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Sign order and argument structure in a Peruvian home sign system

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Sign order and argument structure in a Peruvian home sign system

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Sign order and argument structure in a Peruvian home sign system

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Home sign systems are gestural communication systems that arise when a deaf child is deprived of manual communication, but not social interaction. Yet, despite not having conventional linguistic input, the sign systems developed by such children have been found to exhibit many properties of natural language. In this paper, I examine the productions of RCM, a 28-year-old deaf home signer, and his three most common interlocutors, all living in Nueva Vida, a village in Peruvian Amazonia. According to his parents, RCM has never spoken and has used gestural communication since childhood. Neither RCM nor anyone within the community have been exposed to a conventional sign language. However, RCM's family and friends gesture with him to communicate. Analysis focused on the use of spatial modulation and sign order in argument structure and negation for all four signers, comparing consistency both internal to the signer and across signers.

I found that RCM produces a consistent sign order for transitive constructions, intransitive constructions and negation. RCM used sign order to mark semantic role contrasts. He produced two different lexical negation signs to mark three types of grammatical negation. The ordering of semantic arguments and negation was matched in almost all cases by the three hearing interlocutors. Although RCM had a consistent and productive means of assigning arguments, he also employed space in a class of signs that can be classified as 'directional verbs'. These action signs marked the patient or recipient through movement. In addition to spatial modulation, he assigned referents to abstract space and was able to refer back to these referents using points or spatial modulation. All three hearing signers were found to use some degree of spatial modulation. However, the degree to which the hearing signers were capable of using abstract space varied across signers. I showed that RCM is the innovator of these structures and that the hearing signers learned the structures from RCM.

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Chapter 1

Introduction

It is estimated that only 5% of deaf children are born to deaf parents (Mitchell & Karchmer, 2004). The other 95% are born to hearing parents, some of whom may lack the ability or may choose not to expose their children to a conventional sign language. Children who are profoundly deaf are unable to acquire the spoken language of their environment naturally. However, even with professional intervention, such children have limited spoken language skills (Meadow, 2005). Yet deaf children deprived of manual communication but not social interaction have been found to produce structured communication (Feldman, Goldin-Meadow, & Gleitman, 1978). The systems developed by such children are called "home sign".

However, though I and many other researchers use the terms "gesture" or "gestural" to describe the home sign systems used by such children, it should not be confused with pantomime or the co-speech gesture used by hearing people. As will be seen in this paper, though a home sign system is not a full language, home sign has various linguistic properties that far surpass spontaneous pantomime or

the gestures produced in co-speech gesture. Although the gestures/signs used by home signers are usually very iconic, they are more consistent in meaning and form than pantomime. They are also more structurally complex than the co-speech gesture used by hearing people. For one, co-speech gestures adhere to a structure determined by the speech (McNeill, 1987) and there is usually only one non-concatenated gesture per spoken clause (McNeill, 1992).

In this paper, I describe the system of an adult home signer, RCM, living in a village community in Peruvian Amazonia. I analyze the structure produced by the home signer himself and three of his more common interlocutors. I compare RCM's productions to those of the hearing signers to assess how closely the hearing signers adhere to RCM's system. The research questions to be addressed in this paper are: 'What grammatical features are present in RCM's signing and how consistent are these features?', 'What features are present in the signing of hearing interlocutors and how consistent are these features?' and 'Do RCM and the hearing signers share the same features across their signing?'. To answer these questions, I analyze three grammatical features: sign order to mark argument structure, negation (types of negation and order of negation) and use of grammatical space to mark argument structure.

In addition to describing the grammatical structures of RCM and his signing interlocutors, I also compare my results to those found in other home sign studies, concerning both children and adults. Although we should be hesitant to make comparisons between child home signers and adult home signers given a lack of data describing how home sign systems change over the lifetime of a home signer,

child home signers do display similar structures as those found in adult home sign systems. The research on child home signers can shed light on how early such structures emerge in the productions on home signing individuals.

Given the commonalities that have been observed in previous research on home sign systems and emerging sign languages, there are a number of predictions that can be made about RCM's home sign system. Concerning the productions by hearing signers, it is expected that hearing interlocutors will not adhere closely to the structures (e.g. sign order) produced by RCM. The hearing signers may show consistency within their own signing, but they are not expected to match RCM's signing. In addition to what is expected for hearing signers, we can also posit predictions for RCM's structures based on the results of other studies. Based on previous research, RCM is predicted to show a "patient bias". That is, a bias toward maintaining an overt Patient in transitive constructions and dropping the Actor. Spatial modulation to mark argument structure has been found in some, but not all, home sign systems. Therefore, productive use of grammatical space and spatial modulation is predicted to be possible, although less likely, in RCM's system. However, as hearing interlocutors of home signers have not been observed using grammatical space and spatial modulation, the hearing signers in this study are not predicted to use space to mark argument structure.

In the following pages I first describe the background and methodology of this project, including background on the community and the individual signers. The following sections address the two research questions above, including how my results compare to previous research on home sign and emerging sign languages.

Section 2 covers previous research on argument structure in home sign, village sign languages and community sign languages. In section 3, I describe RCM's and his hearing interlocutors' ordering for intransitive utterances and transitive utterances, both when arguments are expressed with a lexical sign and when they are expressed with a point. Section 4 considers the negation patterns for all four signers. I cover types of negation and the ordering of negation elements relative to the modified sign. In section 5, I cover the use of spatial modulation to encode argument structure. In each section I summarize the results and compare them to what has previously been found in home sign systems and emerging sign languages. I found that RCM's interlocutors display more internal consistency than what is typically found in communities with home signers. RCM's interlocutors more closely adhere to the structures signed by RCM than what has previously been found. I also found that RCM uses more complex spatial modulation than what is typically found for home sign systems and emerging village sign languages.

1.1 Background and Methodology

In this section, I cover the background of the project, the community and research consultants. I also describe the methodology used in elicitation and coding of the data.

1.1.1 Project background

My first trip to Nueva Vida was in summer 2012 working on the documentation of Máíjɨ̲kì, a Western Tucanoan language spoken in the village, as part of the Máíjɨ̲kì Project. While conducting fieldwork, I became aware of RCM, whose mother was a consultant on the Máíjɨ̲kì Project. Although he was the only deaf member of the community, RCM seemed to be able to communicate in sign with most of the people in the village. I was curious about his sign system and how it was that so many people in the village seemed able to communicate with him. Two years later, in the summer of 2014, I was able to return to Nueva Vida in order to work with RCM. I conducted 6 weeks of fieldwork and recorded 24 hours of video data from RCM and three of his most common interlocutors. The results presented in this paper are based 14 hours of this video data.

Nueva Vida is on the Yanayacu river, off the Napo, in Loreto, Peru. The primary language is Spanish, though older members of the community speak Máíjɨ̲kì. The village is located approximately eight hours by boat from Iquitos, the nearest city. The maps in Figure 1.1 show the location of Nueva Vida.

1.1.2 Research consultants

In this study, I analyze the signed productions of four consultants: RCM, ACC, OMT and LTN. RCM is the deaf home signer and ACC, OMT and LTN are all hearing. ACC is RCM's father. OMT and LTN are RCM's friends. The three hearing consultants are three of RCM's most common interlocutors and due to cultural

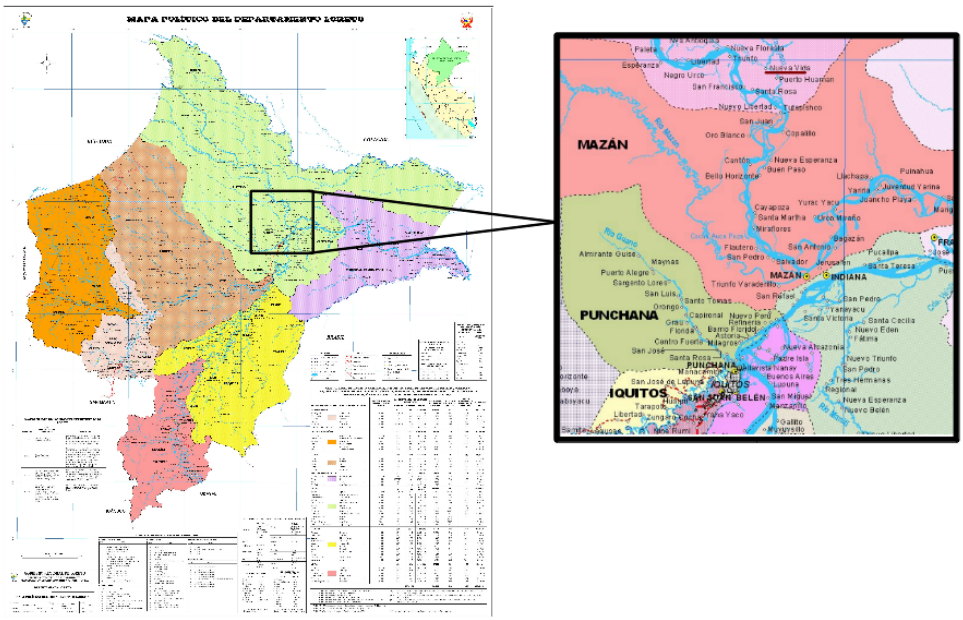

Figure 1.1: Full map of Loreto, Peru on the left. Iquitos can be found in the bottom left corner and Nueva Vida is underlined in red on the zoomed map on the right.

practices, all male. As a young man, RCM was expected to hunt and fish. Therefore, his primary companions were also male. According to his parents, RCM has never spoken and is presumed deaf since birth. Although there is a deaf school in Iquitos, the nearest city to Nueva Vida, RCM has never been to this school nor has anyone in the community. RCM's parents informed me that they were aware of the deaf school, but that they did not know anything about the sign language used there.

RCM

- Deaf
- Age: 28
- Born in Nueva Vida

OMT

- Hearing
- Relation to RCM: childhood friend
- Age: 28
- Born in Nueva Vida

ACC

- Hearing
- Relation to RCM: father
- Age: 50

LTN

- Hearing
- Relation to RCM: friend
- Age: 53
- Born in Puerto Huaman (moved to Nueva Vida age 5)

1.1.3 Elicitation

As RCM was not accustomed to linguistic elicitation, I found that prompted narrative and free conversations between RCM, myself and another interlocutor were most successful in eliciting natural utterances. By guiding the conversation, it was possible to prompt particular structures of interest. For example, asking about RCM's family prompted the use of multiple, non-present third person referents.

In addition to conversational data, I also used pictures from Story Builder

(Sardinha, 2011) as elicitation tools. Story Builder is a set of cards designed for linguistic fieldwork elicitation. The cards use outlined drawings to depict events and people performing different actions. For example, Figure 1.2 shows a person drinking from a glass. I also used pictures from *Neotropical Rainforest Mammals: A Field Guide* (Emmons & Feer, 1997). For example, a picture of a tapir, as in Figure 1.3. Both the Story Builder cards and the pictures elicited vocabulary items, full phrases and prompted conversation.

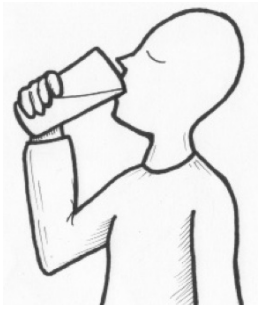

Figure 1.2: Story builder card

Figure 1.3: A picture of a tapir

1.1.4 Coding methodology

The annotation software ELAN was used to annotate and gloss video from the study. The following sections describe the coding methodology that is in use to analyze the data collected in the research of this project. The methodology, which is adapted from Coppola (2002), is presented in a step-by-step process as, for example, the identification of communicative gestures must be completed before thematic roles can be assigned to said gestures.

1.1.5 The identification of communicative gestures

Before beginning any analysis of the home sign system, the conventionalized communicative gestures that make up RCM's system had to be distinguished from non-communicative movements. Distinct movements of the hands, arms and face produced empty-handed and preceded by eye contact or attention-getting gestures were considered to be communicative signs. Self-grooming gestures or manipulations of objects were not transcribed or analyzed. If a gesture occurred in various contexts with the same form and the same apparent meaning, it was considered to be a conventionalized part of the system and therefore considered to be communicative.

1.1.6 The assignment of lexical meaning to gestures

As the system of communication was completely unknown to me and had not yet been documented, assignment of lexical meanings to specific gestures was completed over several steps. The lexical interpretation of individual signs was based on the form of the gesture, the stimulus event and comments from hearing consultants familiar with the home sign system. Many of the gesture forms were iconic of what was being represented and this iconicity was exploited in assigning meaning to and glossing the gestures. The stimulus event, specifically when the stimuli was visible, was also used to assign lexical meaning to gestures. Hearing interlocutors experienced with the sign system were asked for translations of specific gestures or gestural utterances produced by RCM when iconicity or context could not be used to determine meaning. Depending on the task, hearing consultants were asked

for translations at the time of the utterance or while reviewing recordings at a later time. Gestures that were used across multiple contexts with the same meaning were coded using the same gloss. As per convention, glosses are given in English and written with capital letters.

1.1.7 The assignment of thematic roles to gestures

In order to characterize the relations among gestures, they were assigned thematic roles. Following Coppola (2002), the semantic elements employed to characterize gestures were:

> ACT the action being performed
> ACTOR the person performing the action
> PATIENT the person that is Acted on or manipulated
> RECIPIENT the person toward which someone or something moves
> LOCATION location from which or towards which someone or something moves or is located
> THEME inanimate object that is Acted on or manipulated

The assignment of these thematic roles to individual gestures was based on the stimulus or, if there was no stimulus, a translation provided by the hearing consultants. For instance, if the stimulus was a picture of a woman hitting a man, the sign for 'woman' was assigned the thematic role of Actor, the sign for 'man' the role of Patient and the sign for 'hit' the role of Act. In the case of translations, if the utterance was translated as 'the jaguar attacked the peccary', the sign for 'jaguar' was assigned the thematic role of Actor, the sign for 'peccary' that of Patient and the sign for 'attack' was assigned the role of Act.

1.1.8 Segmentation of phrases

In order to make claims regarding the sign order or the grammatical relationship between multiple signs, the productions must be segmented into phrases. A variety of factors are taken into consideration when segmenting productions, particularly narratives in which RCM's productions continued uninterrupted for minutes at a time. These are prosody, hand position and additional gestural mannerisms. Prosody was taken into account in segmentation by considering the rhythm of the production and the pauses between signs. Following Goldin-Meadow's (1985) definition of utterances, if signs were uninterrupted by an appreciable time difference, they could be considered to be part of the same phrase. RCM tended to sign mostly in the signing space in front of him, with few signs occurring below elbow height or above the head. The relaxation of the hands from the signing space is also considered in the segmentation of phrases. If the hands became relaxed and lowered, this was considered to be the end of a phrase. Additional gestural mannerisms were also taken into consideration when segmenting phrases. RCM often accompanied the end of an utterance with a raising of the hands, palm up with a lift of the chin to prompt a response from the interlocutor. However, there wasn't always a response or the response was short enough that RCM did not lower his hands out of the signing space before continuing. This body language is considered to mark the end of a phrase.

1.1.9 Coding of sign order

A main section of this paper considers sign order. Sign order is used to compare within- and between-signer consistency in RCM's signing and in the signing of his hearing interlocutors. Therefore, it is important to establish a consistent means of coding for sign order. This issue also relates to those addressed in section 1.1.8 and section 1.1.7, on the coding of phrases and thematic roles. In order to establish if sign order is consistent, sign sequences must first be segmented into phrases and assigned thematic roles. Once signs have been segmented and assigned thematic roles, I could analyze the prevalence of certain sign orders and establish the consistency both within and across signers.

1.1.10 Coding of spatial modulation

The presence of spatial modulation and the extent of its use is a primary question in this research. It was therefore important to use a consistent means for coding and identifying spatial modulation. I followed methodology developed by Senghas and Coppola (2001) in order to code the use of space. Signs that were produced outside of neutral signing space (i.e. the space directly in front of the signer), incorporated non-neutral locations into their movement or were produced in a location associated with an object or action were coded as spatially modulated. As some signs in their unmodified form were signed outside of what is generally considered to be neutral signing space (for example, TAPIR which was signed behind the head) the 'citation form' or most common form of a sign was also taken into consideration. If the sign

differed in location from where it was typically signed, then it was coded as being spatially modulated.

1.1.11 Coding of referential-loci

Whether or not RCM uses abstract space to refer to displaced referents is another central question in this research. Many conventional sign languages, such as ASL, use a point in space to establish a referential-locus (r-locus) associated with a particular referent. The signing space is used to abstractly represent a referent as opposed to a point to a real-world referent or a location concretely associated with that referent (such as the referent's house). The locus can then be referred to again using a point or a spatially modulated verb. In this paper I use Liddell's framework of *mental space blends* to describe different types of r-loci used by RCM and the hearing signers. Liddell distinguishes between *surrogates* and *tokens* when analyzing *r-loci*. *Surrogates* are normal sized, have body features and can exist outside the signing space. *Surrogates* can also occupy the same space as the signer, in which case the signer can embody features of the referent (i.e. through role-shift). In this case, when a signer points to himself, he is referring to a *surrogate* referent that is located in the same space as the signer. *Tokens*, on the other hand, have height, but no body features, and are limited to the signing space. An r-locus was coded as a *surrogate* if it was set up outside the signing space. If the r-locus was set up inside the signing space, it was coded as a *token*. For a more detailed discussion of Liddell's framework and how it is applied to this research, see §5.

Following Coppola (2002), in order to determine when *r-loci* were used, I

identified spatially modulated signs and then compared the spatially modulated sign with the signs that preceded and followed it. The signs were considered to have a shared *r-locus* if both spatially modulated signs shared the same location. For example, if an index/point was directed to a specific location and then the following Act sign was signed with movement toward the same location, these signs were coded as having the same r-locus.

1.1.12 Coding of role-shift

Along with *r-loci*, role-shift is another productive means of encoding argument structure and referring to displaced referents. A construction was coded as containing role-shift if the signer's body, gaze and shoulders shifted along with a shift of referent. A shift in the body could include either or both a shift on the horizontal plane (pivoting of the shoulders) or vertical plane (lifting or dropping of the gaze and chin).

1.1.13 Glossing conventions and abbreviations

Following typical conventions in sign language research, signs are glossed with capital letters which capture the concept represented by the sign (e.g. EAT). If a single sign must be represented by multiple words in English, the words in the gloss are separated by a dash (e.g. EAT-CANDY). A superscript on a gloss for a sign indicates that the sign was spatial modulated. For example, GIVE^{boy} indicates that the action sign was moved toward the location or the *r-locus* of a boy. A superscript on POINT indicates where the point was directed.

For the ordering of specific types of sign (e.g. Actors and Acts), a dash is used to indicate a strict ordering with no other elements intervening. For example, "Actor - Act" indicates that an utterances consisted of an Actor and an Act, in that order. When comparing the relative order of two types of signs, "$>$" is used. In this case, there may be other elements involved in the utterances but the focus is only on the ordering of two particular elements. For example, the ordering of "Actor - Patient - Act", "Patient - Actor - Act" and "Patient - Act" can all be represented together by "Patient $>$ Act" to show that the Patient occurred before the Act. If there is a subscripted number on an Act, it indicates either that two Acts represent different signs (if the numbers are different) or the same sign repeated (if the numbers are the same). For example, TAKE MASATO DRINK can be represented as Act_1 - Patient - Act_2, where the Patient is the argument of both actions or SHOOT TAPIR SHOOT can be represented as Act_1 - Patient - Act_1, where the same action is repeated.

When discussing word order for argument structure, I make a distinction between arguments expressed with lexical signs and arguments expressed with points. When an argument is expressed with a point, either by pointing to the physical location of the referent or to an *r-locus*, I prefix the label for the thematic role with 'PT.'. For example, 'PT.Actor - Act' indicates that the referent was expressed with a point which occurred before the sign for the Act.

Chapter 2

Assignment of arguments through sign order

In this section, I address how RCM and his interlocutors mark arguments through the order of nominal signs, points and action signs. I first describe the use of sign order in conventional signed languages. I then describe research that has been conducted on argument structure in home sign systems and in young signed languages such as community sign languages and village sign languages. With this background in mind, I describe the orders found in RCM's signing and the signing of the hearing consultants. I compare the internal consistency of each signer and whether or not they adhere to RCM's order. Finally, I discuss how RCM's system compares to what has been found in other home sign studies and whether the results fit the predictions laid out in §1.

2.1 Argument structure in conventional signed languages

Cross linguistic studies of conventional signed languages have found that signed languages are diverse in structure. Although there are modality specific constraints (e.g. phonological constraints) or commonalities, signed languages are syntactically and morphologically diverse. For instance, sign order varies across signed languages. ASL (Liddell, 1980; Fischer, 1975), Brazilian Sign Language (LIBRAS) (Quadros, 2003) and Taiwan Sign Language (Smith, 1990) have a SVO basic word order. However, SOV is the basic word order for Austrian Sign Language (Wilbur, 2002), German Sign Language (Glück & Pfau, 1998; Rathmann, 2000) and Japanese Sign Language (Torigoe, 1994). Sign languages differ structurally in many other ways as well. For instance, ASL does not have auxiliary verbs, while LIBRAS (Quadros, 2003) does. In summary, though there are modality specific constraints to signed languages, they display a variety of structures just as spoken languages do.

2.2 Argument structure of home sign, community sign languages and village sign languages

In this section, I discuss the previous research on the development of argument structure in home sign systems, community sign languages and village sign languages. As these three systems are defined by the social characteristics of the communities in which they develop, comparing these three types of sign systems gives

us insight into the environment in which specific types of structures develop. As described above, home sign systems are created when a single deaf child (or a set of siblings) is born into a hearing family and community with no established sign language that the child can learn. Community sign languages arise when deaf people from different places are brought together and form a community. These deaf people may be home signers or may have been exposed to another sign language. When they form a community, a new language emerges through creolization. Village sign languages, on the other hand, arise when there is a high instance of deafness in a community or village. In this case, there is no creolization process.

For community sign languages, I focus on Nicaraguan Sign Language, which is unique in that its genesis was closely documented. This language is considered a community sign language and came into being through a process of creolization (see Kegl & Iwata, 1989; Kegl, Senghas, & Coppola, 1999; Senghas, 1995; Senghas & Coppola, 2001; Senghas, Coppola, Newport, & Supalla, 1997 for discussions on the creolization of Nicaraguan Sign Language). In 1977 a deaf school was founded in Managua with 25 deaf students. By 1979 it had 100 students and by 1983 it had 400 students (Polich, 1998). The children who attended this school likely arrived with their own unique home sign systems. However, when they were put together, the children developed a more conventionalized system in order to communicate with one another. The phenomena of interest is the difference between the signers who were exposed to Nicaraguan Sign Language at an early age and those who were exposed at a later age. The younger children of the second and third cohorts had the advantage of acquiring the pidgin like system of the older children as a

first language. Unlike the older children, they had a steadier and more conventional input as well as willing interlocutors of the same system.

2.3 Child home signers

In this section I focus on child home signers who were not exposed to a conventional sign language. These children were educated orally with the goal of having them speak, rather than sign. Due to this ideology, the children's caregivers were discouraged from gesturing with the children. A great deal of the research on child home sign stems from a longitudinal study conducted by Susan Goldin-Meadow and colleagues of ten deaf children attending oral schools (Goldin-Meadow & Mylander, 1990, 1984). The children were visited in their homes by experimenters approximately every two months, from the ages of 2 to 5. I will also consider children from additional studies conducted by Goldin-Meadow and colleagues in China and Turkey. These studies will provide a cultural contrast. The children were observed two or three times between the ages of 3;8 and 4;9 (Goldin-Meadow & Mylander, 1998).

Goldin-Meadow and Mylander found that American, Chinese and Turkish signers all produce gestures for transitive Actors, Patients and intransitive Actors at different rates. For all children, the gestures for intransitive Actor and transitive Patient were produced more often than gestures for transitive Actors (that is, the children omitted the Actor in transitive sentences). The authors pointed out that this is reminiscent of an ergative-absolutive pattern. The children produced this

pattern even though the spoken languages in each case were nominative-accusative.

Home signers at the stage of development of the children in this study do not usually produce sentences with more than one overt argument and as mentioned, they often omitted the Actor of transitive actions. It was therefore difficult for the authors to assess what the sign order would be in an utterance with a transitive action. However, all three children in the study tended to produce intransitive Actors before Acts and Patients before Acts (e.g. MOUSE GO and CHEESE EAT). Only one American child (David) and one Chinese child (Qing) produced enough transitive Actors to establish their word order when there was an overt transitive Actor. David produced Actors after the Act (e.g. EAT MOUSE). Therefore, David distinguished transitive Actors from intransitive Actors in both word order and production patterns. Qing, however, produced gestures for transitive Actors before Acts, in the same position as intransitive Actors and Patients (e.g. MOUSE EAT). When transitive Actors and Patients appeared in the same string, Qing produced transitive Actors in second position, after Patients (e.g. CHEESE MOUSE). Based on these results, (Goldin-Meadow & Mylander, 1998) conclude that both Qing's and David's patterns conform to the ergative-absolutive structure.

2.3.1 Mothers' systems

We now turn to the gestures produced by the children's caregivers. Goldin-Meadow and Mylander (1998) analyzed the gestures produced by American and Taiwanese mothers to determine if their gestural patterns were similar to their children's. The authors found that the Chinese mothers' gestures more closely resembled their chil-

dren's gestures than did the American mothers' gestures. Most of the Chinese mothers tended to order their gestures in a sentence in the same way that their children did. American mothers, however, each produced only 2 to 5 relevant gesture sentences; analysis of these sentences did not reveal any statistically significant ordering patterns. For both cultures, mothers produced fewer complex sentences than their children. However, the gap was much wider for the American mothers.

The authors also analyzed the American mothers gestures over time to explore whether the children could be learning their structure from their mothers. They found that in 15 out of 20 sessions, before age 3;8, the children produced more complex gesture sentences than their mothers. The authors concluded that the American children could not have been learning their complex gestural patterns from their mothers, as they did not have sufficient input.

Overall, Goldin-Meadow and Mylander (1998) found that the American children's gestures resembled the Chinese mothers' gestures more than they resembled their American mothers' gestures. From the data, it appears that the American children are responsible for the structure of their own gestures. The authors propose that the Chinese children are also responsible for their own gesture structure, despite the finding that Chinese mothers' gestures do adhere to the structural pattern of their children. However, due to the fact that the American and Chinese children's gestures follow such a similar pattern, the authors conclude that it is more likely that the Chinese mothers followed their children's lead and copied the patterns from their children.

2.4 Adult home signers

In this section, I review the research conducted on adult home signers. As with the children in the previous section, I will focus primarily on the sign order and argument structure of these sign systems. The studies I focus on are a description of three adult home signers in Nicaragua (Coppola, 2002). The signers were not exposed to a conventional sign language and had not acquired a spoken language.

Coppola (2002) analyzed the structure of three adolescent and adult home signers living in rural Nicaragua at two different periods, two years apart. Home signer 1 (called Javier) was 9 at the time of the first study and 11 at the time of the second. The home signer's mother spoke mostly Spanish with him and seems to only use co-speech gesture, rather than engaging in Javier's home sign system. She did not concatenate gestures. Javier's brother also gestured with him, but they had limited mutual intelligibility. Home signer 2 (called Pedro) was 13 at the time of the first study and 15 at the time of the second study. His mother used gestural utterances and rarely spoke Spanish with him. His brother also gestured frequently with him. However, both the mother's and the brother's gestures appeared to be limited by context. Home signer 3 (called Gerónimo) was 18 at the time of the first study and 20 at the time of the second study. Gerónimo appears to have had the most experience with willing interlocutors. At the age of 8, he had three deaf friends that he reportedly gestured with a great deal. However, his mother claims that his home sign gestures did not change during this time. At the time of the study, he also had a friend who gestured with him fluently.

Coppola analyzed the gestures produced by the home signers's mothers. This allows for the examination of the kind of input received by the home signers and the level of cooperation displayed by the mothers in adhering to the gesture system of her child. These results will provide a comparison for the hearings signers who interact with RCM.

Rather than only videotaping narratives or conversations, Coppola ran laboratory-like experiments with the home signers in her study in order to determine the sign order and argument structure of the home signers' systems. In experiment 1, she had the home signers look at pictures of a boy and a girl performing transitive actions. The home signers were then given a picture of a boy and a picture of a girl and asked to describe the actions depicted in the previous pictures. It is important to note that the home signers had these pictures to refer to, as it is crucial for the later discussion. The home signers then gestured to either their mother (home signers 2 and 3) or their brother (home signer 1), who had not seen the pictures of the girl and boy performing the actions. The home signers' responses were videotaped and transcribed.

For the experiment 1, described above, Coppola found that home signer 1 did not have a very consistent sign order. The most consistent pattern displayed was Act - Actor - Patient/Recipient which occurred in 11/19 of his responses. He also used what Coppola refers to as a TRACE gesture, an arc traced in the air between the two pictures. The TRACE was always from the Actor to the Patient/Recipient and thus analyzed as marking arguments.

Coppola found that home signer 2's sign order was most consistently Act -

Actor - Patient/Recipient, reminiscent of a VSO word order. As is common in many signed languages, Javier used space to inflect his action signs. When he did use this form of inflection, the action sign was moved from the Actor to the Patient. Home signer 2 either used a point or a characterizing gesture to refer to the boy and girl. Interestingly, it was only when he used a point that he used spatial inflection. If he used a characterizing gesture, he did not use spatial inflection. He also produced the spatially inflected verbs without separate points or gestures to refer to the Actor or Patient. Home signer 2 used a similar TRACE gesture as home signer 1. The TRACE gesture was performed at the end of the initial utterance and always moved from Actor to Patient/Theme.

Coppola found that home signer 3 had two basic patterns. The first pattern was Patient, Actor - Act. However, the initial gesture, the Patient, was set off prosodically and therefore may be topical. The second pattern was Act - Actor, Patient - Act. Again, the comma indicates a prosodic break.

Coppola performed a second study without the use of pictures. In experiment 2, the home signers were shown a video and were asked to describe what happened in the video. In this case, they were not given pictures of the characters present in the video. In this second experiment, the word orders were found to be different from those in experiment 1.

In experiment 2, home signer 1 had a basic pattern of Actor - Patient - Act. He did not use a TRACE as he did in experiment 1. Home signer 2's pattern was sensitive to animacy. If the Patient was animate, home signer 2 produced an Actor - Act - Patient sign order. However, if the patient was inanimate, signer 2 produced

an Actor - Theme - Act sign order. Home signer 3's most consistent sign order was Actor - Act_1, Patient - Act_2. The subscripts on the actions refer to two different action signs. Home signer 3 would produce a gesture for the Actor, followed by a gesture that referred to the Act performed by the Actor. He then produced the sign for the Patient, followed by an action gesture referring to the result of the action performed by the Actor. For example, *girl hits boy* was gestured as GIRL HIT followed by BOY and a GET-HIT gesture.

2.4.1 Mothers' systems

To determine the word order of the mother's gesture systems, Coppola (2002) elicited utterances following the same methodology and used the same stimuli that were used for home signers. She found that the mother of home signer 1 had an inconsistent and unsystematic sign order. Her most common sign order was Actor - Patient - Act which occurred in 8/19 of the elicited utterances. Note that this does not correspond to her son's gesture order, which was most commonly Act - Actor - Patient/Recipient. The rest of the mother's sign orders were variable.

The mother of home signer 2 was found to have a consistent word order. However, her pattern differed from that of her son. Mother 2 had a consistent order of Actor - Patient - Act. This differs from her son's order of Act - Actor - Patient/Recipient. Again, unlike her son, she did not use a TRACE gesture to mark the Actor and Patient.

Mother 3, like mother 1, had a variable sign order. Her most common structure was Actor - Patient - Act which occurred in 9/20 of the elicited utterances.

Once again, the mother's gestures do not correspond to her son's, who had Patient, Actor - Act and Act - Actor, Patient - Act patterns.

2.5 Community sign language

In this section, I focus on the development of sign order to mark arguments in Nicaraguan Sign Language, a community home sign. Because signers entered the community at different ages and at different times, the argument structure differs by cohort. Senghas et al. (1997) examined the differences between the first generation and the second generation of Nicaraguan signers. They found that the first generation of signers most frequently produced intransitive Actors before Acts (e.g. MAN CRY). For transitive actions involving an inanimate object, the first generation of signers produced a variety of orders and were not consistent in the ordering of the two arguments. For example, MAN TAP, CUP TAP, MAN CUP TAP and CUP MAN TAP were all possible. If the transitive action involved two animate arguments, the signers never produced both arguments with a single verb in any order. The event was most often described with two actions signs which were thematically the reverse of one another. For example, MAN PUSH WOMAN FALL. If the action was ditransitive, involving two animate arguments and an inanimate argument, responses were similar to transitive actions with two arguments where a second action was signed to carry the second animate argument. This suggests that there can only be one animate argument per predicate.

Like the first generation signers, the second generation signers tended to

produce the Actor first in intransitive utterances. For events that involved an animate Actor and an inanimate Patient, the second generation tended to produce either the Actor or the Patient before the action, but not both. The most substantial difference between the two generations of signers involved transitive and ditransitive events with two animate arguments. The second generation still produced two actions, but in a different order, with the two actions occurring adjacent to one another. For example, MAN WOMAN PUSH FALL and MAN PUSH FALL WOMAN. The authors posit that the second generation of signers may have started to topicalize nouns, moving them to the front and leaving the rest of the proposition in its original position. They also posit that another possibility is that the two formally separate and independent verbs are becoming a single serial verb.

2.6 Village sign language

In this section I will briefly cover what has been found for the argument structure in two village sign languages: Al-Sayyid Bedouin Sign Language (ABSL) and Kata Kolok. ABSL arose in a endogamous Bedouin community with a high incidence of recessive deafness (Scott et al., 1995). It is estimated that there are 130 deaf individuals in the community of 3,500. Deaf people are fully integrated into village life and there is widespread use of the sign language by hearing individuals in the village (Meir, Sandler, Padden, & Aronoff, 2010). The sign language is in its third generation. ABSL uses word order to mark the arguments of verbs, which developed as SOV in the second generation of the language (Sandler, Meir, Padden, & Aronoff, 2005).

Kata Kolok developed in Bengkala, an Indonesian village (Winata et al., 1995). There are 47 deaf people out of a population of 2,186 and geneticists estimate that deafness first appeared in the village between 63 and 134 years ago, making the language around the same age as ABSL. Like ABSL, Kata Kolok uses order to mark arguments, though with an SVO sign order. However, neither ABSL (Aronoff, Meir, Padden, & Sandler, 2004) nor Kata Kolok (Marsaja, 2008) have developed spatial verb agreement.

Chapter 3

Assignment of thematic roles through sign order in RCM's system

In this section I discuss the sign order of thematic roles for the four consultants. I analyze the order for intransitive and transitive utterances in which the Actor and the Patient/Recipient is expressed with either lexical signs or points. In the case of points, I include points to real objects or points to locations previously designated for a referent. Following the discussion and breakdown of each individual signer's orders, I summarize and discuss the commonalities and differences between the signers. This is followed by a discussion on how these results compare to previous studies of home signers and their interlocutors, including typical orders and consistency within and across signers.

3.1 RCM argument order

As can be seen in table 3.1, for intransitive utterances expressed with both lexical signs and points, RCM shows a preference for an Actor - Act sign order. This tendency was stronger when the Actor was expressed with a lexical sign, with 82% of the utterances following the preferred pattern as compared to the 57% when the Actor was expressed with a point.

Lexical signs	Proportion following pattern	Points	Proportion following pattern
Actor - Act	51/62	PT.Actor - Act	30/52
Act - Actor	5/62	Act - PT.Actor	14/52
Act_1 - Actor - Act_1	4/62	Act_1 - PT.Actor - Act_1	4/52
Actor - Act - Actor	1/62	PT.Actor - Act - PT.Actor	4/52
Act_1 - Actor - Act_2	1/62		

Table 3.1: RCM's intransitive utterances.

The same preference for an Act final sign order was also seen in transitive utterances. In transitive utterances where the Actor and Patient/Recipient was expressed with a lexical sign, there was a strong preference for a Patient/Recipient $>$ Act sign order. Out of 80 utterances, 73 had a Patient/Recipient $>$ Act order as compared to 5 with an Act $>$ Patient/Recipient order. When the Patient or Recipient was expressed with a point, there was a much weaker pattern. Out of 18 utterances, 8 exhibited a PT.Pat/Rec $>$ Act order while 6 exhibited an Act $>$ PT.Pat/Rec order. As with the intransitive utterances, the proportion of utterances following the pre-

ferred order was larger than in utterances with points. For utterances with a lexical sign as Patient/Recipient, 91% followed the preferred order, compared to 44% of utterances with points.

Regardless of order, there was a strong preference for an overt Patient or Recipient over an overt Actor. In the utterances with lexical signs there were no instances where the Actor was signed with no Patient or Recipient. In the utterances with points, there were only two examples where there was no Patient or Recipient. In both cases, the intended Patient was implied either through role-shift or through context. Table 3.2 shows all transitive utterances with overt arguments signed by RCM.

Lexical signs	Proportion following pattern	Points	Proportion following pattern
Pat/Rec - Act	69/80	PT.Pat/Rec - Act	7/18
Act - Pat/Rec	5/80	Act - PT.Pat/Rec	3/18
Pat/Rec - Act - Pat/Rec	2/80	PT.Actor - Act	2/18
Actor - Pat/Rec - Act	2/80	PT.Actor - Act - PT.Pat/Rec	2/18
Act - Pat/Rec - Act	1/80	Act - PT.Pat/Rec - PT.Actor	1/18
Pat/Rec - Actor - Act	1/80	PT.Actor - Pat/Rec - Act	1/18
		PT.Actor - PT.Pat/Rec - Act	1/18
		PT.Pat/Rec - Act - PT.Pat/Rec	1/18

Table 3.2: RCM's transitive utterances

3.2 LTN argument order

In intransitive utterances with a lexical sign, LTN shows the same preference for an Actor > Act word order as RCM. Out of 19 utterances, 98% were Actor first. However, if the Actor was indicated with a point, there was no clear preference between an Actor first or Act first order. Out of 23 utterances, 39% were PT.Actor > Act order and 34% were Act > PT.Actor order. Table 3.3 shows all of LTN's intransitive utterances that were signed with an overt Actor.

Lexical signs	Proportion following pattern	Points	Proportion following pattern
Actor - Act	17/19	PT.Actor - Act	9/23
Act - Actor	2/19	Act - PT.Actor	8/23
		PT.Actor - Act - PT.Actor	4/23
		Act_1 - PT.Actor - Act_1	2/23

Table 3.3: LTN's intransitive utterances.

For transitive utterances (summarized in Table 3.4), as with the intransitive utterances, there was a clear preference for argument order when the roles were expressed with overt lexical signs. LTN's most common sign order followed a Patient/Recipient > Act order, which was also RCM's most common order. Out of 37 utterances, 84% adhered to the preferred order. However, when it came to transitive utterances with points, LTN had a very variable order. Out of fifteen utterances, LTN had ten different orders. Unlike RCM, LTN did not have a clear preference

when the arguments were expressed with points. In fact, the PT.Patient > Act order displayed frequently by RCM only occurred once out of fifteen utterances.

However, if we consider the relationships between PT.Actor, PT.Pat/Rec and Act, stronger patterns do emerge. LTN showed a preference for PT.Actor > PT.Pat/Rec which occurred in 6 out of 15 utterances compared to PT.Pat/Rec > PT.Actor which only occurred once. LTN also showed a preference for Act > PT.Pat/Rec which occurred in 9 utterances. PT.Pat/Rec > Act occurred in 3 utterances. This pattern is similar to RCM, who also displayed a much clearer pattern when the arguments were expressed with lexical signs as opposed to points. Table 3.4 shows LTN's orders when the arguments were expressed with lexical signs and points.

3.3 OMT argument order

In intransitive constructions, OMT shows a preference for Actor > Act sign order when the argument is expressed with a lexical sign but Act > PT.Actor when it is expressed with a point. All but one of the 11 (91%) lexical sign utterances were expressed with the Actor - Act sign order, which was the same preferred order for both RCM and LTN. Out of 11 utterances with points, OMT signed 9 (82%) with an Act > PT.Actor order, which differed from both RCM and LTN. OMT shows less variability in sign order than either RCM or LTN in both lexical signs and points. However, this may be due to the fact that OMT had fewer total utterances.

Lexical signs	Proportion following pattern	Points	Proportion following pattern
Pat/Rec - Act	20/37	Act_1 - PT.Pat/Rec - Act_1	3/15
Actor - Pat/Rec - Act	11/37	PT.Actor - Act - PT.Pat/Rec	3/15
Act - Pat/Rec	3/37	Act - PT.Actor	2/15
Pat/Rec - Act - Pat/Rec	2/37	Act_1 - PT.Actor - Act_1 - PT.Actor - Pat/Rec - PT.Actor	1/15
Act_1 - Pat/Rec - Act_1	1/37	Act - PT.Actor - PT.Pat/Rec	1/15
		Act_1 - PT.Pat/Rec - Act_1	1/15
		Actor - Act - PT.Actor - PT.Pat/Rec	1/15
		Pat/Rec - Act - PT.Actor	1/15
		PT.Actor - PT.Patient - Act	1/15
		PT.Patient - Act	1/15

Table 3.4: LTN's transitive utterances.

Lexical signs	Proportion following pattern	Points	Proportion following pattern
Actor - Act	10/11	Act - PT.Actor	9/11
Act_1 - Actor - Act_1	1/11	PT.Actor - Act	1/11
		PT.Actor - Act - PT.Actor	1/11

Table 3.5: OMT's intransitive utterances.

OMT does not show a clear preference in sign order when transitive utterances were expressed with lexical arguments. Arguments expressed with points had a variable sign order, with PT.Pat/Rec $>$ Act being the most prominent, occurring in 39% of the utterances. Compared to RCM, LTN and OMT had more variability in transitive utterances with points. Once again, there was a preference for an overt Patient/Recipient in the transitive utterances. In utterances expressed with lexical signs, there were no examples with an overt Actor. In utterances with points, there were only 4/33 instances where there was a point to Actor but no point to Patient/Recipient.

3.4 ACC argument order

For intransitive utterances, ACC, RCM's father, did not show a preferred sign order for either utterances with a lexical sign or utterances with a point. In both cases, the productions were split between an Actor $>$ Act order and an Act $>$ Actor order. Though this does not adhere to RCM's order, who tended to have an Actor $>$ Act order, sign order in intransitive utterances is not crucial for comprehension. With

Lexical signs	Proportion following pattern	Points	Proportion following pattern
Pat/Rec - Act	3/5	PT.Pat/Rec - Act	11/33
Act_1 - Pat/Rec - Act_1	2/5	PT.Pat/Rec - Act - PT.Pat/Rec	4/33
		Act - PT.Pat/Rec	4/33
		Act - PT.Actor	3/33
		Act_1 - PT.Pat/Rec - Act_1 - PT.Actor	2/33
		Act - PT.Pat/Rec - PT.Actor	2/33
		PT.Actor - Act - PT.Actor	1/33
		PT.Actor - PT.Pat/Rec - Act	1/33
		PT.Pat/Rec - Act - PT.Actor	1/33
		Act_1 - PT.Pat/Rec - Act_1	1/33
		Actor - Act - PT.Pat/Rec	1/33
		Pat/Rec - Act - PT.Actor	1/33
		PT.Actor - Act	1/33

Table 3.6: OMT's transitive utterances.

only one argument, variable sign order between the Actor and the Act does not affect meaning.

Lexical signs	Proportion following pattern	Points	Proportion following pattern
Actor - Act	4/8	PT.Actor - Act	4/9
Act - Actor	4/8	Act - PT.Actor	4/9
		PT.Actor - Act - PT.Actor	1/9

Table 3.7: ACC's intransitive utterances.

ACC showed more consistency in argument order for transitive utterances than for intransitive utterances. ACC shared the same preference with RCM of a Patient/Recipient $>$ Act order, with 67% of the utterances following this pattern. That same order was preferred when the arguments were expressed with points, with 63% following the pattern. ACC also had the least variability in transitive sign order when the arguments were expressed with points. However, this may also be due to the lower number of utterances in this category.

Lexical signs	Proportion following pattern	Points	Proportion following pattern
Pat/Rec - Act	26/40	PT.Pat/Rec - Act	6/11
Act - Pat/Rec	7/40	Act - PT.Pat/Rec	2/11
Pat/Rec - Act - Pat/Rec	2/40	PT.Pat/Rec - Act - PT.Pat/Rec	2/11
Act_1 - Pat/Rec - Act_1	3/40	PT.Actor - Pat/Rec - Act	1/11
Actor - Pat/Rec - Act	1/40	PT.Actor - PT.Pat/Rec - Act	1/11
Act_1 - Pat/Rec - Act_2	1/40		

Table 3.8: ACC's transitive utterances.

3.5 Summary and discussion

For argument encoding, RCM showed a preference for a specific order in all four types of utterances examined in this section (intransitives with lexical signs, intransitives with points, transitives with lexical signs and transitives with points). Regardless of whether arguments were being referred to by points or by lexical signs, RCM preferred a Actor - Act order in intransitive utterances and a Patient/Recipient $>$ Act order in transitive utterances. He displayed more internal consistency when the argument was expressed with a lexical sign than when it was expressed with a point.

The other three signers each adhered to RCM's order in some ways but deviated in others. LTN followed RCM's order in both intransitives and transitives with lexical signs, but had variable orders when arguments were encoded with a point. OMT adhered most closely to RCM's pattern with three types of utterances

following the same order pattern as RCM's, showing lower consistency in transitive utterances. ACC followed RCM's pattern for transitive utterances, but did not show an order preference for intransitive utterances. Though ACC was the only signer who had a variable order across both lexical and pointing utterances, he only had two orders for the former and three orders for the latter, which is fewer orders than RCM and LTN. The following tables show the proportion of orders for each signer and each order.

Signer	Intransitive with lexical sign	Intransitive with point
RCM	Actor - Act (51/62)	PT.Actor - Act (30/52)
LTN	Actor - Act (17/19)	PT.Actor - Act (9/23)
OMT	Actor - Act (10/11)	Act - PT.Actor (9/11)
ACC	Actor - Act (4/8) Act - Actor (4/8)	PT.Actor - Act (4/9) Act - PT.Actor (4/9)

Table 3.9: Most common order for intransitive utterances by proportion.

Signer	Transitive with lexical sign	Transitive with point
RCM	Pat/Rec > Act (71/80)	PT.Pat/Rec > Act (8/18)
LTN	Pat/Rec > Act (31/37)	Act > PT.Pat/Rec (9/15)
OMT	Pat/Rec > Act (3/5)	PT.Pat/Rec > Act (13/33)
ACC	Pat/Rec > Act (27/40)	PT.Pat/Rec > Act (7/11)

Table 3.10: Most common order for transitive utterances by proportion.

All four signers displayed higher internal consistency when the referents were expressed with lexical signs than when they were expressed with points. The hearing signers were also more likely to follow RCM's order in utterances with

lexical signs than in utterances with points (ACC being the exception for lexical signs). This lack of across signer consistency for points may be due to RCM's own internal consistency. With only 57% and 44% of RCM's signs following the PT.Actor - Act and PT.Pat/Rec > Act order, it may have been more difficult for the hearing signers to pick up on a consistent sign order. It may not be that the hearing signers are ignoring RCM's preferred order when it comes to points, but that they simply cannot identify the order when RCM himself is not consistent in his signing.

Signer	Lexical	Points
RCM	Actor - Act (51/62)(82%)	PT.Actor - Act (57%)
LTN	Actor - Act (98%)	Variable
OMT	Actor - Act (91%)	Act - PT.Actor (82%)
ACC	Variable	Variable

Table 3.11: Most common order for intransitive utterances by percentage.

Signer	Lexical	Points
RCM	Pat/Rec > Act (91%)	PT.Pat/Rec > Act (44%)
LTN	Pat/Rec > Act (83%)	Act > PT.Pat/Rec (60%)
OMT	Pat/Rec > Act (60%)	PT.Patient/Recipient > Act (39%)
ACC	Pat/Rec > Act (67%)	PT.Patient/Recipient > Act (63%)

Table 3.12: Most common order for transitive utterances by percentage.

3.5.1 Comparison to other home signers

When comparing RCM to other home signers, similar patterns emerge. RCM displayed the same preference for an overt Patient/Recipient over an overt tran-

sitive Actor as the other home signers discussed in sections 2.3 and 2.4. There were no circumstances in which RCM overtly encoded the Actor but not the Patient/Recipient (in the two examples that have a PT.Actor but no Patient/Recipient, the Patient/Recipient was encoded through role-shift and spatial modulation). As outlined in §1, this "Patient bias" was a predicted outcome as it is a common feature of home sign systems.

Unlike what has been commonly been found in other home sign studies and studies of young signed languages, RCM does not prefer two gesture sequences of Actor - Act, Patient - Act to express single transitive events, which is a common strategy in ABSL (Aronoff et al., 2004) and early NSL (Senghas et al., 1997). The hearing signers also did not prefer this strategy. Instead, when both the Actor and the Patient/Recipient were overt, the signers mostly preferred an Actor - Patient/Recipient - Act order. However, transitive constructions with two overt referents were rare. It was more common for the Patient/Recipient to be overt and the Actor to be made clear through context or role-shift.

LTN, OMT and ACC all display more consistency in their own sign order than has been found in other studies examining sign order from hearing interlocutors of home signers. In her comparison between home signers and their mothers, Coppola (2002) found in all three cases that the mothers produced differing sign order from their children. In two cases, the mothers were internally consistent and reliably produced their own order, though it differed from their children. In the third case, the mother's sign order did not reliably encode argument structure. The hearing interlocutors were predicted to not follow RCM's most common sign or-

der. These results from LTN, OMT and ACC showing a consistent ordering that matches RCM's sign order are unexpected given the previous research.

Chapter 4

Negation

In this section I describe the negation patterns of RCM's home sign system. I focus on the types of negation expressed by the signers and the ordering of the negation signs relative to the negated element. In section §4.1 I review the negation patterns in conventional sign languages and the home sign system of David, a child home signer. In the following sections I describe RCM's negation and then the negation patterns produced by the hearing signers. I found that RCM uses two different manual negation signs for four different types of negation (rejections, standard negation, existential negation and denials). I found that RCM had a strong tendency to produce the negative element after the negated sign. All three hearing signers also produce the same ordering, adhering to that produced by RCM.

4.1 Negation in other sign systems

Cross-linguistically, it has been found that all conventional sign languages have at least one uninflected negative particle ('not') that reverses the polarity of the clause

(Finnish Sign Language, proposed to only have a head shake as a negator, is a possible exception (Savolainen, 2006)) (Zeshan, 2006). Typically, negative existentials ('none') are expressed in the same way as possessive functions ('not have') in signed languages. Across sign languages, different syntactic positions for NOT have been reported. In ASL, it tends to be preverbal (Newport & Meier, 1985; Aarons, 1994), in German Sign Language it tends to be post-verbal and affixal to the verb (Pfau, 2000). In Swedish Sign Language, Bergman (1995) argues that the syntactic position of NOT is dependent on the type of verbal categories and predicates. NOT precedes adjectival and nominal predicates. In sentences containing a main verb, NOT is post-verbal (e.g. SEE NOT or KNOW NOT). In sentences where the main verb is preceded by a modal, NOT follows the modal instead. In certain classes of verbs, negation can also be incorporated into the verbal sign. For example, in ASL KNOW-NOT and LIKE-NOT are single signs with negative incorporation (Woodward & Desantis, 1977).

In a study investigating negation in the productions of David, a child home signer, Franklin, Giannakidou, and Goldin-Meadow (2011) found that David expressed three different types of negation: rejection, denial and nonexistence (identified by Bloom (1970) as the three negative meanings in the early speech of children learning English). Rejection negations, as defined by Bloom, are those in which "the referent actually existed or was imminent within the contextual space of the speech event and was rejected or opposed by the child". Denial negations are those that assert that a predication is not the case. Nonexistence does not imply the negation of a predication. Rather, it states the absence of an object or action. Out of 327

negative sentences, Franklin et al. (2011) report that David used a head shake in 276 of those constructions (84%). In the remaining utterances, David used manual gestures such as a palm swipe away from the body (7 utterances), a manual flip (38 utterances) and a shrug of the shoulders (3 utterances). Compared to David, RCM's negation appears more consistent, with two manual markers predictably expressing different types of negation.

4.2 Types of negation in RCM's home sign

RCM has two separate lexical signs for negation, glossed as NO and NONE. NO is articulated with a 1 handshape and a back-and-forth waving motion, shown in Figure 4.1. The negator NO can function as an interjection to reject the proposition made by an interlocutor, as in example 4.1. In this case, it can appear at the beginning of the utterance.

Figure 4.1: NO articulated with a 1 hand shape and waved back-and-forth.

(4.1) RCM: WASH-HAIR POINT^{soap}

‘That [soap] is for washing hair.’

OMT: NO WASH-HANDS POINT^{soap}

‘No, that [soap] is for washing hands.’

However, this section focusses on the function of NO as a standard negator and a denial negator. As a standard negator, NO occurs after the action sign and reverses the polarity of the action, as in example 4.2.

(4.2) SING SHOOT^{bird} LEAVE ANGRY SING NO

‘[The bird] sings. [I] shoot. [The bird] leaves and is angry. [The bird] doesn’t sing.’

As a denial negator, NO occurs after a nominal sign and results in the meaning of ‘this is not...’. This can be used when correcting the label of an object as in example 4.3.

(4.3) DEODORANT NO

‘That is not deodorant.’

The second lexical negator is an existential negator glossed as NONE and is articulated with a 5 handshape twisted back and forth, as shown in Figure 4.2. NONE occurs after nominal signs or points and results in the meaning ‘there are none’ (as in example 4.4) or ‘not have’ (as in example 4.5).

(4.4) MASATO DRINK POINT^{right} SUN EVENING MASATO NONE

‘[They] drink masato. By the evening, there is no masato.’

Figure 4.2: NONE articulated with a 5 hand shape and a twisting motion.

(4.5) MONEY BILL NONE

'[I] don't have any money.'

NONE can also have the meaning of 'empty', as in example 4.6.

(4.6) STOMACH NONE

'[My] stomach is empty.'

4.3 RCM negation

As described above, NO can modify either Acts (standard negation) or nominals (denial). NONE can modify nominals (existential negation). The following tables show the number of occurrences and ordering of NO and NONE when they modified an Act or a nominal. Note that NO used as an interjection was not included in this table as it was not modifying a single sign. Additionally, if NO or NONE was the only sign in the utterance, they were not counted.

Table 4.1 shows the ordering of Acts and NO. The most prominent order was Act - Neg, with 93% following this order.

Standard negation	Proportion of utterances following pattern
Act - Neg (NO)	41/44
Neg (NO) - Act	2/44
Neg (NO) - Act - Neg (NO)	1/44

Table 4.1: RCM's negation pattern for standard negation.

Tables 4.2 and 4.3 show the negation patterns for existential negation and denials, respectively. As can be seen, both orders were Nominal - Neg in 100% of the utterances in both cases.

Existential negation	Proportion of utterances following pattern
nominal - Neg (NONE)	9/9

Table 4.2: RCM's negation pattern for existential negation.

Denial	Proportion of utterances following pattern
nominal - Neg (NO)	6/6

Table 4.3: RCM's negation pattern for denial.

As shown in the tables, RCM displays a strong preference toward the negation sign following the element that is being negated for all three types of negation.

4.4 LTN negation

Like RCM, LTN produced the same types of negation using the two negation signs. For standard and existential negation, LTN had an Act - Neg and Nominal - Neg order respectively for 100% of the occurrences.

Standard negation	Proportion of utterances following pattern
Act - Neg (NO)	12/12

Table 4.4: LTN's negation pattern for standard negation.

Existential negation	Proportion of utterances following pattern
nominal - Neg (NONE)	8/8

Table 4.5: LTN's negation pattern for existential negation.

For denials, LTN's order followed RCM's order of Nominal $>$ Neg 66% of the time. However, it should be noted that there were only three occurrences of NO modifying a nominal. Given the lack of data for denials, LTN's ordering for this construction is difficult to assess.

Denial	Proportion of utterances following pattern
nominal - Neg (NO)	2/3
Neg (NO) - nominal - Neg (NO)	1/3

Table 4.6: LTN's negation pattern for nonverbal negation.

4.5 OMT negation

The three following tables show OMT's order for standard negation, existential negation and denial. As can be seen, his order was either Act - Neg or Nominal - Neg 100% of the time in all three cases. OMT produced the same types of negation and the orders follow RCM's preferred orders in negative constructions.

Standard negation	Proportion of utterances following pattern
Act - Neg (NO)	13/13

Table 4.7: OMT's negation pattern for standard negation.

Existential negation	Proportion of utterances following pattern
nominal - Neg (NONE)	3/3

Table 4.8: OMT's egation pattern for existential negation.

Denial	Proportion of utterances following pattern
nominal - Neg (NO)	4/4

Table 4.9: OMT's negation pattern for denial.

4.6 ACC negation

Unlike the other signers, ACC only produced NO and did not produce any examples of NONE in the analyzed video. ACC had only three examples of NO modifying an action sign. Across these three occurrences, the order of Act - Neg was consistent. This is the same order preference exhibited by RCM.

Standard negation	Proportion of utterances following pattern
Act - Neg (NO)	3/3

Table 4.10: ACC's negation pattern for standard negation.

ACC had no examples of the negator NONE. It is unclear if this was due to the sign being absent from his inventory or if it simply never occurred during elicitation sessions. However, it should be noted that there did not seem to be any instances where NO was being used in place of NONE. That is, there were no examples that were expressing existential negation using NO.

Existential negation	Proportion of utterances following pattern
nominal - Neg (NONE)	0/0

Table 4.11: ACC's negation pattern for existential negation.

As shown in table 4.12, for nonverbal negation, ACC's order followed the Nominal $>$ Neg order in 100% of the occurrences.

Nonverbal negation	Proportion of utterances following pattern
nominal - neg (NO)	7/7

Table 4.12: ACC's negation pattern for denial.

4.7 Summary and discussion

Within and across signers, the level of consistency is high for negative constructions. For all four signers, the most prominent sign order was the same (except that ACC did not have any occurrences of NONE). The signers were all internally consistent, LTN having the lowest rate at 66% for denials. Table 4.13 shows the most common order for each signer and each type of negation. Percentages are given for the percentage of utterances that follow the stated order.

Signer	Standard Negation	Existential Negation	Denial
RCM	Act - Neg (93%)	Nominal - Neg (100%)	Nominal - Neg (100%)
LTN	Act - Neg (100%)	Nominal - Neg (100%)	Nominal - Neg (66%)
OMT	Act - Neg (100%)	Nominal - Neg (100%)	Nominal - Neg (100%)
ACC	Act - Neg (100%)	—	Nominal - Neg (100%)

Table 4.13: Most common order across signers for negation.

Worth noting is the fact that these negation patterns do not follow negation in the dominant spoken language (Spanish). In Spanish, verbal negation occurs before the verb (e.g. 'Yo no canto' *I do not sing*). Although it can be said that RCM's negation pattern could be said to follow Máíj̱ɨ̱kì negation, I do not believe that Máíj̱ɨ̱kì has a significant influence on RCM's sign system. LTN is the only hearing signer in the study who speaks Máíj̱ɨ̱kì. In Máíj̱ɨ̱kì, verbal negation is marked with a verbal suffix as in example 4.7.

(4.7) kwàkòmáyí

kwàkò -má -yí
cook -NEG -1sg.PRES
'I am not cooking.'

Although there have not been any studies on the consistency of negation structure across home signers and their interlocutors, the previous studies discussed in §2 have shown that hearing signers rarely adhere to the sign order produced by the home signer. Given these results, it was predicted that RCM's interlocutors wouldn't be consistent in their productions of negation either.

Chapter 5

Spatial Modulation

Verbs in signed languages are typically divided into three classes: "agreement" verbs, which use space to agree with referents, "spatial" verbs, which agree with locative arguments, and "plain" verbs, which have no agreement morphology (Padden, 1983). In the previous sections, I described how RCM marks argument structure through sign order on "plain verbs". In those cases, the Actor and Patient/Recipient roles were encoded through sign order, with no spatial modulation on the action sign. In this section, I discuss the first class, usually referred to as "agreement verbs". I show that RCM has a small set of action signs that can be spatially modulated in a consistent manner to show argument structure. Not only can these action signs be modulated toward physically present referents, but also towards abstract locations that have previously been designated as occupied by a non-present referent.

In the following discussion, I will address different views and analyses of spatial agreement in signed languages. However, the framework I will be using to

describe the spatial modulation in RCM's system is Liddell's framework of mental space blends. This framework is suited for the description of RCM's system because it assumes fewer linguistic processes than other analyses. As RCM's system does not possess all the features of a full language, an analysis involving agreement morphology may be assigning linguistic sophistication that is not present in RCM's system. Liddell's framework does not make these assumptions. Furthermore, as will be discussed, the differentiation between surrogate blends and token blends is particularly well suited for describing RCM's system.

A common feature of conventional signed languages is the presence of a class of verbs that can be inflected for argument structure through movement. These verbs are inflected for person by moving the sign from the location of the subject to the location of the object. The verb can be inflected toward physically present referents or toward a location in space previously designated for a displaced referent. In Figure 5.1, we see an example of the spatial verb GIVE in ASL. In the picture on the left, the verb is inflected for a second person subject and first person object, it therefore moves from the "hearer" toward the signer. In the middle picture, the verb is inflected for second person subject and third person object. The verb moves from the location of the "hearer" toward the third person referent. In the picture on the right, the verb is inflected for third person subject and second person object and thus moves in the opposite direction.

In the case of a displaced referent, the location designated for a referent is indicated by indexing a specific locus in the signing space which I will refer to as a referential locus (r-locus). Once an r-locus has been designated for it, the

Figure 5.1: Directional agreement in ASL on the verb GIVE.

referent occupies that space until a new referent has been designated for that space. By allowing the signer to refer to the referent without resigning the same nominal every time it is referred to, r-loci perform a similar function in signed languages as pronouns do in spoken language.

There are many different views regarding the status of of spatial agreement in signed languages and the morphological complexity of spatial agreement. There is the "classic view", proposed by Stokoe, Casterline, and Croneberg (1965) who consider the movement portion of the sign to be inflectional. There is also the "simultaneity view", which states that morphemes inside the verb are expressed simultaneously with the verb and correspond to the object and subject (Meier, 1982). The "sequentiality/simultaneity view" stipulates that there is an "agreement morpheme" which consists of location features and is an independent affix (Sandler, 1989, 1986; Liddell & Johson, 1989; Shepard-Kegl, 1985). Gee and Kegl (1982, 1983) argue that agreement verbs have a LOC morpheme which is represented sep-

arately from the verb stem.

Liddell (2003), on the other hand, makes the argument that the verb is the only linguistic component with a lexical entry and that agreement depends on the representation of entities in mental spaces. Through blending *real space* and *mental space*, the signer can refer to entities that are not physically present. *Blending*, as described by Fauconnier and Turner (1996), is the cognitive process that operates over two mental spaces as inputs. The structure of the blend comes from *real space* and a *mental space*, creating a new space, termed the *blended space*, with elements from the input spaces. In sign, when using space to refer to displaced referents, one of the input spaces is *real space*, the physical space occupied by the signer. The *mental space*, occupied by the referents, is mapped onto or *blended* with the *real space*, creating a blend between physical space and the *mental space*. The displaced referents can be seen as occupying the same physical space as the signer and can thus be indexed through points or agreement verbs.

Liddell makes a distinction between two mental spaces that are occupied by displaced referents: *surrogate space* and *token space*. *Surrogate space* is blended with all of *real space*, resulting in the referents (surrogates) being normal sized and having body features. This can be seen in, for example, a shift of eye-gaze when the signer directs a verb toward the surrogate. A surrogate can also occupy the same space as the signer, a strategy used in role-shift. Therefore, when the signer points towards their own body, they are actually referring to the surrogate, not themself. *Token space*, on the other hand, blends only with the signing space. This results in the referents (tokens) being limited to the signing space. Unlike surrogates, tokens

are not full sizes, though they do have height. Following Liddell's framework, tokens cannot be used in role-shift.

5.1 Spatial modulation in home sign and community sign languages

In this section I describe the previous findings on the use of spatial modulation in other home sign systems and community sign languages. I cover child home signers, adult home signers and the development of spatial modulation in Nicaraguan Sign Language. Village sign languages do not have a dedicated section as spatial modulation is posited to not develop for several generations in village sign languages. For example, spatial modulation has not been found in Al-Sayyid Bedouin Sign Language (Aronoff et al., 2004) or Kata Kolok (Marsaja, 2008), two third-generation village sign languages with widespread use within their respective communities.

5.1.1 Spatial modulation in child home sign

Goldin-Meadow and Mylander (1990) report that David, an American child home signer, used spatial displacement of the action sign to indicate arguments of the action, similarly to how many conventional sign languages mark inflectional morphology on verbs. The child home signer produced utterances wherein the action sign was moved toward the physically present Patient/Recipient. Note, however, that this use was purely indexical. The child employed this type of spatial mod-

ulation only towards physically present entities and could not assign an abstract location in space to a referent. Other than this indexical use of spatial agreement, the home signing children were found to mark argument structure solely with sign order and not with spatial modulation.

Though the majority of the home signing children did not use spatial modulation to mark arguments, this is not evidence that spatial modulation would not develop later. At the time of the studies, no child was older than 4;9 and it may be the case that they simply had not developed spatial agreement yet. Even in children acquiring ASL as a first language spatial agreement is not typically acquired until age 3;6 (Meier, 1991). Therefore, it may simply be the case that the home signing children simply hadn't begun to use spatial modulation at the time of the study. We must therefore look to adult home signers to assess whether or not the development of spatial modulation is possible without linguistic input.

5.1.2 Spatial modulation in adult home sign

Coppola (2002) found that only one of her three home signing research subjects used spatial modulation of the Act gesture to encode argument structure. As with what was observed in David's use, this adult home signer only used spatial agreement to refer to physically present objects. Otherwise, all three of the home signers used sign order to encode the Actor and Patient. Interestingly, two of the home signers also used what she called a TRACE gesture to encode the Actor and Patient. In this case, the signer gestured an arc that was traced in the air between the two referents. As the TRACE was always from the Actor to the Patient/Recipient,

it was analyzed as marking arguments. However, once again, this spatial sign was used only with physically present referents and never to refer to displaced referents.

In descriptions of short vignettes, Coppola and So (2005) report that two of four Nicaraguan adult home signers used spatial modulation along with abstract space. That is, the home signers used a point to identify the location of the referent in space and directed a spatially modulated sign toward that location. If the point was directed toward an empty spatial location, it was categorized as abstract deixis. The other two signers relied on person-anchored deixis (using another person in place of the referent from the vignette), finger-anchored deixis (points to fingers as referents) or sign order to encode argument structure.

5.1.3 Spatial modulation in community sign language

In her dissertation, Senghas (1995) analyzed the differences in the production of Nicaraguan signers who were exposed to the developing language as young children to those who were exposed as adolescents and adults. The input that the young Nicaraguan children were exposed to provides a contrast to the input Goldin-Meadow and Coppola's home sign subjects were exposed to.

In one study, Senghas analyzed the production of verbal spatial agreement in three different groups totaling 25 signers, which were divided by age of entry into the school. The three groups and their age range of entry were: *young*: 0;0–6;6 n=8; *medium* 6;7–10;0 n=8; *old* 10;1–27;5 n=9. Here, I concern myself with her results on spatial agreement. Senghas results were collected by videotaping the signers narrating a video they had watched. The different structures of interest were

quantified by group and compared between the groups. I will be focusing only on the results of the spatial verbal inflection.

In their narratives, Senghas found that the signers from the *young* and the *medium* age group produced three times more verbs with spatial agreement than did the signers from the *old* group. She did not find any statistical difference between the *young* and the *medium* groups. Based on these results, age of entry, and thus age at exposure to the developing sign language, is a crucial factor in the use of spatial agreement forms.

5.2 Spatial modulation in RCM's home sign system

As discussed in section 3, RCM has a consistent means of marking argument structure through sign order. However, like conventional sign languages and, as discussed above, some emerging sign languages and home sign systems, he has also developed a strategy for marking arguments through spatial modulation of the action sign. In this case, RCM moves the action sign through space toward the location of the Patient or Recipient (either in *real space, surrogate space* or *token space*). Notice that this is slightly different to spatial modulation in conventional sign languages, which mark both the subject and the object of the verb through movement. RCM was only consistent in marking the Patient or Recipient through spatial modulation, but not the Actor. Although some examples do appear to display movement beginning at the location of the Actor and ending at the location of the Patient/Recipient, this was most likely not productive and may have only been

coincidence in those instances. In the following sections, I describe RCM's use of spatial modulation and the hearing signers' use of spatial modulation.

5.2.1 RCM's spatial modulation

As is common in other home sign systems and village sign languages, RCM uses real space (also referred to as Object-Anchored Deixis Coppola and So 2005) to refer to referents. For example, nearby villages and towns did not have individual signs, but instead were referred to with a point. This point could be modified for distance, if there were multiple possible referents in that direction. Similarly, people could be referred to by pointing in the direction of their house. Even when the person was referred to by a name sign, this was almost always followed by a point to their house. This strategy of using concrete space is also common in other sign systems, from emerging sign languages to fully conventionalized national sign languages.

In addition to using concrete space to point out referents, RCM also spatially modulated signs toward the real world location of the referent. Although similar to what has been observed in other sign languages, RCM inflected action signs toward referents that were not visible. David, the child home signer, was observed to use some spatial agreement, inflected only toward physically present and visible referents (Goldin-Meadow & Mylander, 1990). Similarly, the adult home signers studied by Coppola (2002) only used spatial agreement when they had a picture to refer to.

RCM was observed using spatial modulated with a small set of actions

signs. These were SHOOT, SCORE-GOAL, PUNCH, RECORD and GIVE. As we will see, not every instance of these signs were accompanied by spatial modulation. In some cases, there was no overt Patient/Recipient and therefore no need to use spatial modulation to mark arguments. In other cases, there was an overt argument but it was marked through sign order rather than spatial modulation.

One such action sign that could be spatially inflected for the Patient was the sign SCORE-GOAL. The Patient was marked on this sign by directing the sign toward the referent. In Figure 5.2, RCM signs the uninflected form of SCORE-GOAL as part of the utterance 'No goals are scored'. In this case, there is no overt Actor or Patient and therefore the Act sign is not inflected for person. In Figure 5.3, however, RCM signs SCORE-GOAL with spatial modulation. In this example, RCM is describing playing soccer against the village down river (Puerto Huaman) which, in this case, is behind him.

Instead of using a lexicalized sign or a point for the village that he is referring to and relying on sign order to mark the arguments of the action, RCM inflects the sign toward the physical location of the village. This use of *real space* does not require a mental space blend. Even though RCM is using the grammatical feature of spatial modulation, he is still relying on indexicality to point out the argument of the action sign. A blend is not necessary as the location of the referent corresponds to *real space* and there is no imagined referent in *surrogate space* or *token space* that requires a mental space blend. In contrast, in the following examples, I discuss how RCM uses *surrogate space* and *token space* to refer to displaced referents when no referent in *real space* is available to him.

Figure 5.2: SCORE-GOAL uninflected
"No goals are scored."

In the following example illustrated in Figure 5.4, RCM describes hunting monkeys. He signs the lexical sign for monkey and then modulates the sign SHOOT upwards, toward where a monkey would be in a tree. If this utterance were only interpreted as taking place in *real space* we would be forced to conclude that RCM was describing shooting a monkey that was in the ceiling of the house. However, that was not the case. Furthermore, had he wanted to use a real object to indicate his meaning, he could have indicated one of the trees outside the house to convey the meaning that the monkey was in the tree. Instead, he spatially modulates the action toward an imagined monkey above him in an imagined tree.

This example should be categorized as use of *surrogate space* because the action is modulated toward a referent outside of the signing space. As can be seen in Figure 5.4, the sign is pointed toward a location well above RCM's head, which is not part of the signing space. Furthermore, surrogates have height, which the

Figure 5.3: SCORE-GOAL$^{Puerto\ Huaman}$
"We score goals against Puerto Huaman."

referent clearly possesses in this example. Through a mental space blend which consists of *real space* and a *surrogate space* occupied by the monkey in the tree, RCM is able to refer to the imagined monkey, despite there being no real world monkeys or trees above him. The fully sized monkey and tree were mapped onto the *real space* of the house, resulting in the Act sign being spatially modulated toward the ceiling. For this sign to be properly interpreted, this mental space blend must be assumed.

The above example describes RCM's use of *surrogate space*. In the following example, RCM uses *token space* to refer to two displaced referents. In Figure 5.5, RCM describes how a girl hit a boy. The images below show the portion of the utterance in which he identifies the location for the boy and then spatially modulates the action (PUNCH) towards the location identified for the boy. Notice that the action of punching has lost much of its mimetic quality (a punch to the side with a rotated wrist as opposed to a punch forward). RCM is sacrificing some iconicity of

Figure 5.4: MONKEY SHOOT^{monkey} FALL
"[I] shoot the monkey and it falls."

the sign in order to include information about the semantic arguments of the action. The two referents are limited to the signing space and do not appear to be full sized (two children could not both occupy the spaces indicated). Therefore, this example can be categorized as use of *token space*.

This class of spatially modulated action signs was significantly smaller than the class of signs that were not spatially modulated. I observed only five signs that were spatially modulated (SHOOT, SCORE-GOAL, PUNCH, RECORD and GIVE). Not every instance of these action signs were spatial modulated. For example, in Figure 5.2, SCORE-GOAL was not spatially modulated because there was no overt reference. In other cases, RCM used sign order to communicate the argument structure. Table 5.1 shows the total number of tokens for each action and the number of tokens that were spatially modulated. In the following section, I will compare these results to what was produced by the hearing signers.

(a) MALE

(b) POINT^{boy}

(c) PUNCH^{boy}

Figure 5.5: FEMALE CHILD MALE POINT^{right} PUNCH^{right}
"The girl punched the boy."

	Tokens with spatial modulation	Total tokens
SHOOT	12	21
SCORE-GOAL	4	8
PUNCH	5	12
RECORD	4	4
GIVE	17	34

Table 5.1: RCM's use and proportion of spatial modulation.

5.3 Hearing signers' use of spatial modulation

In this section, I describe the use of spatial modulation by the hearing signers who interact with RCM. All three hearing signers used space to some extent to mark argument structure. However, all three signers used space less than RCM. That is, all three signers had a smaller set of signs that could take spatial modulation when compared to RCM. In addition, the proportion of signs that were spatially modulated was smaller than the proportion of signs produced by RCM with spatial modulation. Interestingly, LTN and ACC both each used spatial modulation with an action sign that RCM did not spatially modulated (SEE and TIE respectively). All three signers had the sign SHOOT in common. Only LTN seems to make use of *token space*. OMT and ACC both used *surrogate space* but not *token space*.

The example below in Figure 5.6 shows LTN using spatial modulation on the sign LOOK. The sign moves from in front of the eyes toward the Patient of the action, in this case an image on a card. Note that, like RCM, LTN does not encode the Actor through movement. The Actor (RCM) was indicated with a point, rather than through movement. This example further shows that in RCM's system, only the Patient or Recipient is marked through movement, which is contrary to what is seen in conventional sign languages.

This use of spatial modulation on SEE as produced by LTN does not follow RCM's productions of SEE. Compare LTN's production in Figure 5.6, in which LTN maintains the same handshape, moving the sign toward the Patient (the card), to RCM's production in Figure 5.7. RCM does not retain the 2 handshape when

Figure 5.6: SEE^{card}
"Look at the card."

indicating the Patient. Instead, he changes his handshape to an index and points toward the Patient. In addition to the handshape difference, LTN produced the sign with a single, fluid movement from the start of the sign at the eyes and toward the Patient. RCM, on the other hand, produces two distinct movements. The sign SEE begins at the eyes and moves outward. The hand is then lowered to a chest height, there is a change to a 1 handshape which is then moved outward toward the referent. There were no examples from RCM producing SEE with spatial modulation.

The example in Figure 5.8 shows ACC spatially modulating SHOOT toward a surrogate. In this example, he is referring to a peccary. ACC first pointed forward, indicating the location of the peccary and then spatially modulated the action sign toward the location that was indexed. As with the example shown for RCM, ACC uses the same strategy of a mental space blend to indicate a referent that is not physically there.

Unike ACC and OMT, LTN was the only hearing signer observed to use

Figure 5.7: SEE^{forward} POINT^{forward}
"I see that there."

token space. When asked to sign "The girl hit the boy," LTN indicated two separate locations for the girl and the boy, followed by a spatially modulated sign for PUNCH which moved toward the location assigned to the boy. LTN was then asked if he could sign the sentence "The boy hit the girl". In this case, LTN again assigned two separate locations in space for the two referents and then spatially modulated the sign for PUNCH toward the location assigned for the girl. These two examples form a clear contrast, showing that spatial modulation was used with the Act sign to indicate the Patient of the action. These two utterances were nearly identical to the utterance made by RCM given in Figure 5.5. Again, this utterance should be categorized as *token space* rather than *surrogate space* because the locations assigned for the referents were limited to the signing space and the tokens were not shown to be full sized.

As with sign order, RCM displayed greater complexity and consistency than did the hearing signers. All three hearing signers had fewer signs with which they

Figure 5.8: SHOOT^{peccary}

used spatial modulation. The hearing signers also had a smaller proportion of signs that were modified with spatial modulation. In the cases where there was no spatial modulation of the Act signs, the signers either used sign order or there was no overt Patient. Table 5.2 shows LTN's spatial modulation signs and the proportion of those that were modified with spatial modulation. Three of the four signs were signs that RCM also spatially modulated (SHOOT, RECORD and PUNCH). In addition to these three signs, LTN also used spatial modulation with the sign SEE contrary to RCM's use of SEE, which was never modified spatially.

	Tokens with spatial modulation	Total tokens
SEE	5	21
SHOOT	1	7
RECORD	1	1
PUNCH	2	5

Table 5.2: LTN's use and proportion of spatial modulation.

Table 5.3 shows OMT's use and proportion of spatial modulation. OMT was observed using spatial modulation with only one sign: SHOOT. The proportion of tokens with spatial modulation were smaller than RCM's. It should be noted, however, that OMT did not produce any examples of PUNCH, GIVE or RECORD. It is therefore unclear whether or not OMT would produce these Act signs with spatial modulation. OMT did produce one example of SCORE-GOAL. However, this was produced with no spatial modulation.

	Tokens with spatial modulation	Total tokens
SHOOT	2	16

Table 5.3: OMT's use and proportion of spatial modulation.

Table 5.4 shows ACC's use and proportion of spatially modulated action signs. ACC was observed to use spatial modulation with two action signs: SHOOT and TIE. ACC had a high proportion of spatial modulation on the sign for SHOOT which is similar to RCM's proportion for that particular sign. ACC produced one instance of TIE with spatial modulation. There were no examples of PUNCH, SCORE-GOAL, GIVE and RECORD from ACC. It is therefore unclear whether or not ACC would produce these signs with spatial modulation.

	Tokens with spatial modulation	Total tokens
SHOOT	9	21
TIE	1	10

Table 5.4: ACC's use and proportion of spatial modulation.

To summarize, LTN, ACC and OMT were all observed to use spatial modulation of action signs with abstract space, but only LTN was observed using *token space*. The other two signers, OMT and ACC, did use abstract space, but only through *surrogate space* and not through *token space*. Furthermore, RCM seemed to rely on spatial modulation to mark argument structure more than the hearing signers. The proportion of those signs used by RCM that were marked with spatial modulation was higher than for the proportion of signs marked with spatial modulation for the hearing signers. This furthers the argument that RCM is the leader of innovation in the signing system. Similar to what was discussed regarding sign order, the hearing signers in this study adhere more closely to RCM's system than has been previously observed in home sign studies. Coppola (2002), whose work focuses on adult home signers, and Goldin-Meadow and Mylander (1998), whose work focuses on child home signers, reported that none of the mothers used spatial modulation to encode argument structure when signing with their children.

Chapter 6

Discussion

In this paper, I have described the sign order and spatial modulation in RCM's home sign system. To encode argument structure, the most common sign order used by RCM was Actor - Act in intransitive constructions and Patient/Recipient - Act in transitive constructions for both argument expressed with lexical signs and arguments expressed with points. RCM was more consistent in his ordering when the arguments were expressed with lexical signs. It was found that most of the hearing signers adhered to this order, but with less consistency than RCM. These findings differ from what has been seen in other home sign studies where the hearing interlocutors did not adhere to the signing order of the home signers at all. However, similar to previous studies, RCM does appear to be the leader of innovation in his system, given that he is more structured and consistent in his productions, with the hearing signers following his structure, rather than the other way around.

RCM's system has two different lexical signs for negation, NO and NONE, which are used for standard negation, denials and existential negation. RCM and

the hearing signers all consistently signed the negative sign after the sign that was being negated (for example, SING NO or MASATO NONE). As with sign order to express argument structure, the ordering of negation shows that RCM's interlocutors are consistent across their own utterances and follow RCM's order.

In examination of the use of spatial modulation to encode argument structure, I used Liddell's framework of mental space blends to analyze production because this framework distinguishes between *surrogates* and *tokens*, two strategies for referring to displaced referents. It was important to make this distinction because, as we saw, although all four signers did use spatial modulation, only RCM and LTN made use of *token space*. The other two signers were limited to real space and *surrogate space*. Furthermore, Liddell's framework avoids assigning linguistic sophistication that may not be present in RCM's home sign system. In addition to using more complex abstract space than the hearing signers, RCM also produced more types of action signs that could be spatially modulated and the proportion of total tokens with spatial modulation was larger than for the hearing signers.

RCM's system is an example of a home sign system that developed among willing interlocutors. The hearing signers who interact with him adhere to his system and display a high level of internal and across signer consistency. These results differ from the results of previous research on home sign systems. As discussed in previous sections, child home signers seem to be the ones "leading" the creation of their gesture system in that they are contributing the most to the conventionality of their system, with their parents following (or not, in the case of the American parents). In the adult home signers, it was found that the parents tended to not adhere

to the same system as their children, despite their being internal consistency in the system itself. These results raise the question of what kind of interaction is needed for a home sign system to flourish and develop more complex features. The hearing people who interact with RCM seem to behave differently than those who interact with the home signers in previous studies. Does this type of interaction, where the hearing signers tend to defer to the home signer, lead to more conventionality across hearing signers within the community? This is a question I plan to pursue in future research with more controlled studies. By testing the level of mutual understanding and conventionality of the system among hearing signers, I will be able to better answer how the attitudes and behaviors of the hearing interlocutors can affect the development of a home sign system.

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