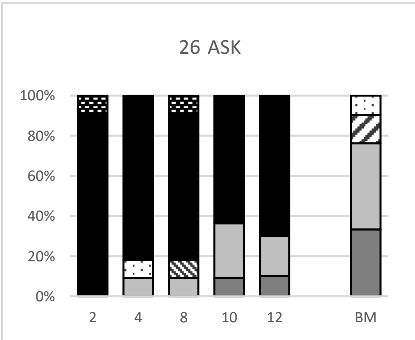


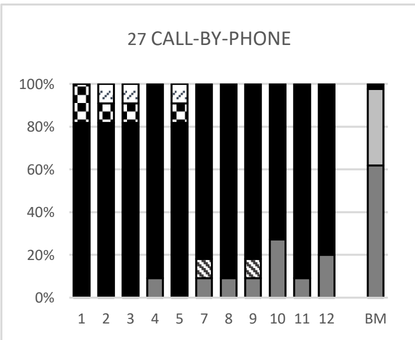


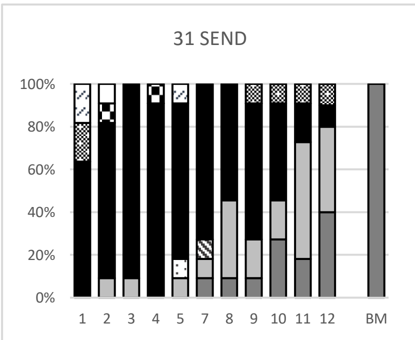


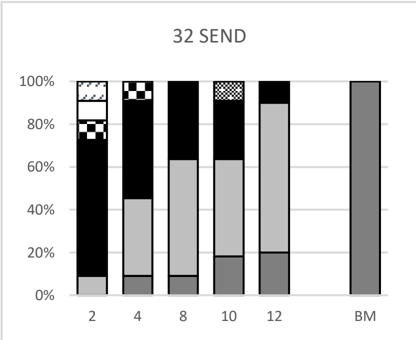
Category 2: prompts that evoked modified verbs in the benchmark-group










32 SEND
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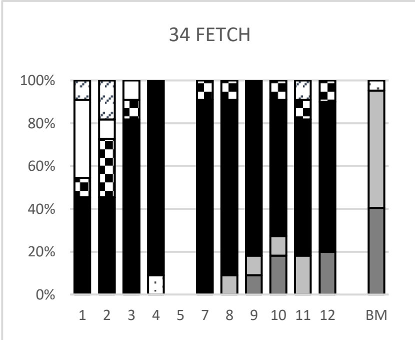
BM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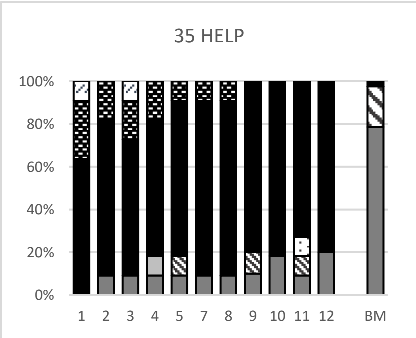
BM


35 HELP
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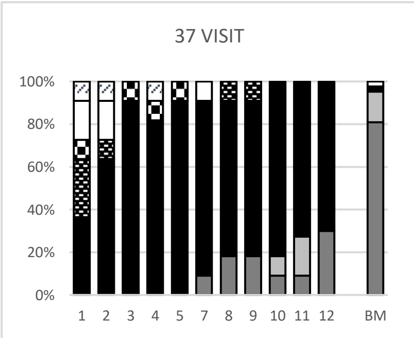
37 VISIT
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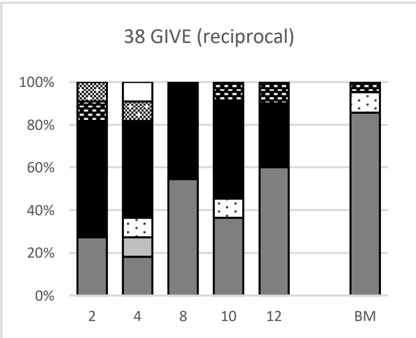
BM


38 GIVE (reciprocal)
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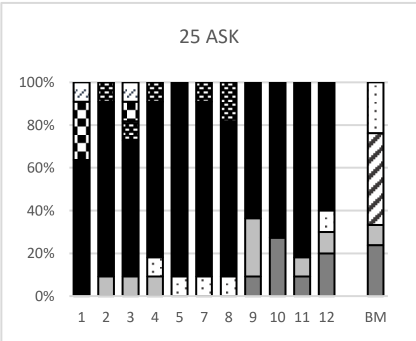
12
BM

Category 3: prompt that evoked modified verbs and character assignment in the benchmark-group



Appendix 5D: Analyses regarding presence or absence of localization of third-person referents [study 3]

The graphs shown on the next page show the results of an additional analysis with regard to presence or absence of localization of third-person referents. For this analysis, the responses containing a fully agreeing or partly agreeing verb were examined and coded for the presence or absence of localization (i.e., establishing of a locus for a referent). The striped parts of the bars detail the distribution of partly/fully agreeing verbs without localization. Note that the numbers of responses are sometimes small. The three SL2-participants with previous knowledge of NGT are excluded.

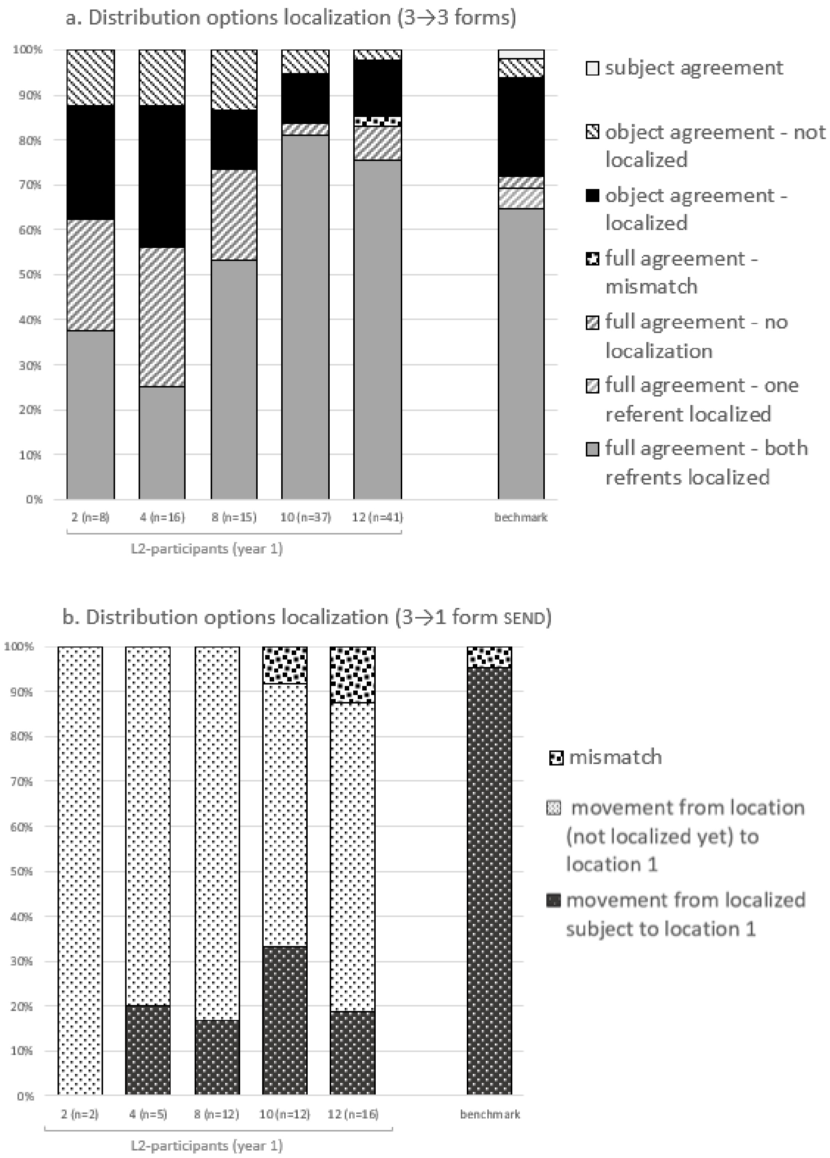
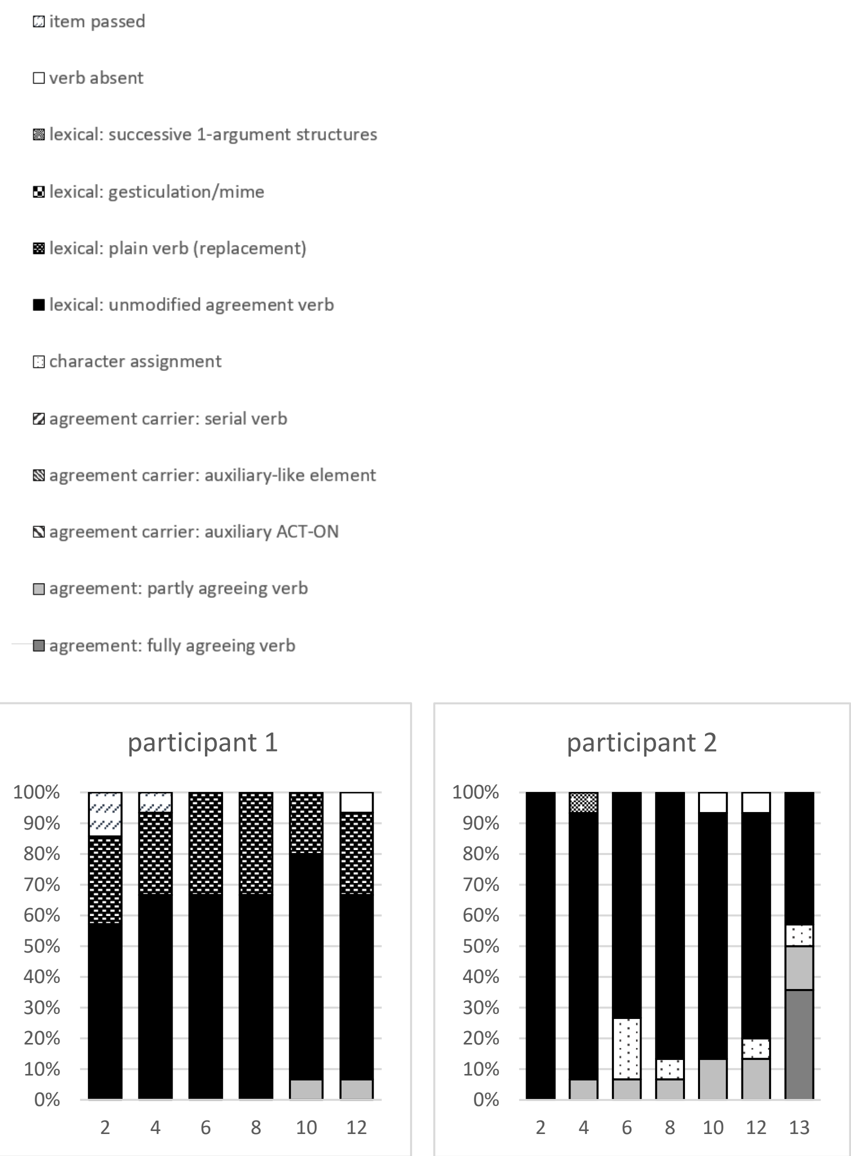
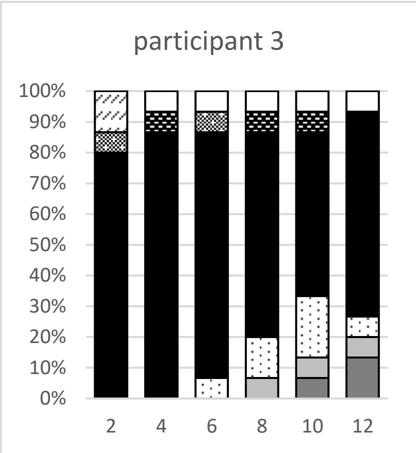


Figure A.5D.1. Distribution of presence of localization of third-person referents. For 3→3 forms, two third-persons referents could be localized (a), for the 3→1 form SEND, one third-person referent could be localized.

Appendix 5E: Analysis per SL2-participant (year 1) [study 3]

The following graphs show the data obtained in the six tests featuring all 15 targets.




participant 3
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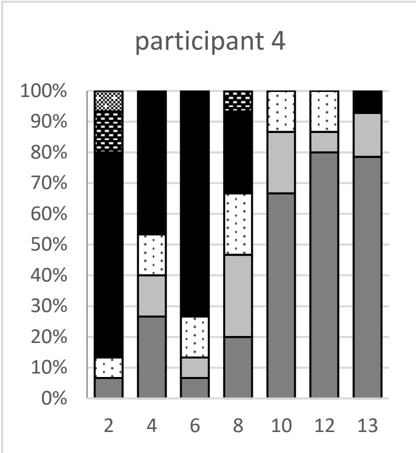
participant 4
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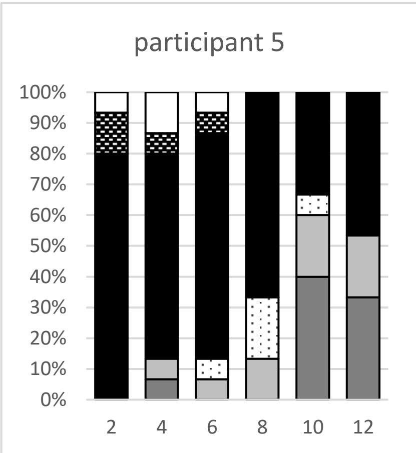
participant 5
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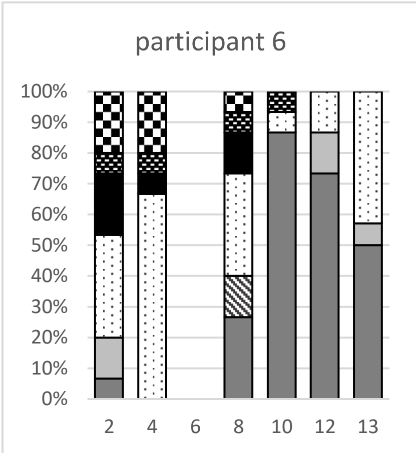
participant 6
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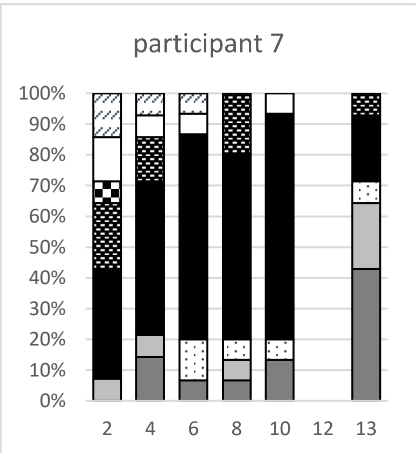
participant 7
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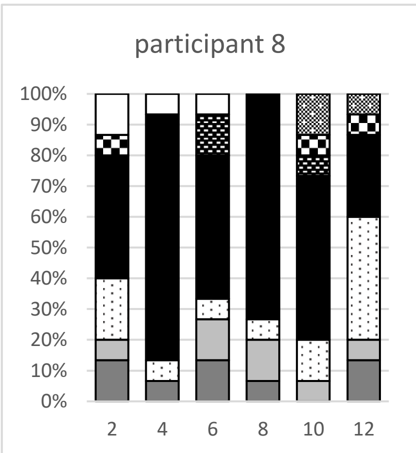
participant 8
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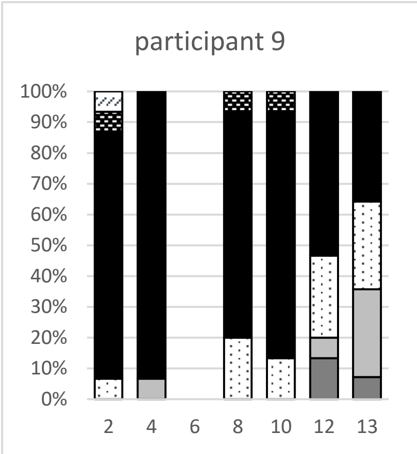
participant 9
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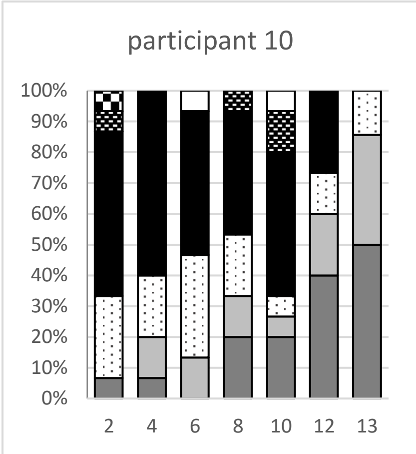
participant 10
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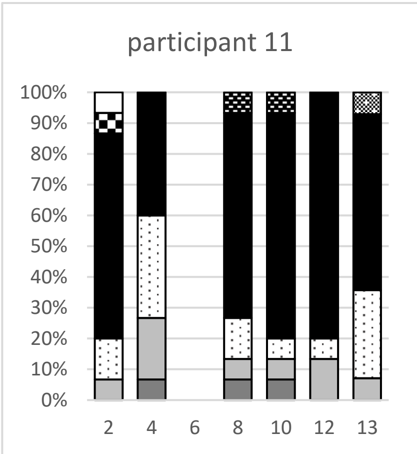
participant 11
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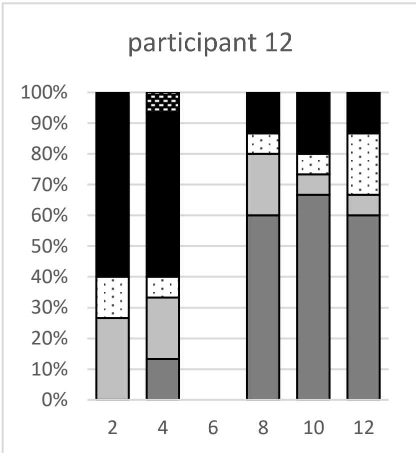
2 4 6 8 10 12 13


participant 12
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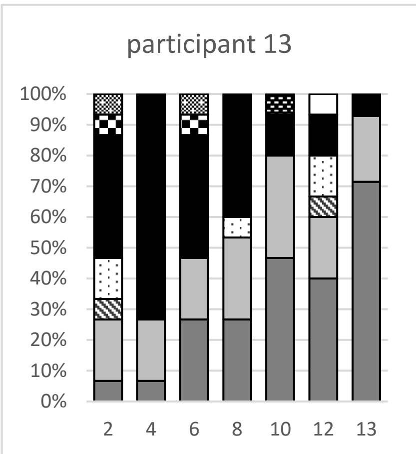
2 4 6 8 10 12


participant 13
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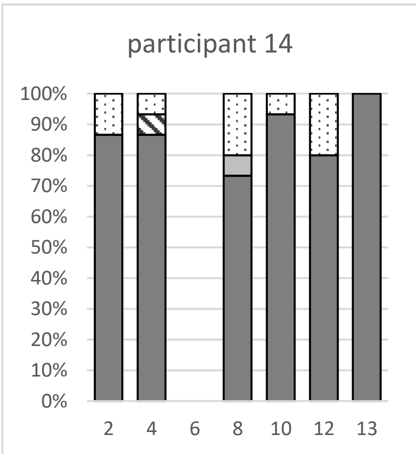
participant 14
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Appendices to Chapter 6

Appendix 6A: Overview of instructional tasks [study 4]

Table A.6A.1. Overview of instructional tasks study 4

Task	Input and task
1a	Input: Ten role-play scenes figuring two/three persons Task: learners imitate scenes (role-play, involves agreement with present persons)
1b	Input: a signer recalls the ten scenes shown in 1a, using the neutral signing space Task: learners imitate the signer (involves use of neutral space)
2	Input: a signer signs 14 short sentences, for example: "*Eef just send me an email, she will arrive five minutes late because her train is delayed.*" Task: the learners match the sentences to photos (conditions B, C) and indicate the verb referents (condition A); learners copy the sentences (output)
3	Input: a signer signs 12 short sentences, for example: "*Tomorrow I will travel to Paris with the Thalys, I'm going to visit Klaas and Irene. I told Klaas [that I will visit them], but I did not tell Irene.*" Task: the learners match the sentences to photos (conditions B, C) and indicate the referents of the verb (condition A); learners copy the sentences (output)
4	Input: ten short stories Task: learners have to indicate with symbols how and where the referents are localized in space using a top-down view (conditions B, C), and draw arrows between locations to indicate the verb's movement (condition A); learners produce their own sentence (free output)

Task	Input and task
5	Input: five medium-length stories Task: learners must answer questions about the story (written in Dutch on worksheet) and indicate with symbols how and where the referents are localized in space using a top-down view (conditions B, C). Learners in condition A draw arrows between locations to indicate the verb's movement in addition.
6	Input: a signer presents five situations, each seen from different angles. Task: students watch the stories.
7	Input: six medium-length stories featuring various referents and verb modification between these referents Task: the learners watch the stories and discuss how the referents are localized and the connections between the referents. The learners of condition A are in addition requested to pay attention to the agreement verbs and to discuss who is doing what to whom for each of these verbs.
8	*This task was not carried out due to time restrictions; for the sake of completeness, it is included here* Input: a dialog between two signers (interview) Task: students discuss the dialog contents (condition B, C) and discuss the form and meaning of the agreement verbs produced by the signers (condition A).

Appendix 6B: Overview of verb forms instructional materials [study 4]

Table A.6B.1. Overview of verb forms in instructional materials.

	form of the paradigm →	1→2	1→3	2→1	2→3	3→1	3→2	3→3
featuring in tests	ANSWER	4	3	2		5		1
	ASK	9	4	8		14		7
	HELP	9	2	8		4		4
	VISIT	6	3	6		2		
	TEASE							
	SEND-EMAIL	4	5	5		7		2
	FETCH (backwards verb)	5	2	5		4		3
	TELL	2	4	1		9		1
	EXPLAIN	3		3				
	CALL-FOR-ATTENTION	16	6	1		7		2
	GIVE	8	6	11	1	4		
	SEND-MESSAGE	2	8	2		10		1
	SEND-BY-POST	2	12	1		1		5
	CALL-BY-PHONE		5			2		2
	SUPPORT	1		1				2
	TAKE-OVER	1						
	DELIVER		3					2
	DELIBERATE (reciprocal)		2					
	PAY		2					
	LOOK-AT		1					1
	SEND-MONEY		1					
	THROW					1		
	TAKE-CARE-OF/BABY-SIT							1
	total verbs	72	69	54	1	70	0	34
	agreement auxiliary ACT-ON	1	3					1

In total, the seven tasks featured 300 verb forms and five instances of agreement auxiliary ACT-ON. 117 of the 300 verb forms were offered in tasks 1–3, prior to mid-test T2.

Appendix 6C: Overview of prompts in testing materials [study 4]

Table A.6C.1. Overview of prompts aimed at eliciting agreement verbs in intervention study.

	Test 1 and test 2	**Test 3 and test 4**
1*	Tomorrow I am going to help my grandfather.	Tomorrow I will help my aunt.
2	I helped the teacher.	I helped the student.
3	The two brothers help the two sisters.	The three teachers help the two students.
4*	The father helps his son.	The mother helps her daughter.
5*	The teacher helped me yesterday.	The salesman helped me yesterday.
6	My father helps me.	My grandmother helps me.
7	Can you please answer me?	Can you please answer me?
8	My brother answered you yesterday.	My sister answered you the day before yesterday.
9*	The teachers answer the students.	The teachers answer the children.
10*	The doctor answers the woman.	The policeman answers the child.
11	Tomorrow you visit the teacher, is that correct?	Yesterday you visited the woman, is that correct?
12	The teacher visits you tomorrow, is that correct?	The woman visits you tomorrow, is that correct?
13*	The family visits grandpa.	The man visits the sick girl.
14	The man visits my mother today.	The girl will visit my grandma tomorrow.
15	Tomorrow I will ask my brother.	Last week I asked my cousin.

16	I ask the man.	I ask the boy.
17	You did ask me.	You ask me.
18	You fetch/pick up grandpa.	You fetch/pick up daddy.
19	Yesterday you fetched/picked up the woman.	Yesterday you fetched/picked up the child.
20	My sister will fetch me/pick me up tomorrow.	My friend will fetch me/pick me up tomorrow.
21	The student fetches me/picks me up.	The teacher fetches me/picks me up.
22	Did you tease your sister?	Did you tease your friend?
23	Your brother teases you, right?	Your cousin teases you, right?
24	You email me, okay?	You email me, okay?
25*	Grandma will email me tomorrow.	Jan will email me tomorrow.
26	-	I caught my sister [in the act].
27	-	You threatened me!
28	-	The policeman caught me [in the act] yesterday.
29	-	The boy threatens the teacher.

Note: The original Dutch sentences are translated into English. The prompts indicated with an asterisk consisted of a Dutch sentence and a photo (e.g., a photo of a grandmother/man behind a computer accompanied the Dutch sentence in prompt 25).

Appendix 6D: Teacher benchmark [study 4]

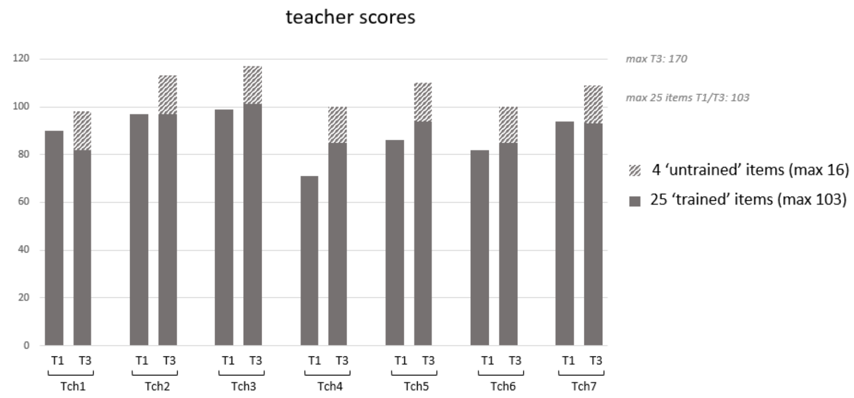

Figure A.6D.1. Overview of responses on Tests 1 and 3 produced by ISLDS-teachers.

Figure A.6D.1 provides an overview of the responses of ISLDS-teachers on Tests 1 and 3. The teachers' responses were distributed as follows: For T1 (*n* = 175), 96% of the responses contained a modified verb (93% fully modified, 3% partly modified for object or by means of an agreement auxiliary). 4% of the T1-responses were coded as misagreement (i.e., begin or endpoint did not match loci or loci-referent associations were unclear). For T3 (*n* = 203), 97% of the responses contained a modified verb (95% fully modified, 2% partly modified for object or by means of an agreement auxiliary), and 3% was coded as misagreement.

As can be seen from this figure, the teachers did not reach 100% scores on both tests. This can be explained by the fact that some items were produced without localization of the referents. As explained in Section 2.2, agreement verbs can serve as a means to localize, thus the absence of localization is not an error. Two teachers, in particular, used the agreement verb as means of localization (Tch4 did not localize a third-person referent in 18 of the 54 responses (33%), while Tch6 omitted third-person localization in 52% of the responses. The other teachers showed relatively low percentages of omission of 4–11% of the responses).

The teacher benchmark served as a means to decide whether some student-solutions were acceptable or not. Some non-canonical localizations, for example, were produced both by teachers and students.

Further analysis showed that 11 of the 13 responses that were coded as ‘misagreement’ could be found in two teachers’ data. Tch1 produced seven and Tch5 produced five instances of misagreement. Presumably, these teachers misinterpreted the Dutch sentences.