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A comprehensive study of referring expressions in ASL

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A COMPREHENSIVE ANALYSIS OF REFERRING EXPRESSIONS IN AMERICAN SIGN LANGUAGE

by

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DEDICATION

This dissertation is dedicated to my family.

At each step, this work was for my powerful little boy, *Cam*,

for my incredible and amazing main-man, *John*,

And, most of all, for *Janey,* who made it all possible.

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ABSTRACT

Substantial research has examined how linguistic structures are realized in the visual/spatial modality. However, we know less about linguistic pragmatics in signed languages, particularly the functioning of referring expressions (REs). Recent research has explored how REs are deployed in signed languages, but much remains to be learned.

Study 1 explores the inventory and workings of REs in American Sign Language by seeking to replicate and build upon Frederiksen & Mayberry (2016). Following Ariel, F&M propose an inventory of REs in ASL ranked according to the typical accessibility of the referents each RE type signals. Study 1 reproduced their results using more complex narratives and including a wider range of REs in various syntactic roles. Using Toole's (1997) accessibility rating protocol, we calculated average accessibility ratings for each RE type, thus making possible statistical analyses that show more precisely which REs differ significantly in average accessibility. Further, several RE types that F&M had collapsed are shown to be distinct. Finally, we find general similarities between allocations of REs in ASL and in spoken English, based on 6 matched narratives produced by native English speakers.

Study 2 explores a previously unexamined set of questions about *concurrently*

occurring REs: collections of REs produced simultaneously. It compares isolated REs that occur in a linear fashion, similar to spoken language grammars, with co-occurring REs, signaling multiple referents simultaneously (termed here *constellations*). This study asks whether REs in constellations have pragmatic properties different from those of isolated/linear REs. Statistical evidence is presented that some categories of REs do differ significantly in the average accessibility values of their referents, when compared across linear versus concurrent configurations.

Study 3 examines whether the proportions of various RE categories used by native ASL signers vary according to the recipient's familiarity with the narrative. Do ASL narratives designed to be maximally explicit because of low recipient familiarity demonstrate distinct RE allocations? In this sample of 34 narratives, there is no statistically significant difference in RE use attributable to recipient familiarity.

These findings have important implications for understanding the impact of modality on accessibility, the use of REs in ASL, and visual processing.

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LIST OF ABBREVIATIONS

AGR…………………………………………………………………………… Agreement

BU……………………………………………………………………….Boston University

CA…………………………………………………………………...…Constructed Action

DCL…………………………………………………………………Descriptive Classifier

DD…………………………………………………………………. Definite Determiner

ICL………………………………………………………………... Instrument Classifier

IX…………………………………………………………………….……….Index

SCL……………………………………………………………….…… Semantic Classifier

CHAPTER ONE

1. Rationale for the Study

In the 50 years since signed languages have been acknowledged as full-fledged languages (Stokoe, 1960, 1978; Bellugi & Fischer, 1972) there has been a substantial body of research devoted to investigating many of their linguistic features. We have learned a great deal about how formal linguistic structures are realized in the visual/spatial modality (See Emmorey & Lane, 2013; Emmorey and Reilly, 2013; Liddell, 2003; Vali & Lucas, 2000 for summative accounts of ASL linguistic research). There is also a body of work, albeit comparatively smaller in scope, that has investigated how discourse pragmatic functions are linguistically signaled in signed languages (see Lucas, 2014; Winston, 1999 for summaries of work on ASL pragmatics). However, we know significantly less about the pragmatic functions of linguistic structures in signed languages than we do about how pragmatics works in spoken languages. This is especially true as it relates to the study of referring expressions (RE), which have received abundant attention in the literature on spoken languages (e.g., studying how context impacts variations in discourse practices, implicatures, or composition strategies unique to certain text types). There are some studies that have explored how REs are deployed in signed languages (Morgan 2006; Swabey, 2011; Bel, Ortells & Morgan, 2015; Frederikson & Mayberry, 2015; 2016; Perniss & Özyürek, 2015), however, there is still much to learn.

1.1. Background on Referring Expressions

REs are an important part of the pragmatic system of any language as they play an especially significant role in promoting coherence and successful communication. In basic terms, REs are coordination signals sent by speakers/signers during discourse. These signals are reflective of the expectations/assumptions that speakers/signers[1] have about how accessible an entity is, or should be, to an addressee/perceiver. Each language has an inventory of REs (signals) at its disposal ready to be strategically deployed in order to provide appropriate information about an entity's identity as well as the position the entity in question is assumed to occupy in the cognitive status of an addressee/perceiver (Ariel, 1988, 1990; Gundel, Hedberg, & Zacharski, 1993; Almor & Nair, 2007). Importantly, the signaling process represents only one part of the bilateral coordination that referring requires. Addressees/perceivers must interpret these signals and, in that interpretation, there is an expectation that the signals the receive are appropriate to the context.

Because referring requires coordination between the senders and receivers of signals, studying how REs are deployed in discourse provides important and interesting insights into the complexity of the joint-action that underlies everyday discourse practices (Clark, 1996a). These insights are important because much of the pragmatic work we do is unconscious and invisible to interlocutors. Pragmatic skills are often a part of what Gee (1997) has referred to as *discourse identities*. In other words, pragmatics includes the

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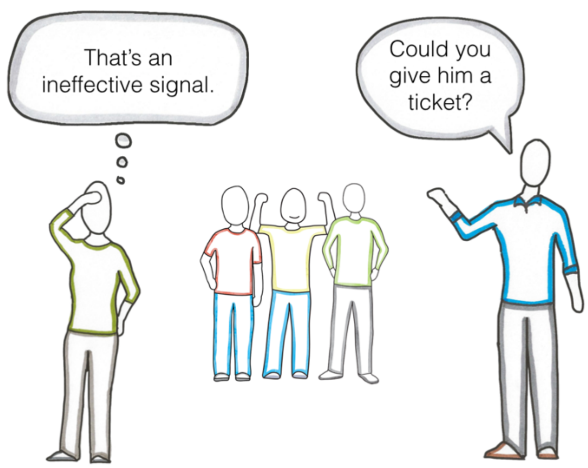
[1] The terms *signer* and *perceiver* will be used to denote the expressive and receptive roles that interlocutors assume in sign language discourse, paralleling the *speaker/listener* designation used in spoken language research.

skills and practices to which we have been apprenticed all our lives, we get them *for free* and, more often than not, the principles that guide those pragmatic actions are inaccessible to us. Studies about pragmatics are, therefore, important because they help to illuminate the strategies we employ so that we can learn more about the act of referring and, perhaps, leverage what we learn for productive purposes.

In order to briefly illustrate an example of how referring *works*, let us consider the following context and its implications for the scenario outlined below in Illustration 1.1. A woman is handing out tickets at an event where she sees a colleague she does not know well. To her surprise, the colleague informs her that he has a son who is also at the event. As his son is in need of a ticket, the colleague makes the following request while looking at a group of boys, "*Could you give him a ticket*?"

Illustration 1.1 Example of a Coordination Breakdown in the Act of Referring



Understandably, the woman in our scenario is confused. In this unfamiliar context, the colleague has chosen to signal his son using the RE, *him*, which is not a signal explicit enough to illuminate his son. In this context, with limited background and multiple competitors, appropriately introducing his son to the discourse requires a highly informative RE such as a definite description (e.g., the boy with his hands up, the boy in red, etc.).

Additionally, our addressee (the woman) takes the proposition "*Could you give him a ticket*?" as a signal indicating that she should know who *him* is. Again, because interlocutors assume that referring aims to achieve bilateral coordination the woman is perplexed, and most likely goes through an internal monologue that asks, "Wait, why did he use the RE *him*? Did he describe his son and I missed it? What went wrong here?" This scenario showcases the implicit joint-action that characterizes every act of referring. Effective discourse requires consistent, tacit evaluation of the extent to which we share mutual beliefs and discourse participants must "co-ordinate not only on the content of what they say…but also on the processes by which they establish that content" (Clark,1996b: 329).

This example also provides us with an opportunity to understand the inverse relationship between the accessibility of the entity and the informativeness of the RE we use to signal that entity in discourse, which is the basis of Ariel's *accessibility theory* (1988; 1990). Much of the analysis that has been done on REs in spoken as well as signed languages has applied Ariel's principles, including the present study.

For instance, in the scenario outlined in Illustration 1.1, the son is *inaccessible* to the woman (i.e., she has no idea who *him* is supposed to be) and, therefore, she requires an RE that is *highly informative* (i.e., a definite description such as "the boy with the green top"). Using a definite description serves as a signal confirming that everyone in the discourse is well-aware that the entity (the son) is new and unfamiliar.

Conversely, if the woman in our scenario was an old family friend who was very close with her colleague's son (i.e. the son was *highly accessible*) that scenario would only require a *minimally informative* RE. We can imagine that in this context, having being informed that the son is also at the event, the very same signal, "*Could you give him a ticket*?" would work as an effective contribution to this referring action.

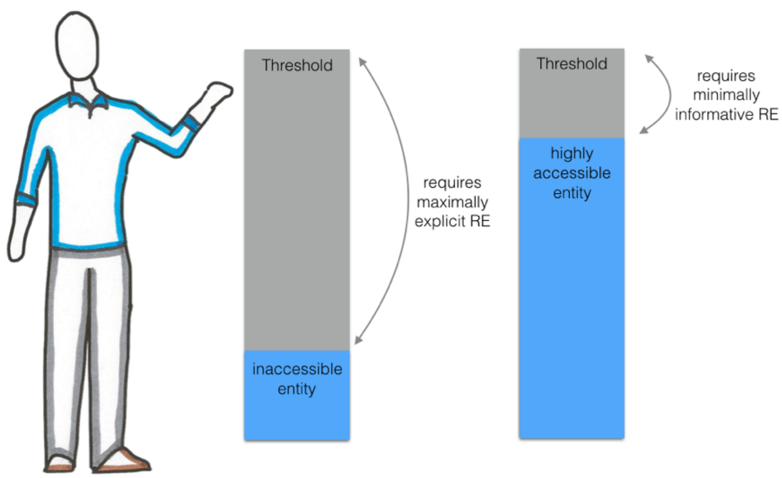
Finally, if we continue with the same "old family friend context" (i.e., the son is still *highly accessible*), and if in this context, the colleague decided to deploy an RE that was *highly informative* (i.e. a definite description) such as "*Could you give the boy in the yellow top a ticket*?" this choice would result in similar confusion, causing the woman to puzzle over why an RE signaling unfamiliar status was deployed. She would once again engage in an internal monologue asking, "Wait, I've seen his son grow up, does he really think I don't know who his son is? Maybe he's trying to be funny? Maybe he has early onset dementia?" and so on. This example further illustrates how we must be strategic in deploying REs, because not only do under-informative REs cause a breakdown in coordination (Illustration 1.1), so too, do overly-informative REs (as in our last scenario).

Using these examples, we can also more easily understand the inverse relationships that characterizes referring. This principle has been described at length in the literature where researchers have demonstrated how we work together as speakers/signers and listeners/perceivers in applied discourse to coordinate references and maintain cohesive dialogues (Ariel, 1990; Gundel, Hedberg, & Zacharski, 1993; Almor & Nair, 2007).

Figure 1.1 is designed to highlight the inverse relationship between accessibility and informativeness in Ariel's *Accessibility Theory* (1988; 1990).

Figure 1.1 An Example of the Inverse Relationship Betweeen Accessibility and Reference in Ariel's Accessibility Theory (1988).

Two shaded blocks, where the blue shading represents the levels of contextual, environmental, or linguistic information already available to a listener/recipient. The grey area indicated by the arrows represents the threshold necessary for effective referring. The informativeness of RE signals will vary depending on the necessary "quantity left" to fully satisfy the threshold. In this way, we can see the inverse relationship between the accessibility of references and the informativeness of expected RE signals.



In each act of referring, the amount of "information" that is needed in order to satisfy the informational threshold (i.e., the unfilled grey space in Figure 1.1) is dependent on the level of accessibility of our referent, which is impacted by several factors; these include how well-known the referent is based on shared knowledge and community membership, how recently the entity has been mentioned in the previous discourse, and how many competing entities are present in the discourse (Ariel 1990; Arnold, 2010; 2008, Clark & Wilkes-Gibbs, 1986). In order to satisfy the quantity of "unfilled space" in Figure 1.1 speakers/signers must take into account all of these factors so that the space is filled by an appropriately informative RE of our choosing.

The complexity of referring is compounded when we consider the range of *discourse statuses* that entities can occupy in the discourse, because each status is often associated with typical signals (REs). Ariel (1990) describes these three discourse statuses. An entity can be *introduced* (i.e., an entity's first mention in the discourse, as in Illustration 1.1); an entity can also be reintroduced (i.e., the entity is discourse old, but after having gone out of focus, is brought back into focus), and, finally, an entity can be *maintained* (the entity is discourse old and is kept in focus, occupying a *front-and-center* position in the discourse) (Ariel, 1990). In order to signal the status that entities occupy in the discourse (e.g., this entity is new, this entity is being reintroduced, this entity is being maintained), we deploy particular REs associated with signaling newness, reintroduced status, or maintained status. The principles determining which RE signals which discourse status roughly follow the inverse relationship between referent accessibility and RE informativeness discussed above.

Ariel (1990) identified a range of four RE types in English, each of which sends a particular signal about entities in the discourse and each of which is typically associated with entities occupying a particular status in the discourse.

Definite Descriptions: The tall boy, The orange soda can, The student I told you about

Demonstratives: This woman, That kid

Pronouns: he, she, him, it

Null: e.g. ∅ contains gluten, ∅ ran into John this morning.

In Ariel's framework, we most typically deploy definite descriptions to signal entities that are highly inaccessible (entities that occupy new or reintroduced status into the discourse), followed by demonstratives (typically signaling entities reintroduced into the discourse), pronouns signaling highly accessible entities (which typically occupy maintained status) and finally, null forms which signal the most highly accessible entities in the discourse.

If we consider all the factors that must be taken into account when we refer (including considerations related to the context of the situation, the range of RE signals at our disposal, and the discourse status occupied by the entity) it reveals the substantial intricacy that characterizes this process. The result of investigations such as these is a "deeper understanding and appreciation of the complexity and expressive elegance of particular languages and the uniquely human system of linguistic communication" (Ladusaw, 2012).

Languages offer a variety of REs from which we can choose, and each option from the inventory of referring expressions available to us occupies a unique status, sending different accessibility signals about our referent based on a correlating rank in an *accessibility hierarchy* (Ariel, 1988, 1990; Gundel et al., 1993). The value in studying REs rests with how they help to reveal our beliefs about what our communicative partners *should know*, or information they *should need* in order to promote understanding.

In order to maximize the coherence of discourse, interlocutors rely on each other to effectively deploy and interpret REs to ensure that we all know *to who* or *to what* we are referring (Ariel, 1990; Clark & Wilkes-Gibbs, 1986; Clark, 1996; 2005; Gundel et al., 1993).

1.1.2. Inventory of Referring Expressions in ASL

Because ASL has such a rich inventory of referring expressions, with a wide array of pronominal-like referring options (Friedman, 1975; Hoffmeister, 1978; Supalla, 1982, 1986; Kegl, 1986, 1987; Winston, 1991; Friedman, 1975; Sandler & Lillo-Martin, 2006; Liddell, 2003) it presents us with an important opportunity to understand how REs might be deployed differently in signed languages than they are in spoken languages. Many of these referring types are not linear (i.e., they are *less lexical* than the RE options we typically see in spoken languages) and they can be expressed using visual-spatial or non-manual devices. This dissertation will treat all ASL referring types, regardless of their linear, spatial or non-manual character as *overt* references. Because much of what we know about language and pragmatics has been based on spoken language research, there is a tendency to regard linear constructions in ASL (i.e., those that most closely align with spoken forms) as overt, and to consider ASL's non-linear devices as "zero-anaphora" forms.

Additionally, the poly-componential character of ASL creates the possibility for depicting referents concurrently. We propose a new category for those REs from the entire inventory of referring expressions that can, and do, occur simultaneously (constellations). Part of the nature of a visual/spatial language is its ability to depict referents concurrently and many of the forms above can co-occur; acknowledging and exploring this feature of the signed modality is one of the novel contributions of the present research. All of these options raise interesting questions about a how these forms are deployed in discourse, how we think about competing discourse statuses in concurrent structures, and where the larger range of REs fall on a hierarchy of accessibility in ASL. The range of referring forms in ASL will be described in detail in Chapter 2.

1.1.3. Ideas about Accessibility in Signed Languages

Researchers have begun investigating patterns of REs in several signed languages, including ASL (Morgan, 2006; Swabey, 2011; Perniss, 2007; 2008; Perniss and Özyürek, 2008, 2015; Bel, Ortells & Morgan, 2015; Frederiksen &Mayberry, 2015, 2016). Some of these studies have already proposed hierarchies outlining REs that carry greater and lesser informational loads (Morgan, 2006; Frederiksen & Mayberry, 2016). The most extensive of these is by Frederiksen &Mayberry (2016), where they proposed the following hierarchy:

Table 1.1 Proposed Hierarchy of Accessibility in Frederiksen & Mayberry (2016)

Signal	
Inaccessible Entity	Nouns
	SaSSes
	Agreement Verbs and Constructed Action
	Null (zero anaphora from plain verbs)
Highly Accessible Entity	Semantic Classifiers

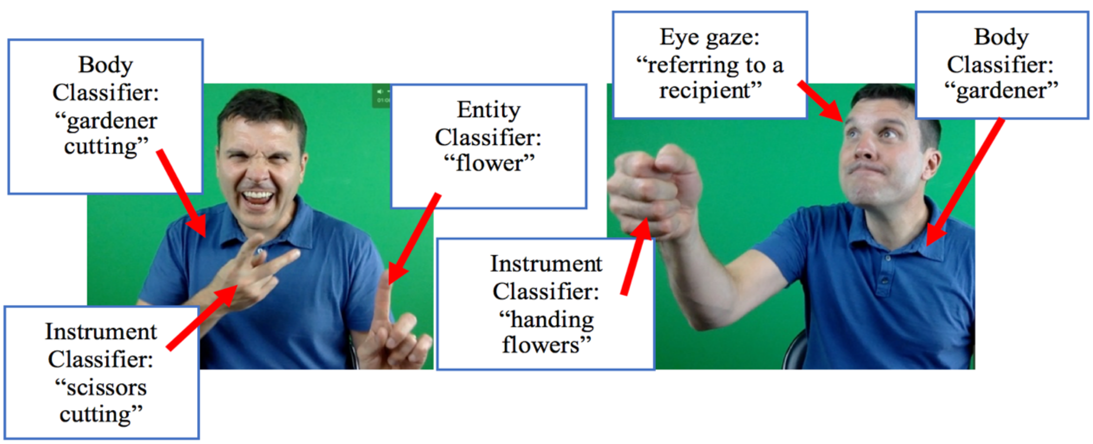
Acknowledging the valuable work that has been done, the current study seeks to build on that foundation by conducting an extensive, comprehensive analysis of REs in ASL. We will analyze a greater number of more complex ASL narratives and will expand the syntactic roles of RE tokens included in our analysis (Frederiksen & Mayberry [2015; 2016] focused on REs in subject position).

We will analyze ASL narratives to describe the distribution of RE forms across various discourse statuses in addition to measuring the accessibility values for the entities to which REs relate. These values take into account "distance" that RE forms have from previous mentions (i.e., analyzing the average number of sentences that separate REs in our sample), number of previous mentions, and intervening competitors in the discourse.

Importantly, we will also consider questions related to the affordance of modality, and simultaneity as it applies to referring expressions. Again, the visual-spatial character of ASL allows for possibilities that are not typically available to spoken languages because spoken language is organized almost exclusively according to linear principles. The articulatory nature of spoken language results in producing one word (and, therefore, one reference) at a time. This is not to neglect that spoken languages have REs that indicate plurality (e.g., we, they, guys); however, because ASL is organized visually/spatially it has the potential to refer to multiple entities concurrently in a way that is dramatically different than typical plural REs; ASL allows for indicating multiple referents simultaneously *in addition to* describing their relationships to one another. These REs (termed here constellations) are described in detail later in Section 1.6.6. This multi-dimensional informativeness leverages the visual architecture of ASL (and all signed languages) and presents references to multiple entities in ways distinct that from spoken languages. In order to fully appreciate how REs are realized in ASL, we require models that can indicate concurrent references (Perniss, 2008; Perniss & Özyürek, 2015; Liddell, 2000; 2003; Dudis, 2004; Zwitserlood, et al. 2013). Otherwise, relying on linear models may result in overlooking the rich referential and informational “density” that concurrent forms include (Figure 1.2).

Figure 1.2 Examples of how ASL can include references to multiple entities concurrently: Constellations.

The first example (at left) shows three concurrent references, (1) using a body classifier (constructed action) to indicate a “gardener”, (2) using an instrument classifier to indicate “scissors” (3) a descriptive classifier to refer to a flower that is “about to be cut.” The second example (at right), shows three concurrent references, (1) a body classifier (constructed action) to indicate “the gardener,” (2) eye gaze to refer to another character, and (3) a handling classifier used to refer to “a bouquet of flowers.”



Furthermore, acknowledging the referential value of concurrent forms can lead to greater insights into how modality impacts accessibility. For example, there are important unanswered questions about how to rank concurrent forms on an accessibility hierarchy. It is also important to ask about how the elements within a concurrent form relate to one another. This study will also explore whether REs that typically carry low informational loads when used in isolation (signaling a highly accessible referent) are "licensed" by appearing as concurrent forms, to occur in discourse statuses where REs with higher informational loads are typical. In effect, we will explore whether the concurrent structures possible in ASL have any impact on the informativeness of REs when they occur in a constellation. All of these questions require that we adopt a system that recognizes the referential density of concurrent forms.

1.1.4. Article Dissertation Format

In order to arrive at these answers, we will describe three distinct, but related studies investigating different facets of how referring expressions are realized in various discourse contexts in ASL. This thesis is organized as an *article dissertation* where each of the three studies are designed as stand-alone articles intended for publications. As such, the structure of each study (Chapters 3, 4, and 5) will necessarily include some redundancy in order to ensure that readers are well-informed about the background, design, and principles of each study. Chapter 6 will provide a conclusion that addresses each study in addition to discussing the overall contributions, limitations, as well as future directions that result from all three investigations. Our conclusions may yield important new insights into how interlocutors in ASL use REs as coordination devices to promote coherent, effective communication in a variety of settings. These three studies may also help us better understand the pragmatics of ASL and the role of referring an and accessibility in languages that employ both linear and spatial features to create coherence in discourse.

1.2 Proposed Research Studies

All levels of this study will use Ariel's (1988, 1990) framework, which was also adapted for use by Morgan (2006), Frederiksen and Mayberry (2015, 2016) and Perniss and Özyürek (2015) for their research on referring expressions in British Sign Language (BSL), ASL, and German Sign Language/Turkish Sign Language respectively. These studies have contributed to important considerations about REs in signed languages, however, each has considered the system of REs in ways that do not always take into account the full inventory of options available to signed languages. To our knowledge, no studies have extensively explored co-occurring REs within a system of referring. Additionally, we are not aware of any formal studies that have researched the degree to which ASL users purposively shift their deployment of REs to satisfy audiences with greater or lesser access to or familiarity with the same content. As a result, many questions remain about how modality and context factor into the use of REs in ASL.

1.2.1 Study One (Article One)

The first component of the study will analyze ASL narrative samples from 19 Deaf adults with native language skills[2]. The narratives are all based on the same 6-panel picture stimulus (Balloon Story, see Section 1.5, Figure 4). The data used for this study provides an ideal context for analysis in that the common stimulus includes five competing referents, including three human, male characters and two inanimate entities. This study will ask five key questions:

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[2] All native users are defined as Deaf children of Deaf parents. Most subjects were 3rd generation Deaf or greater.

1. Can we replicate the findings of comprehensive research on REs in ASL (F&M) if we include a broader subset of REs from a narrative sample? Are the relationships that previous research describes robust enough to be maintained with this wider inventory of REs?
2. Is the inventory of referring expressions as identified in the current literature extensive enough to characterize the range of referring options available in ASL as evidenced in this corpus of narrative retellings? Do the conclusions of this study align with proposed models for ASL?
3. How are REs used to signal various discourse statuses (introduced, maintained, reintroduced) in ASL, as evidenced in this sample of narrative retellings? Do our results support the research to date?
4. Does the use of a system for calculating accessibility scores (Toole 1996) better inform a hierarchy of accessibility?
5. Do the patterns that emerge in the analysis of ASL inform new ideas about the notion of accessibility, or can the findings be subsumed under the frameworks proposed for discourse accessibility phenomena in spoken and signed languages?

1.2.2. Study Two (Article Two)

Research on REs in ASL has not fully considered the implications for those REs that include reference to several concurrent entities. Because ASL can leverage its visual-spatial architecture in addition to using multiple articulators (hands, body, eye-gaze, head), many entities can be represented simultaneously (Liddell, 2003; Liddell & Vogt-Svendsen, 2007; Poizner, 1983; Vermeerbergen, et al., 2007; Cormier et al., 2013;

Dudis, 2004). This second study will explore how forms that include simultaneous referents (constellations) function differently than those REs that occur in isolation in order to arrive at a more comprehensive understanding of the system of REs in a visual-spatial modality. This study will ask the following key questions:

1. Do all RE types documented in isolation (from Study 1) emerge in constellations? Conversely, are all RE types that emerge in constellations included in the isolation data?
2. If there are REs that occur in both environments, do they occur in equal frequencies?
3. Do all RE types that occur in both environments demonstrate the same allocations across discourse statuses? Are there differences in the preferred accessibility values for entities they represent in each environment?
4. Will analyzing the patterns we find for REs in constellations better inform a hierarchy of accessibility?

1.2.3. Study Three (Article Three)

From the research on spoken languages, we know that interlocutors "need to make local assumptions about what their addressee knows or is attending to at each point in the discourse" (Arnold 2008, p. 499). The same is most likely true in ASL, but to date there have been no formal studies about how native users deploy REs as the same signers engage audiences with explicitly varying levels of access to the same content. The third study of the proposal will analyze the pattern of referring expressions in 15 native users of ASL as they are realized in two contexts: one, taken from studies one and two, where an intended recipient's access to the context of the narrative is known to be rich, and another, where the same participant's retelling of the same narrative is carried out while the signer knows that the intended recipient has had significantly reduced access to the context. This study will ask the following key questions:

1. Does explicit awareness of different levels of recipient access impact the pattern of REs used in narrative samples of Deaf adults?
2. Do narratives designed to be maximally explicit demonstrate different allocations and patterns in the deployment of REs?
3. If so, are there implications for understanding/reconstructing a hierarchy of accessibility in ASL?
4. Are RE allocations conditioned by the stimulus? In other words, will the allocations we find be generalizable to more complex ASL narratives?

1.3. Plan of Inquiry Overview

The proposed study includes 3 related studies. All will involve in-depth analyses of ASL narrative samples based on the same stimulus (The Balloon Story). In each phase, I will explore how RE are allocated across 3 discourse statuses (introduced entities, reintroduced entities, and maintained entities). Using Toole's Accessibility Scale (1996) I will calculate accessibility values for each entity and use those to apply a statistical analysis. Using both data points we will be able to complete a sophisticated analysis of REs in ASL. We will focus our analysis on investigating the inventory of RE, how REs are allocated throughout discourse statuses, the typical entity accessibility values REs signal, how modality and the architecture of a signed language impact the choice of RE-types, how these factors influence the patterns of RE as they are employed in ASL narratives, and finally, how varying context and access to information affects the choices and allocations of RE forms.

1.4. Significance of Study

The findings of these studies may have important implications for cross-modality comparisons of language structure and function, specifically related to questions about how concurrent features of signed languages may contribute to efficiency, accessibility, and processing advantages. Additionally, our investigation will provide support for expanding the typology of REs in ASL and will provide evidence for distinguishing between linear and concurrent approaches to referring.

This analysis draws on Arnheim's (1969) theoretical framework about visual processing suggesting that there is an informational and economical privilege available to seeing (as opposed to hearing) that is inherent to nature of the visual modality. Arnheim describes how when we see, we cannot help but see entities *in relation to one another* (i.e., we process the visual world in what he terms *constellations*). In the same manner, the modality and architecture of ASL can take advantage of this informational and economical privilege in ways that spoken languages cannot. In other words, ASL can use its visual-spatial affordances to depict entities, and their relationships, simultaneously (as constellations). In this dissertation, when two or more REs are present simultaneously, signaling two or more entities, together they comprise what we will term *a constellation*.

Interestingly, ASL can, and does, also allow for depicting entities in linear-sequential fashion, paralleling the modality of spoken languages. As a result, we are presented with a valuable opportunity to compare each type of referring (concurrent or linear) to see if there are accessibility implications for choosing concurrent as opposed to linear options.

Research has already documented how gestures co-occurring with spoken REs serve to enhance an RE's explicitness or an entity's accessibility (Ariel, 1990; Berman & Slobin, 1994; Levy & McNeill, 1992). The present study goes beyond this idea as we explore how the co-occurring linguistic features of a visual languages may interact to illuminate unique referring strategies. Our results can help us to understand the larger impact of modality on promoting coherent and efficient referring practices.

Our results may have relevance for research on language development in ASL, specifically in terms of pragmatic competencies and how signers employ effective strategies to promote comprehension. There are also implications for the design of ASL-based educational materials for Deaf children and composition techniques intended to maximize access for various audiences with differing levels of content familiarity. Additionally, we can apply what we learn from this study to promote comprehensible input to support language acquisition/learning for Deaf children with limited language skills. Finally, results may help to inform ideas about how to more effectively evaluate levels of textual complexity in ASL.

CHAPTER TWO

2.1. Relevant Previous Research and Scholarship

The foundation of this study rests on important research on referring expressions applied to both spoken and signed languages. We will also review research relevant to narratives and narrative analysis which is briefly described in sub-sections below.

2.1.1. Referring in Spoken Languages

One of the fundamental ideas on which this work is based is the principle of common ground (Clark, 1996; Clark & Brennan, 1991; Tomlin 1987) which suggests that language users are consistently monitoring their communicative partners for understanding, and they use that information in the course of interacting to make decisions about how to best carry out this joint action (Clark, 1996; Clark & Brennan, 1991; Clark & Krych, 2004). Clark and Carlson (1981) argue that this mutual knowledge, or *common ground,* plays an important role in nearly every act of comprehension.

Research has offered competing rationales for describing why referent choices are made, however, there is general agreement that in choosing a referent type, speakers must take into account the prominence of a referent within the narrative and how their choices of referring expressions signal specific mental representations to communicative partners (Carminati, 2002; Ariel 1988; Ariel 1990; Ariel 2001; Gundel, Hedberg & Zacharski, 1993; Amor & Nair, 2007; Almor & Phillips, 2006; Arnold, 2008; Stivers, 2006).
Ariel (1988) underscores the essential role played by interspeaker collaboration in her research on accessibility that describes how referent choices inform notions of accessibility. Her model acknowledges the role that mutual background knowledge,

community membership, physical co-presence all play in affecting the kinds of referring expressions that interlocutors use. Research has shown that in actual discourse there exists some quantity of information that shared context and/or the physical/linguistic environment provides. Clark & Carlson (1981). However, Ariel is most concerned with how *linguistic* co-presence can inform the choices that language users make. In other words, it is of great importance *how many utterances back* the speaker made his last reference to the discourse entity in question. In order to address inconsistencies in an overly contextual or syntax-based rationale for our RE choices, Ariel (1988) proposes that instead of "accounting for reference by the notion of context, I suggest that natural languages primarily provide speakers with the means to code the accessibility of the referent to the addressee…In other words, referring expressions are no more than guidelines for retrieval" (p. 68). Understanding referring expressions as a product of cooperation, where linguistic REs signal a speaker's estimation about a hearer's access to the identity of a referent, and where hearers take those signals as appropriate indications of the accessibility of the entity gives us a better sense of the strategies speakers believe to be the most effective in coordinating communication (Ariel 1988; 1990; 2001).

There has been substantial research on this issue focusing on the aspects of discourse that influence choices speakers make decisions about deploying referring expressions. The conclusions that many have reached suggest that a speaker's task is to pick a referring expression that appropriately fits the current discourse situation (no more or less informative than is necessary), so as to make it easy for the listener to retrieve the referent. Chafe (1994) states, "If language is to function effectively, a speaker is obliged to categorize a shared referent in a way that allows the listener to identify it" (p. 97).

A similar approach was undertaken by Gundel et al. (1993) who suggest that it is the extent to which referents are mutually identifiable to discourse participants that determines the choices we make, and the processing our interlocutors apply related to specific referential forms. This idea highlights especially well the joint action that characterizes much of pragmatics. Gundel et al. propose a *Givenness Hierarchy* that is based on dimensions similar to those proposed by Ariel.

Almor and Nair (2007) also undertake a comprehensive discussion of many of the approaches to understanding referring expressions, arguing, in ways similar to Ariel (1988; 1990), that referential forms are products of cooperation between language users and their listeners. They go on to propose the *Information Load Hypothesis* which is a detailed view of how referential forms "reflect a balance between discourse function and processing cost" (Almor & Nair, 2007: p.85). Interestingly, they allude to the cognitive constraints presented by the sequential nature of spoken language, suggesting that the linearity of spoken language presents processing costs and the potential for memory overload. This will have implications when we talk about co-occurring referring expressions in ASL.

Related research has suggested that, perhaps, the very reason we have various referent forms (i.e., pronouns) is to offset the processing and memory costs that have been proven to result from using repeated, highly informative referring expressions (Almor & Eimas, 2007; Almor & Phillips, 2006; Ariel, 2001). Signed language research has also pointed to modality constraints that limit the performance of Deaf children in linear sequences (Wilson, Bettger, Niculae & Klima,1997; Wilson & Emmorey, 2000). By extension, these studies indicate that there may be value to considering how non-linear forms (concurrent structures) serve to maintain coherence in discourse, an idea alluded to in research by Perniss (2008).

An important consideration fundamental to understanding the procedures we follow in order to maximize coherence and understanding in discourse is most notably articulated by Grice (1975). Grice outlined how various maxims lend themselves to the kinds of implicit expectations and assumptions we have about one another. Most relevant among the maxims Grice proposes is the *maxim of quantity*, which states that speakers must make their contributions as informative as is required, but not more so (Grice, 1975). These ideas highlight the strategic assumptions (whether explicit or implicit) that language users make about referring expressions and all that those choices entail. involves calculating the accessibility of each referent in terms of the addressee's mental state.

Research has also shown that in order to coordinate we apply a range of pragmatic devices in order to synchronize with conversational partners toward the eventual goal of establishing a mutual common ground. (Clark, 1985; Clark & Carlson, 1981; Clark & Krych, 2004). This is especially true when speakers tailor elements of their language output to audiences depending on whether the audience is known to have greater or lesser levels of access to the content/context of the discourse (Clark, 1987, Isaacs & Clark, 1987). We make adaptations in our referring strategies, depending on assumptions about an audience's access to content, or their levels of expertise in a particular area (Wilkes-

Gibbs & Clark, 1992). Much less is known about how this happens in ASL.

As we have noted, the range of referring forms in English includes four basic types: *definite descriptions* (The cute, little boy), *demonstratives* (this kid), *pronouns* (he), and *null forms* (Ariel, 1990). The distributions for these RE forms, arranged in order of explicitness, has been well-documented with definite descriptions favored in introduced status, both definite descriptions and demonstratives favored in reintroduced status and pronouns and null forms favored as maintaining REs. The range of referring expressions typically available to English users is less than the extensive inventory of REs available to users of ASL. This study has identified 8 different RE types, some of which can co-occur. Section 2.2 will describe each RE type extensively.

2.1.2. Informational Density

Research has described how referring expressions in spoken languages may have the potential to subsume a variety of *informational loads* as some REs are packed with more or less informational density. For example, certain pronoun forms in English, by virtue of their production (e.g., as stressed), can include more information than do unstressed pronouns (Ariel, 1988; Gundel, et al., 1990). Additionally, in languages like Japanese, certain pronoun forms include information that indicate a personal relationship between the speaker and the referent of the pronoun (Ono & Thompson, 2003). We also know that when speakers communicate information about complex events related to the location and actions of multiple referents within a spatial setting, they employ devices such as spatial verbs, locatives, prepositions that do serve to communicate information about relative relationships, but these are linear, add-ons to the discourse (Levy &

McNeill, 1992; Berman & Slobin 1994). Importantly, users of spoken language employ gestures *along with speech* in order to maintain coherence as they situate referents and describe the relations among them. (Perniss & Ozyurek, 2008; Levy & McNeill, 1992; Berman & Slobin 1994; Gernsbacher 1997). Although not equivalent, it is important to recognize this simultaneous potential for semantic/informational density as it will have important implications in our consideration of ASL and how it employs referring expressions.

There is also research on spoken language that describes how the accessibility of certain forms of referring expressions may be language specific (Ariel, 1988, 1990). This idea is important because as we turn to signed language research we will highlight how it can, and has helped us to realize that some language structures (e.g. referring expressions), "might be explained better in terms of the MODALITY, and specifically, the VISUALITY of signed languages. A complicating factor that often emerges when we try to understand the architecture of ASL in terms of spoken languages relates to ASL's poly-componential architecture. Specifically, there are often challenges related to describing its ability to include a dense quantity of information simultaneously, not as linear *add-ons*. Because signed languages provide a unique "articulatory landscape" many of its structures have to be understood in non-linear terms (Anible & Morford, 2015, p.244).

2.2. Referring in Signed Languages

Having established a framework for understanding how REs have been characterized in spoken languages, it is important to step back and acknowledge that the linguistic forms we see in one modality may be altogether incompatible with another. As Freidman (1975) pointed out over four decades ago, “That which is amenable to a language in the oral/auditory channel is not necessarily easy or even possible in the manual /visual mode, and vice versa. The fact that a language is perceived visually allows for possibilities unavailable in a language perceived auditorily (and vice versa)” (p. 959). As we consider the studies related to REs in signed languages it will be important to keep in mind Friedman’s observation.

ASL uses a range of devices to refer to entities in discourse (Supalla, 1982,1986; Liddell, 2003; Janzen, 2006). These forms have been studied extensively in isolation (Freidman, 1975; Hoffmeister, 1978; 1987; Kegl, 1986; Lillo-Martin: 1986; 1990; Lillo-Martin & Klima, 1996; Sandler& Lillo-Martin, 2006; Wilcox, 2004; Bahan, 1996; Bahan et al., 2000; Cormier & Sevcikova, 2013; Dudis, 2014; Wulf, et al. 2002; Morgan and Woll, 2003; Winston, 1991; Liddell, 2000; 2003; Liddell & Vogt-Svendsen, 2007), but comparatively few examples have explored their realization in a *system of referring expressions* (Winston, 1991; Morgan 2006; Swabey, 2011; Bel, Ortells & Morgan, 2015; Frederiksen & Mayberry, 2015; Perniss 2007; 2008; Perniss & Özyürek).

The inventory of referring options includes nominal forms which closely parallel the forms of spoken languages such as noun phrases and names (Liddell, 2000). Additionally, ASL also uses indexing, a device that is analogous to English pronouns, where entities are referred to using pointing gestures (Hoffmeister, 1978; 1987; Lillo-Martin & Klima, 1996; Liddell, 2000; 2003; Cormier, Schembri, & Woll, 2013). These forms act as pronouns that can incorporate information about the physical or conceptual location of an entity in space. Indexes can also include information about number, indicating whether the references are singular or plural (Hoffmeister, 1987; Lillo-Martin & Klima, 1996; Kuhn, 2015).

Beyond these forms, where comparisons between spoken and signed languages are relatively easy to make, there is a range of additional options. It is in these "unit representations of pronominal reference that ASL vastly differs from oral language" (Friedman, 1975). For example, ASL uses *entity classifiers*, a category of referring expressions that incorporates several sub-types (Supalla, 1982; 1986) including semantic classifiers. Semantic classifiers are REs conveyed using particular handshapes that entail information about the semantic category of the referent. Use of this form indicates that the referent is a person, vehicle, animal, structure, or aircraft (Supalla, 1982; 1986; Sandler & Lillo-Martin, 2006).

Other classifier forms are handling classifiers (or instrument classifiers) whose role is to indicate an entity being manipulated in some way by virtue of a handshape. For example, a balloon being held on a string is indicated by the "XA" handshape, or a hammer being swung is indicated by the "S" handshape.

Descriptive classifiers (or size and shape specifiers, SASSes) indicate referent by describing its qualities. They highlight its physical and geometric characteristics. Both of these forms, to one degree or another, incorporate information about the size, shape or outline of the referent noun (Bellugi, 1979; Supalla, 1982; 1986). In all classifier cases, the handshapes function very much like pronouns in the discourse (Friedman, 1975; Kegl, 1986; Winston, 1991). There is debate about whether descriptive classifiers play a predominant anaphoric or adjectival role (Zwitserlood et al., 2013), but there is evidence that these forms do refer to entities in discourse while providing descriptive information.

ASL also uses *role shifts* as referring expressions. This form allows signers to differentiate between characters in discourse. Commonly employed for dialogue and to indicate a character's emotional reactions, role shifts can be signaled through overt or discrete changes in head, face, eye gaze and body posture (Morgan, 1999; Bahan & Supalla, 1995; Cormier et al. 2013).

A referent form closely related to role shifts are *body classifiers*. Body classifiers are distinguished from role shifts in the function they perform, using the entire body to animate references as they engage in physical acts (see constructed action below). Supalla (1986) describes them as a "kind of mimetic representation rather than a visual-geometric representation of the noun" (p. 197). Most recently, they have been referred to as surrogates where a signer assumes the physical behaviors, actions and mannerisms of a character in discourse (Liddell, 1995; Cormier et al., 2013).

The literature often refers to these two forms, role shifts and Body Classifiers, as constructed action (Padden 1990; Winston, 1991; Metzger, 1995; Cormier et al. 2013). Constructed action is exemplified when signers enact actions, behaviors or emotions of entities in discourse. Constructed dialogue (Winston, 1991), a sub component of constructed action occurs when linguistic interactions of the entities in discourse are recreated.

Another form of referring expression is *eye gaze,* described by Bahan & Supalla (1995) as references to entities in discourse using overt and discrete orientations in eye gaze to specific locations in space. They explain how by shifting gaze away from the audience, a speaker indicates that they are taking on the gaze of a referent and “seeing the story through the eyes of the character” (p. 179). In recreating a dialogue, a signer’s body and eye gaze allow a signer to switch back and forth between references without having to explicitly reintroduce a character each time. Eye gaze can work alone or in complementary fashion with verbs of agreement, role shifts and body classifiers to indicate other entities in discourse (Aarons et al., 1992; Bahan, 1992; Neidle et al., 2000). *Verbs of agreement* are verbs in ASL that use space, directionality and handshapes to include referring information about subjects, objects and the theme in a phrase (Kegl, 1986; 1987; Sandler & Lillo-Martin, 2006). For verbs of agreement, the *beginning and end points* of the sign’s production serve as the subject or object determined by the direction of the sign. Choices of handshape configuration can also indicate entities in discourse. In this way, when verbs of agreement co-occur with specific handshapes (where the handshape serves as a pronoun itself) can provide information that refers to multiple entities (Kegl, 1986; 1987; Winston, 1991; Friedman, 1975; Sandler & Lillo-Martin, 2006) (See Figure 3.2).

ASL is also a language that uses null forms (Lillo-Martin,1986; Bahan et al., 2000; Wulf, et al., 2002). *Null* arguments occur in sentences where the subject is not overtly stated and the subject would otherwise be expressed by an explicit *noun or pronoun*. Some studies have included verbs of agreement and role shifting as null/zero anaphora forms, but Bahan et al. (2000) describe how null forms (e.g., pro drop) are distinguished from linguistic devices that indicate entities using role shift, location, handshape or eye gaze. Lillo-Martin (1986) makes a similar distinction that Frederiksen and Mayberry incorporate into their (2016) research on RE in ASL.

Some researchers have pointed to the potential for the visual modality to represent multiple references using the affordances of space, urging further study in order to understand the rich information conveyed by these forms (Friedman, 1975; Winston, 1991; Perniss 2008; Perniss and Özyürek, 2008; 2015: Dudis, 2004: Liddell, 2003). Winston (1991) explicitly states that "an area needing further investigation is that of the nature and quality of these combinations of features…such an investigation will add to an understanding of the structure of ASL discourse" (p. 399). These combinations are important, and a pilot study found that simultaneous combinations of each form mentioned above occurred frequently in ASL narrative samples. Similar forms (e.g. buoys and blends) have been discussed in the literature (Liddell, 2003; Dudis, 2004), however, they have rarely been studied as part of a comprehensive system of referring expressions. The research has suggested that these simultaneous forms provide more explicit information than simple references to entities.

Applying the logic of visual architecture may present fascinating opportunities for complementing what little we know about how these simultaneous combinations work. For example, Arnheim (1969) described a useful concept he called "constellations" which refers to the visual mode's potential to incorporate concurrent information about multiple entities as well as their spatial relationships. In other words, Arnheim (1969) explains that what we see must necessarily be realized as a coordinated constellation. We have adopted Arnheim's term to describe the condition where multiple REs appear concurrently as their depiction includes information about the entities *as well as their* relationships to one another. Arnheim's work was limited to visual perception, but it has important and interesting implications for understanding the architecture of ASL. Friedman (1975) alluded to this idea as she describes how ASL can represent "metaphoric icons" or "metaphoric visual representations" by taking advantage of the visual relationships that, together, comprise a "semantic component of their referent" (p. 960).

Specific examples of this idea have been explored in the research on *buoys* in ASL (Liddell, 2003; Liddell & Vogt-Svendsen, 2007). Buoys are stationary configurations of the non-dominant hand providing referential continuity through a stretch of discourse using visual means to maintain references. These forms allow for referents (functioning like pronouns) to "remain in place as other depicting signs are produced" (Liddell, 2003: 263). In other words, buoys are set up and held in space as other referents are concurrently produced. Other research has also demonstrated that if we are to fully understand the structure of signed languages it is important to appreciate the concurrent forms that ASL, and all sign languages, allow (Poizner, 1983; Vermeerbergen, et al., 2007; Cormier et al., 2013). Liddell (2000; 2003) and Dudis (2004) also describe how ASL allows for what they call *simultaneous blends* which are forms that allow for information about competing perspectives in the same event space to be depicted concurrently. For example, ASL blends allow for a semantic classifier depicting (i.e., referring to) a vehicle to co-occur with a role shift (constructed action) depicting (i.e., referring to) the driver of the vehicle. The competing perspectives also include information about different perceptual scales. For example, constructed action can depict a “close up” frame of reference indicating (mimetically) a man running and we can also have a simultaneous “long shot”, depicting the same entity running using a semantic classifier. Dudis discusses how this approach adds to the informative-ness of the referent, contributing rich multi-dimensional information that provides both general and specific information about the same entity. The added informative-ness that results from ASL’s concurrent potentials is an important idea we expand on in this dissertation. Perniss and Özyürek (2008) and Perniss (2007) refer to similar structures in a study of Turkish and German Sign Language. Their results showed that different depicting forms (functioning as referring expressions) can occur together in various combinations they call *fusion types*. They proposed that these combinations serving to provide information about various co-occurring referents from different perspectives (character and observer) could be explained as efficient and densely-informative structures that result from the spatial affordance of signed languages.

There is a small collection of studies that have explored how concurrent forms might be realized in a *system of referring expressions* that can inform an accessibility hierarchy (Morgan 2006; Swabey, 2011; Perniss and Özyürek, 2008; 2015; Bel, Ortells & Morgan, 2015; Frederiksen & Mayberry, 2015; 2016). In almost half of these studies the focus has been, to some degree, on L2 learners (Swabey, 2011; Bel, Ortells & Morgan, 2015; Frederiksen & Mayberry, 2015). Most of these studies have applied *Accessibility Theory* (Ariel, 1988; 1990) as the framework for categorizing referring expressions various signed languages (excepting Swabey, 2011). Their analyses have considered general categories of REs (including pronouns, classifiers, noun phrases and null forms) yielding similar results for the types of REs they find distributed across discourse statuses, but the broad nature of these categories leads to questions about how a distilled inventory might be more informative.

For example, in their study, Perniss and Özyürek (2015) compared the production of overt references (nouns and pronouns, generally) to the occurrence of null (or zero anaphora) referring forms in narrative samples of native German signers. Within their larger, *overt* category, they pinpointed Body Classifiers (*enactments*) as occurring frequently in reintroduced discourse status, a status that typically calls for a more informative RE. They propose an explanation that these *more visible* forms may have a richer informative quality than do other less obviously enactive forms. Similarly, Frederiksen and Mayberry (2016) attempted to refine their zero-anaphor category, distinguishing between verbs of agreement and role shift (constructed action), but their results suggested that each occupied the same position in their proposed accessibility hierarchy.

Another important body of research has proposed that the simultaneous affordances of signed language may serve as a vehicle for efficient and appropriately informative referring expressions (Dudis, 2004; Perniss, 2008; Perniss & Özyürek, 2008; Zwitserlood, et al. 2013). Tang, Sze & Lam (2007) discuss this simultaneous feature of signed languages in their research on Hong Kong Sign Language where they state that as signers become more proficient they realize that "classifier constructions can be decomposable into meaningful morphological units, which can be sustained and 'stacked up' (*concurrently*)[3] with some other morphological or syntactic units in the construction" (p. 310).

ASL includes the potential to reference multiple entities concurrently and their special relationships to one another, Kyle and Woll (1985) as well as Zwitserlood, Perniss & Özyürek (2013) discuss this same potential in British sign language and Turkish sign language respectively. Four other studies (Morgan and Wohl, 2003; Frederiksen &Mayberry, 2015, 2016; Perniss & Özyürek, 2015) address the concurrent potential of the visual modality to lesser and varying degrees, however, there is limited discussion of how these forms relate to the to the process of referring.

In the studies that have proposed an organization for a hierarchy of accessibility in signed language (Morgan, 2006; Bel et al., 2015; Frederiksen & Mayberry, 2015) researchers acknowledge that the range of referent types considered was intentionally limited. For example, Morgan's (2006) breakdown of referring expressions in BSL includes the following typology arranged from most explicit to least explicit information loads: Noun Phrases, entity classifiers, and role shift. Bel et al.'s typology includes: nominals, null pronouns and overt pronouns. Frederiksen and Mayberry (2016) expand on these, recognizing additional referent forms including: nouns, pronouns/indexing, zero anaphors, and classifiers.

Although they include the most extensive inventory of referent types, Frederikson and Mayberry's studies (2015; 2016) indicated a comparatively low incidence of classifier use across maintained and reintroduced discourse statuses. This runs counter to

[3] Added for clarification.

other findings (Morgan, 2006; Perniss & Özyürek, 2008) as well as to the pilot research related to this proposal. It may be, as they claim, that sample size and their narrative stimulus accounted for these results.

An additional interesting question discussed by the Frederiksen & Mayberry (2015) study is related to the differences in the frequency of referent reintroduction between L2 learners of ASL and native signers (L2 signers used substantially more reintroductions). They suggest that the L2 learners' focus on signing one clause at a time necessitated more frequent reintroductions compared to native signers. This may indicate that native users exploit the affordances of the visual modality to a greater degree by "relying on having multiple articulators, native signers might be able to simultaneously keep multiple referents active in signing space, and thus in the discourse" (p.12). This explanation can contribute to accounting for the "constellation" of referents noticed in our initial study.

Again, Frederiksen & Mayberry's (2016) study, using their (2015) data, provides the most comprehensive account to date on how referring expressions are deployed in ASL narratives. This analysis offers valuable opportunities for comparison as they expand on the inventory of referring expressions including a proposed a hierarchy of accessibility that includes:

Table 2.1 A Proposed hierarch of Accessibility in ASL (Frederiksen & Mayberry, 2016)

Signals that an Entity has…	
Low accessibility	Nouns/Nominals
	SASSes (DCL)
	Agreement Verbs and Constructed Action
	Null (zero anaphora from plain verbs)
High accessibility	Semantic Classifiers

Their proposal, based on recognizing distinct RE functions across discourse statuses, encouraged distilling larger categories of REs into finer, separate referent forms. Their data also suggest that the clear distinctions between maintained and reintroduced discourse status in ASL may not be as prominent as they are in spoken languages.

Frederiksen & Mayberry (2016) concede that these results may be interpreted differently as “referent tracking in ASL may rely on devices other than those used in spoken language” (p.17). One important consideration when interpreting their results is related to their approach to counting REs. In order to maintain consistency and to avoid the often-complicated nature of dealing with ASL’s poly-componential architecture, they exclusively counted REs that related to entities in subject position for reintroduced and maintained discourse status. As a result, much of the referring information that occurs in non-subject position did not factor into their results. Additionally, their approach, did not include referring information that co-occurred. They do acknowledge this limitation and highlight the value of exploring the implications of space and role shift on REs, urging more studies to test their proposed hierarchy of referring expressions.

In light of all of these studies, important questions arise as we consider how the research on REs in signed language may have been shaped by borrowing, or adapting, paradigms from spoken language research (Swabey, 2011; Morgan 2006; Frederikson & Mayberry 2015; 2016). If our explanatory models are predisposed to considering referring expressions in linear terms, it presents a very real challenge in that, unlike the spoken modality, many of the referring expressions used in signed languages occur, or can occur, concurrently (Perniss, 2008; Perniss & Özyürek, 2015; Liddell, 2000; 2003; Dudis, 2004; Zwitserlood, et al. 2013). As a result, it may be that many of our current characterizations of referent forms may have been conflated, or overlooked so that examples in ASL fit nicely into standard, linear models.

2.3. Narrative Analysis

The research on narratives has helped to frame this human practice and make sense of content that is often unwieldy (Gee, 1985; 1996). The analysis of narratives for this study must take into account several factors which will be described below.

2.3.1. Calculating Accessibility

In order to create a common frame of reference for comparisons of referring expressions researchers have proposed scales for generating numerical values for accessibility (i.e. Fox, 1987; Toole, 1996). Toole's (1996) model among the research on referring expressions is the most widely used. In this system, it is possible to earn a maximum value of 6 (most accessible referent) and a minimum value of -2 (least accessible referent). REs with limited informational value would be preferred for referents with high accessibility values. Additionally, REs with a more substantial informational load would be preferred for referents with lower values (i.e. those that are relatively inaccessible). For each RE, Toole (ibid.) proposes three factors in assigning an accessibility value: (1) number of propositions back to previous mention, (2) topicality, and (3) competition. Working definitions and numerical values are explained below. The term proposition is defined as "a semantic unit composed of a predicate plus its arguments" (Toole, 1996, p.461). Propositions are similar to what Chafe (1980) describes as idea units. As Toole (1996) makes clear, "it is not claimed that the weightings assigned to the various contributing factors have cognitive reality" (p. 217), these values are merely useful approximations of perceived accessibility status.

Competition is an important consideration in narrative structure as speakers tend to choose expressions that are the least ambiguous. As a result, the process of referring is made more challenging if there are multiple referents competing for attention in the discourse (Arnold & Griffin, 2007; Arnold, Tanenhaus, Altmann, & Fagnano, 2004)

Additionally, research has shown that that as more entities are added to the discourse, speakers must actively deploy various referring strategies that send appropriate signals about intended referents (Arnold & Griffin, 2007; Slobin, 1996). An important consideration in eliciting complex narratives is related to stimuli that create conditions where multiple and sometimes ambiguous characters need to be distinguished from one another by virtue of strategically deployed referring expressions. As such several stimuli have been developed (Renfrew, 1991; Slobin, 2004) however, the *Balloon Story* first developed Karmiloff-Smith (1985) has been a consistent option for researchers collecting narratives. The present study will use a stimulus adapted from Karmiloff-Smith's (1985) original Balloon Story in order to elicit key features in ASL narratives (Hoffmeister, Bahan, Greenwald & Cole, 1999). Designed as part of a comprehensive ASL test battery, the Adapted Balloon Story has been used to elicit narratives from Deaf children since 1990.

2.3.2. Transcription Systems

There has been a general lack of consistency among transcription systems for signed languages (Morgan, 2005). One widely-used approach to sign glossing conventions was established by Baker-Shenk and Cokely (1980). This system was adapted for simple narrative coding by Hoffmeister, et al. (1999) as part of the expressive battery of the ASL Assessment Inventory. This system was informed by work from Bahan & Supalla (1995) and will be the transcription method used in the present study.

2.3.3. Episode Boundaries

The strategies that we use for narrative practices are often unconscious, some researchers have characterized them as part of what they refer to as *discourse identities* (i.e. natural ways of interacting that are inaccessible to explicit consideration) (Gee & Grosjean,1984; Gee,1985; 1992). Discourse identities, and the social practices to which we are enculturated, can support an organization for narratives that is characterized by flexible and general principles (Heath, 1982; Scollon & Scollon, 1981; Gee,1985). Across cultures, our narrative structures can be organized into “episodes” or “parts” that are grouped together by reference and elaboration about a single event (Ochs & Schieffelin, 1983; Gee, 1985). Gee describes how with thoughtful approaches narratives can be distilled into episodes which can also be parsed into stanzas (i.e. organized clusters of lines or propositions providing individual details about an episode), and, finally, the smallest unit, lines or propositions. This work, despite using novel labels, is in line with much of the well-established research on the structure of oral narratives (Labov,1972; Hymes,1981; Mandler, 1981; Schieffelin, & Ochs, 1986). In the present study, we adapt these considerations to episode boundaries in ASL. A similar approach was applied by Bahan & Supalla (1992) in their development of materials used to analyze original ASL narratives.

2.3.4. Pragmatic Competencies

Finally, considerations of referring expressions in ASL is intimately linked to pragmatic competencies. It is well-established that narratives can be used as a tool to assess pragmatic competencies in both spoken and signed languages (Botting, 2002; Bamberg & Damrad-Frye, 1991; De Villiers, 2004; Thagard, Hilsmier, & Easterbrooks, 2011; Rathmann, Mann, & Morgan, 2007). However, there has been limited study on how to effectively evaluate narrative productions in ASL apart from cursory attempts to code spontaneously generated checklists that have questionable reliability.

Research has also shown that narrative analysis can reveal the sophisticated level of coordination work that effective communication requires. The fundamental premise underlying this notion is that interlocutors engage in *joint- action* working together (in implicit and explicit ways) to construct meaning in discourse (Grice, 1975; Clark, 1996; Clark & Wilkes-Gibbs, 1986). Because we know that the coordination that sharing narratives requires becomes more and more complex as the discourse is extended, (especially if we have to manage expanded discourse statuses as well as increasing numbers of competing entities) more complex narratives can better inform a sophisticated analysis (Ariel, 1988, 1990; Arnold, 2010; Almor & Nair, 2007).

It is the goal of the present study to leverage the extensive research that has been done and documented here to expand our current knowledge base as it relates to referring expressions in ASL and to use that information to support more effective approaches to teaching, evaluation, material development, and future research.

CHAPTER THREE

3.1. An Overview of the Rationale for the Study

Despite the substantial body of research devoted to investigating many of the formal linguistic features of signed languages, there is comparatively less research that analyzes its pragmatic qualities (see Lucas, 2014; Winston, 1999 for examples of summative work on ASL pragmatics). As a result, we know significantly less about the pragmatics of signed languages than we do about how pragmatics are applied in spoken languages. One important area in this domain is related to the study of referring expressions (REs). REs are significant because they provide insights into the strategic bilateral process required for language users to create and maintain coherence in discourse. When speakers/signers deploy REs, the serve as implicit signals about how maximally or minimally accessible a speaker/signer perceives an entity to be. Addressees interpret these signals as information about the entity in question *and* as indicators about the entities' level of accessibility. In effect, REs are "guidelines for retrieval" (Ariel, 1990) where listeners/perceivers are directed to appropriate entities. The significance of studying REs in ASL is related to the potential to illuminate the complex internal and external coordinating work signers and perceivers employ in successful language use.

3.1.1. Present Study Goals

The goal of this study is to replicate the results from a comprehensive analysis of REs in ASL (Frederiksen & Mayberry, 2016, hereafter F&M). In order to gain deeper insights into how REs in ASL are organized and how they function in narrative discourse we will also expand on F&M's research in important ways.

Frederiksen & Mayberry's (2016) results were based on analyzing narratives elicited from relatively simple 6-panel stimulus (including 2 animate entities and one inanimate entity) collected from 12 subjects using ASL from birth. Additionally, F&M included only reintroduced and maintained RE tokens occurring in subject position. Our replication study will investigate whether the robust relationships they report between RE-types and the entities they signal are maintained in an expanded analysis.

The present study will elicit narratives from 19 native[4] ASL users. Narratives are based on a more complex stimulus (including 3 competing animate entities, and 2 competing inanimate entities), and a more intricate story line. Additionally, we will include all RE tokens regardless of their syntactic roles (in or out of subject position). The conclusions at which this study arrives may help to expand what we know about referring in ASL as well as the inventory of referent categories. Before describing this study, we will present a general overview of how REs function in the discourse, followed by an account of ASL RE-types and how they are realized.

3.2. Referring Expressions

The ability to effectively leverage REs to promote coherent discourse is an essential skill that all language users must have. As we engage with one another in discourse we expect cooperation between speakers/signers[5] and listeners/perceivers. In other words, listeners/perceivers anticipate speakers/signers choosing the most

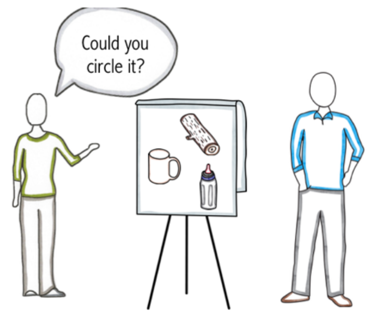
[4] Native users are defined as having Deaf parents and using ASL since birth.
[5] In this chapter and throughout subsequent chapters, we will use the terms "signer" and "perceiver" as equivalent to the "speaker" and "listener" designations that are most commonly used in the literature on discourse processes.

economical RE form that maximizes the likelihood of successful communication; and speakers/signers presume that the signals they send will be appropriately processed (Smith, 1982; Clark & Wilkes-Gibbs, 1986; Clark & Krych, 2004; Clark and Brennan, 1991; Clark, 1996).

For example, if an entity is inaccessible by virtue of being new to the discourse (or due to limited background knowledge, and/or limited environmental/linguistic cues), speakers/signers are more likely to choose RE signals that are maximally explicit (e.g., pronouns, as opposed to extended noun phrases) (Ariel, 1996; Gundel, Hedberg, & Zacharski, 1993; Almor & Nair, 2007; Arnold, 2008). This makes sense because with limited common ground, listeners/perceivers need more information to arrive at the implicit threshold for referent retrieval. In addition, listeners will expect a signal that indicates that the entity in question is new.

In order to showcase this idea, let us consider the following context and its implications for the scenario in Illustration 3.1. Two people walk into a room where an easel is set up depicting images of various inanimate entities. Both individuals are unaware of the images that have been depicted until they walk into the room. One of the people initiates the discourse with the proposition, “Could you circle *it*?” In the unfamiliar context described above, the signal, *it*, is inappropriate because *it* is not informative enough to illuminate the referent indicated by the speaker/signer. In this situation, the speaker/signer must be aware that the unfamiliar context (which includes multiple, potential, competing entities) requires a more explicit RE in order to effectively refer to the intended entity.

Illustration 3.1 Using Inappropriate Signals When Interlocutors are Unfamiliar with the Context



We must also consider that addressees/perceivers assume that the signals they receive will be appropriate and appropriately informative (part of the joint-action quality of referring).

In the scenario outlined in Illustration 3.1, our addressee/perceiver takes the proposition, "*Could you circle it*?" as a signal that the speaker/signer believes the addressee/perceiver to fully aware of what *it* is. This ineffective/inappropriate signal can lead to confusion, and a resulting range of internally-directed questions from the addressee/perceiver such as, "Why does she think I know what *it* is? Am I missing something?" This example highlights how the pragmatics of referring involves more than sending signals; it reveals how both interlocutors *expect coordination* (Clark, 1996; Clark & Wilkes-Gibbs, 1986). In this way, the act of referring illuminates the implicit joint action that characterizes the dynamics of communication, illustrating the complex pragmatic coordination that we, as language users, must constantly navigate.

This example also provides an opportunity to understand the inverse relationship between the informativeness of RE signals we deploy, and the amount of access an addressee/perceiver has to the entity in question. Recall the situation described in Illustration 3.1 where the addressee has *very low* access to the entity in question. This context demands an RE that signals the entity as new, distinguishing it from other competitors. In other words, our RE must be *highly informative* (i.e., deploying a definite description such as "*the coffee mug*" is necessary for effective referring in this context, as opposed to REs with limited explicitness such as "*it*" which is a typical signal for a discourse old entity). Conversely, if an entity is *highly accessible* and in focus, all that is needed to satisfactorily signal that the entity in question is accessible, is an RE with *low informativeness* (e.g., a pronoun). Restated, entities that are *inaccessible* are associated with RE signals that are *highly informative/explicit*; and entities that are *highly accessible* are associated with RE signals that are *minimally informative* this is the basic premise of Ariel's Accessibility Theory (Ariel, 1990) and in much of the subsequent research on referring (Ariel, 1996; Gundel, Hedberg, & Zacharski, 1993; Almor & Nair, 2007; Arnold, 2008).

Taken as a whole, each option from the inventory of referring options available to us in a particular language occupies a unique status on a hierarchy with each option sending a corresponding (inverse) accessibility signal about the entity in question. (The following examples demonstrate this accessibility dynamic in context (REs are in bolded italics):

1. ***Bernie Sanders, the senator from Vermont,*** is running for President.

This explicit RE (definite description) sends a signal that the listener needs a great deal of information to access the referent. In this case, the speaker is being highly explicit to support access to the referent with low accessibility.

2. ***That senator*** is running for president.

The moderate explicitness of this RE (demonstrative) signals that the referent in question occupies a more accessible status, and listeners in this case (as compared to the example in sentence 1) are better equipped to retrieve the referent.

3. ***He*** is running for president.

Finally, this minimally explicit RE choice (pronoun) indicates that the referent in question is highly accessible (in focus), and for retrieval, it only requires the low informational load that English pronouns carry.

Table 3.1 Outline of How Explicitness Signals Accessibility.

This structure is adapted from Ariel's Accessibility Theory (1988).

Referring Expression	Levels of Explicitness	Accessibility Signal
Definite description (***Bernie Sanders, the senator from Vermont***)	highly explicit	Signals that the entity has low accessibility
Demonstrative (***That senator***)	↕	↕
Pronoun (***He***)	low explicitness	Signals that the entity has high accessibility

It is important to notice that RE choices entail two parts: (1) the semantic content of the RE itself, (2) the signal it sends (most often about how easily the entity is retrieved) (Ariel, 1996). The coordination work that this requires becomes more and more complex as any discourse is extended. This is especially true if we have to manage increasing numbers of competing entities across multiple discourse statuses (Ariel, 1988; 1996; Arnold, 2008; Almor & Nair, 2007).

An additional example can help to illuminate how the signaling function of REs is, in many ways, independent of the RE's informational/semantic value. Imagine a couple intensely tracking the 2016 presidential election results together, and both witnessing the winner declared on TV. Now imagine, with both fully aware of the outcome, one individual turning to the other and using the following extended definite description:

4. **Donald J. Trump, host of the reality TV show *The Apprentice***, is our next president.

When language users opt for REs that are intentionally and obviously more explicit than is necessary (as in sentence 4), we, as listeners, clearly see the *signaling* feature of the RE. In this case, the addressee is already aware and familiar with the entity in question. But instead of an internal dialogue that asks "Wait, did my husband think I wasn't watching? Does he think I didn't understand the broadcaster?" our addressee is well aware that this pragmatic device (being intentionally and overly explicit) signals something else altogether about particular attitude about the entity. In this way, we can see the intricacy involved in deploying REs effectively and their important role as signalers.

The fundamental premise underlying all of these examples is that successful communication requires *joint-action* where interlocutors work together using implicit and explicit information to construct meaning in discourse (Grice, 1975; Clark, 1996; Clark & Wilkes-Gibbs, 1986). As we go forward, exploring how REs are allocated in ASL and investigating how they serve as signals for accessibility, let us first review the inventory of REs available in this language.

3.3. Referring Expressions in ASL

Studies of REs in ASL are motivated by various factors, among them is ASL's extensive inventory of referring devices, among them is a rich pronominal system that makes a wider range of REs available to ASL users than are typically found in spoken languages (Morgan, 1999; Morgan & Woll, 2003; Morgan, 2006; Bel, Ortells & Morgan, 2014).

Definite Descriptions (DDs):

These most explicit RE forms in ASL are realized as noun phrases (BAD BOY), lexical nouns (MAN), or names used to refer to a person or object. In this analysis, if a noun or phrase was immediately preceded or followed by an indexing-pronoun (pointing), the entire RE was coded as a definite description. This is in line with the approach adopted by F&M[6]

Instrument (Handling) Classifiers(ICLs):

ICLs are handshapes that serve as REs indicating how an entity is being manipulated (Supalla, 1982; 1986). ICLs use handshape forms to add to their explicitness (i.e., an

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[6] There are occasions when DDs are coded as NPs in this dissertation.
In these studies, these labels are interchangeable.

entity that is long and thin will be represented by an appropriately configured handshape, as will a thick or tiny entity). Additionally, because they often co-occur with verbs of agreement or with constructed action, they are often part of a dense *constellation* of REs. In this configuration, ICLs can often leverage the simultaneous information presented by their handshape and co-occurring REs to enhance their own informativeness (Figure 3.1).

Figure 3.1 Examples of Instrument Classifiers.

At left, the handshape is referring to a balloon using ICL: XA "holding a balloon on a string." At right, both handshapes (2 hands ICL: S) are used to refer to manipulating a bow and arrow.

ICLs represent a RE with relatively high explicitness that can signal entities that are inaccessible in the discourse.

Descriptive Classifiers or Size and Shape Specifiers (DCLs)

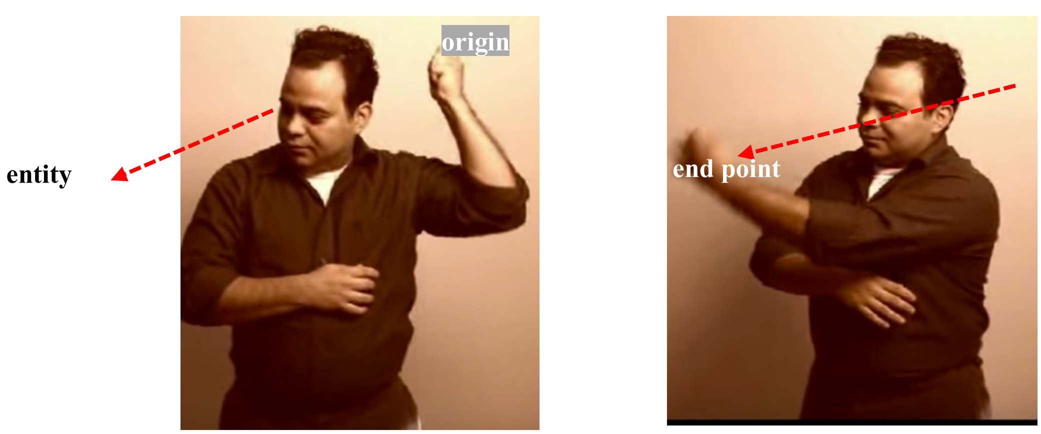
DCLs refer to a noun by denoting its physical and geometric characteristics as well as its spatial outline (Supalla, 1986). This RE form also represents a high level of informative-ness for a number of factors: 1) DCLs inherently include visually-descriptive information 2) they can also "agree" with an entity's location in space and 3) DCL can depict a vantage-point to the represented entity (in space) that parallels a perceiver's perspective on the actual entity in their physical experience.

Agreement (AGR):

AGR (excepting some examples of eye gaze) includes forms that are almost always realized concurrently with other RE-types. Interestingly, despite its non-overt qualities it is a RE form with relatively high levels of *referring power*. In the same way as ICLs, AGR can leverage the co-occurring information of other RE types to enhance its own ability to be explicit/informative. There are multiple ways that agreement can be realized in ASL. In verbs of agreement, the "agreement" is manifested as the *beginning and end points* of the sign's production (Figure 3.2). These loci often serve as the subject or object determined by the direction of the sign. In addition to instantiating subjects and objects, agreement can work in concert with various handshapes of the sign to include referring information about the theme in a phrase (Shepard-Kegl, 1985; Kegl and Schley, 1986; Kegl, 1987; Sandler & Lillo-Martin, 2006) (See Figure 3.2).

Figure 3.2 Examples of Both Eye Gaze and Verb of Agreement.

At left, the eye gaze of the character represented by constructed action is fixed on an entity in space. At right, you see the endpoint of the verb of Agreement that also indicates the same entity in space.



AGR is often realized along with ICL, which often results in a constellation of three REs (the inanimate entity being manipulated, in addition to the beginning and end points of the agreement representing two other entities). Another RE that involves agreement is *eye gaze,* or reference to entities in discourse using overt and discrete orientations in eye gaze to specific locations in space (Bahan & Supalla, 1995). Eye gaze, too, almost always co-occurs with constructed action, however, it was sometimes, however infrequently, realized as a stand-alone RE.

Indexing pronouns (IX)

IXs are REs that refer to entity by pointing to a particular location(s) in space. In our analysis, indexing was considered an independent referring expression only when it was used without an accompanying noun phrase. Indexes have been discussed as the closest ASL form to pronouns in spoken language (Hoffmeister, 1978; Engberg-Pedersen, 2003; Meier & Lillo-Martin, 2010). The generic character of this RE type in ASL contributes to its broad application as a signal for entities with various levels of accessibility. IX are most commonly used as maintaining REs. However, there are occasions when IXs accompany DDs, resulting in IXs being subsumed into an explicit noun phrase. IX do occur in isolation, and because they have the potential to signal *and* "agree" with an entity's location, they can also independently signal entities that are inaccessible.

Constructed Action (CA):

ASL has the capacity to employ unique devices to denote and differentiate between characters in discourse called role shifts and body classifiers. In this study, these forms are subsumed under the larger *constructed action* category (Winston, 1991, Metzger, 1995, Cormier et al. 2013). Supalla (1986) describes them as a kind of mimetic representation rather than a visual-geometric representation of the noun. More recently they have been referred to as surrogates where a signer assumes the physical behaviors, actions and mannerisms of a character in discourse (Liddell, 1995).

CAs are an interesting RE type as they can occur independently, in addition to co-occurring with other RE types. If we consider them in their common, independent form they present as an RE type with limited informative-ness. Independent CAs function as maintainers and are almost never an RE used to signal an inaccessible entity.

Semantic Classifiers/Entity Classifiers (SCLs):

This RE category includes a range of handshapes that indicate the semantic category of an entity (e.g. person, vehicle, animal, structure or aircraft) (Friedman, 1975; Shepard- Kegl, 1985; Kegl and Schley, 1986; Winston, 1991). These RE types, similar to CA, have the ability to occur independently or concurrently with other RE forms. Independently, they signal highly accessible entities and are not favored REs for inaccessible entities unless a narrator is intentionally attempting to be vague.

Null Arguments (Null):

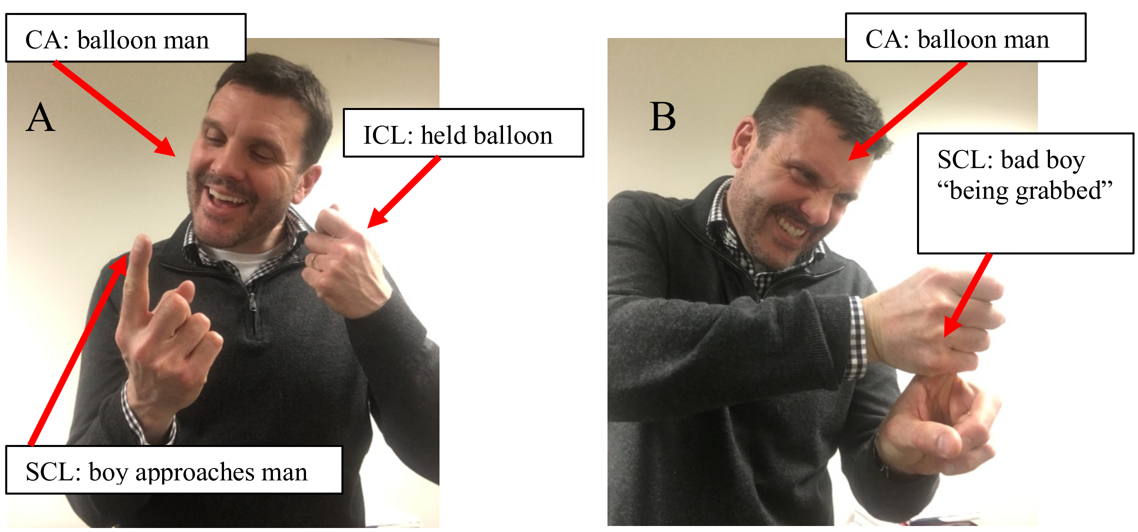
For the purposes of this study, *null* arguments are exclusively pro-drop forms where context licenses deleting a referent's explicit mention. Here, null arguments are understood to occur in sentences where the subject is not overtly stated, or represented by any of the RE types mentioned above (i.e., in the present study, a verb of agreement where referents are indicated by location is not a considered a null argument). Null forms, as a minimally-explicit RE, refer to highly accessible entities and are almost exclusively realized in discourse statuses reserved for less-informative REs.

Constellations:

Constellations are defined as multiple, co-occurring REs (at least two or more) that signal two or more distinct entities. All REs in this organization constitute a constellation. Part of the nature of a visual/spatial language is its ability to depict referents concurrently (See Figure 3.3). Research on signed languages has demonstrated that if we are to fully understand the structure of signed languages it is important to appreciate the concurrent forms that all sign languages allow (Poizner, 1983; Vermeerbergen, et al. 2007; Cormier et al. 2013). These forms are not included in this study.

Figure 3.3 Examples of Constellations.

In each image below multiple references to entities are presented simultaneously. This is made possible by affordances of the visual-spatial architecture of ASL.



English Translation (left panel): The man holding a balloon was approached by the boy.

English Translation (right panel): The balloon man grabbed the bad boy.

3.4. The Present Study

We know from research in spoken languages that systematic patterns emerge in RE choices dependent on discourse status and other factors that impact accessibility (Ariel, 1988; 1996; Gundel, Hedberg, & Zacharski, 1993; Almor & Nair, 2007; Arnold, 2008). In considering studies that have been done on how REs are deployed in ASL, there is emerging evidence that signers also make strategic decisions about which referring expressions to use in various discourse statuses (Wulf et al., 2002; Swabey, 2011; Frederiksen & Mayberry, 2015; 2016). The manner in which these studies have explored patterns of REs has built a foundation for how to begin thinking about REs in ASL. However, not until Frederiksen and Mayberry's (2016) study (F&M), using Ariel's (1996) framework, has a comprehensive analysis been done on how the range of REs in ASL might be organized in a proposed hierarchy of accessibility.

F&M's research offers a valuable context for studying REs, and in our attempt to replicate their results we will expand on their analysis by including a greater range of participants, a more complex stimulus, a wider range of REs occupying various syntactic roles, and we will apply a systematic statistical approach using Toole's Accessibility Scale (1996). It is our intention to explore whether the robust relationships they report between ASL REs and the entities they signal, still hold after we broaden the investigation. In line with F&M's approach, avoiding the complications that result from REs that co-occur, we will only include those REs that occur as discrete, independent forms (i.e., all constellations, or REs that co-occur, will be removed from the present study's narrative analysis). However, we will return to constellations in Chapter 4.

3.5. Method

3.5.1. Participants

Data from a total of 19 deaf, native users of ASL (i.e., having deaf parents and acquiring ASL from birth) participated in this study. They ranged from 21–69 years of age (mean age: 34.5, median age: 27.5), of the 20 subjects, 13 were female and 6 were male. 30% of the sample was at least 3rd generation deaf or greater, and 15 of the 19 participants had advanced degrees (i.e., degrees beyond a bachelor's). These narratives were collected in order to analyze how sophisticated, native, ASL users deployed REs in narrative discourse.

Additionally, spoken English Balloon Story narratives from 6 hearing, native users of English (4 females and 2 males) were included in the data English language narrative samples. Balloon Story narratives were audio recorded and analyzed for RE distributions across discourse statuses. These narratives were collected for a previous study[7]. Hearing participants ranged in age from 18 to 61 (mean age 38.3, median age 38.5).

3.5.2 Procedure

After providing informed consent, participants were given instructions in ASL by a native user of ASL. The participants were presented with a colored, 6-panel, wordless picture sequence adapted by Hoffmeister et al. (1999) from Karmiloff-Smith's (1979) *balloon stories* (see Figure 5). The stimulus for this study included one main character

[7] The spoken English Balloon Story narratives were collected as part of a class project (by T.A. Czubek, 2014).

(the balloon boy) and two secondary characters (balloon man and the bad boy) as well as two featured objects (balloon one and balloon two). All participants were given as much time as they needed to view and become familiar with the story. All participants reviewed the story together with a native user before recording. When they acknowledged that they were ready to retell the story, the stimulus was removed and participants told the story to that native user. The entire process was video recorded. Several studies have used similar procedures to elicit narratives (e.g., Hickmann and Hendriks, 1999; Kail and Hickmann, 1992; De Villiers, 2004). It is clear that subjects and testers, in all cases, were fully aware of each other's shared knowledge of the characters and events in the balloon story. As a result, this study was able to control for the important and complementary role that mutual knowledge, community membership, physical co-presence plays in choosing referring expressions (Ariel, 1988; Clark & Krych, 2004).

The spoken English samples from hearing native users were collected using the same procedure outlined above (albeit in spoken English). All spoken English versions of the Balloon Story narrative were audio-recorded without including any identifying information.

3.5.3. Materials

Again, the stimulus for the narratives was based on one, wordless illustrated comic comprised of a six-panel picture sequence (Hoffmeister et al.,1999), adapted from Karmiloff-Smith's (1979) *balloon stories*. The revised balloon story includes various entity and object referents in order to ensure that signers would need to describe multiple characters and identify competing objects, encouraging multiple opportunities for introducing, maintaining and reintroducing referents.

We also included coding data from three readily available professionally-produced ASL narrative videos as we extended the analysis in order to determine if our findings were generalizable to more complex narrative samples. We chose three narratives from ASL Literature (*Wrong Daughter* by Elinor Kraft, *Deaf Spies of the Civil War* by Ben Bahan, and *Bird of a Different Feather*[8] by Ben Bahan). The relevant details of each narrative are described later.

Figure 3.4 The Balloon Story.

This 6-panel, wordless cartoon was adapted from the original work by Karmiloff-Smith (1979) by Hoffmeister et al. (1999). The panel was the stimulus for all balloon stories.

[8] Because *Bird of a Different Feather* is approximately 20 minutes long, we coded the first 2 minutes and 39 seconds of the narrative to maintain consistency with the other narratives. This served to ensure that we did not diminish the overall proportion of introduced REs as compared to the other narratives which were both also approximately 3 minutes long.

3.6. Coding and Annotation

In an effort to determine whether the robust relationships that Frederiksen & Mayberry report (2016) could be replicated with a larger sample of REs, we coded all REs regardless of syntactic role. In their research, Frederiksen & Mayberry (2016) included only those REs in subject position for reintroduced and maintained discourse status, and opted not to include co-occurring REs. Having already expanded the sample of REs and in order to maintain consistency between the present study and Frederiksen & Mayberry (2016), our study also excluded any RE tokens that co-occurred. However, we will return to the implications of co-occurring REs in Chapter 4.

This study used a five-tiered methodological approach to coding and annotation: (1) Transcribing collected video recorded narrative samples from 19 native ASL users and 6 native English users (Hoffmeister, et al., 1999; Bahan & Supalla, 1996), (2) coding REs by type and discourse status on a Chronological Anaphora Matrix (See figure 3.5) (3) coding entities signaled by ASL referring expressions for accessibility values (Toole, 1996), (4) disaggregating REs into two categories, those that occur in isolation and those that co-occur (in constellations), (5) distilling referring expressions into coherent patterns of use.

3.6.1. Transcriptions

Initially, ASL transcriptions were typed and organized into glossed propositions that were distinguished from one another based on predicate boundaries (Tomlin,1987). The term proposition is defined as “a semantic unit composed of a predicate plus its arguments” (ibid., p.461). This procedure is similar to the approach adopted by

Frederiksen and Mayberry (2015; 2016).

Because there has been a lack of consistency among transcription systems for signed languages (Morgan, 2005), the present study chose to use sign glossing conventions (Baker-Shenk & Cokely, 1980) adapted for simple narrative coding by Hoffmeister et al. (1999) as part of the expressive battery of the ASL Assessment Inventory. ASL signs were glossed and denotations were used to indicate the variety of referent forms, as well as to indicate simultaneously represented entities. There was some flexibility in determining clausal boundaries if the predicate was complex, however these designations did not cause inconsistencies in discourse status designations. Once they were typed and arranged in propositions, the transcribed versions served as a resource for the next step of coding, entry into the CAM. Eight transcriptions (40%) were randomly selected and reviewed by two skilled users of ASL. The inter-observer agreement coefficient for transcription accuracy of the ASL narrative samples was 93.5%. The spoken English narratives were also transcribed from audio recordings. The transcriptions were reviewed by a native user of English, and all REs were coded on the Chronological Anaphoric Matrix (Figure 3.5). Inter-observer agreement coefficient for the accuracy of English coding samples, and the CAM coding was 100%.

3.6.2 Chronological Anaphora Matrix

In line with much of the literature on referring expressions in spoken languages, the following criteria were used to identify referential functions/discourse status: *(a) Introduction*: this discourse status represents the first mention of referent in the story, *(b) Maintenance:* this status includes referents that continue to refer to the same character within a clause or in successive clauses, (c) *Reintroduction:* this status includes referents that refer back to a previously mentioned character/object whose last mention was at least beyond the previous clause. Similar categories have also been applied in Morgan's (2006) and Frederiksen and Mayberry's (2015; 2016) work in analyzing referring expressions in sign languages.

After doing a pass through of the data from the present study, the following inventory of referring expressions was needed in order to capture all of the data:

Table 3.2 Inventory of Referring Expressions Included in the Present Study.

Inventory of Referring Expressions in the Present Study
Definite Descriptions (DD)
Semantic Classifiers (SCL)
Instrument or Handling Classifiers (ICL)
Descriptive Classifiers or Size and Shape Specifiers (DCL/SASSes)
Indexing (IX)
Constructed Action (CA)
Agreement: verbs of agreement, eye gaze (AGR)
Null

The range of RE types was more extensive than the range included in the Frederiksen & Mayberry data.

Coding presented a challenge due to the fact that this study required devising a system that could easily depict the chronology, type, and simultaneous potential of various referents presented in ASL. To resolve this issue, I developed a Chronological Anaphora Matrix (CAM) which served as a simple, well-designed matrix for coding referents according to chronology, the entity to which they referred, referent types, discourse status, and the proposition number. The CAM form indicated discourse status identifying a referent as either Introduced, Maintained or Reintroduced by color code (e.g. introduced- indigo/blue, maintained- mauve, and reintroduced-red). The CAM was well-equipped to document/display both independently and concurrently occurring RE forms.

Each narrative was coded on an individual CAM form that represented all of the REs that occurred in a single narrative. The CAM codes the chronology of REs in order from top to bottom. If a RE occurs independently (as in a noun phrase with no co-occurring referents) it appears alone in its horizontal row. As an example, line #1 in Figure 3.5 "THAT BOY-IX," appears as the first RE, and it appears in proposition 1. It is coded in blue as it is the first mention (i.e. its discourse status is *introduced*).

Figure 3.5 Chronological Anaphora Matrix (CAM).

This coding tool presented an outline that allowed the data to be organized chronologically (top-down), while providing opportunities to see multiple levels of information simultaneously including information about entities, discourse status (by color), proposition, and whether REs occurred in isolation or concurrently.

#	Balloon Boy	Balloon Man	Slingshot boy	Balloon 1	Balloon 2	clause #
1	THAT BOY-IX					1
2				BALLOON		1
3	rs:boy					2
4		THAT MAN				2
5		IX				3
6	loc: to boy	BCL:man hands baloon		ICL: balloon		3
7	rs:boy					4
8	BCL:holds balloon			ICL: balloon		4
9			THAT LITTLE BOY			5
10			SCL: crouching			5
11			rs:bad boy			6
12			BCL:shoots slingshot			6
13				DCL:balloon pops		7
14	THAT BOY-IX					8
15	rs:boy					9
16		THAT MAN HAVE BALLOON				9

Legend:

Introduced	Reintroduced	Maintained

If a RE includes multiple, concurrent referents, they all appear on the same horizontal row. Any line that includes 2 or more REs on a horizontal represents a concurrent reference. Line #6 in Figure 3.5 displays that there are 3 REs subsumed in a constellation that occurs in proposition #3.

Some propositions include more than one independently occurring RE, and as such, several REs may be coded on different horizontals from the same proposition. For example, in Lines # 9 and 10 we see the DD (THAT LITTLE BOY) and the SCL: "boy crouching" both occurring in the same proposition. The actual typed transcription is provided here:

Proposition 5: THAT LITTLE BOY SCL: "bad boy crouches behind" / DCL: "fence"

Figure 3.6 An Introduced Noun Phrase Occurring Independently of Any Other RE.

#	Balloon Boy	Balloon Man	Slingshot boy	Balloon 1	Balloon 2	Prop. #
1	THAT BOY-IX					1

Figure 3.6 displays an introduced (blue) RE in isolation.

Figure 3.7 A Constellation of REs (all co-occurring) With Competing Discourse Statuses.

6	loc: to boy	BCL:man hands baloon		ICL: balloon		3

Interestingly, Figure 3.7 highlights the fact that in this constellation, not all REs occupy the same discourse status (as happens frequently in the data). In line #6, the Balloon Man has maintained discourse status (color coded as mauve/maintained) because he remains in focus, having been referred to in propositions 2 and 3 (see Figure 3.5). The Balloon Man is indicated by constructed action (BCL: man hands balloon). We can also see in line #6 (Figure 3.7) that while the Balloon Man is being referred to, he is holding a balloon, indicated by an instrument classifier (ICL: balloon). No reference to the balloon appears in the previous sentence, and as it has already been introduced, it earns reintroduced discourse status (coded red). Additionally, the Balloon Man has presented the balloon to the Balloon Boy. The Balloon Boy is referred to using agreement/location as he occupies the space of the end point of the instrument classifier (ICL: balloon). The Balloon Boy has maintained (mauve) discourse status as he, too, is in focus, having been referred to in the previous sentence.

Coding for all narratives followed this method. Five Chronological Anaphora Matrixes (20%) were randomly selected and reviewed by a skilled user of ASL for accuracy as compared to the video and typed transcripts. The agreement coefficient between initial coding and the rater for designating discourse statuses was 90.68% (or 146/161 tokens).

3.6.3. Accessibility Values

Each referring expression was also coded for a numerical accessibility value using a scale adapted from Toole (1996). It was possible to earn a maximum value of 6 (most accessible) and a minimum value of -2 (least accessible). For each RE, three factors were considered in assigning an accessibility value: (1) number of propositions back to previous mention, (2) topicality, and (3) competition. Working definitions and numerical values are explained in detail in Chapter 1, Section 1.6.4. As Toole (1996) makes clear, “it is not claimed that the weightings assigned to the various contributing factors have cognitive reality" (p.217), these values are merely useful approximations of perceived accessibility status. 20% of the sample was randomly selected and reviewed by a skilled user of ASL to determine the reliability of the assigned accessibility values. The inter-observer agreement coefficient in comparing the accuracy of transcripts, narrative videos and CAM coding was 92.59% (198/215 tokens). For a more detailed description of Toole's Accessibility Scale see Section 2.3.1.

3.6.4. Organizing by Type and Discourse Status

Once this was complete, REs were organized according by token-type and discourse status (*Introduced, Reintroduced, and Maintained*) to see trends across the data. Types were identified based on the existing literature (Morgan, 2006; Frederiksen & Mayberry, 2016), however, additional RE categories (outlined already in Section 3) were added to accommodate alternate referring forms that consistently emerged in the data. Discourse status was determined using Ariel's (1988) framework and incorporating features from Morgan & Woll (2003), Morgan (2006) as well as Frederiksen and Mayberry (2016).

3.6.5. Heat Maps

A heat map is a popular graphical method for visualizing multi-dimensional data in which a table of numbers are encoded as a grid of colored cells. The rows and columns of the matrix reveal patterns that are often difficult to discern in typical tables (Galli, 2016). Proportions and distributions for REs for all three discourse statuses were depicted using shaded blocks. Heat maps in the present study are designed to be read horizontally.

Across each horizontal (representing a discourse status) darker shades represent more frequently occurring REs and lighter shades represented less frequent occurrences.

Finally, proportions and distributions for REs throughout three discourse statuses were analyzed to propose an accessibility hierarchy. The following results rely heavily on Ariel's (1988; 1996) work as a guide in making determinations about accessibility and the roles each RE assumes in discourse. In addition, the important initial work done by Morgan (2006) and Frederiksen and Mayberry (2015; 2016) help to shape the analysis and organization of this study. When possible, their results will be used for comparison purposes in order to discover consistencies, as well as differences that can inform a comprehensive understanding that complements different levels of the present analysis.

3.7. Results

Results are presented as follows: First, we calculated the total number of RE's and analyzed their distribution according to discourse status. Next, we compared our results to those of F&M, examining the frequency and proportion of each RE. Our analysis includes a wider range of RE tokens and applies a detailed examination of a subset of the REs to determine whether they should be considered independently or as part of other categories. We then visualize the data using two different heat maps to further describe the distribution of REs by discourse status. Finally, we conducted a linear regression analysis by coding each type of RE onto Toole's accessibility scale in order to compare pairs of RE types statistically. We then extend the analysis by applying the same procedure to the ASL literature narratives and comparing those results with the Balloon Story narrative results.

3.7.1 Narrative Data

The average number of propositions per ASL narrative was 17.9 (median 16.5). All subjects incorporated each of the 6 episodes featured in the 6-panel Balloon Story stimulus. An analysis of 5 randomly selected ASL transcripts showed an average of 67.83 signs per narrative (Min = 35, Max = 121), and an average of 42.33 referring expressions (Min = 23, Max =65) per narrative. This indicated that the 6-panel stimulus elicited a narrative with a high proportion of REs.

Details from the ASL literature narrative data is described in Table 3.3

Table 3.3 Relevant Features for ASL Literature Narratives

Comparative features for Balloon Story narratives is also provided.

ASL Literature	Propositions	Length in Minutes	Animate Entities	Inanimate Entities
Wrong Daughter	106	2:48	5	1
Bird of a Different Feather	82	2:39	7	2
Deaf Spies of the Civil War	88	2:44	5	2
Means ASL Literature Balloon Story	92 (17.9)	2:43 (50)	5.6 (3)	1.6 (2)

3.7.2. ASL Referring Expression Data

A total of 856 ASL REs were coded in the narrative samples, including both REs from the Balloon Story that occurred as discrete, independent forms as well as those that occurred concurrently (i.e., in constellations), Table 3.4 provides a broad perspective on their distribution.

Table 3.4 Proportion and Number of Referring Expressions by Discourse Status in the Present Study

Discourse status	Introduced	Reintroduced	Maintained
Proportion	11.09%	16.35%	72.54%
Number	95	140	621

The data show that the vast majority of referring expressions occurred in maintained discourse status with substantially less occurrences of REs in introduced and reintroduced categories.

Next, in an effort to be consistent with the approach used to count REs in the F&M studies (2015; 2016) we eliminated all REs in constellations (decreasing the sample size of RE tokens by 44%). This disaggregation impacted proportions across all discourses statuses. The revised allocations, in addition to the allocations reported in Frederiksen and Mayberry (2016), are showcased in Table 3.5. What follows is an attempt to explore whether Frederiksen and Mayberry's findings (2016) can be replicated despite including a broader range of REs in terms of syntactic role.

3.7.3. Can We Replicate Frederiksen and Mayberry's Findings?

As we analyze Table 3.4, the initial data suggest remarkable consistencies between the studies. Along with the similarity in total number of REs, the proportions of REs in maintained discourse status are almost identical. In both studies, maintained referents occupy the overwhelming number of REs. The proportion of REs used to introduce entities was also similar, with the present study reporting 7% less. However, the percentage of referents in reintroduced status reported in the present study was almost three times greater (19% to 7%) as compared to the F&M data (2016).

Table 3.5 Distribution of Referring Expressions by Discourse Status in the Present Study Compared to the Distribution Reported in Frederiksen and Mayberry (2016).

	Introduced Referents	Reintroduced	Maintained	Total Number
Present Study	17% (81)	19% (89)	64% (306)	476
Frederiksen and Mayberry (2016)	24% (108)	7% (31)	69% (310)	449

This discrepancy could be due to the fact that the Frederiksen and Mayberry (2016) stimuli included simpler storylines with less competing entities (2 characters and 1 object entity, as compared to 3 characters and 2 objects in the present study). Simpler stories may have translated into fewer opportunities for incorporating reintroduced referents. In addition, a shorter, simpler narrative could contribute to increasing the overall proportion of introduced REs as the introduced occurrences could be calculated relative to a smaller total number, however there is some question as to how108 tokens occurred in introduced discourse status. F&M (2016) do acknowledge that their narrative stimulus was relatively simple and suggest that future research use more complex narrative stimuli. Table 3.6 provides a more explicit picture of where referent types appear across all three discourse statuses for the present study.

Table 3.6 Proportion of Referring Expression Tokens in Isolation from the Present Study by Discourse Status and Type.

RE in Isolation	NP	NULL	SCL	ICL	IX	CA	DCL/SASS	AGR
Introduced (n=81)	94% (76)	0%	1% (1)	0%	4% (3)	1% (1)	0%	0%
Reintroduced (n=89)	63% (56)	2% (2)	0%	0%	7% (6)	19% (17)	9% (8)	0%
Maintained (n=306)	28% (85)	6% (19)	12% (38)	0%	8% (24)	39% (120)	3% (9)	4% (11)

Each of the three discourse statuses above is arranged in a descending progression with each step downward indicating increasing levels of referent accessibility (i.e. maintained referents are more accessible than introduced referents). In other words, the REs predominating in introduced and reintroduced discourse statuses (the uppermost rows) are more likely to be signals for entities with low accessibility, and those REs that are more prevalent in maintained discourse status are, conversely, typically signals for entities that are highly accessible.

It is important to note that Frederiksen & Mayberry's typology (2016) condensed certain RE categories that the present study distills into separate classifications. For example, they include agreement verbs *and* constructed action in one larger category (zero anaphor). Although this conceptualization is in line with how much of the research talks about referent forms (Lillo-Martin, 1986; 1991; Lillo-Martin & Meier, 2011), the present study discriminates between these two types. We adopt this approach in order to recognize the non-linearity of various REs. In other words, rather than group all RE forms together that do not overtly include a distinctly articulated reference, we regard the spatial features embedded within verbs of agreement as overt referring devices (i.e., each origin and endpoint in a verb of agreement is itself a RE) despite not including a separate lexical label. By the same token, constructed action, despite its mimetic, non-lexical character, is also considered to be an overt and distinct RE. In recognizing these forms as distinct, we hope to avoid the tendency for linear orientations that sometimes impacts how we understand and describe signed languages (Dudis, 2004) (Figure 3.8). As we continue, we will demonstrate how this approach to distinguishing RE-types is valuable and represents a novel contribution to the research.

Figure 3.8 Describing Non-Lexical Overt Referring Types

The example in this figure is intended to make clear that each RE, despite not being an independently articulated reference still represents an overt RE using the spatial and visual affordances of ASL.

Unsurprisingly, results suggest that noun phrases (DDs) are the most common RE type in introduced and reintroduced discourse status (94% of introduced REs are DDs, 63% of reintroduced REs are DDs). These are the preferred option when adult narrators are aware that the referent in question is new and/or relatively inaccessible. The proportion of DDs decreases as assumed accessibility increases (i.e. as you progress top-down we see a smaller and smaller proportion of DDs). These results are consistent with those from other spoken and signed languages (e.g. Gundel et al., 1993; Mulkern, 1996; Morgan, 2006; Frederiksen and Mayberry, 2015, 2106) because we know that "low accessibility markers [e.g., DDs] are those commonly uttered on the basis of general knowledge in unmarked initial retrievals" (Ariel, 1988, p. 69).

Our results also indicate that constructed action (role shifts and body classifiers) are far less likely to refer to entities in discourse statuses that require more explicitness (Introduced-1%, Reintroduced-19%) than they are to appear in maintained discourse status (39%). Additionally, the data from the present study included IXs as a consistently occurring, independent RE category across all discourse statuses. However, IXs were not included in the Frederiksen and Mayberry (2016) hierarchy because they occurred so infrequently; for their data, most IXs occurred in tandem with nouns (i.e. they were always part of a larger noun phrase (nominal), and were rarely realized as independent REs. Interestingly, ICLs (handling classifiers), a form that was also not included in the Mayberry and Frederiksen (2016) study, figured prominently across all discourse statuses in our *overall* data. The frequency of ICLs was almost assuredly a function of the stimuli, as the Balloon Story incorporated competing *object entities* with roles that were essential to the narrative plot. Figures 3.9, 3.10 and 3.11 highlight how the allocation of individual, isolated REs across discourse statuses from the present study compares to the allocations reported for individual REs in the Frederiksen & Mayberry data (2016).

Figure 3.9 RE Allocations of REs in Isolation from the Present Study and Frederiksen & Mayberry (2016)

This bar graph that represents the allocation of REs and the expanded inventory of REs included in the present study. The Frederiksen & Mayberry (2016) data was reorganized for comparison purposes.

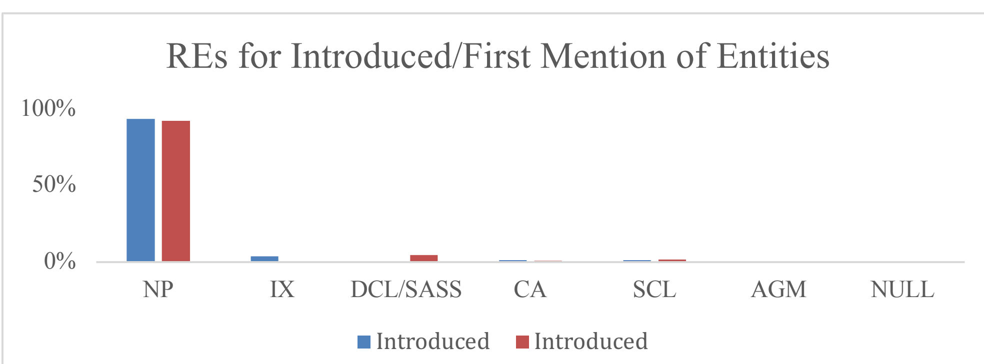


Figure 3.10 RE Allocations of REs in Reintroduced Discourse Status from the Present Study and Frederiksen & Mayberry (2016)

This bar graph that represents the allocation of reintroduced REs and the expanded inventory of REs included in the present study. The Frederiksen & Mayberry (2016) data was reorganized for comparison purposes (CA and AGR were separated into distinct categories and IX was included) in order to more easily compare their results to the expanded inventory of REs included in the present study.

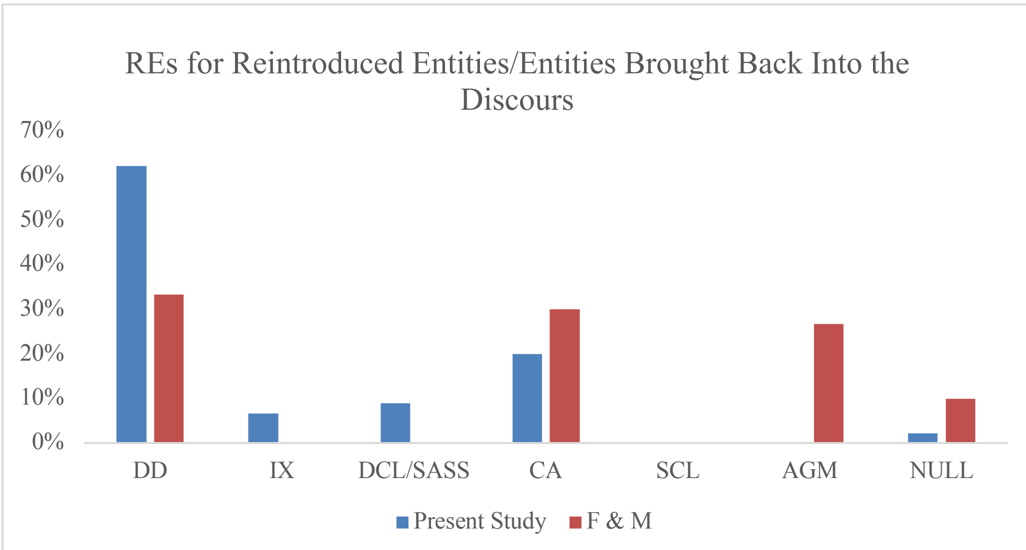
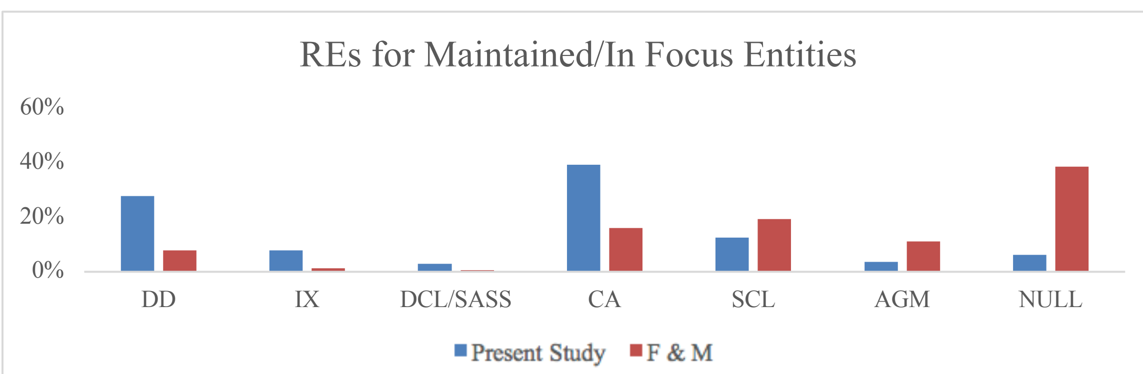


Figure 3.11 RE Allocations of REs in Maintained Discourse Status from the Present Study and Frederiksen & Mayberry (2016)

This bar graph that represents the allocation of maintained REs and the expanded inventory of REs included in the present study. The Frederiksen & Mayberry (2016) data was reorganized for comparison purposes (CA and AGR were separated into distinct categories and IX was included)



In order to create consistency across studies, using data reported from Frederiksen and Mayberry (2016), we were able to distill their CA and AGR tokens into separate RE categories, whereas in their original data they are subsumed into one larger category. In addition, we renamed their “zero anaphora from plain verbs,” *Null*, in order to maintain uniformity across the two studies. Recall, in contrast to the present study, that only tokens in subject position were included in the Frederiksen and Mayberry (2016) data sets. However, by virtue of this side-by-side comparison, we can see that there is a great deal of consistency between each study’s results. For example, both studies show that DDs are heavily favored in introduced discourse status. Consistencies are also remarkably clear for the allocations of CA and SCLs in introduced status. In maintained status, each study indicated the same two most frequently occurring RE types (DD and CA), and proportions for each are comparable. Frederiksen and Mayberry (2016) report more Null forms in reintroduced status; interestingly, the present study did not report a frequent occurrence of Null forms in any discourse status. Despite the broad similarities in results, more differences arose when we analyzed RE allocations in maintained discourse status. The present study reported greater proportion of CA and DDs. In our data, CAs were the overwhelmingly preferred form for REs in maintained discourse status (39% of all maintained REs), however, their role in maintained discourse status in Frederiksen and Mayberry’s data (2016) was relatively small (16%). This difference may be a natural outcome of our more complex stimulus generating longer narratives and, as a result, more maintained REs. Including maintained referents that were not in subject position may also have contributed.

Another notable difference between the studies related to Null forms. In Frederiksen and Mayberry's data (2016), Null forms comprised 40% of the REs in maintained discourse status, whereas their proportion occurrence in maintained status for the present study was only 6%. This was difficult to explain and may have been a result of subtle differences in the definitions of Null. Importantly, in both data sets ICL tokens do not appear. However, the overall trends across studies was strikingly similar, and it was illuminating to see that our revised typology also contributed to noticing new RE forms and their allocations (IXs, SASS or DCLs).

The next step in our analysis was to organize the data in heat maps which are, themselves, especially effective tools for noticing different kinds of allocations. The process of determining how distributions of REs translate into accessibility can be complex as we consider the proportions of various types within and across all three discourse statuses. As a result, we were able to construct a creative and visually comprehensible organization that helped to gain a better sense of the trends for each RE by discourse status and type.

3.7.4. Visual Allocations of ASL REs

Figure 3.12 Heat Map Data from RE Tokens in Isolation.

This heat map presents a visual allocation of REs from the present study that occurred in isolation. Organized horizontally, the shading of blocks in each row indicate the frequency with which RE forms occur in that discourse status.

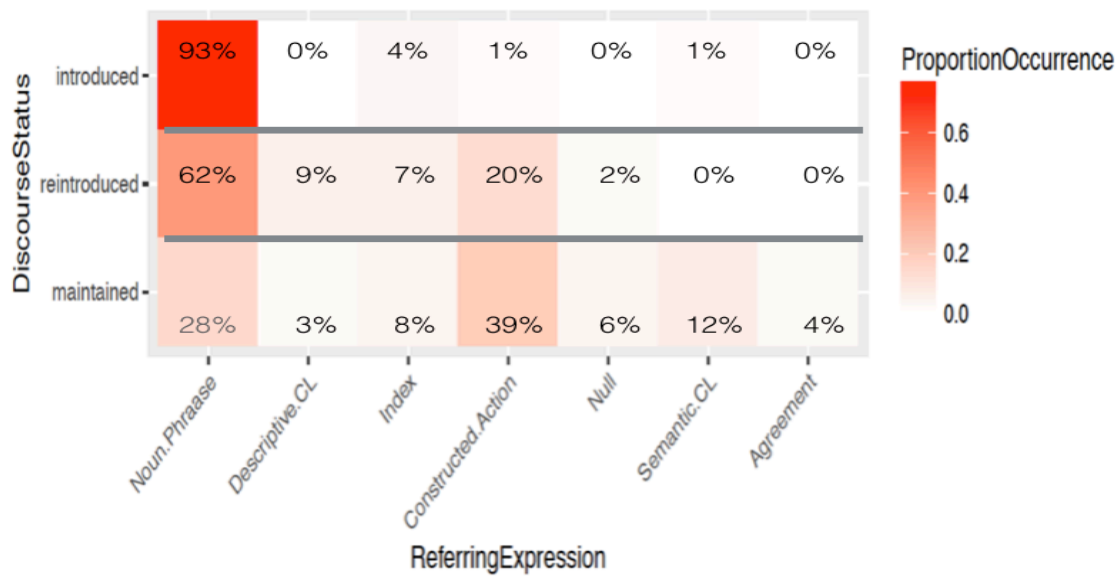


Figure 3.12, designed to be read horizontally, has REs plotted on the X-axis and discourse statuses plotted on the Y-axis. Discourse statuses are arranged in an ascending order (as in earlier tables) where the uppermost discourse status (introduced) typically requires the most explicit RE. The second row represents reintroduced discourse status, one that requires a mid-level of explicitness. Finally, the bottom row highlights maintained discourse status where we typically use REs with minimal explicitness. Shading across a horizontal contributes a nuance to the analysis that lets us see trends across each discourse status. For each discourse status, the darkest shading in that row represents the most frequently occurring RE in that status, and the succeeding darkest block represents the next most frequently occurring RE, and so on. Again, this manner of

organization allows us to see tendencies and allocations that help to inform decisions about developing a hierarchy of accessibility.

There is also value in interpreting the heat map vertically so as to notice trends in individual REs. Understood in this way, if an RE trends top-down from dark to light shading, it suggests that the RE is highly explicit and is more likely to occur frequently in discourse statuses where referents are assumed to have low accessibility (introduced and reintroduced). If, on the other hand, the RE trends top down from light to dark shading, it can indicate that the RE has a less explicit quality and is more likely to occur in discourse statuses where referents are assumed to be highly accessible.

For example, patterns in Figure 3.12 clearly reinforce our earlier conclusion about DDs as they trend from dark to lighter, but each row's shading indicates that DDs are always frequently occurring REs. The data also suggest that constructed action (CA) is a favored, minimally-explicit RE as it trends downward from light to dark. To a lesser extent, semantic classifiers (SCLs) and Null forms also trend from light to darker, indicating that they, too, are RE forms associated with highly accessible referents. The heat map demonstrates the reduced role of AGM and ICLs as independently occurring REs (ICLs disappear altogether). Again, these results were not surprising particularly because ICLs and Agreement are RE forms that co-occur. Interestingly, IXs were similarly frequent as they occurred across all statues, a trend that seems to send competing signals about its status as a marker for an entity's accessibility.

3.7.5 Reorganizing Allocations

After considering these allocations, we reorganized the x-axis of the heat map to reflect a progression of REs starting with the most maximally-explicit RE and concluding with the least informative RE, progressing from left to right. The initial organization was a random assignment that the statistical analysis applied. The new organization along the x-axis took into account the fact that explicit REs are more favored in introduced and reintroduced discourse statuses, and less informative REs are more favored in maintained discourse status.

Figure 3.13 Heat Map Depicting Reorganized REs in Isolation from Present Study

ASL REs from Balloon Story narratives are allocated from most explicit to least informative (horizontally from left to right). Darker red areas reflect higher proportions of occurrence.

In order to see REs presented in an order that presented most to least explicit, the data were re-arranged (Figure 3.13). The resulting pattern of shaded blocks assumed a downward-stepped pattern from left to right (again, trending from most informative RE to least informative). The progression, from left to right, mirrored the sequence of the proposed accessibility hierarchy from the comprehensive work of Frederiksen &

Mayberry (2016). The visual nature of the data arranged in heat maps allowed for relatively straightforward ranking based on the levels of shading within particular discourse statuses. For example, despite CA figuring more prominently in reintroduced status than did DCLs or IXs, CA's disproportionately high incidence in maintained status (typically signaling highly accessible entities) merited its less-explicit rank. Heat map trends also indicated that CA, more than Null forms and SCLs, figured prominently in reintroduced discourse status. Null forms, as compared to SCLs, also showed a greater tendency to appear in reintroduced discourse status, earning Null forms a more informative status than SCLs.

3.7.6. Cross-Linguistic Comparisons

As we considered the heat map allocations more closely, potential parallels were noted between the distribution of REs in ASL and the distribution of REs documented in English (Ariel, 1990). In ASL (as in English), DDs represent the most explicit RE type, as evidenced by the darker shaded blocks in those discourse statuses associated with more explicit REs. After ASL DDs (trending from left to right), were the extensive inventory of pronominal forms, eventually *bookended* by Null forms (as occurs in English). However, there was one noteworthy exception in the ASL data as SCLs assumed the last place in the progression, "outside" the Null form bookend[9]. The following progression represents the sequence of RE explicitness/informative-ness

[9] AGR occurred so infrequently in isolations that it is hard to draw any meaningful conclusions about its rank and for the sake of discussion it was not included in the pattern. ICLs only occurred in constellations.

according to the present study's allocation data:

[Nouns/Noun Phrases > Pronoun Forms > NULL >] SCL[10]
DCL
IX
CA

Interpreted in broad terms, this pattern seems to provide some evidence of a cross-linguistic/cross-modal parallel if we focus only on the sequence inside the brackets. In order to highlight this proposal, we used Ariel's (1988) framework to organize REs from spoken English narratives of the same Balloon Story. As in Ariel (1990), these data were organized into four categories described in Figure 3.14.

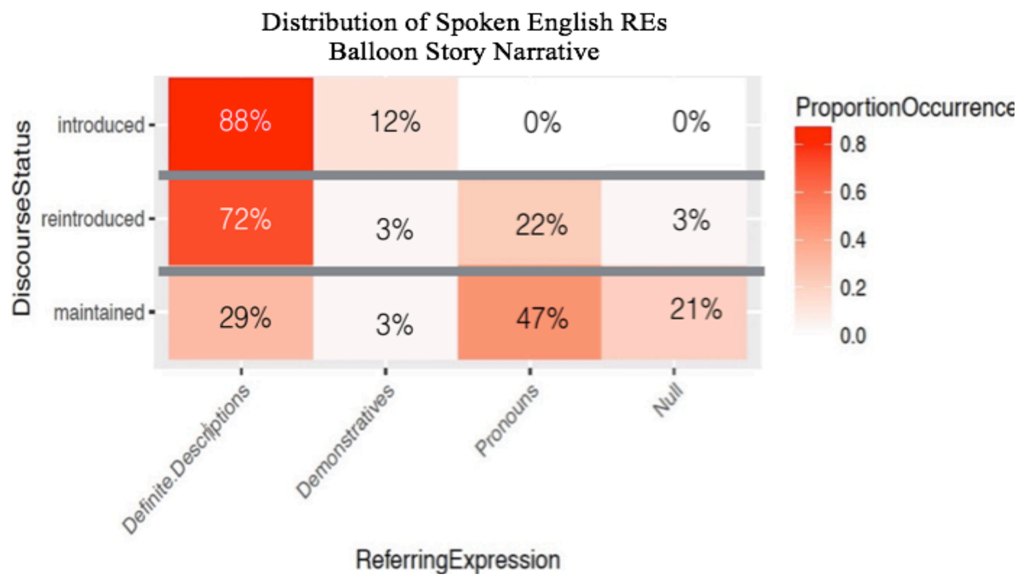
1. Definite Descriptions: *a young boy dreaming about a balloon, the vendor*, *the kid who shot the balloon*
2. Demonstratives: *this man who's holding a bunch of balloons. this other kid behind this barrel*
3. Pronouns: *he, him;* and
4. Null*: omitted referents.*

Despite the relatively limited inventory of RE types available in English, the downward-stepped pattern highlighted for the Spoken English narratives in Figure 3.14 is noticeably similar to the overall allocation for the ASL narratives in Figure 3.13.

[10] SCL, in this least explicit position, represents the only example of a pronominal form that does not support the proposal.

Figure 3.14 Heat Maps Depicting Spoken English REs from the Balloon Story Narratives.

REs are allocated proportionally across all 3 discourse statuses. Darker red areas reflect higher proportions of occurrence. (Total RE tokens, n = 123) (Introduced RE tokens, n=30, Reintroduced RE tokens, n=36, maintained RE tokens n=57)



The following progression represents a broad characterization of the English data:

Definite Descriptions/Demonstratives > Pronouns > Null Forms

If we consider the range of pronominal forms included in the inventory of REs in the ASL narrative data as a super-ordinate *pronominal category (i.e. those pronominal forms bookended by DD and Null forms)*, the ASL data seems to conform to a similar, general pattern (with the notable exception of SCLs).

These results may suggest that if we focus only on linear, isolated representations, REs in ASL generally behave like REs in English. However, the placement of SCLs outside this bookend, warrants consideration. Recall that in separating the data to better align RE types in the present study with the F& M analysis, we eliminated 44 % of the data set. It may be the case that if we include SCLs from that sample, there will be new allocation patterns resulting in SCLs assuming a new, more informative rank on the x-axis (inside the bookend). An additional factor that may contribute to SCLs earning a less informative rank relates to their greater frequency. Because Null forms were not frequently occurring (21 RE tokens) as compared to SCLs (39 RE tokens), SCL's relative frequency may simply have created more opportunities to appear as maintainers. Both forms (Null and SCLs) are minimally-informative, and favored in maintained status. Therefore, SCLs may have occupy a greater proportion of maintained REs because they were used more. This proposal warrants further, detailed study, but it does present interesting, potential cross-linguistic parallels. This question, and other questions about detailed approaches to ranking the informativeness of REs in ASL, will be the focus of the next section. In Section 3.7.7. we will apply a statistical analysis in order to determine the typical accessibility values of entities signaled by various REs entities. This investigation will help to address natural ambiguities that characterize an analysis based on allocations.

3.7.7. Relationships Between RE types and Entities

In order to arrive at a more concrete understanding of the relationship between these RE-types and the entities to which they referred, we endeavored to calculate *accessibility* values for the entities in the narrative. Determining these values would enable us to identify whether REs were signaling highly accessible or inaccessible referents. Using a previously established model (Toole, 1996), accessibility values would provide an additional layer of information that could more comprehensively inform how a hierarchy of accessibility for ASL REs might be composed. This represents an additional, novel contribution to the research. Results of this analysis were translated into a box and whisker plot (Figure 3.15).

Figure 3.15 Box Plot for All RE Tokens Occurring in Isolation

Plotting the accessibility values of all isolated REs and the relationship between accessibility value and RE type. Means for RE accessibility values are reported. The upper and lower "hinges" correspond to the first and third quartiles (25th and 75th percentiles). Accessibility values range from a maximum of 6 (highly accessible entities) to -2 (maximally inaccessible entities).

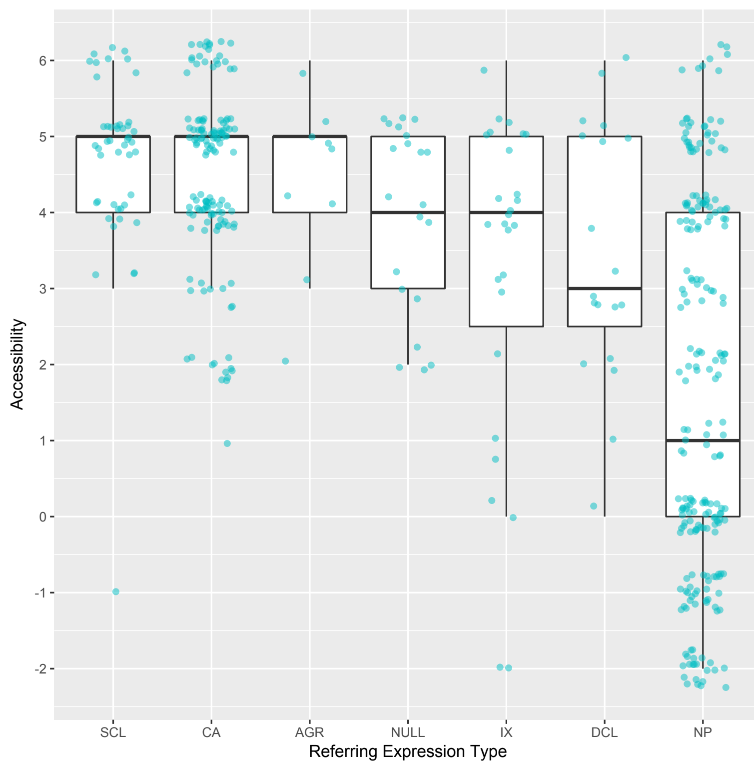


Figure 3.14 outlines how the accessibility values of each RE occurrence in isolation are distributed by type, including the mean for each RE as well as 95% confidence interval. In line with all conclusions thus far, DDs occur most often, and they refer to entities with a markedly lower average accessibility than all other forms. Apart from DDs, DCLs referred to entities with average accessibility values that were lowest among all other RE forms indicating a higher level of explicitness in the form itself. In contrast, we can also

clearly see that SCLs, CAs and AGR refer to entities that with the highest average accessibility values, indicating that they are RE forms that are not highly explicit. AGR forms appeared in isolation so infrequently that it is difficult to draw any meaningful conclusions about this form. The data also show Null and IX forms as distributed similarly with a comparable relationship to entities with generally lower accessibility values. Interpreting the mean accessibility values of entities associated with Null forms seems to suggest that Nulls may not occupy the lower “bookend” position on a hierarchy of accessibility if we consider only REs in isolation. In this way, Figure 3.15 certainly provides valuable information about the relationships between RE types and the accessibility levels of the entities to which they refer. However, in order to determine whether these relationships are statistically significant, we applied linear regressions comparing the accessibility relationships for each RE form to all others. The results of that analysis appear in Figure 3.16.

3.7.8. Statistical Analyses of RE types

In an effort to determine if there was a statistically significant difference in how each RE compared to all other REs in terms their relationships to entities or those entities’ accessibility values, we applied repeated a linear regression analysis (Figure 3.16).

Figure 3.16 Linear Regression Comparing All RE Types in Isolation.

This chart indicates the how the accessibility value of each RE form occurring in isolation differs from all other forms. ß refers to the amount of change in the referent accessibility following one unit of change in the independent variable (e.g., CA versus IX). The greater the difference of t values from 0, the greater likelihood that there is a significant difference between the two RE forms in question. If the difference is statistically significant, p values are <.05.

NP	NP						
IX	ß=1.6065 t= 4.049 p= < .001***	IX					
DCL	ß=1.8950 t=4.074 p= ,.001***	ß=0.2885 t=0.496 p= 0.62037	DCL				
NULL	ß=2.3737 t=5.342 p= <.0017***	ß=0.7672 t=1.357 p= 0.17558	ß=0.4787 t=0.778 p= 0.4371	NULL			
AGR	ß=2.824e+00 t=4.446 p= <.001***	ß=1.1481 t=1.535 p= 0.12555	ß=0.8596 t=1.093 p= 0.2750	ß=0.3810 t=0.492 p= 0.623	AGR		
CA	ß=2.8812 t=13.571 p= < .001***	ß=1.2747 t=3.114 p= <0.01**	ß=0.9862 t=2.072 p= 0.0388*	ß=0.5075 t=1.114 p= 0.266	ß=0.1265 t=0.189 p= 0.850	CA	
SCL	ß=3.1169 t=9.875 p= < .001***	ß=1.5105 t=3.205 p= 0.001**	ß=1.2220 t=2.305 p= 0.0216*	ß=0.7433 t=1.452 p= 0.147	ß=0.3623 t=0.5111 p= 0.609	ß=0.2358 t=0.712 p= 0.47687	SCL

The results, again, reinforce the unique role of DDs, whose referents' accessibility values are significantly different from those of all other forms. Importantly, in our study, CA was a disaggregated element of the zero-anaphora category in the F&M typology (2016). In their proposed hierarchy of accessibility for ASL, CA and AGR were grouped together, assuming they served the same signaling role. Our results showed that the accessibility values of the entities to which CA refers differed significantly from those signaled by IXs and DCLs. These differences were not observed in the relationship between AGR and other RE categories, lending support to our decision to establish CA as a stand-alone category, apart from AGR. We acknowledge that AGR was not a frequently occurring RE in isolation and as such, these conclusions are preliminary. However, results of later analysis reveal that this proposal has merit. We will discuss this further in Study 2.

By the same token, IXs, a form that was not included in the F&M typology (2016), also signaled entities with significantly different values than those entities signaled by CA and SCLs, suggesting that IXs should also be included as an independent constituent of the inventory of REs in ASL.

3.7.9. Expanding on the Analysis

As we completed our extensive analysis, we arrived at the conclusion that our results were largely replicating those of F&M, and our findings were validating the rank order of ASL REs from F&M's proposed hierarchy of accessibility in ASL. Importantly, in addition to replicating their hierarchy, our results extended the inventory of REs they proposed. Our extended hierarchy will be described in the *Results* section. However, as we reviewed these data and the overall parallels we found, it occurred to us that these consistencies may have resulted from the stimuli used to elicit the narratives. In other words, despite the Balloon Story offering a more complex stimulus, it was still a relatively simple 6-panel cartoon with a small number of competing entities. As a result, we considered that the narratives in each study may have been shaped by their overall simplicity.

We determined that replicating our findings in longer, more complex ASL narratives would lend more support to our proposed model, and indicate that the RE allocations we described were generalizable. In order to do this, we chose three additional narratives from ASL literature signed by native users of ASL, all publically available. The first example of ASL literature, *Deaf Spies of the Civil War*, included 5 animate entities and 2 inanimate entities, all bearing significance to the narrative. *Deaf Spies of the Civil War* is an example of ASL Folklore typically shared among Deaf community members. The version used in this study was professionally-produced and was intended for commercial dissemination for various audiences (both Deaf and hearing). The second narrative from ASL literature, *Wrong Daughter*, included 5 animate entities and one inanimate entity, all significant to the narrative. *Wrong Daughter* is a narrative of personal experience recorded while being delivered to an adult, Deaf audience. The third narrative, *Bird of a Different Feather*[11], included 7 competing animate entities and 2 inanimate entities. *Bird of a Different Feather* is an original allegory that was professionally filmed and commercially available, it is intended for both Deaf and hearing audiences, and a range of age levels (elementary-aged to adult).

Research has shown that adding entities into the discourse creates more opportunities for strategic and sophisticated referring practices (Arnold & Griffin, 2007). Coding these narratives yielded a total of 371 REs tokens. The breakdown of propositions, narrative length, and entities are described in Table 3.7.

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[11] Because Bird of a Different Feather is approximately 20 minutes long, we elected to code the first 2:39 (which corresponds to an episode break in the ASL narrative) in order to be consistent with the lengths of the other ASL literature narratives.

Table 3.7 Breakdown of Propositions in Three ASL Literature Samples. Comparative features for Balloon Story narratives is also provided.

ASL Literature	Propositions	Length in Minutes	Animate Entities	Inanimate Entities
Wrong Daughter	106	2:48	5	1
Bird of a Different Feather	82	2:39	7	2
Deaf Spies of the Civil War	88	2:44	5	2
Means ASL Literature	92	2:43	5.6	1.6
Means Balloon Story	(17.9)	(50)	(3)	(2)

We also compared the overall allocations for each narrative type across conditions (REs in isolation vs. REs occurring in constellations.

Table 3.8 Comparing the Allocations of REs in Each Condition (In Isolation and in Constellations): Familiar Context Narratives vs. ASL Literature Samples.

Narrative Type	REs in Isolation	REs in Constellations
Familiar Context Narrative RE tokens, (n=856)	55.6%	44.39%
ASL Literature RE tokens, (n=371)	51.4%	48.51%

The percentage allocations of REs in each condition for each sample of narratives was similar, with the ASL Literature narratives reporting a more-equal distribution of RE tokens across each condition.

Table 3.9 Comparing the Allocations of RE Across Discourse Statuses (In Isolation and in Constellations): Familiar Context Narratives vs. ASL Literature Samples.

Discourse status	Introduced	Reintroduced	Maintained
Familiar Context	11.09%	16.36%	72.54%
Number of tokens	95	140	621
ASL Literature	6%	28.3%	66%
Number of tokens	22	105	244

We noted variations across the RE allocations s across each discourse status, this was presumably due to the differences in narrative types. For example, the reduced number of introduced tokens was not surprising as the familiar-context narratives include 5 entities from each of the 19 Balloon Story narratives (95 tokens) while the ASL literature narratives include only one mention of each of the 22 entities from all narratives.

However, comparing the proportions across reintroduced and maintained status was more informative. In the familiar-context Balloon Story narratives, reintroduced REs comprised 16% of the total number of RE tokens. In the ASL literature narratives, reintroduced RE tokens comprise 28% of the entire sample. The greater proportion of reintroduced tokens was a logical outcome as ASL literature narratives (ASL literature narratives averaged 92 propositions per narrative as compared to the Balloon Story narratives, that averaged 18 propositions per narrative). Additionally, the ASL literature narratives were more complex, averaging 5.6 animate entities and 1.6 inanimate entities per narrative (as compared to 3 animate and 2 inanimate entities per Balloon Story narrative). As a result, the more complex, extended nature of the ASL literature narratives seems to have created more opportunities for characters to be reintroduced, thus, the greater proportions of reintroduced tokens.

Interestingly, the ASL narratives included a slightly lower proportion of maintained REs, a result that may be due to the more complex nature of the ASL literature narratives. In other words, with more competing characters, and longer more-complex storylines, there was less opportunity to maintain entities in discourse.

We separated the allocations of individual REs occurring in isolation in order to conduct a more detailed comparison of the ASL literature narrative RE allocations and the RE allocations from the Balloon Story narrative. Comparisons appear below in Tables 3.10 & 3.11.

Table 3.10 ASL Folklore Narratives: Percentage Allocations of REs in Isolation from All Three ASL Folklore Narratives by Type and Discourse Status.

REs in isolation, n = 191.

RE in Isolation	NP	NULL	SCL	ICL	IX	CA	DCL/SASS	AGR
Introduced (n=20)	90% (18)	0.00%	0.00%	0.00%	5 % (1)	5% (1)	0.00%	0.00%
Reintroduced (n=48)	34.88% (15)	6.98% (5)	2% (1)	0.00%	34.88 % (15)	11.62% (5)	11.62% (7)	0.00%
Maintained (n=123)	4.87% (6)	11.38 % (14)	9.75 % (12)	0.00%	29.26% (36)	34.95% (43)	9.75% (12)	0.00%

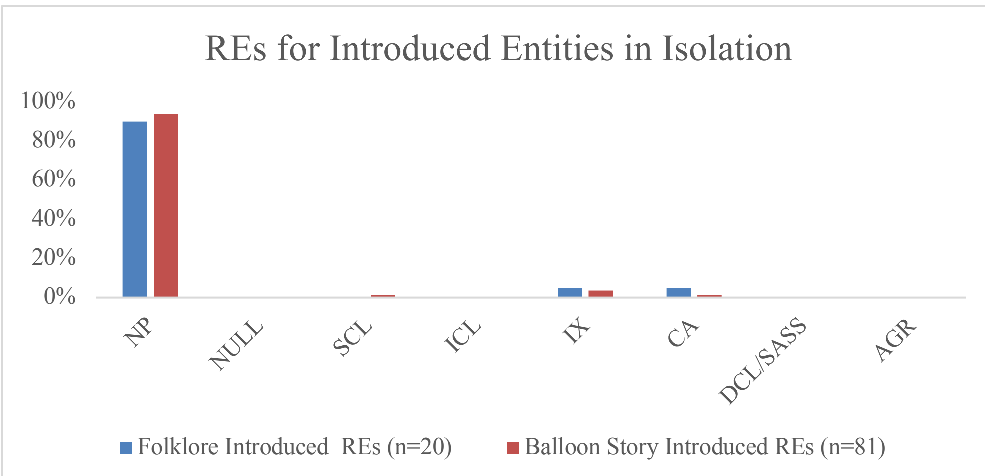
Table 3.11 Balloon Story Narratives: Percentage Allocations of REs in Isolation by Type and Discourse Status.

REs in isolation, n = 306.

RE in Isolation	NP	NULL	SCL	ICL	IX	CA	DCL/SASS	AGR
Introduced (n=81)	93.83% (76)	0.00%	1.23% (1)	0.00%	3.70% (3)	1.23% (1)	0.00%	0.00%
Reintroduced (n=89)	62.92% (56)	2.25% (2)	0.00%	0.00%	6.74% (6)	19.10% (17)	8.99% (8)	0.00%
Maintained (n=306)	27.78% (85)	6.21% (19)	12.42% (38)	0.00%	7.84% (24)	39.22% (120)	2.94% (9)	3.59% (11)

In order to provide more accessible interpretation of the results and comparisons across Balloon Story narratives and the ASL literature narratives, we organized the data into bar graphs comparing the RE allocations from each type of narrative (Balloon Story vs. ASL Literature) by discourse status. The first comparison is presented in Figure 3.17.

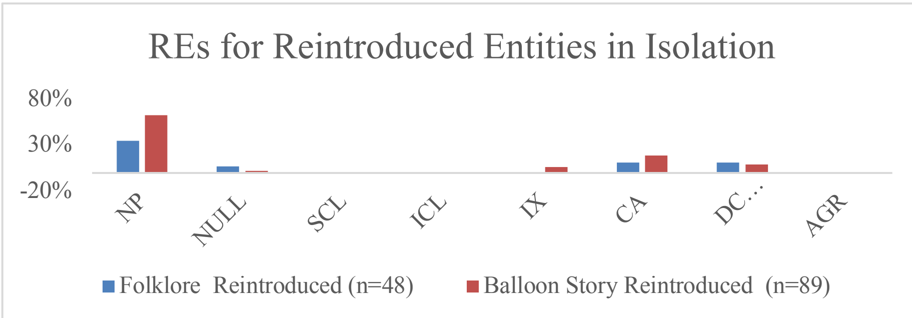
Figure 3.17 Allocations of Introduced REs in Isolation ASL Literature Narratives vs. Balloon Stories from Familiar Context Narratives



The allocations in introduced status were remarkably similar across each narrative type. However, because entities in introduced discourse statuses generally favor highly-explicit REs, it was not surprising that DDs predominated in both narrative types.

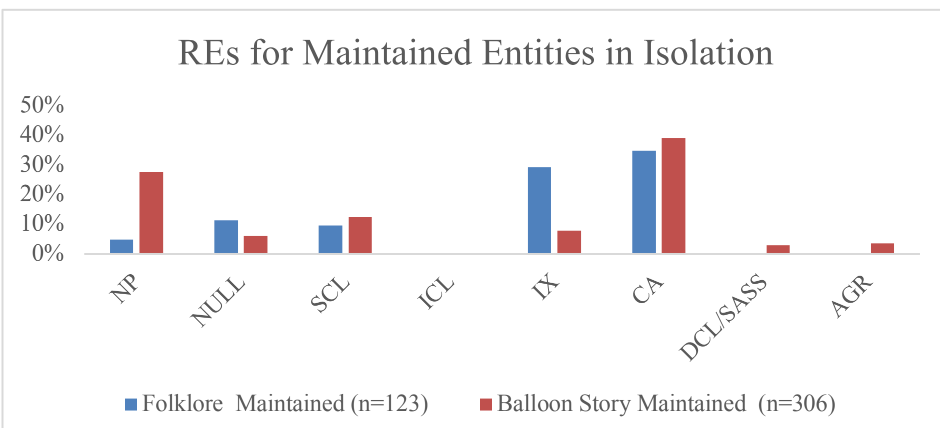
Reviewing the results for RE allocations in reintroduced and maintained discourse offer a more informative comparative context. If RE allocations are consistent in these environments, it may provide evidence that the patterns we identified may not be constrained by the Balloon Story narrative and might be generalized to broader conclusions about RE allocations in ASL discourse. Figures 5.18 and 5.19 outline the results of for RE allocations in reintroduced and maintained discourse statuses.

Figure 3.18 Allocations of Reintroduced REs in Isolation ASL Literature Narratives vs. Balloon Stories from Familiar Context Narratives



Once again, the allocations proved strikingly similar across the four RE types most commonly deployed in reintroduced discourse status (DDs, NULL, CA, and DCLs). The consistency of these results was surprising and suggests that the findings described in Chapter 4 are robust and, perhaps, generalizable to other ASL narrative types. The allocations in maintained status are described in Figure 3.19.

Figure 3.19 Allocations of Maintained REs in Isolation ASL Literature Narratives vs. Balloon Stories from Familiar Context Narratives



Again, the overall distributions were remarkably similar. However, one noticeable difference was related to 2 RE-types, DDs and IXs. In the ASL literature narratives, the proportion of DDs was reduced and the proportion of IXs was increased. Closer investigation about why this result occurred, led us to realize that in one of the examples of ASL literature, the narrator was, herself, a character in the narrative. This was interesting because the implications of selecting this genre type yielded a marked increase in IX use (presumably in lieu of DDs) in order to signal “I/me” or “herself”. In this ASL literature narrative, 33 of the IX tokens deployed (63 %) were references to herself. This result was illuminating and valuable, suggesting that ASL narratives of personal experience generate an increase in typical proportions of IX, ***and*** a corresponding decrease in the proportion of DDs, especially in maintained discourse status.

Overall, the level of consistency in comparing the isolated RE allocation results in complex ASL literature samples with the simpler Balloon Story narratives was surprising. These data seem to confirm the proposal that the RE allocations we have described in this dissertation may be reliable for a wide range of ASL narrative forms, and not limited to the stimulus we used to elicit our narratives.

However, there are some differences that may be better illuminated by a more explicit comparison of mean accessibility values. Table 3.12 highlights this comparison.

Table 3.12 Comparing Mean Accessibility Values Signaled by Isolated REs in ASL Literature Narratives and Balloon Stories

Only REs that consistently occurred in both narrative types are included in Table 3.12. As a result, AGR values were not considered. p values from two-sample T test results comparing mean accessibility values for each narrative type by RE are reported.

RE Type	(ASL Literature) Mean Accessibility Value Signaled in Isolation and (SD)	(Balloon Story) Mean Accessibility Value Signaled in Isolation and (SD)	Difference in Mean Accessibility Values Signaled
Definite Descriptions	0.39 (1.9) (n=37)	1.57 (2.4) (217)	-1.18 (p=0.0006)*
Index	3.63 (1.5) (n=52)	3.18 (2.1) (n=33)	.45 p= 0.85379
Descriptive Classifier	3.47 (1.3) (n=19)	3.47 (1.6) (n=17)	0 (no difference)
Null	3.73 (1.7) (n=17)	3.95 (1.2) (n=19)	-.22 (p= 0.3315)
Constructed Action	3.69 (1.7) (n=49)	4.45 (1.1) (n=138)	-.76 (p= 0.002)*
Semantic Classifier	4.31 (0.4) (n=13)	4.69 (1.1) (n=39)	-.38 (p= 0.0362)*

Despite the results reinforcing a similar ranking for each RE type on the hierarchy of accessibility, there seem to be examples where master storytellers use specific RE types (DD, CA, and SCL) to signal entities that have significantly lower accessibility values that our participants in the Balloon Story narrative.

In considering each RE-type, we can see that DDs in ASL literature narratives signal entities with accessibility values significantly lower than those entities signaled by Balloon Story participants, suggesting perhaps that when master storytellers use DDs, these most explicit RE-types are applied to great effect. It may be that master storytellers use other, more-sophisticated referring devices to successfully signal inaccessible entities.

A result of note was that IXs were the only isolated RE form in the ASL literature sample signaling entities with higher accessibility values than were signaled in the Balloon Stories. This result, again, seems to be a function of including a narrative of personal experience (NPE) where IX were used frequently in maintained status (typically reserved for signaling highly accessible entities). In this instance, the IX was most often used as a personal pronoun (IX-me). Personal pronouns are regarded as among most accessible RE forms and as a result the higher accessibility values for IX in the ASL literature narratives is unsurprising. In a related finding, the overall proportions of DDs were reduced as compared to the typical allocations reported for maintained DDs in the Balloon Story narratives. This change may have also contributed to the lower DD entity accessibility values signaled by DDs, especially as IXs seem to have been used in lieu of DDs as maintainers. In other words, including less DDs in maintained status (DDs that would have, presumably, signaled highly accessible entities) results in lowering their overall mean accessibility values. The converse argument applies to IXs. With its status as a frequently occurring "maintainer" in NPEs, IXs more frequently signaled highly accessible entities, which increased the overall mean accessibility values for entities signaled by IXs.

SCLs and CAs also signal significantly less accessible entities in the ASL literature narratives than they do in the Balloon Story narratives. This may be another example of how more complex narratives may result in diminishing overall accessibility values. It is interesting that these effects are only seen at the extremes of the accessibility hierarchy. In other words, REs that typically signal the least accessible entities (DDs) and those that signal the most accessible entities (SCLs) are two of the three RE-types that signal significantly lower entities.

It is also the case that all other RE-types in the ASL literature narratives signaled entities that were, on average, less accessible than in those signaled in Balloon Stories (though not significantly different). These results may also be explained as a function of the differences in the complexity and length of the ASL literature narratives (ASL literature samples include more competing entities and are substantially longer). It is reasonable to expect that overall accessibility values in the ASL literature narratives would be lower. As accessibility values take into account numbers of competing entities, as well as "distance back" to prior mentions, longer, more-complex samples inherently provide more opportunities for entities to assume lower accessibility values. Importantly, regardless of these interesting differences, the overall trends in RE allocation and mean accessibility values still show strong levels of consistency and, again, reinforce the ranking we propose in the expanded hierarchy of accessibility.

3.8. Discussion

1) In this study, we analyzed a set of narratives elicited in ASL and from the data we determined a range of RE types and their allocations across discourse statuses. 2) We found distribution patterns that largely paralleled those of F&M, 2016, 3) We found that certain RE types, previously been categorized as part of a larger zero-anaphora type demonstrated distinctive referring qualities from one another. 4) We added two additional forms to the inventory of REs (Null and ICLs) both of which add important dimensions to the repertoire of available REs in ASL, 5) We proposed the idea that there may be general similarities between the allocation of REs in ASL and English narratives, an idea that requires more intensive analysis, 6) we applied a statistical analysis to the study of REs that has added sophistication to the level of inquiry beyond allocation patterns.7) we expanded the analysis to complex ASL narratives and were able to replicate the rank order of REs in the extended hierarchy of accessibility for ASL, generalizing our findings to more sophisticated narrative forms.

3.8.1. Replication

Our initial goal of replicating the findings of Frederiksen & Mayberry (2016) was successful as our results largely paralleled theirs with regard to the distribution of different types of REs across discourse statuses, with some important divergences. Despite including more subjects, a more complex stimulus, and incorporating all REs regardless of syntactic roles we have shown that the patterns of RE allocation that have been reported in F&M are generalizable, and not limited to a specific subset of the ASL RE data.

Our analysis also extended the typology of REs in ASL to include DCLs and IXs, as independently occurring REs. The most likely reason for DCLs emerging in the present study (as opposed to not occurring in F&M) relates to the differences in stimulus. The design of our stimulus, the Balloon Story, encouraged reference to multiple inanimate entities as well as changes in their physical state; this was essential to the plot of the narrative (Hoffmeister, et al., 1999). Additionally, because the Balloon Story was more intricate with more competing entities and events, it may have contributed to eliciting IXs as stand-alone REs more than is likely in the simpler, less-complex narratives.

The present study's results were also able to show that entities signaled by CA had accessibility values that were significantly different from select RE categories. These differences did not emerge in AGR[12], suggesting that these two RE categories are distinctly behaving REs. This supports our proposal to revise the typology proposed by Frederiksen & Mayberry (2016) which clustered CA and AGR in a larger, zero-anaphora category with both REs occupying same status on their proposed hierarchy of accessibility in ASL. Taken together, the results of the present study both support and expand the hierarchy proposed by Frederiksen and Mayberry (2016) suggesting that the

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[12] Agreement (AGR) did not occur frequently in the Study 1 data, however, when AGR did occur it was most often realized as eye gaze and it signaled entities with among the highest mean accessibility ratings. Chapter 4's analysis, in which AGR figures prominently, will better inform these findings. The differences we describe here between constructed action (CA) and AGR become more pronounced and more interesting in the following study.

patterns of RE allocation they report are reliable and consistent when including a broader cross-section of the RE data (i.e. all REs regardless of syntactic roles).

Table 3.13 The Present Study's Proposed Hierarchy of Accessibility for REs in Isolation.

RE forms and the accessibility signal they send about entities to which they refer, as arranged on a continuum. This table adds one new form, indexing (IX), and two redefined forms constructed action (CA) and agreement (AGR) respectively (all highlighted in bold).

RE Form	Signals
Definite Description	Low Accessibility
Descriptive Classifiers (SASSes)	
Indexing	
Constructed Action	
Null	
Semantic Classifiers	
Agreement*	High Accessibility

Table 3.14 Frederiksen and Mayberry's (2016) Proposed Hierarchy of Accessibility for ASL.

RE forms and the accessibility signal they send about entities to which they refer, arranged on a continuum.

RE Form	Signals
Nouns/Nominals	Low Accessibility
SASSes	
Zero Anaphora (Agreement Verbs & CA)	
(Null) Zero Anaphora from Plain verbs	
Semantic Classifiers	High Accessibility

3.8.2. Expanding the Replication: ASL Literature Narratives

We were also able to demonstrate consistencies in RE allocations, signaled accessibility values, and the resulting implications for constructing a hierarchy of accessibility in ASL between the ASL literature data and our Balloon Story data. These results suggest that our findings are generalizable to other narrative forms and not limited to elicited samples from simple stimuli.

We also found an effect of more complex narratives that served to decrease overall entity accessibility values. These results may have been a function of the longer, more complex narratives themselves, that lead to more opportunities for less accessible entities (those that are new or reintroduced) to occur. The lower overall entity accessibility values could also an outcome of the sophisticated narrative strategies employed by master storytellers. In other words, there may be referring techniques that *master storytellers* employ that allow them to successfully signal more inaccessible entities than *ordinary communicators* typically do.

Finally, we noted that including specific narrative forms, such as narratives of personal experience (where the narrator is a character in the story told from first-person perspective) can affect the distributions and accessibility values of select RE-token types (e.g., IX).

3.8. 3.Cross Linguistic Comparisons

Although comparing ASL and English production is not an explicit focus of this dissertation, these data raise interesting questions about how the potential for cross-linguistic parallels. But as this was not our intention, a more-focused analysis is necessary to make definitive conclusions about how to talk about the relationships between REs in ASL and REs in English.

3.8.4. Analytical Tools

Another contribution the present research on REs in ASL relates to introducing tools that add depth to the overall analyses. The design of the Chronological Anaphora Matrix (CAM) allows RE data to be recorded and characterized in such a way as to reflect the multi-dimensional elements of referring (noting chronology, referent entities, discourse status, RE number, and proposition numbers). The CAM was also designed to illuminate whether an RE occurs in isolation or in a constellation (a feature that will be an important consideration in the analysis described in Chapter 4).

Additionally, the incorporation of heat maps, as a visually-accessible chart conceived to more clearly depict RE allocation trends across discourse statuses (horizontally) and within particular REs (vertically), represents a novel contribution to the analysis of REs in ASL.

Finally, the application of Toole's (1996) accessibility value scale added a layer of sophistication to the present research on ASL REs that allows for a more-nuanced and scientific comparisons between, and information about, RE types. Taken together, these tools help us understand referring in ASL on a deeper level and they serve to better inform decisions about constructing a hierarchy of accessibility in ASL.

3.8.5. Future Directions

A final conclusion relates to *the data that we did not include* in this study. Recall that our analysis only included RE tokens occurring in isolation. As a result, we excluded 44% of the RE tokens that were coded in the overall data, a significant portion of REs from our data. Our results seem to accurately reflect how to characterize REs in isolation, but there may be interesting and valuable implications that these additional data have related to notions of accessibility, hierarchies, and the inventory of referring expressions. This raises important questions about whether the models we have chosen to apply to RE analysis may be incomplete (especially in terms of how we describe allocations and the typologies of REs). As a result, more research is needed in order to fully appreciate the poly-componential and simultaneous nature of ASL. Studies that focus on how REs are realized in constellations will be an important next step as we continue to explore the implications of referring and accessibility in ASL. This will be the focus of Chapter 4.

CHAPTER FOUR

4.1. ASL's Concurrent Potential

Recent studies have begun to expand the body of research on referring expressions (REs) in American Sign Language (Wulf et al., 2002; Swabey, 2011; Frederiksen & Mayberry, 2015; 2016; *Study 1 of this dissertation*) and we are learning more about the expanded inventory of REs available to the visual modality. Research has also documented how REs occur in consistent patterns in several signed languages (Wulf et al., 2002; Morgan, 2006; Perniss, and Özyürek, 2008, Swabey, 2011; Zwitserlood, I., Perniss, P. M., & Özyürek, A., 2013; Frederiksen and Mayberry, 2015; 2016). The manner in which these studies have explored the patterns of RE allocation has built a foundation for how to begin thinking about REs in ASL, but there are important elements of how referring occurs in ASL (as well as many signed languages) that deserve more focused attention.

An important example of one area where much remains to be learned relates to the potential of signed languages to indicate multiple referents simultaneously (Liddell, 2003; Liddell & Vogt-Svendsen, 2007; Poizner, 1983; Vermeerbergen, et al., 2007; Cormier et al., 2013; Perniss and Özyürek, 2008). However, approaches to characterizing the concurrent referring potentials that exist in signed languages have been generally inconsistent and the research on REs in ASL has not extensively addressed the implications of ASL's poly-componential affordances. Results from Study 1 of this dissertation have indicated that there may be value in distinguishing between two different manifestations of REs: 1) those that occur independently (i.e., REs in isolation),

2) those that co-occur (i.e., REs occurring in constellations). The current inquiry will expand the investigation in Study 1 by including all REs from the ASL narrative samples (including REs that co-occur/constellations) with the intention of arriving at a more comprehensive understanding of the complex system of referring in ASL.

4.2. What is a Constellation?

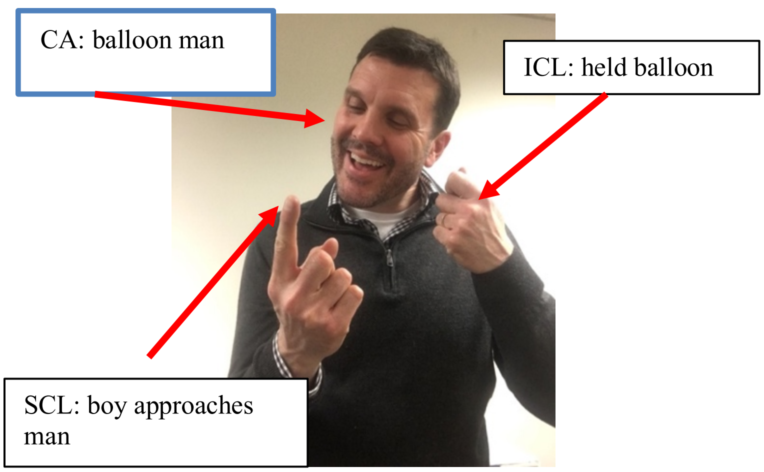
Because ASL can leverage its visual-spatial architecture using various articulators (hands, body, eye-gaze, head), multiple entities can be represented simultaneously (Liddell, 2003; Liddell & Vogt-Svendsen, 2007; Poizner, 1983; Vermeerbergen, et al., 2007; Cormier et al., 2013; Dudis, 2004). Again, several studies have addressed how multiple entities or multiple perspectives on the *same entity* can be portrayed simultaneously in signed languages (Liddell, 2003; Liddell & Vogt-Svendsen, 2007; Dudis, 2004; Perniss & Ozyurek, 2008). Their collective research, using a range of terms (e.g. buoys, blends, and fusion types), has suggested that *concurrence* seems to create additional informativeness. This idea will have important implications as we think about REs representing multiple entities going forward. In order to establish a clear framework for how to think about co-occurring referential forms in ASL, I am proposing a new term, *constellations*, in order to effectively address the co-occurring referential potential of ASL (and perhaps all signed languages). Constellations are defined as any condition where simultaneous references (2 or more) are made to multiple entities (2 or more) using the poly-componential affordances of signed language.

4.2.1. Constellations as Information about Entities and Relationships

As an example, Figure 4.1 illustrates a how ASL can reference several entities simultaneously. Because depictions such as these can seem relatively straightforward, it is worth explicitly considering how the visual modality allows us to simultaneously refer to each entity (in Figure 4.1, references are made to the man, balloon, and boy) *and* provide access to important information about each entity's relationships to others in the constellation. As a result, this type of referring device seems to include an efficient, informational density.

Figure 4.1 Example of a Constellation.

In the image below, multiple references to entities are presented simultaneously. This is made possible by affordances of the visual-spatial architecture of ASL.



English translation: The man holding a balloon is approached by the boy.

In Figure 4.1 we can see three entities depicted simultaneously, but in order to better understand the mechanics of this example, let us consider its transcribed version using conventions from (Hoffmeister, 1999). As we look at the transcription, note the backslash (/), indicating that the subsequently transcribed entity is being depicted simultaneously.

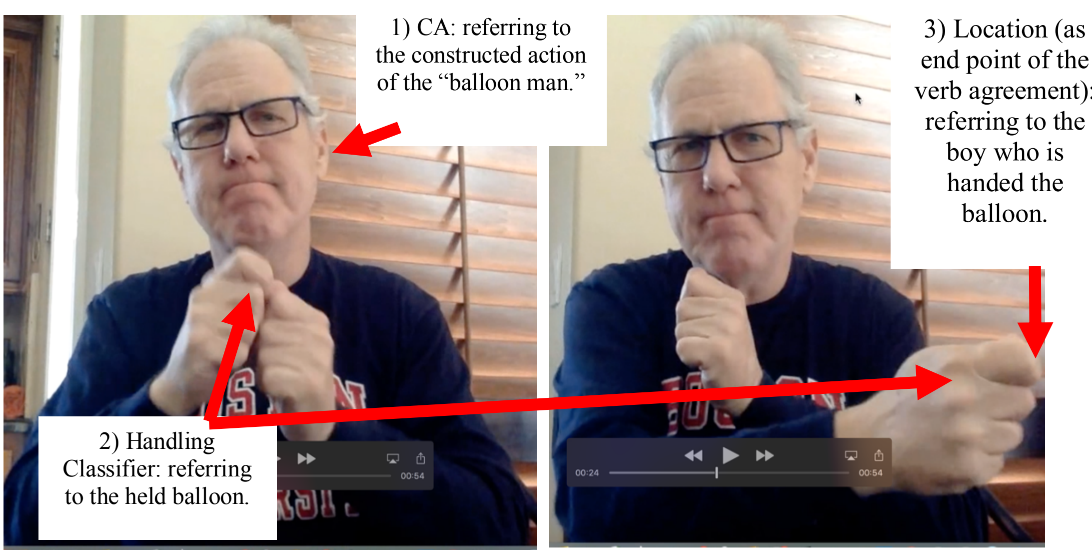
1. *Constructed Action (BCL): adult (balloon man)* / *Instrument/Handling Classifier (ICL): holding thin object (balloon)* / *Semantic Classifier (SCL): approached by entity (boy).*

In considering the content of the coding above, it becomes clear that constellations effectively function as sentences. Additionally, the coding helps to demonstrate how various elements of the constellation *work together.* In this example, the "BCL: man" and the "ICL: holding balloon" *work together* to function as a complex nominal (e.g. The man holding a balloon) and concurrently, the "SCL: boy approaches" *works together* with the "BCL: man" to indicate their relative spatial relationship functioning as the object of the preposition.

Let us consider another example.

Figure 4.2 Second Example of a Constellation.

In the image below, multiple references to entities are presented simultaneously. This is made possible by affordances of the visual-spatial architecture of ASL.



English Translation: The balloon man hands a balloon to the boy.

Figure 4.2 includes references to the same three entities as represented in Figure 4.1. The transcription for this proposition is as follows:

4. Constructed Action (BCL): balloon man / Instrument/Handling Classifier (ICL): hands balloon / Agreement (AGR): to loc. X (boy).

Figure 4.2 also highlights the referential and informational density of constellations. For example, the "BCL: man" and the "ICL: hands balloon" are still *working together,* but in this instance "ICL: hands balloon" functions as the predicate and the poly-componential nature of the form (ICL), *also* refers to the balloon (e.g. The man hands a balloon). Additionally, and concurrently, "AGR: to loc. (boy)" *works together* with **both** "BCL: man" and the "ICL: hands balloon" to indicate 1) the relative spatial relationship between the man, and the boy 2) the boy's status as goal/recipient of the entity balloon, 3) the entity "balloon" on a path from man to boy.

4.2.2. Linearity vs. Concurrence

Interestingly, the concurrent potential of ASL (described above) is generally unavailable in spoken languages given their linear/sequential architecture. For comparative purposes, we turn to the English equivalent of the constellation in Figure 1:

2. *The <u>man</u> holding <u>a balloon</u> is approached by <u>the boy</u>.*

In the English translation, we see that every referent is named and the same relationships characterized in ASL are clearly outlined using various English grammatical forms. For example, "the man" is named as an DD, and the information "holding a balloon", (a new referent and relationship to the DD) occurs in a relative clause, generating a complex nominal. Additionally, the information "approached by the boy," including reference to the boy and his orientation relative to the man, occurs in a verb phrase (verb + prepositional phrase). We can see that in order to accomplish the equivalent communicative goals, the architecture of English (as a sequential, spoken language), uses clauses, embedding, and additional adjuncts to include the same kind of information that can occur *concurrently* in ASL constellations. Interestingly, it is certainly true that ASL can also represent these forms in sequential/linear terms. However, the results of organizing the ASL syntax in linear fashion are far less preferred than their concurrent arrangement in constellations. For example, in ASL, it is grammatical (but awkward and odd) to sign the following:

3. MAN HOLD BALLOON AND BOY APPROACH TO MAN

The syntactic form realized in Sentence 3 is not canonical. Instead, it is characteristic of choices that might be made by a novice ASL user; or it is an intentionally facetious presentation of information by a skilled user of ASL, designed to suggest that the listener is being especially dense, and thus the listener requires the information communicated in an overly-explicit syntactical arrangement. The preferred form is a constellation, that leverages the spatial and concurrent potentials of ASL. The unnecessary linearity of Sentence 3 (despite its grammaticality), would be considered inefficient, or odd.

This is not to suggest that linear, sequential forms are never preferred in ASL. Results of Study 1 demonstrate that there are many examples of stand-alone, isolated REs that occur in regular, consistent patterns. However, with multiple interacting entities, a constellation seems to be the preferred referring option. Let us consider an English translation of Figure 4.2:

4. The man hands the balloon to the boy.

In this English version, the same concurrence of BCL and ICL in the ASL constellation does not translate to a complex nominal. Instead, the information from the ICL results in a predicate ("hands the balloon") occurring concurrently with the object/theme "the balloon." Finally, the endpoint of the agreement in ASL serves as the object of the preposition, "to the boy." Again, the linear English syntax generates clearly equivalent information, but constellations in ASL present the same information *concurrently*. If we consider the linear version of Figure 4.2 in ASL, the result is glossed as follows:

5. MAN GIVE BALLOON TO BOY

But this, too, is an inefficient and awkward construct that would be an unlikely choice of a native ASL user. Linear forms as in Sentence 5 might be characteristic of a frustrated answer given to an individual who has repeatedly asked, "Wait, who did the man give the balloon to?"

What becomes clear after considering these examples is that there are interesting and important pragmatic implications for choosing linear as opposed to concurrent referring forms. In this study, beyond identifying *constellations* as a new referential category in ASL, I am proposing a new pragmatic condition in ASL, ***Linear vs. Concurrent***. This proposal suggests that there are pragmatic implications related to choosing REs from each condition. In other words, because the affordances of ASL (and all signed languages) allows for referring to entities using REs in isolation (Linear condition) and using constellations (Concurrent condition) on a pragmatic level, signers must make determinations about which form sends the appropriate signal to an interlocutor. This study will attempt to show that by analyzing the strategic decisions that native ASL users make in choosing between Linear vs. Concurrent forms, there are interesting and important insights we can gain into the pragmatics of ASL, the nature of referring, and ideas about accessibility theory.

4.3. Why Are Referring Expressions Important?

The significance of studying how REs are deployed in ASL narratives is related to the insights it provides into the mechanics of the complex coordination that underlies ASL discourse practices. REs are perhaps best understood as signals, strategically deployed in order provide information about a referent's identity *as well as* its assumed cognitive status in our mental representation (i.e. whether we, as listeners, should be familiar or unfamiliar with the referent in question) (Ariel, 1988; Clark & Wilkes-Gibbs, 1986; 1996; Amor & Nair, 2007).

The ability to effectively leverage REs (i.e., the ability to send the right kinds of signals to our listeners) promotes coherence in discourse, an essential skill that all language users must have. As a result, when we engage with one another (with respect to REs) we expect cooperation between speakers/signers[13] and listeners/perceivers. In other words, listeners/perceivers are familiar with the signals and anticipate speakers/signers sending the appropriate signals, which are characterized by the most economical RE form that maximizes the likelihood of successful, coherent communication.

If we were to use an analogy to characterize the referring process, we might imagine the act of referring to an entity in discourse as the equivalent of summoning a mysterious and elite branch of the Pragmatic Forces known as the Signal Corps. The Signal Corps' sole mission is to *appropriately illuminate entities, in order to maintain coherence in the messy world of discourse*. For example, in this analogy, choosing to use an explicit noun phrase, is the equivalent of speakers/signers electing to deploy the Signal Corps' BIG, BRIGHT, FLASHING signals that serve to inform perceivers that their attention is required. Invariably, the entities signaled by the BIG, BRIGHT, FLASHING signals are either new or out of focus, and, as such, they require some fanfare to "assume or re-take the stage". This is an appropriate deployment, in line with the mission of the Signal Corps to *maintain coherence in the messy world of discourse.* If, however, the entity in question is already in focus (center-stage), deploying BIG, BRIGHT FLASHING signals (i.e., opting for explicit noun phrases) is an inappropriate, and inefficient use of the Signal Corps' resources. In this case, the entities are *already*

[13]We will use the terms "signer" and "recipient" as equivalent to the "speaker" and "listener" designations which are most commonly used in the literature on discourse processes.

occupying a privileged, *illuminated* position “on stage”. This circumstance, would lead to confusion and consternation, as listeners/perceivers wondered to themselves, “Why were the BIG, BRIGHT FLASHING signals deployed? What could this possibly mean?” The latter scenario highlights the presumption listeners hold that the resources of the Signal Corps will be appropriately and responsibly deployed (i.e. not overly-informative). The same analogy can be used to understand our strategic use of minimally explicit REs. If an entity already occupying center-stage wished to continue there, a much less elaborate signal is necessary. In this situation, the Signal Corps might make a tactical decision to apply a modicum of *subtle and diffused stage lighting*. This option would serve to effectively signal the entity’s maintained presence on stage without distracting/or shifting our attention elsewhere (i.e., deploying pronominal REs in lieu of other more pronounced signals). On some occasions, the Signal Corp may decide that the entity is so well-illuminated that signaling would be an entirely inefficient use of time and resources altogether (or potentially distracting). In those instances, the Signal Corps may elect to refrain from sending any signal at all (i.e., null forms). Finally, imagine the stage as occupied by a host of competing entities, all of whom are vying for “one shining moment” in the spotlight. In this state of affairs, if the Signal Corps opts to, once again, deploy their *subtle and diffused stage lighting* resources (i.e., under-informative signals), no entity is appropriately illuminated. This strategic decision leaves listeners confused and unsure about who, among the present entities, merits attention.

This characterization is essentially what we do when we deploy REs. All of these ideas are well-articulated in the research (Clark, & Brennan, 1991; Clark & Wilkes-

Gibbs, 1986; Tomlin, 1987; Clark & Krych, 2004; Ariel, 1990; Gundel, Hedberg, & Zacharski, 1993; Almor & Nair, 2007; Arnold, 2008).

The analogy described above illustrates how our job as language users is to consider the unique signal that each option from the inventory of referring options available to us will send, without being overly-informative or under-informative.

Because it is often confusing, it is worth explicitly describing the inverse relationship between the *explicitness* of REs and the *signals* they send about accessibility (i.e., RE signals with high levels of explicitness are sent to illuminate entities with low levels of accessibility and vice versa). (Ariel, 1988; 1990; Gundel et al., 1993). Figure 4.3, highlights this dynamic.

Table 4.1 How Explicitness Signals Accessibility.
This structure is adapted from Ariel (1990).

Referring Expression	Levels of Explicitness	Accessibility Signal
Definite description (*Jimmy Kimmel, the host of ABC's late night show.*)	highly explicit ↑	Signals that the entity has low accessibility ↑
Demonstrative (That late night guy)	↓	↓
Pronoun (He)	low explicitness	Signals that the entity has high accessibility

The fundamental premise underlying all of these examples is that successful communication requires joint action where interlocutors work together using implicit and explicit information to construct meaning in discourse (Grice, 1975; Clark, 1996; Clark &

Wilkes-Gibbs,1986). The coordination work that this requires becomes more and more complex as any discourse is extended. This is especially true if we have to manage increasing numbers of competing entities across multiple discourse statuses (Ariel, 1988, 1990; Arnold, 2008; Almor & Nair, 2007).

In addition, if the inventory of REs available to a language is extensive (as it is in ASL), and if REs are able to be deployed in two conditions (in isolation or in constellations) it creates an especially complex network of referring options that users have to appropriately navigate. In other words, the ASL Signal Corps has a great deal of resources at its disposal, but it also has to effectively, and appropriately, deploy those resources without causing confusion. This process is made more intricate of we consider the role of discourse statuses.

4.3.1 Constellations and Competing Discourse Statuses

Because they include multiple REs, another noteworthy and complicating aspect of studying REs in constellations relates to their potential for representing entities with competing discourse statuses simultaneously. Recall that discourse statuses include the following three potential designations:

1. Introduced (an entity's first mention- an entity's first time on stage).
2. Reintroduced (an entity is discourse old, but last occurred at least one (or more) proposition back- having left the stage our entity is returning).
3. Maintained (an entity is discourse old and in focus, mentioned in the previous or same proposition- our entity is and has been center-stage for some time).

When we consider that constellations have the capacity to represent *multiple entities* that can occupy *competing discourse statuses* (i.e., in constellations we can signal some entities as maintained and others as introduced), we can see another layer added to the already complex referring process in ASL. In other words, in constellations, the Signal Corps sometimes needs to make decisions about how to illuminate multiple entities concurrently as some entities demand BIG, BRIGHT FLASHING signals while others may only require *subtle and diffused stage lighting*. Reconciling all of these intricacies reveals the demanding nature of referring in ASL.

An effective way to display how constellations can include competing entities with competing discourse is to return to the Chronological Anaphora Matrix (CAM) (Figure 4.3). Recall that the CAM is a tool providing information about the entity, RE type, discourse status, chronology, proposition #, and whether an RE occurs in isolation or in a constellation. It is described in detail in Section 3.6.2. in Chapter 3.

Figure 4.3 Chronological Anaphora Matrix (CAM).

Each entity's RE from Figure 1 above appears on the same horizontal indicating their simultaneous occurrence in proposition 5. This is the ninth RE in the ASL narrative.

#	Balloon Boy	Balloon Man	Slingshot boy	Balloon 1	Balloon 2	proposition #
9	SCL:1 "boy"	BCL: man		ICL: holds balloon		5

In Figure 4.3, on line #9 we see a constellation with three concurrent REs occurring in proposition 5. The constellation includes a semantic classifier (SCL) referring to the "balloon boy", whose status is reintroduced (coded red) into the discourse. This indicates that the last mention of "the boy" was at least 2 propositions before. A body classifier (BCL/CA) and instrument classifier (ICL) refer to the balloon man and balloon #1, respectively. The latter entities are both in focus, with maintained discourse status (coded mauve). This indicates that the last mention of each of these entities was in the preceding proposition.

Because there are both linear and concurrent options available, ASL users need to make decisions about how to refer to each entity (opting for REs in isolation or a constellation), and narrators need to make this decision while considering the appropriate signal to send about each entity. In this case, narrators need to reconcile the illumination needs of maintained or reintroduced entities.

As we can see, the implications of the unique, poly-componential architecture of constellations makes them an intriguing topic of study. The comparisons between how referring happens using linear RE types as opposed to using constellations offers us a valuable context for asking a variety of interesting questions about the interaction between referring and modality and the implications for a comprehensive understanding of pragmatics in ASL.

4.4. The Present Study

It has been well established that systematic patterns emerge in how specific RE options are used depending on several factors including 1) the discourse status of the referent (i.e., Is the referent new? Is it being reintroduced? Is it maintained and in focus?), and 2) the level of access that interlocutors have to the referent in question (Ariel, 1988, 1990; Gundel, Hedberg, & Zacharski, 1993; Almor & Nair, 2007; Arnold, 2008; Toole, 1996). As studies have considered the expanded inventory of REs available to the visual modality, they have documented consistent patterns evident in the growing literature on REs in signed languages (Supalla, 1982; 1986; Wulf et al., 2002; Morgan, 2006; Perniss, and Özyürek, 2008; Swabey, 2011; Zwitserlood, I., Perniss, P. M., & Özyürek, A., 2013; Frederiksen & Mayberry, 2015; 2016). The manner in which these studies have explored the patterns of RE allocation has built a foundation for how to begin thinking about REs in ASL. In building on this work, results from Study 1 of this dissertation have indicated that there may be value in distinguishing between two different manifestations of REs: 1) those that occur independently (e.g. in isolation), 2) those that co-occur (e.g. members of constellations). The current inquiry will investigate the patterns that emerge in REs as a result of these two conditions (Linear vs. Concurrent), while devoting special attention to exploring whether the accessibility of REs in ASL are influenced by ASL's spatial and concurrent potential. For example, it will be important to discover if all RE types documented in isolation (from Study 1) emerge in constellations. Conversely, we will investigate whether all RE types that emerge in constellations are included in isolation. Additionally, if there are REs that occur in both environments, do they occur equally frequently? Do the REs that occur in both environments prefer the same proportional allocation across discourse statuses? Are there interesting differences in their preferred accessibility values (i.e., differences in the average accessibility scores associated with referents that each RE signals)? And, finally, can REs in constellations better inform a hierarchy of accessibility? As we move to our analysis we will address each of these questions in order to arrive at a comprehensive understanding of REs in ASL.

4.5. Methods

The present study analyzed the entire ASL data set from Study 1 of this dissertation. For a review of research methods please see Section 3.5. of Chapter 1.

4.6. Results

4.6.1. Differences in RE Allocations and Roles: Isolation vs. Constellations

Our first step in the analysis was to ask whether the allocations for REs that occurred in isolation were different from the allocations for REs that occurred as constellations. Additionally, we wanted to investigate whether the data, now including REs in isolation and REs occurring in constellations, resulted in some RE types occurring in one, but not the other, condition. Tables 4.2 and 4.3 illustrate the dramatic differences in allocation for REs in each condition.

Table 4.2 Percentage Allocations of REs in Isolation by Type and Discourse Status. This table includes a distribution of only REs that occur as stand-alone (isolated) forms (n=476).

RE in Isolation	NP	NULL	SCL	ICL	IX	CA	DCL/SASS	AGR
Introduced (n=81)	93.83% (76)	0.00%	1.23% (1)	0.00%	3.70% (3)	1.23% (1)	0.00%	0.00%
Reintroduced (n=89)	62.92% (56)	2.25% (2)	0.00%	0.00%	6.74% (6)	19.10% (17)	8.99% (8)	0.00%
Maintained (n=306)	27.78% (85)	6.21% (19)	12.42% (38)	0.00%	7.84% (24)	39.22% (120)	2.94% (9)	3.59% (11)

Table 4.3 Percentage Allocations of REs in Constellations by Type and Discourse Status

A table including a distribution of only REs that co-occur (in constellations) forms (n=380).

RE in Constellations	NP	NULL	SCL	ICL	IX	CA	DCL/SASS	AGR
Introduced (n=14)	28.57% (4)	7.01% (1)	7.01% (1)	50% (7)	0.00%	0.00%	0.00%	7.01% (1)
Reintroduced (n=51)	1.96% (1)	7.84% (4)	5.88% (3)	25.49% (13)	0.00%	11.76% (6)	0.00%	47.06% (24)
Maintained (n=315)	0.00%	0.32% (1)	7.3% (23)	11.74% (37)	0.00%	47.9% (151)	0.00%	32.69% (103)

Perhaps the most significant conclusion that stands out from this data is that REs in constellations account for 44% of the overall RE tokens. This suggests that if our models are predisposed to discount such a significant portion of the data set, it may be wise to adjust our models. Additionally, we can see that 81% of all introduced entities are indicated by RE tokens in isolation, indicating that constellations are not the preferred option for as introducing entities. As we look closer at the comparative results, we can also see striking differences in several levels of RE allocation.

4.6.2. Are there RE Forms Unique to Each Condition?

In answering this question, we wanted to explore if there was value in considering REs in isolation and REs in constellations as separate conditions with patterns of RE occurrence unique to each. ICLs (a category that does not occur in the isolated RE data) assume a significant role in the constellation data. Given the low incidence of REs occurring in constellations related to introduced entities, when constellation REs do serve as “introducers”, ICLs comprise the greatest number of REs in that discourse status

(52%), double the percentage of DDs. This, too, was striking as introductions are typically reserved for more informative REs, and ICLs were not predicted to be a highly explicit RE. Additionally, a case could be made that AGR (because it occurs so rarely in the isolated data set, and then, it appears only in maintained contexts as eye gaze) is also a form unique to constellations. We are inclined to include them as an RE type unique to constellations (i.e., another RE form that almost exclusively co-occurs) because they behave so similarly to ICLs. AGR, too, assumes a large role in discourse statuses typically requiring more explicitness, predominating in reintroduced status (and appearing infrequently as an introducer). However, AGR also plays a large role in maintained discourse status (32%) for constellations.

Conversely, in the constellation data, neither IX or DCLs appear at all, whereas in the isolated data, both IX and DCL regularly occurred across almost every discourse status. It is important to note that DCLs occur infrequently across the *entire* data set, a factor largely attributed to the stimulus (The Balloon Story). However, our preliminary findings strongly indicate that there are pronounced differences between the distribution/allocation of REs in isolation and in constellations. As we explore further, we will generate potential explanations for why this may occur.

4.6.3. Analyzing REs Appearing in Both Conditions

There are several RE forms that occur in *both* isolation and constellations; these include DDs, Null forms, SCLs, CA, (and, to a lesser extent, AGR). The cross-condition RE-types will be especially informative as they can provide a comparative context to assess the relationship between each condition (in isolation and in constellations) and the allocations of individual REs.

Noun Phrases (NP)

Established as the most explicit/informative RE, we expected to see this RE-type predominate in introduced and reintroduced status; and this result held true for the isolated RE data. In fact, as we look across all discourse statuses in the isolated data, DDs figure prominently in each. They comprise almost all of the isolated-introduced examples (94%), DDs comprise 63% of the isolated-reintroduced examples, and they comprise almost one-third of all REs in isolated-maintained discourse status. However, in constellations, they comprise only 26% of the total introduced REs (5 tokens of 19). While 26% ranks as the second highest occurring RE in that status, the marked reduction in percentage is noteworthy. It is striking that DDs are so infrequent in constellations, only occurring 6 times out of the entire sample of 310 RE tokens. The diminished proportion of DDs in constellation-statuses that call for maximally-explicit REs was interesting, and we speculate later about what may contribute to their reduced role.

Semantic Classifiers (SCL)

We can see that in the isolated RE data, SCLs are almost exclusively concentrated in maintained discourse status. This indicates that SCLs, in isolation, are a favored RE for signaling highly accessible referents. However, in constellations, SCLs are equally distributed across *all* statuses. This trend is the inverse of what occurred with DDs. In other words, DDs in isolation are heavily favored for signaling inaccessible referents, but in constellations their role in discourse statuses requiring maximally-explicit REs is *diminished*. Whereas, SCLs in isolation, which have a strong tendency to signal *highly accessible* referents, in constellations appear equally frequently across all discourse statuses. Somehow, SCLs occurring as a constellation, end up having a *greater* role in discourse statuses that signal inaccessible referents.

Null Forms

In a pattern that parallels the trends in SCLs, Null forms in isolation, too, predominate in maintained discourse status, almost never occurring anywhere else. However, in constellations, Null forms are most consistently realized as REs reintroducing new entities into the discourse, a role typically reserved for more explicit REs (5 of 6 Null occurrences are in introduced or reintroduced discourse status).

Agreement (AGR)

Again, it is difficult to draw especially meaningful conclusions about AGR as they were a RE form that occurred minimally in isolation, however in those rare instances where AGR was realized, it used exclusively to indicate entities in maintained status (signaling highly accessible referents). However, as described above, they figure prominently in the constellation data across all discourse statuses.

Constructed Action (BCLs and Role Shift)

Interestingly, the allocations for CA did not reflect the trend observed for SCLs and Null forms. In contrast, the allocation of CA remained relatively consistent. In both conditions, CA was favored as an RE in maintained status (i.e. a signal for a highly accessible referent). In fact, the proportion of CA in constellation-maintained was even greater compared to the proportion in isolation. Interesting proposals can be made about why this form, apart from all others, diverges from the trend we describe. One factor that distinguishes CA from other ASL pronominal forms is its realization as a *mimetic/visible enactment*. This accessible and transparent approach to referring may contribute to its general consistency as a maintainer across both isolated and constellation conditions[14].

The interesting conclusion of these results suggests that there may be a general trend that discourages the RE forms regarded as highly explicit in isolation from occurring in constellations. In the other direction, those RE forms associated with low informativeness in isolation do occur in constellations. In this condition, REs seem to be able to signal less accessible referents than they can otherwise signal on their own. The next dimension of this inquiry, calculating accessibility values, will contribute to informing a more comprehensive discussion about each of these RE forms across conditions.

4.6.4. Understanding Accessibility Values

In order to arrive at a more concrete understanding the relationship between RE-types and the entities to which they referred, every entity across the narrative samples was assigned an accessibility value using Toole's Accessibility Scale (1996) described in detail in Section 3.6.3. of Study 1. Determining these values enabled us to identify whether REs typically referred to highly accessible or inaccessible referents. Again, we analyzed the disaggregated data, separating REs in isolation from REs occurring in

[14] Interestingly, despite its entrenched position as an RE form that maintains entities in discourse, later results related to signaled accessibility values indicate an effect of appearing in constellations for CA that allows it to signal less accessible entities than it otherwise can on its own.

constellations, in order to discover if REs signaled entities with different entity accessibility values depending on whether REs appeared in either condition (isolation or constellations). Entity accessibility values also provide an additional layer of information that will more comprehensively inform how a hierarchy of accessibility for ASL REs might be composed. Calculating and applying accessibility values for entities signaled by REs in ASL represents an additional, novel contribution to the research.

Results of this analysis were translated into box and whisker plots to compare the distribution of REs and the values of the entities they signaled in each condition. Figures 4.4 and 4.5 provide a detailed picture of how appearing in isolation or constellations results in changes to the mean accessibility values of entities to which each RE referred.

Figure 4.4 includes *all* RE tokens, with the scatter plot highlighting the distinction between the distribution of REs in isolation (blue data points) as well as REs in constellations (pink data points). Mean accessibility values include all entities (those referred to by REs in isolation and REs in constellations). Perhaps the most salient feature of Figure 4.4 is that REs occurring in constellations are heavily concentrated across four main RE-types. Additionally, REs in isolation almost never appear in AGR or ICLs.

Figure 4.4. Box Plot for All RE Tokens

Plotting the accessibility values of all REs and the relationship between accessibility value and RE type. Overall means for entity accessibility values including REs in isolation and REs in constellations are reported. The upper and lower "hinges" correspond to the first and third quartiles (25th and 75th percentiles). Accessibility values range from a maximum of 6 (highly accessible entities) to -2 (maximally inaccessible entities).

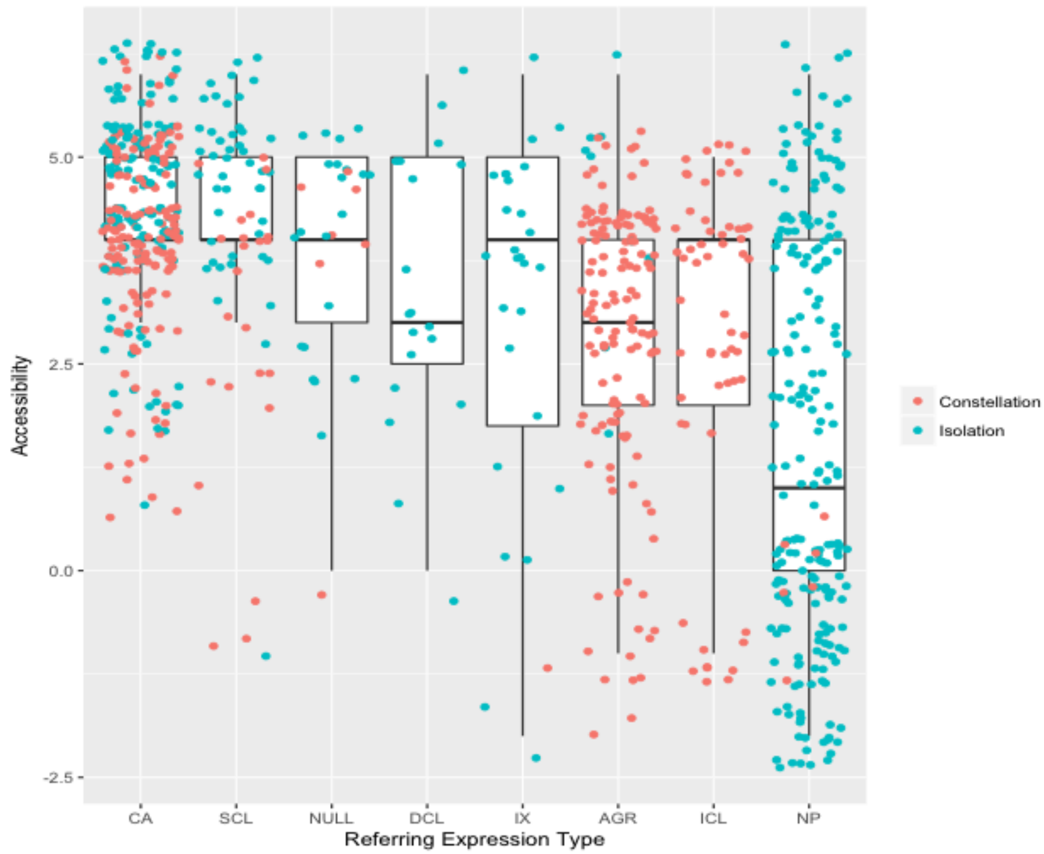


Figure 4.4 further illustrates DDs' favored role as RE form for entities with low accessibility values as evidenced by their entities earning the lowest mean accessibility score. Figure 4.4 also reinforces that DDs occur almost exclusively in isolation. The same distribution is noted for DCLs and IX. Interestingly, DCLs refer to entities with the second lowest mean accessibility values (after DDs). We turn now to exploring the

disaggregated data in order to explore the individual relationships between REs in each condition and the accessibility values of entities to which they refer.

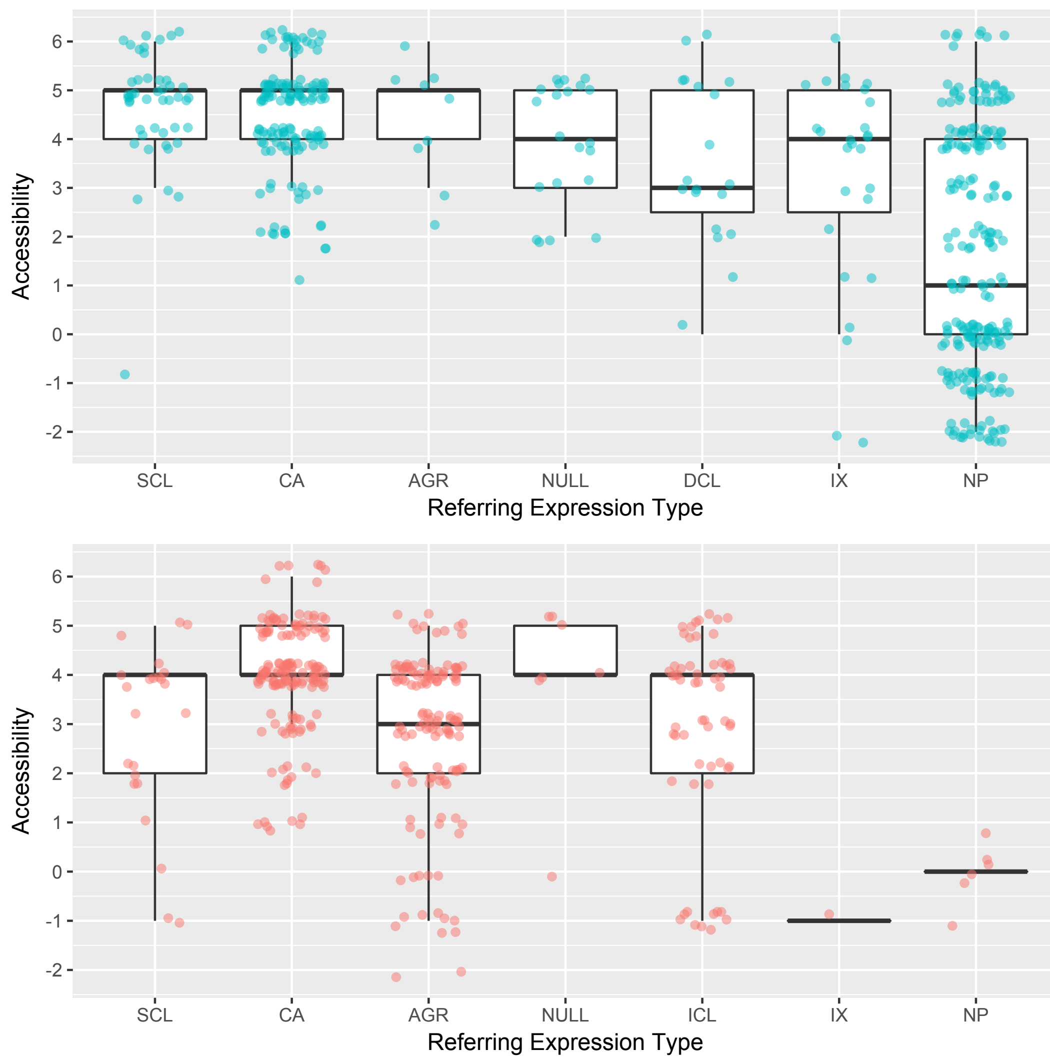
4.6.5. Accessibility values in the Disaggregated Data

Figure 4.5 reveals an interesting change. Because CA and SCLs are the REs that most consistently occur in both conditions it is important to highlight the mean accessibility values of entities signaled by CA and SCLs in isolation versus constellations. These data show that in isolation, the accessibility values for entities they signal are one-point greater than the accessibility values of entities they signal when occurring in constellations (12%). This indicates that, on their own, SCLs and CA are preferred REs for entities that are somewhat more accessible, and when they occur as constellations, they typically refer to entities that are comparatively less accessible. This is intriguing and in line with the trends noted earlier in Section 4.6.3.

In a related observation, we see that DDs and DCLs, in isolation, signal entities with the lowest accessibility values, indicating that these forms have greater explicitness as compared to all other REs in isolation. As we noted, it is intriguing why these most explicit forms are relatively absent in constellations.

Figure 4.5. Box Plots for RE Tokens in Isolation and Constellations

Plotting the accessibility values of entities related to individual REs in isolation (top-green) and REs in constellations (bottom-pink). Means for entity accessibility values are reported. The upper and lower "hinges" correspond to the first and third quartiles (25th and 75th percentiles). Accessibility values range from a maximum of 6 (highly accessible entities) to -2 (maximally inaccessible entities).



It is also worth noting that ICLs disappear from the isolated data set altogether[15]. Figure 4.5 illuminates how the mean accessibility values of entities signaled by SCLs and CA

[15] Again, AGR forms appear so infrequently that it is impossible to draw any meaningful conclusions about their behavior in isolation.

decrease to ~4 (in isolation, mean values for both = ~5). Additionally, in this condition, ICLs and AGR emerge as frequently occurring REs. The mean accessibility value for entities signaled by AGR REs (3) is among the lowest of any other mean accessibility value in any condition (excepting DDs). this finding as interesting as AGR is an a RE type that almost exclusively co-occurs and not expected to be highly informative.

In contrast to the isolated RE data, in constellations, DDs and IXs simply do not occur to any meaningful degree in constellations, and in constellations, DCLs disappear altogether. Despite the challenge this presents for meaningful commentary on the significance of their distribution patterns/accessibility values, their relative absence raises important questions about *why* they are so infrequent.

Taken as a whole, results from this section seem to suggest:

1) Constellations seem **not to** favor REs if REs are regarded as highly explicit in isolation.

2) However, RE forms that refer to highly accessible entities in isolation (i.e., entities with greater mean accessibility values) tend to occur in constellations.

3) For REs that occur in each condition (in isolation and in constellations), there is an effect of occurring in constellations that results in REs signaling less accessible entities than they do in isolation.

The next level of analysis will explore the implications of how signaled entity accessibility values can be compared across RE token-types. In order to determine if the relationships between individual REs and the entity accessibility values they signaled was different for different REs, a linear regression analysis was applied comparing each RE to every other RE.

4.6.6. Linear Regressions for Mean Accessibility (Isolation vs. Constellations)

Using repeated linear regressions this section will analyze all REs comparing each entity accessibility value and its related RE in both isolation and in constellations. In these analyses, we controlled for RE type and whether or not REs appeared in constellations. Figures 4.6 and 4.7 describe the results.

These results confirm the unique role of DDs as referring devices use for entities whose accessibility values are significantly different than all other forms'. Occurring as an isolated RE, CA is used for entities whose accessibility values are significantly different than the accessibility values signaled by IXs. CA is also used to signal entities whose accessibility values are significantly different than the entity values signaled by DCLs. Importantly, AGR, does not demonstrate the same relationships to other RE types. These findings reinforce the proposal made in Study 1 distinguishing between CA and AGR as components of a larger RE-type. These results also suggest that if we were to compose a hierarchy of accessibility for REs in ASL, both IXs and DCLs must assume a rank on that scale different from, and not "close" to, CA (the same would hold true for DDs). As mean accessibility values have already been reported, we know that DDs, IXs DCLs in isolation signal less accessible entities. This means that CA in isolation must signal highly accessible entities.

Figure 4.6 also describes that SCLs signal entities whose accessibility values are significantly different than the entities signaled by IXs and DCLs. Using the same mean accessibility value data allows us to place SCLs in isolation as another RE that signals highly accessible entities; this occupying a rank on the "opposite" end of the accessibility scale from DDs, IXs, And DCLs.

Figure 4.6 Linear Regression Comparing RE Types in Isolation.

This chart indicates the how accessibility values of entities related to individual REs occurring in isolation differ from all other forms. ß refers to the amount of change in the accessibility following one unit of change in the independent variable (e.g., CA versus IX). The greater the difference of t values from 0, the greater likelihood that there is a significant difference between the two RE forms in question. If the difference is statistically significant, p values are <.05.

NP	NP						
IX	ß=1.6065 t= 4.049 p= < .001***	IX					
DCL	ß=1.8950 t=4.074 p= ,.001***	ß=0.2885 t=0.496 p= 0.62037	DCL				
NULL	ß=2.3737 t=5.342 p= <.0017***	ß=0.7672 t=1.357 p= 0.17558	ß=0.4787 t=0.778 p= 0.4371	NULL			
AGR	ß=2.824e+00 t=4.446 p= <.001***	ß=1.1481 t=1.535 p= 0.12555	ß=0.8596 t=1.093 p= 0.2750	ß=0.3810 t=0.492 p= 0.623	AGR		
CA	ß=2.8812 t=13.571 p= < .001***	ß=1.2747 t=3.114 p= <0.01**	ß=0.9862 t=2.072 p= 0.0388*	ß=0.5075 t=1.114 p= 0.266	ß=0.1265 t=0.189 p= 0.850	CA	
SCL	ß=3.1169 t=9.875 p= < .001***	ß=1.5105 t=3.205 p= 0.001**	ß=1.2220 t=2.305 p= 0.0216*	ß=0.7433 t=1.452 p= 0.147	ß=0.3623 t=0.5111 p= 0.609	ß=0.2358 t=0.712 p= 0.47687	SCL

Figure 4.7 Linear Regression Comparing RE Types in Constellations.

This chart indicates the how accessibility values of entities related to individual REs occurring in constellations differ from the relationships of all other forms. ß refers to the amount of change in the accessibility following one unit of change in the independent variable (e.g., CA versus IX). The greater the difference of t values from 0, the greater likelihood that there is a significant difference between the two RE forms in question. If the difference is statistically significant, p values are <.05.

NP	NP					
ICL	ß=2.879e+00 t=4.413 p= <.001***	ICL				
NULL	ß=3.857e+00 t=4.557 p=<.001***	ß=0.977833 t=1.606 p= 0.1091	NULL			
AGR	ß=2.824e+00 t=4.446 p= <.001***	ß= -0.0548 t= -0.229 p= 0.8192	ß= -1.0327 t= -1.750 p= 0.08101	AGR		
CA	ß=3.91e+00 t=6.287 p= <.001***	ß=1.1012 t=4.698 p= <.001***	ß=0.1234 t=0.210 p= 0.83392	ß=1.15609 t=6.393 p= <.001***	CA	
SCL	ß=2.870e+00 t=4.114 p= <.001***	ß= -0.009745 t= -0.026 p= 0.9793	ß= -0.9876 t= -1.504 p= 0.13352	ß=0.04514 t=0.131 p= 0.8957	ß= -1.1110 t= -3.266 p= 0.00119**	SCL

Figure 4.7 shows important new patterns emerging as they relate to the interaction between the accessibility of entities signaled by CA and the accessibility of entities signaled by AGR respectively. This effect is also observed between the accessibility of entities signaled by CA and the accessibility of entities signaled by SCLs. These are new

relationships that did not exist in the isolation data. Additionally, there is a significant difference between the accessibility values of entities singled by ICLs (a form that does not occur in isolation) and the accessibility values of entities signaled by CA.

Table 4.4 Statistically Significant Differences in Entity Accessibility Values Signaled by REs Across Conditions

This table organizes the linear regression results, demonstrating how appearing in each condition changes the relationships between RE types and the entity accessibility values. All differences reported are statistically significant.

In Isolation	
RE type	**Significantly Different From**
Noun Phrase	all other RE types
Constructed Action	Index, Descriptive Classifiers
Semantic Classifiers	Index, Descriptive Classifiers
In Constellations	
RE Type	**Significantly Different From**
Noun Phrase	all other RE types
Constructed Action	Instrument Classifiers, Agreement
Semantic Classifiers	Constructed Action,
Null*	Agreement (approaches significance p=.08*)

These results show how new relationships emerge in the accessibility values of entities signaled by REs that occur in constellations as compared to the accessibility values signaled by REs occurring in isolation. The differences we report in each condition are statistically significant, indicating that there is a real and measureable effect on the signaling function of select RE token types that results from occurring in a constellation that is different when they occur in isolation.

Additionally, these results reinforce the value of distinguishing between AGR and

CA (i.e., in constellations each RE token-type signals entities with significantly different accessibility values). These RE types have sometimes been included in a larger, zero-anaphor category (Lillo-Martin 1986; 1991; Frederiksen & Mayberry, 2016). Taken together, these data support our proposal for expanding the inventory of referring expressions. By extension they also suggest that there is merit to acknowledging the *unique conditions* of Linear and Concurrent RE forms. These new relationships also require that proposing two separate hierarchies, one for REs occurring in isolation and another for REs occurring in constellations. We turn now to an expanded analysis of RE token-types and the entity accessibility values they signal.

4.6.7. ANOVA

We continued our analysis in order to discover additional relationships that may exist between RE types, and to ensure that the differences we already noted were, indeed, significant. ANOVA indicated that for five of the six REs that occurred in both conditions (occurring in isolation and occurring in constellations), the average accessibility value for the referent being signaled was *lower* in the constellation configuration than in the isolated configuration, with three of the five statistically significant at alpha = .05, and two showing trends in the same direction (Table 4.4). These data reinforce the proposal that there is an effect of occurring in constellations that allows REs to signal entities that are less accessible than they can signal on their own. Additionally, different degrees of variation across conditions seem to support the idea that the range of RE types include in the present study are uniquely occurring, distinct members of an expanded typology of REs in ASL.

Table 4.5 ANOVA: Change in Mean Entity Accessibility Scores Across Conditions by RE Type

The following table outlines the results of an ANOVA analysis comparing the difference in means between accessibility values for entities signaled by REs occurring in isolation and accessibility values for entities signaled by REs occurring in constellations (range: -2 to 6). As F-ratios increase beyond 3.6, they approach significance. The table also provides numbers of RE tokens in each condition (n).

RE type	Sig. diff x Condition	mean access. score in Isolation	mean access. score in Constellations	(n) ISO	(n) CONST
AGR	F=7.17, p<.008	4.33	2.82	9	131
CA	F=13.41 p<.0003	4.46	3.98	137	154
IX	F=3.60, p=.069	3.18	-1.00	27	1
NP	F=2.43, p=.12	1.57	0	216	6
Null	NS	3.95	3.86	21	7
SCL	F=25.49 p=.0001	4.70	2.86	46	23
DCL	NS	3.47	NA	19	NA
ICL	NS	NA	2.87	NA	58

4.6.8. Comparison of Heat Maps: REs in Isolation and REs in Constellations

The final dimension to this study's comprehensive analysis returns to heat maps where visual trends can also illustrate the differences in RE distributions by both type and discourse status. Figures 4.8 and 4.9 illustrate how REs in isolation and in constellations exhibit divergent patterns of allocations.

Figure 4.8 Heat Map Data from RE Tokens in Isolation.

This heat map represents only those REs that occurred in isolation.

Total REs occurring in isolation=476. Introduced n=81, Reintroduced=89, Maintained=306.

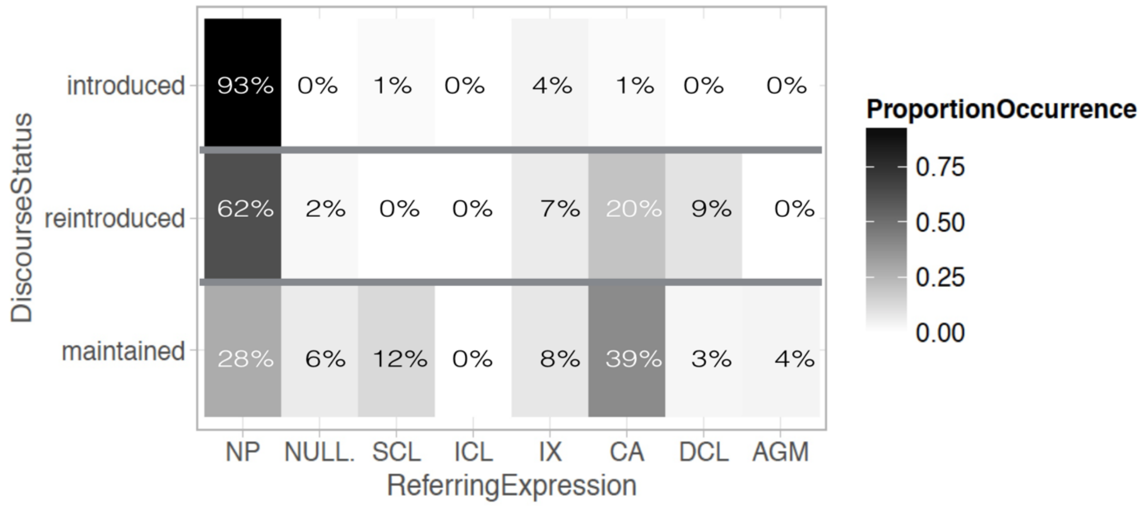
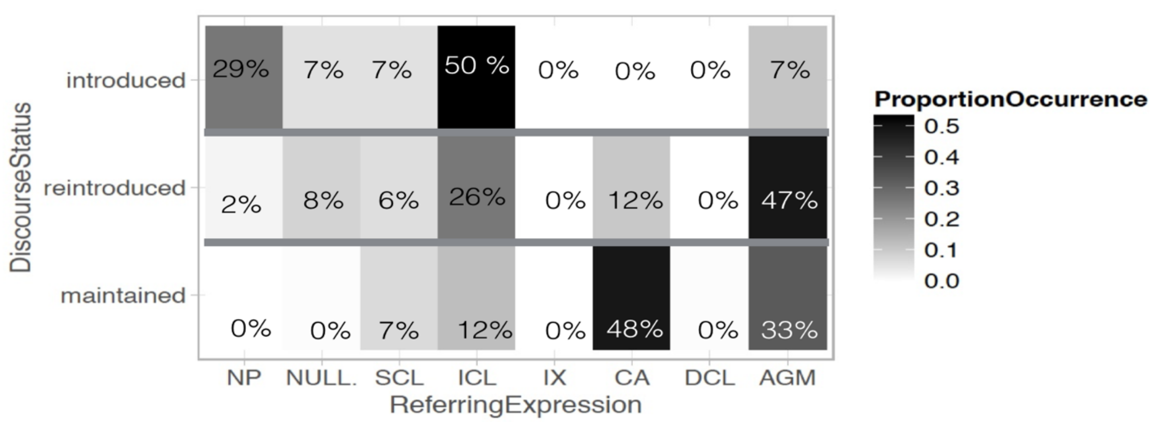


Figure 4.9 Heat Map Data from RE Tokens in Constellations.

This heat map represents only those REs that occurred as members of constellations.

Total REs occurring in constellations=380. Introduced n=14, Reintroduced=51, Maintained=315.



Comparing the heat maps for REs occurring in isolation and REs occurring in constellations showcase the conclusions we have described thus far in visual terms. In order to avoid redundancy, we will briefly describe the overall impact of the heat maps on our understanding of RE allocations in each condition. If we simply analyze the allocations in each discourse status (each horizontal) we can clearly see the important changes that occur. There are almost no cases where the same kind of shading pattern is seen across the horizontals when we compare the isolated data to the constellation data (SCLs in maintained status are the one exception).

If we look at the vertical trends in the data we see the same effect, and in many cases, the shading patterns are "reversed" with darker (greater) allocations in isolation resulting in lighter (lesser) allocations in the constellations (or vice-versa). CA is a notable exception as it represents the favored RE form for maintained referents in both conditions. The patterns of vertical shading for CA are similar across each condition, trending from light to dark (again, suggesting a greater likelihood for use with maximally accessible referents). However, the intensity of CA shading changes in the constellation data, indicating that it is more highly preferred for maintained entities in constellations than in any other discourse status. This is an interesting finding because despite this stronger tendency to maintain referents in constellations, we know from previous analyses that, on average, when CA occurs in constellations, it refers to entities that are relatively more inaccessible than those they refer to in isolation. However, the strong tendency for CA to assume entities in maintained status indicates that it may be what previous researchers have called a *lean referring form* (Perniss and Özyürek, 2015).

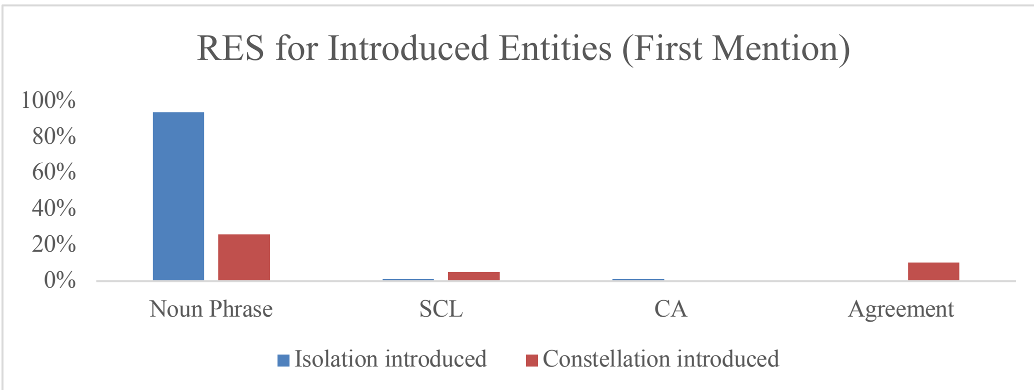
4.6.9. Comparing Select RE Allocations by Discourse Status

We can also represent the striking changes in proportions of RE allocation from each condition as bar graphs in Figures 4.10–4.12. The following figures highlight only those

REEs that occur consistently in each condition (NP, SCL, CA, and AGR).

Figure 4.10 Proportions of RE types Allocated in Introduced Discourse Status by Condition

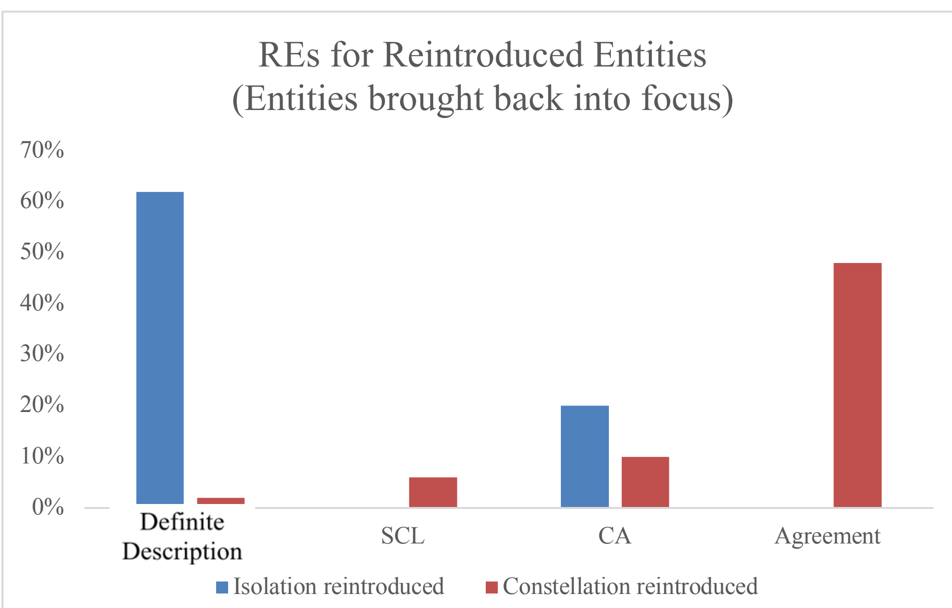
Comparisons of REs in isolation and REs in constellations.



The striking differences in allocation here are surprising as introduced entities typically signaled by highly informative REs (DDs). However, in constellations, DDs assume a much less prominent role with AGR emerging as a frequent RE signal.

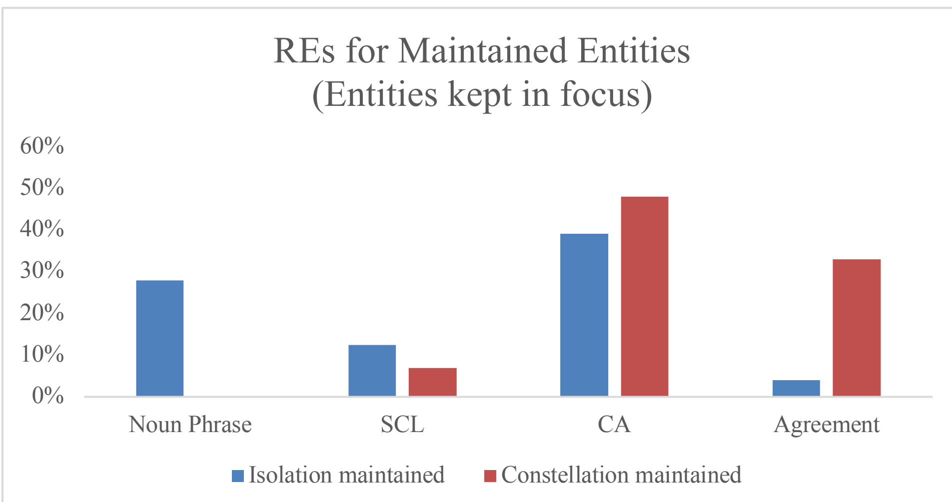
Figure 4.11 Proportions of RE types Allocated in Reintroduced Discourse Status by Condition

Comparisons of REs in isolation and REs in constellations.



In Reintroduced status, we see the frequency of DDs reduced to nothing while AGR assumes an even more prominent role as a *reintroducer*. This is further evidence that there is an effect of occurring in a constellation seems to license specific RE token types to assume referring roles they do not in isolation. Additionally, it also seems to suggest that DDs are not favored in reintroduced status, which may indicate that their highly informative qualities may not be appropriate for arrangement in a constellation.

Figure 4.12 Proportions of RE types Allocated in Maintained Discourse Status by Condition Comparisons of REs in isolation and REs in constellations.



We see similar, divergent trends in maintained status, excepting CA (which shows similar allocations). However, it is clear that each of these figures showcases how the signaling role of REs changes based on occurring in one condition or another (i.e., occurring in isolation or in constellations).

4.6.10. Expanded Analysis: Constellations in ASL Literature Narratives

The next level of analysis involved comparing the constellation data from the ASL Literature narratives to our Balloon Story results. In line with the approach adopted in Study 1, we determined that if the patterns we noted in our Balloon Story constellation data were consistently occurring in more complex, sophisticated ASL narratives, it would indicate that our findings were generalizable across various narrative forms. Our first step was to compare the allocation of REs occurring in constellations across each narrative type. Tables 4.6 and 4.7 detail the results.

Table 4.6 ASL Literature Narratives: Percentage Allocations of REs in Constellations by Type and Discourse Status.

Distributions of co-occurring REs from ASL Literature narratives (REs in constellations), n = 180.

REs in Constellations	NP	NULL	SCL	ICL	IX	CA	DCL	AGR
Introduced (n=2)	0%	0%	50% (1)	50% (1)	0%	0%	0%	0%
Reintroduced (n=57)	0%	3.5% (2)	12.3 % (7)	14.04 % (8)	0%	29.8% (17)	5.26% (3)	35.08% (20)
Maintained (n=121)	0%	2.5 % (3)	7.44 % (9)	7.44% (9)	0%	42.98% (52)	3.31% (4)	36.36 % (44)

Table 4.7 Balloon Story Narratives: Percentage Allocations of REs in Constellations by Type and Discourse Status.

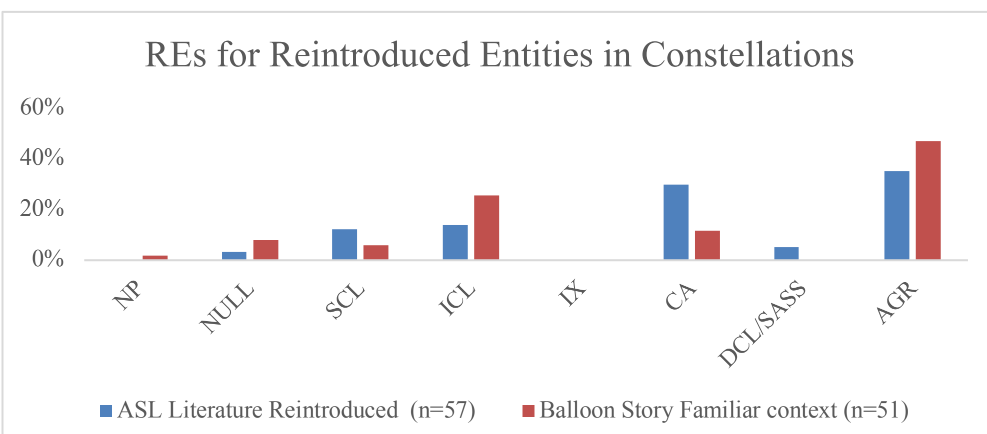
Distributions of co-occurring REs from Balloon Story narratives (REs in constellations) (n=380).

RE in Constellations	NP	NULL	SCL	ICL	IX	CA	DCL/SASS	AGR
Introduced (n=14)	28.57% (4)	7.01% (1)	7.01% (1)	50% (7)	0.00%	0.00%	0.00%	7.01% (1)
Reintroduced (n=51)	1.96% (1)	7.84% (4)	5.88% (3)	25.49% (13)	0.00%	11.76% (6)	0.00%	47.06% (24)
Maintained (n=310)	0.00%	0.32% (1)	7.3% (21)	11.74% (37)	0.00%	47.95% (151)	0.00%	32.96% (103)

Our next step in the analysis was to look at each discourse status and compare RE allocations within that status. Importantly, because only 2 RE tokens signaled introduced entities in constellations from the ASL literature narratives, these results are not informative. However, it is noteworthy to point out that introduced REs occurring in constellations are rare in both narrative types (ASL literature and Balloon Stories). DDs comprise .01% of introduced RE constellation tokens in the ASL literature data, and .06 of all constellation RE tokens in the familiar-context Balloon Story data. This is in line with previous findings that indicate DDs in constellations are not favored for introducing entities into the discourse.

The following comparisons of RE allocations in reintroduced and maintained status will provide further, valuable comparisons for our expanded investigation; those results are presented in Figures 4.13 and 4.14.

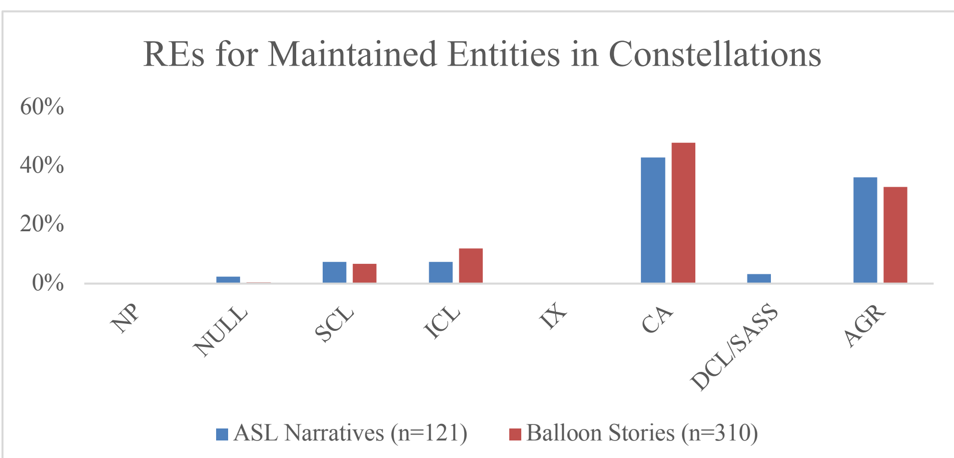
Figure 4.13 Allocations of Reintroduced REs Occurring in Constellations: ASL Literature Narratives vs. Balloon Stories from Familiar Context Narratives



Allocation results in Figure 4.13 reveal more general consistencies across most RE types in both narrative types. However, CA occurs in the ASL literature narratives in noticeably greater proportions than in the Balloon Story narratives. Recall that our previous results indicate that CA is preferred in reintroduced status. We know that the ASL narratives are longer, and more complex with a greater potential to reintroduce entities than Balloon Story narratives. Figure 4.13 shows that RE tokens comprised 28% of all ASL literature narrative REs, while only 16% of RE tokens signaled reintroduced entities in the Balloon Story narratives. It follows, therefore, that a we would see a greater incidence of the most preferred, maintaining RE type (CA).

While acknowledging the distinctions in the proportion of CA tokens between the two narrative types, the overall allocation of REs in reintroduced status seem to be consistent based on patterns showing the same RE types realized, and absent for each narrative type. These results may add to the proposal that the RE allocation we describe this dissertation may be applicable to various ASL narrative forms. Figure 4.14 details the RE allocations for maintained RE tokens in constellations.

Figure 4.14 Allocations of Maintained REs in Isolation ASL Literature Narratives vs. Balloon Stories from Familiar Context Narratives



The RE allocations in maintained status are, once more, remarkably similar. Whether these data are considered in terms of the occurrence of RE type, or the proportions of allocation for each RE, they add more confidence to the proposal that the patterns we describe in Chapter 4 may be robust enough to be applied to various ASL narrative forms. Our next level of analysis was related to exploring the accessibility levels of entities signaled by each RE token.

4.6.10. Mean Accessibility Values: Balloon Story vs. ASL Literature Samples

Calculating entity accessibility values allows us to deepen the level inquiry beyond allocations and creates the potential for more nuanced comparisons as well as statistical analysis. If the accessibility value results from complex ASL Literature samples are line with the Balloon Story results, it will help to affirm the reliability of our findings. Figure 4.15 outlines the accessibility values of entities signaled by RE tokens in isolation and the accessibility values of entities signaled by RE tokens in constellations.

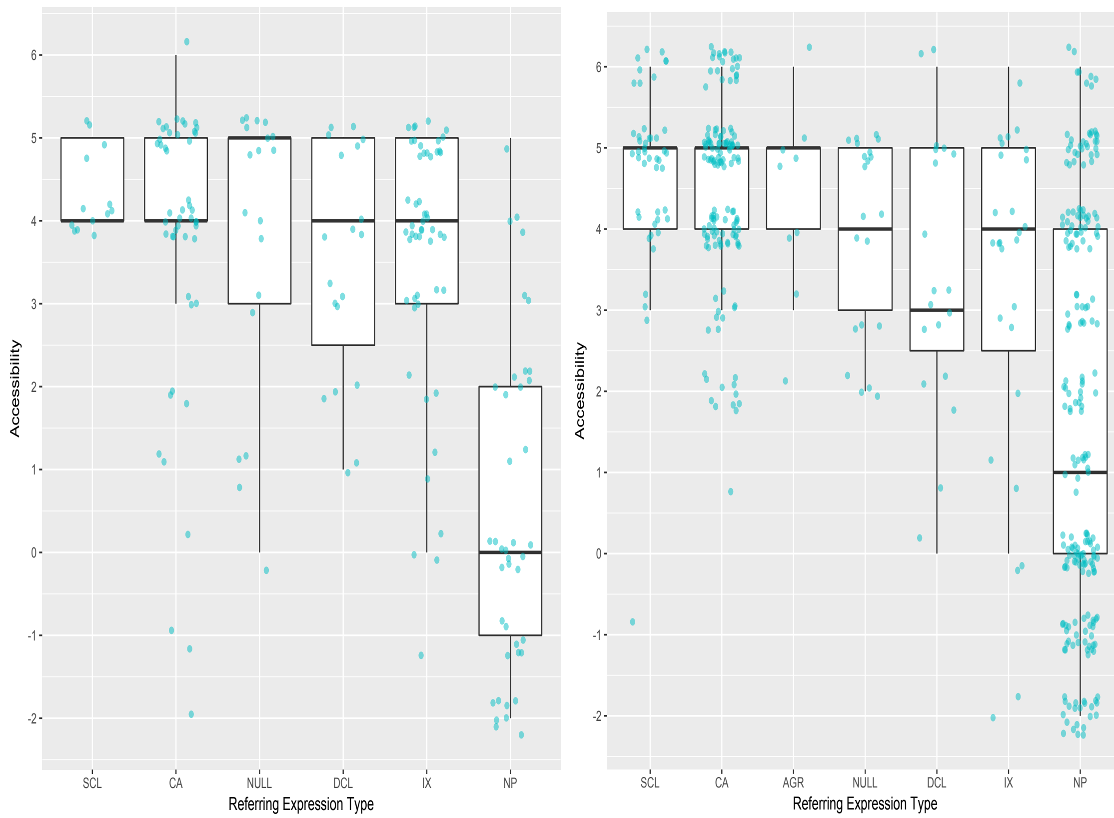
Visual comparisons across each narrative type (ASL Literature and Balloon Stories) reveal interesting parallels suggesting that the general distributions of accessibility values by RE tokens are similar. Additionally, the rank order that our data has revealed (trending from left to right, starting with REs signaling more accessible and ending with REs signaling inaccessible entities) is also consistent (Figure 4.15) is also consistent.

Figure 4.15 Box Plot Comparing RE Tokens in Isolation from ASL Literature samples (at left) and Familiar Context Balloon Story Narratives (at right).

Darker horizontal lines in the boxes represent mean accessibility values of the entities signaled by each RE type.

***In the ASL Literature Samples AGR does not occur in isolation.**

ASL LITERATURE RE TOKENS **BALLOON STORY RE TOKENS**



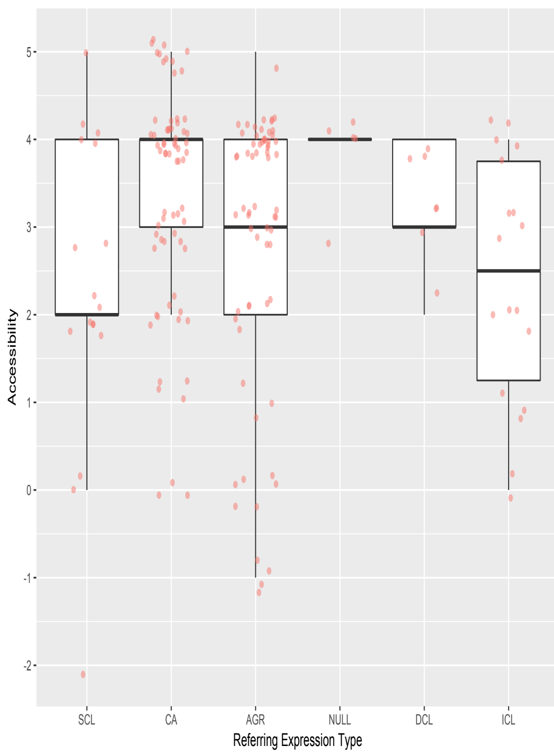
We turn now to comparing the accessibility values of entities signaled by ASL literature REs occurring in constellations and those signaled by Balloon Story REs occurring in constellations.

Figure 4.16 Box Plot Comparing RE Tokens Occurring in Constellations from ASL Literature samples (at left) and Familiar Context Balloon Story Narratives (at right).

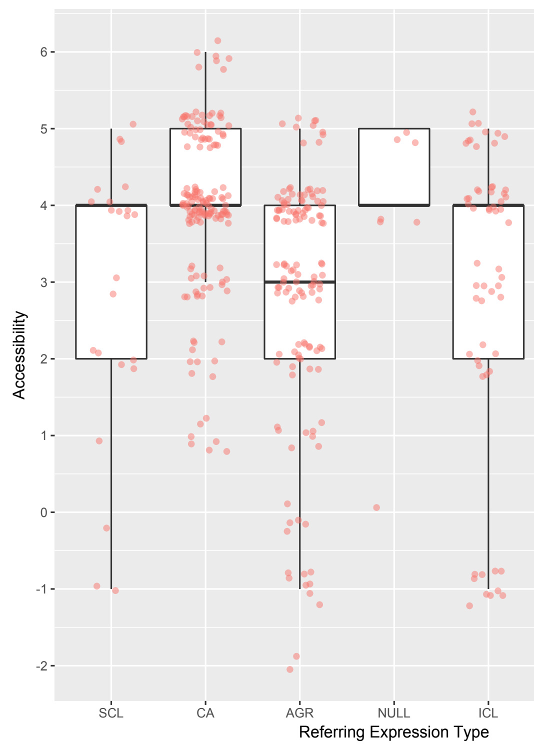
Darker horizontal lines in the boxes represent mean accessibility values of the entities signaled by each RE type.

**IX and DDs do not occur ASL literature constellations.*
**DCLs do not occur in Balloon Story constellations*

ASL LITERATURE RE TOKENS



BALLOON STORY RE TOKENS



In this comparison, we also can see the general similarities in accessibility value distribution across RE token types. However, there seems to be a tendency for lower mean accessibility values signaled by RE token type in the ASL narrative constellations. This is interesting and prompted the application of a statistical comparison using t-tests to determine if the differences in mean entity accessibility values signaled by REs in each narrative type were significantly different.

Table 4.8 Comparing Mean Accessibility Values Signaled by ASL Narrative REs Occurring in Constellations and Constellation REs from Balloon Stories

Only REs that consistently occurred in both narrative types are included in Table 5.18. As a result, DCL, DD and IX values were not considered. p values from two-sample T-test results comparing mean accessibility values for each narrative type by RE are reported.

RE Type	(ASL Literature) Mean Accessibility Value Signaled in Constellations and SD	(Balloon Story) Mean Accessibility Value Signaled in Constellations and (SD)	Difference in Mean Accessibility Values Signaled
ICL	2.38 (1.3) (n=18)	2.87 (2) (n=57)	-.38 (p= 0.117)
Null	3.8 (0.4) (n=5)	3.85 (1.7) (n=6)	-.05 (p= 0.4725)
Agreement	2.78 (1.6) (n=64)	2.82 (1.6) (n=128)	-.04 (p= 0.435)
Constructed Action	3.37 (1.2) (n=69)	3.98 (1.0) (n=157)	-.61 (p= 0.0001)*
Semantic Classifier	2.29 (1.7) (n=17)	2.86 (1.7) (n=25)	-.57 (p= 0.148)

Importantly, the results from Table 4.8, suggest strong consistencies in signaling function across narrative types, as despite generally lower mean accessibility values in the ASL literature narratives, no significant differences were noted except in CA. It is interesting to note that in each condition (in isolation and in constellations) CAs signaled entities with values that were significant different (lower) in the ASL narratives. This result shows that the master storytellers seem to have been able to employ their language facility to use CA as a RE signal for less accessible entities than the participants in our Balloon Story narratives, suggesting that there may be unique and sophisticated strategies that master storytellers employ to enhance an REs referring potential.

Recall that our results from analyzing REs in isolation from the ASL narrative data, also resulted in signaled accessibility values that were lower than those in the simpler, less-complex balloon stories. This may simply highlight the important impact of analyzing longer, more complex narratives on lowering accessibility values. Or, it may indicate that master storytellers employ creative and skilled techniques that were not applied by the subjects in our sample. This is an interesting potential direction for future study.

4.7. Discussion

4.7.1. Important Distinctions: REs in Isolation and in Constellations

The results of this study show that any comprehensive analysis of REs in ASL must look at two separate dimensions: 1) REs in isolation and 2) REs that co-occur (i.e. constellations). On every level of the analysis there was compelling evidence that REs behaved differently depending on whether they occurred in isolation or in constellations. We will address questions about why in the following section.

4.7.2. Proposed Constellation Effects

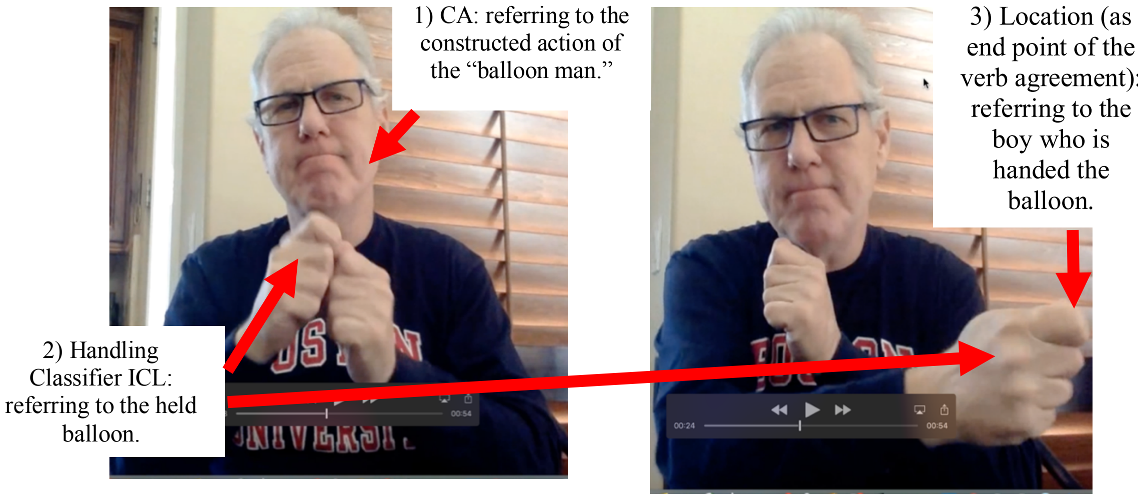
Results of Study 3 also seem to suggest that there is an effect of occurring in constellations that licenses REs signal less accessible entities than the ones they typically signal on their own. In other words, special referring *privileges* seem to be granted to REs so that they become more appropriate signals for entities with lower accessibility levels than they are as independent REs.

One explanation for why this may occur has its roots in a theory of visual processing that suggests that there is a *privilege* that *seeing* enjoys over hearing, simply because when we see, we cannot help but see in relation (Arnheim,1969). Of course, spoken language is perfectly capable of referring to entities and describing the relationships between them using many linguistic devices including relative clauses, embedding, and prepositions. But the spatial efficiency unique to the visual modality serves to congeal this information into a constellation that lets us see entities *and* their relationships to one another simultaneously. Friedman (1975) alluded to this idea as she described how ASL can represent "metaphoric icons" or "metaphoric visual representations" by taking advantage of the visual relationships that, together, comprise a "semantic component of their referent" (p. 960).

We propose that it may be that REs leverage their dense, economical architecture in order to promote explicitness by benefitting from a pattern of *redundancy* made possible by concurrent architecture of constellations. On some level, this seems to parallel the results from research on spoken language referring that show, "stressed pronouns (already lower accessibility markers than unstressed pronouns) are transformed into fully-fledged Mid-Accessibility markers when accompanied by special pointing gestures" (Ariel, 1988, p.78). The co-occurring, *special pointing gestures* can include indexing, gesturing, and nodding. Perniss & Ozyurek (2008) also discuss this propensity for gestures that accompany speech to "help speakers to situate referents and describe relations among them" (p. 353).

Interestingly, and unsurprisingly, the redundancy of speaking and gesturing about the same entity, enhances the explicitness of the spoken RE. Redundancy, especially as it appears in spoken (or face to face discourse), is known to facilitate processing and free up comprehension resources that listeners/ can use elsewhere (Tannen, 2007). In order to demonstrate how redundancy is uniquely realized in ASL, let us return to Figure 2 which effectively showcases the complementary and redundant *referential information* that can co-occur in a constellation. In what follows, we will describe how occurring concurrently in space may inherently add referential information that enhances explicitness.

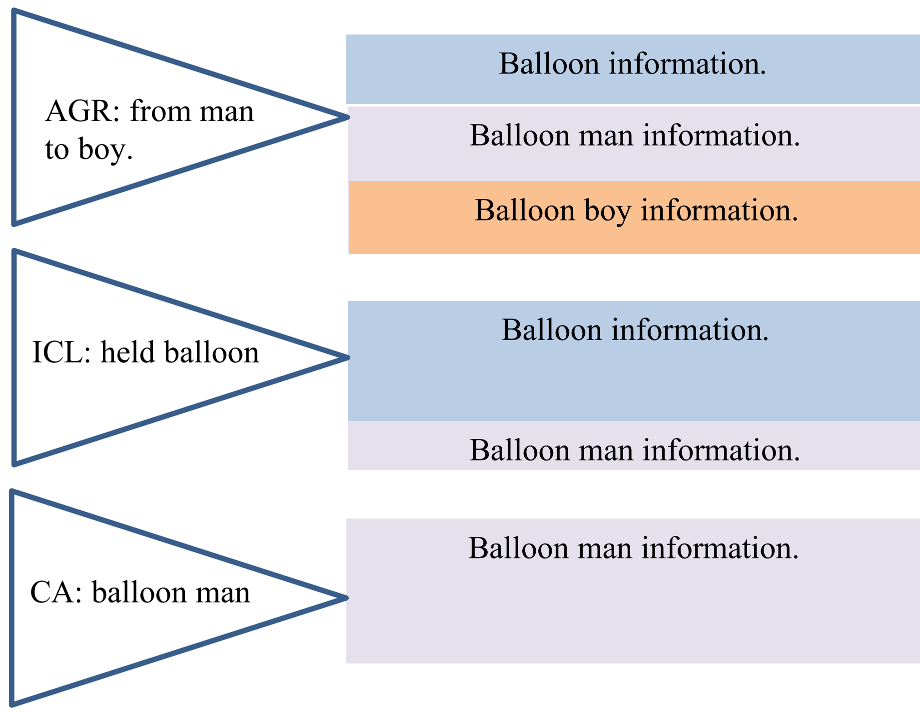
Figure 4.17 A Typical Constellation



As we discussed previously, in 4.10, three REs are arranged in a typical constellation (CA, ICL, and AGR). If we consider how each RE *works together*, we see that CA includes referring information exclusively about the *Balloon man*; while ICL includes referring information about the *balloon (it is being held in space),* in addition to some undefined quantity of referring information about the *Balloon* (i.e. we cannot quantify this information as having 17 % greater explicitness, but because of the architecture of ASL we also simultaneously gain the knowledge the *Balloon Man* is holding the balloon); and finally, AGR includes referring information about the *Balloon man* (the balloon is coming from him), *the Balloon* (it is moving along a path from the Balloon man to the Balloon boy) and t*he Balloon boy* (he is the recipient of the balloon). In this way, the concurrent, visual architecture of ASL may leverage this redundancy to generate additional explicitness for referential purposes. Figure 4.11 depicts this idea in visual terms.

Figure 4.18 Redundancy Effect of Constellations

A visual display of how REs occurring in constellations contribute redundant information concurrently. This may help explain why REs in constellations refer to entities that are less accessible than those to which they typically refer on their own.



In support of this proposal, we refer to the ANOVA results demonstrating that almost all REs occurring in both conditions (in isolation and in constellations) signaled entities with lower mean accessibility values when they occurred as constellations. Our proposal is that the confluence of referring information that results from a constellation (Figure 4.11) may be *just enough* to license an RE's relationship to less accessible entities. To return to our analogy, it may be that the co-occurring illumination deployed by the Signal Force for constellations result in a cumulative, enhancing effect, as compared to the individual illumination characteristic of REs in isolation. This co-occurring illumination may boost the explicitness of minimally informative REs types (normally assuming minimal roles in discourse statuses reserved for more explicit REs), to become appropriate signalers in more explicit discourse statuses when they occur as constellations. This can explain the resulting changes in allocations we see in heat maps from REs in isolation to REs in constellations.

Our results also suggest that REs we regarded as highly explicit (DDs and DCLs), seemed to be *discouraged* from occurring in constellations. Part of the explanation for why this pattern may emerge is related to our proposal about using signals with inappropriate levels of informative-ness. As we discussed earlier, in ASL, it is perfectly grammatical to recast the entities and relationships depicted in a constellation using sequential terms. However, the sequential version of forms normally expressed as constellations is considered inappropriate and awkward. Part of the resistance to the sequential/linear options we described seems to be related to their over-explicitness. This is an important consideration, because if it is true that arrangement in a constellation contributes to enhancing explicitness levels, it may be that adding highly explicit REs results in an overly informative sentence (i.e., DDs in constellations are the equivalent of the Signal Corps deploying an inappropriately powerful illumination technique).

Another, more focused, example that may support the redundancy proposal is related to the mean accessibility values reported for AGR in constellations. Recall that those values (excepting DDs - which did not occur frequently) were among the lowest of any values reported in Figure 4.5 and Table 4.4. Their role as signaling entities with low accessibility values may result from the multi-dimensional nature of the referring information they provide. If the diagram we proposed in Figure 4.11 is accurate, we can see that AGR has the potential include three levels of referring information (more than any other form). This multi-dimensional informativeness naturally results in cumulative signaling illumination, and it may help explain why AGR can be used to refer to entities with accessibility values lower than most other forms'.

Our analysis also included data from sophisticated ASL narratives and those results reinforced our findings about the unique impact on RE when they occurring in a constellation. This comprehensive analysis supported our proposal for a distinct condition in ASL referring and gives us more confidence that our findings are generalizable to various narrative forms.

4.7.3. Expanding the Inventory of REs in ASL

Additionally, we were able to demonstrate the value in expanding the inventory of REs in ASL to include the range of forms identified in the present study. By describing the unique allocations across discourse statuses and across conditions (in isolation and in constellations), in addition to demonstrating significant differences between the mean accessibility values of select REs, we propose that each RE type we have included assumes a distinct role in the typology of referring expressions in ASL. Taken together, the comprehensive study of multiple factors related to accessibility outlined in our results contributed developing two, proposed accessibility hierarchies.

4.7.4. Two Hierarchies of Accessibility

Each proposed hierarchy includes additions to the inventory of REs. The first, based on results from Study1, outlines a hierarchy for REs that occur in isolation (Table 4.9). This hierarchy replicates the findings of Frederiksen & Mayberry (2016), while including additional RE forms (DCL/SASSs and IXs). The second (Table 4.10), is based on the constellation data from the present study, and it outlines a novel organization of REs. In this model, DDs maintain their status as the most explicit form, despite their infrequent appearance in constellations. However, significant changes result in the distribution and type of RE forms in this environment.

Table 4.9 Proposed Hierarchy of Accessibility in ASL for REs Occurring in Isolation

A hierarchy of accessibility organized (top-down) from most to least explicit. This proposed model includes an expanded inventory of REs as compared to previous research (Frederiksen & Mayberry, 2016). It includes only REs that occur in isolation.

RE Form	Signals
Noun Phrase	Low Accessibility
Descriptive Classifiers/SASSes	
Indexing	
Constructed Action	
Null	
Semantic Classifiers	High Accessibility

Table 4.10 Proposed Hierarchy of Accessibility in ASL for REs Occurring in Constellations

A hierarchy of accessibility organized (top-down) from most to least explicit. This model This model only includes REs tokens occurring in constellations. ICL represents an addition to the inventory of REs in ASL.

RE Form	Signals
Noun Phrase	Low Accessibility
ICL/Handling CL	
Agreement	
Semantic Classifiers	
Null	
Constructed Action	High Accessibility

Notice in Table 4.10, DCLs and IXs do not appear, but, in their place, two new RE forms emerge, ICLs and AGR. They both occur frequently in the constellation data and assume a status on the hierarchy that indicates a relatively high level of informativeness. Additionally, it is interesting that among the types of REs that occur frequently in both conditions (in isolation and constellations) SCLs and CA assume new statuses on the hierarchy and, as a result, send different signals about an entity's accessibility. This is in contrast to DDs and Null forms, whose signals do not change significantly. Together, these two hierarchies comprise a new, expanded proposal that can guide further comprehensive inquiries into REs in ASL.

Finally, these data seem to offer strong support for the proposal that there are important pragmatic implications for REs that occur in Linear vs. Concurrent conditions. Although this study represents what the author believes is a significant contribution to the literature on REs in ASL, more research is certainly necessary in order to determine if these models are complete and accurate. Studies that are able to replicate these results will be an important next step as we grow to understand accessibility in ASL and how it relates to the affordances of a visual-spatial modality. Research in this domain can inform important work related to applying composition strategies that promote accessible and coherent ASL resources, as well as encourage teaching/communication strategies designed to enhance explicitness and promote comprehension.

CHAPTER FIVE

5.1. The Impact of Maximal Explicitness on Referring Expressions in ASL

As effective language users, we are expected to apply a range of pragmatic devices in order to successfully coordinate with conversational partners. Part of this process requires establishing a mutual common ground (Clark, 1985; Clark & Carlson, 1981; Clark & Krych, 2004). This is especially true when speakers tailor elements of their language output to audiences depending on whether the audience is known to have greater or lesser access to the content/context of the discourse (Isaacs & Clark, 1987). Referring expressions (REs) are one such element. Their important role as pragmatic devices helps us to coordinate with others. They function as signals that we send to communicative partners to establish and maintain the accessibility and coherence of references we make throughout discourse practices.

For example, if we know that information/entities are new to the discourse, we opt for more explicit REs to establish common ground (Ariel, 1988, 1996; Amor & Nair, 2007; Arnold, 2008). This approach has been shown to consistently occur in both spoken and signed modalities (Morgan, Perniss, Cormier et al., 2013; Frederiksen and Mayberry, 2016; Czubek, Studies 1, 2 of this dissertation). Additionally, research on spoken languages has shown that speakers also use unique referring strategies *throughout the discourse,* depending on whether the audience is known to have substantial or limited background information about the topic/content currently in focus (Isaacs & Clark, 1987, Clark& Krych, 2004). In spoken languages, research has shown that when an audience is presumed to have limited common ground or is lacking background knowledge, competent language users will employ maximally-explicit REs in order to compensate for these "accessibility deficits" (Wilkes-Gibbs & Clark, 1992; Isaacs & Clark, 1987). Much less is known about how ASL users tailor RE deployment to audiences unfamiliar with the topic/content of the discourse.

5.2. The Present Study: Study 3

In order to determine if the level of audience familiarity impacts how REs are deployed in ASL narratives, we will analyze the same narrative produced by signers in two different contexts. Context 1 is an environment where signers are narrating to an audience who is clearly aware of their interlocutor's intimate familiarity with the characters, episodes, and events of the narrative (termed here, *familiar context*). Context 2 is an environment where signers are narrating to an audience that is overtly *unfamiliar* with characters, episodes, and events of the same narrative (termed here *maximally-explicit context*).

In comparing these two narrative versions (familiar and maximally-explicit contexts), we will gain a better understanding of the strategies that adult, native users of ASL employ to maximize explicitness/informativeness. If unique patterns emerge across contexts, they may help to inform the hierarchy of explicitness in ASL, in addition to the kinds of signals individual RE types send. These results are also valuable because they may also help to illuminate successful coordination strategies that ASL users can apply in the development of informational videotexts, in teaching, as well as in promoting comprehensible input that facilitates language acquisition and learning.

5.2.1. The Goals of Study Three

There are several interesting questions that can expand on the findings of Studies 1 and 2. As we analyze the narrative samples from familiar and maximally-explicit contexts, our inquiry will investigate the following questions:

- Does the type of context impact the number of propositions in each narrative? *We predict that there will be greater numbers of propositions in the maximally-explicit narrative.*
- Is the overall distribution of REs across discourse statuses similar in each context? *We predict that distributions will change, with more explicit REs assuming greater roles in narratives designed to be maximally-explicit.*
- Are individual RE types deployed differently in each context? *We predict that RE forms known to be highly informative (i.e., DDs, DCLs, IX in isolation and DDs, ICLs and AGR in constellations) will assume greater roles in reintroduced and maintained statuses as compared to previous results.*
- Are the RE forms that have been established as maximally-explicit in Studies 1 and 2, more frequently occurring in the maximally-explicit narratives? *We predict that maximally-explicit forms will occur more frequently.*
- Do mean accessibility values for entities related to specific REs change across contexts? We predict that more entities will be kept in focus making them more accessible. As a result, we predict that mean accessibility values for entities in the maximally-explicit narratives will be higher on average.
- Does narrative context affect the proportion of REs that occur in isolation or in constellations? We predict there will be no impact on the proportions of REs deployed in each condition.

5.3. Methods

5.3.1. Participants

Familiar Context Narratives:

Data from Studies 1 and 2 were derived from *familiar context narratives*. Data included narratives from a total of 19 deaf, native users of ASL (i.e., having deaf parents and acquiring ASL from birth). They ranged from 21- 69 years of age (mean age: 34.5, median age: 27.5), of the 19 subjects, 13 were female and 6 were male. 30% of the sample was at least third-generation deaf or greater, and 15 of the 19 participants had graduate degrees. These narratives were collected in order to analyze how sophisticated, native, ASL users deployed REs in narrative discourse.

Maximally-explicit Context Narratives:

The maximally-explicit ASL narratives for the present study were collected from 15 of the same 19 ASL native subjects participating in Studies 1 and 2. The only criterion for including this sub-section of participants for Study 3 was the availability of subjects to generate 2 narratives. Ages of the sub-section ranged from 21- 69 years old (mean age: 37.5, median age: 28). Of the 15 subjects, 10 were female and 5 were male. 40% of the sample was at least 3rd generation deaf or greater, and 12 of the 15 participants had graduate degrees.

After having recorded the familiar context narratives, 15 participants were asked to tell the story again. However, in this telling it was made clear that the narrative was to be delivered to a perceiver who had no information or background knowledge about the Balloon Story. All participants were told that once complete, the unfamiliar perceiver would be questioned about certain details related to the Balloon Story. Ten of the fifteen narratives for Study Two were collected within minutes after the familiar context narratives were recorded. Five of the fifteen narratives were collected weeks after the familiar-context narrative recording. In this way, we hoped to elicit maximally-explicit narratives with unique referring strategies. These narratives were collected in order to analyze the different referring strategies that emerged in sophisticated, native, ASL users deployed REs in a maximally-explicit narrative telling.

5.3.2. Procedure

After providing informed consent, participants were given instructions in ASL by a native user of ASL. The participants were presented with a colored, 6-panel, wordless picture sequence adapted by Hoffmeister et al. (1999) from Karmiloff-Smith's (1979) *balloon stories* (see Figure 5.1). The stimulus for this study included one main character (the balloon boy) and two secondary characters (balloon man and the bad boy), as well as two featured object-entities (balloon one and balloon two). All participants were given as much time as they needed to view and become familiar with the story. All participants reviewed the story together with a native user before recording. When they acknowledged that they were ready to retell the story, the stimulus was removed and participants told the story to that native user. The entire process was video-recorded. Several studies have used similar procedures to elicit narratives (e.g., Hickmann and Hendriks, 1999; Kail and Hickmann, 1992; De Villiers, 2004). It was clear that subjects and testers, in all cases, subjects were made explicitly aware of the testers and their shared knowledge of the characters and events in the balloon story. As a result, this study was able to control for the important and complementary role that mutual knowledge, community membership, physical co-presence plays in choosing referring expressions (Ariel, 1988; Clark & Krych, 2004).

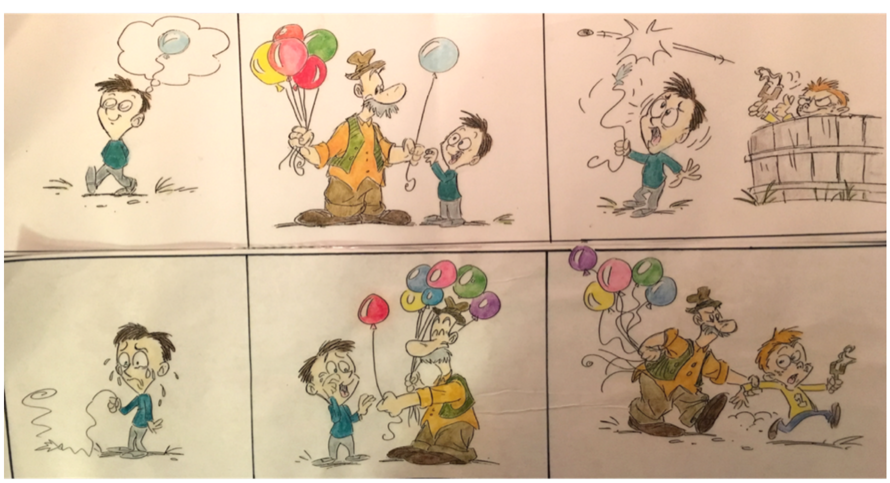
The elicitation of the maximally-explicit narrative occurred after the familiar context narrative was recorded. In each case, with the stimulus already removed and unavailable to the tester or the subject, the tester asked the subjects to retell the narrative once more to a new partner who would be questioned about details in the narrative afterwards. It was made explicitly clear that the new audience was completely unfamiliar with the context of the balloon story. These maximally-explicit narratives were also video recorded.

5.4. Materials

The stimulus for the narratives was based on one, wordless illustrated comic comprised of a six-panel picture sequence (Hoffmeister et al.,1999), adapted from Karmiloff-Smith's (1981) *balloon stories*. The revised balloon story includes various entity and object referents in order to ensure that signers would need to describe multiple characters and identify competing objects, encouraging multiple opportunities for introducing, maintaining and reintroducing referents; these features are important elements of effective narrative stimuli (Arnold & Griffin, 2007).

Figure 5.1 The Balloon Story.

This 6-panel, wordless cartoon was adapted from the original work by Karmiloff-Smith (1981) by Hoffmeister et al. (1999). The panel was the stimulus for all balloon stories.



5.5 Coding and Annotation

This study used a four-tiered methodological approach: (1) Transcribing maximally-explicit collected video recorded narrative samples from 15 native ASL users (Hoffmeister, et al., 1999; Bahan and Supalla, 1996), (2) coding REs by type and discourse status on a Chronological Anaphora Matrix (See Figure 6), (3) coding ASL referring expressions for an accessibility value (Toole, 1996), (4) distilling referring expressions into coherent patterns of use.

5.5.1. Transcriptions

Initially, ASL transcriptions were typed and organized into glossed propositions that were distinguished from one another based on predicate boundaries (Tomlin, 1987). The term proposition is defined as "a semantic unit composed of a predicate plus its arguments" (ibid., p.461). This procedure is similar to the approach adopted by Frederikson and Mayberry (2015; 2016). A detailed description of the coding procedure is outlined in Chapter 3, Section 3.6.1.

5.5.2. Chronological Anaphora Matrix (CAM)

In line with much of the literature on referring expressions in spoken languages, the following criteria were used to identify referential functions/discourse status: (a) *Introduction*: this discourse status represents the first mention of referent in the story; (b) *Maintenance*: this status includes referents that continue to refer to the same character within a clause or in successive clauses; (c) *Reintroduction*: this status includes referents that refer back to a previously mentioned character/object whose last mention was at least beyond the previous clause. Similar categories have also been applied in Morgan's (2006) and Frederiksen & Mayberry's (2015; 2016) work in analyzing referring expressions in sign languages.

Using data from the Chapters 3 and 4, the following inventory of referring expressions is included in the analysis.

Table 5.1 Inventory of Referring Expressions Included in the Present Study

Inventory of Referring Expressions in the Present Study
Definite Descriptions (DD)
Semantic Classifiers (SCL)
Instrument or Handling Classifiers (ICL)
Descriptive Classifiers or Size and Shape Specifiers (DCL/SASSes)
Indexing (IX)
Constructed Action (CA)
Agreement: verbs of agreement, eye gaze. (AGR)
Null

We used the Chronological Anaphora Matrix (CAM), which depicted the chronology, type, proposition, and simultaneous potential of various referents presented in ASL. The CAM form indicates discourse status identifying a referent as either Introduced, Maintained or Reintroduced by color code (e.g., introduced- indigo/blue, maintained- mauve, and reintroduced-red). A detailed description of the CAM is provided in Chapter 3, Section 3.6.2.

5.5.3. Accessibility Values

Each referring expression was also coded for a numerical accessibility value using a scale adapted from Toole (1996). It was possible to earn a maximum value of 6 (most accessible) and a minimum value of -2 (least accessible). For each RE, three factors were considered in assigning an accessibility value: (1) number of propositions back to previous mention, (2) topicality, and (3) competition. Five CAMs (20% of the sample) were randomly selected and reviewed by a skilled user of ASL to determine the reliability of the assigned accessibility values. The agreement coefficient between original coding and the rater was 92.59% (198/215 tokens). A detailed description of the Toole's Framework is presented in Chapter 3, Section 3.6.3.

5.5.3. Organizing by Type and Discourse Status

Once this was complete, REs were organized according to type and discourse status in order to see trends across the data. Types were identified based on those outlined in Studies 1 and 2 (see Table 5.1).

5.5.4. Heat Maps

A heat map is a popular graphical method for visualizing multi-dimensional data in which a table of numbers are encoded as a grid of colored cells. The rows and columns of the matrix reveal patterns that are often difficult to discern in typical tables (Galli, 2016). Proportions and distributions for REs for all three discourse statuses were depicted using shaded blocks. Heat maps in the present study are designed to be read horizontally. Across each horizontal (representing a discourse status), darker shades represent more frequently occurring REs and lighter shades represented less frequent occurrences.

5.6. Results

5.6.1. Effects on the Number of Propositions

We predicted that the maximally-explicit narratives would generate, on average, greater numbers of propositions. We based this prediction on the assumption that narrators would be more likely to elaborate in an attempt to establish common ground with an audience unfamiliar with the context (Isaacs & Clark, 1987). A comparative analysis of the propositions coded from the transcripts from each of the 15 subjects who participated in Study 3 is outlined in Table 5.2

Table 5.2, Number of Propositions in Familiar and Maximally-explicit Contexts.

This table outlines the data from 15 subjects including the number of proposition in each context, the mean number of propositions in each context, and the mean difference between each.

Subject	Propositions in Familiar Context	Propositions in Maximally-explicit Context	Difference
1	30	24	-6
2	23	27	4
3	19	22	3
4	20	20	0
5	17	23	6
6	16	28	12
8	13	19	6
9	24	31	7
10	15	17	2
11	16	16	0
12	11	17	6
13	27	30	3
14	26	27	1
15	21	22	1
mean	19.86	23.07	3.21

Overall, the maximally-explicit narratives produced generally more propositions (mean increase = 3.21/ SD= 4.23). The addition of 3 more propositions per narrative (on average) was an early indication that narrators might be engaging in novel strategies to establish common ground. A paired Wilcoxon Test revealed a significant difference in the number of propositions in the maximally-explicit versus familiar context ($V = 8.5$, $p = 0.018$). Importantly, in all narratives but one, there were more propositions in the maximally-explicit condition than the familiar condition. These results confirmed our early predictions, and the analysis moved to exploring the allocation of REs and their occurrence in various discourse statuses.

5.6.2. Effects on Distributions in Each Context

The next step involved investigating broad trends in the data. In order to do this, we compared the allocations of all REs in both familiar and maximally-explicit narratives. The allocations described in Table 5.3 include data from the Familiar Context narrative analysis in Chapter 4 and the maximally-explicit narrative data from the present study.

Table 5.3. Proportion and Number of ASL Referring Expressions by Discourse Status: Familiar Context Narratives. The total number of RE tokens=856.

Discourse status	Introduced	Reintroduced	Maintained
Familiar Context	11.09%	16.36%	72.54%
Number of tokens	95	140	621
Maximally Explicit	11.26%	13.66%	75.07%
Number of tokens	75	91	500

Table 5.3 displays the remarkably consistent patterns of allocation between studies. There was a slight increase in REs used to maintain entities, but, overall, the results suggest no significant changes in allocations between each narrative context.

5.6.3. Referring Expressions Per Narrative

The next level of analysis compared the average number of REs used per narrative in each narrative type (familiar vs. maximally-explicit). Our prediction was that the number of REs deployed in the maximally-explicit narratives would be greater than the number deployed in familiar context narratives. These expectations were reinforced by the earlier results that showed a significant increase in the number of propositions in maximally-explicit narratives.

Surprisingly, our analysis revealed that the mean number of REs per narrative did not change substantially from familiar to maximally-explicit contexts. Narratives in the familiar context included an average of 44 REs per narrative, while narratives in the maximally-explicit context included an average of 45 REs per narrative. The next level of analysis involved separating the allocations of REs from each narrative context in order to compare the proportions of REs occurring as isolated examples versus REs occurring as constellations.

5.6.4. General Proportions of REs Across Contexts

Table 5.4 Proportion of REs in Isolation and Constellations in Both Narrative Contexts

Context	REs in Isolation	REs in Constellations
Familiar Context Narrative (n=856)	55.6%	44.39%
Maximally-Explicit Narrative (n=666)	54.5%	45.49%

These results, too, showed no significant differences and, to the contrary, seemed to suggest a strong level of consistency that we did not expect.

Patterns of Referring Expression Deployment in Each Context

In Chapter 4, we proposed two expanded hierarchies of explicitness for ASL building on the work of Frederiksen & Mayberry (2016). As we engaged in the next level of analysis we predicted that in the maximally-explicit narratives there would be an increase in the number of highly informative REs used in reintroduced and maintained discourse statuses (DDs, DCLs and IX for isolated context and DDs, ICL and AGR in constellations). A comparison of the allocations in each context (familiar and maximally-explicit) for both REs occurring in isolation and occurring in constellations is presented in the figures below.

Table 5.5 Familiar Context Narratives: Percentage Allocations of REs in Isolation by Type and Discourse Status.

This table includes a distribution of only REs tokens that occur in isolation from the familiar context narratives (n=476).

REs in Isolation	NP	NULL	SCL	ICL	IX	CA	DCL/SASS	AGR
Introduced (n=81)	93.83% (76)	0.00%	1.23% (1)	0.00%	3.70% (3)	1.23% (1)	0.00%	0.00%
Reintroduced (n=89)	62.92% (56)	2.25% (2)	0.00%	0.00%	6.74% (6)	19.10% (17)	8.99% (8)	0.00%
Maintained (n=306)	27.78% (85)	6.21% (19)	12.42% (38)	0.00%	7.84% (24)	39.22% (120)	2.94% (9)	3.59% (11)

Table 5.6 Maximally-explicit Context Narratives: Percentage Allocations of REs in Isolation by Type and Discourse Status.

This table includes a distribution of only REs tokens that occur in isolation from the maximally-explicit context narratives (n=363).

RE in Isolation	NP	NULL	SCL	ICL	IX	CA	DCL/SASS	AGR
Introduced (n=60)	100% (60)	0%	0%	0%	0%	0%	0%	0%
Reintroduced (n=66)	72.7% (48)	3.03% (2)	0%	0%	6.06% (4)	6.06% (4)	12.12% (8)	0%
Maintained (n=237)	29.11% (69)	7.59% (18)	10.12% (24)	0%	5.06% (12)	43.46% (103)	3.79% (9)	.84% (2)

Analysis of the results suggested that there was no meaningful effect of context on the allocations of REs across discourse statuses. Instead, the results point to a strong reliability across the data from Studies 2 and 3. In order to more clearly see the remarkably similar distribution across each context we represent the RE allocations using heat maps in Figures 5.2 and 5.3.

Figure 5.2 Familiar Context Narrative Heat Map Data from RE Tokens in Isolation.

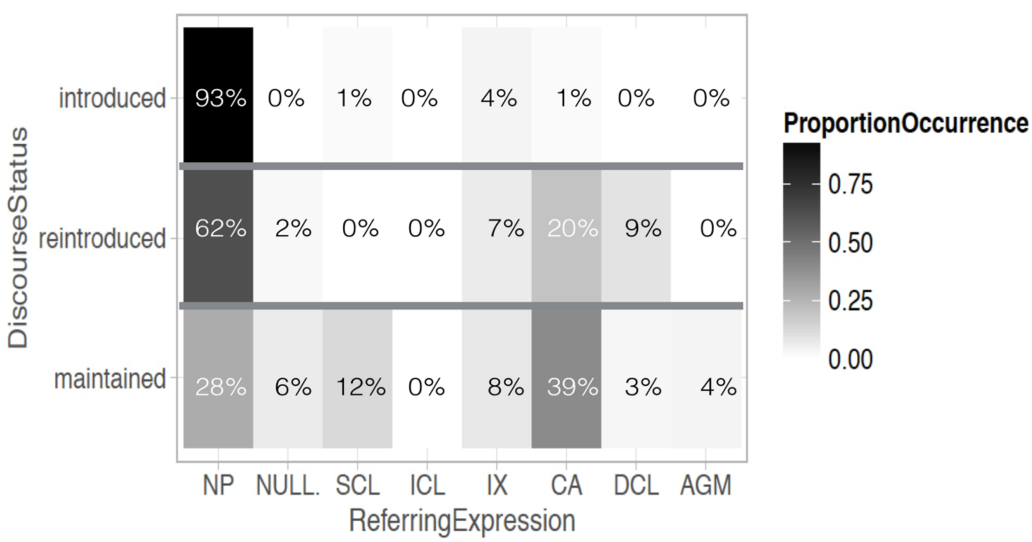
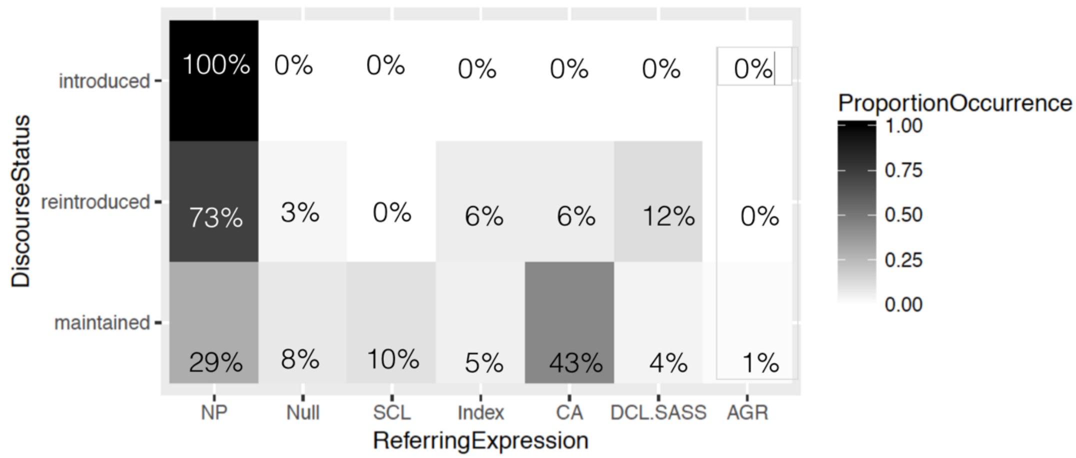


Figure 5.3. Maximally-explicit Context Narrative Heat Map Data from RE Tokens in Isolation.

(This heat map does not include ICLs as they did not occur in isolation.)



Again, the reliability in results is striking. This similar distribution was not expected, but it did serve to reinforce the idea that our previous analysis of RE allocation was accurate, and replicable. We turned next to comparing the allocations of REs in constellations for each context; the allocations are presented in Tables 5.7 and 5.8.

Table 5.7 Familiar Context Narratives: Percentage Allocations of REs in Constellations by Type and Discourse Status

A table including a distribution of co-occurring REs from familiar context narratives (REs in constellations) forms (n=380).

RE in Constellations	NP	NULL	SCL	ICL	IX	CA	DCL/SASS	AGR
Introduced (n=14)	28.57% (4)	7.01% (1)	7.01% (1)	50% (7)	0.00%	0.00%	0.00%	7.01% (1)
Reintroduced (n=51)	1.96% (1)	7.84% (4)	5.88% (3)	25.49% (13)	0.00%	11.76% (6)	0.00%	47.06% (24)
Maintained (n=310)	0.00%	0.32% (1)	7.3% (23)	11.74% (37)	0.00%	47.9% (151)	0.00%	32.69% (103)

Table 5.8. Maximally-explicit Context Narratives: Percentage Allocations of REs in Constellations by Type and Discourse Status

A table including a distribution of co-occurring REs from familiar context narratives (REs in constellations) forms (n=303).

RE in Constellations	NP	NULL	SCL	ICL	IX	CA	DCL/SASS	AGR
Introduced (n=15)	0.00%	0.00%	13.33% (2)	73.33% (11)	0.00%	0.00%	0.00%	13.33% (2)
Reintroduced (n=25)	0.00%	0.00%	4.00% (1)	24.00% (6)	0.00%	16.00% (4)	0.00%	56.00% (14)
Maintained (n=263)	0.00%	0.00%	4.56% (12)	16.73% (43)	0.00%	44.86% (118)	.76% (2)	33.07% (87)

These distributions also reflected strong levels of consistency. Despite the percentage values for DDs appearing to drop substantially in the maximally-explicit, introduced discourse status (proportions of DD drop from 29% to 0%), we must recognize that only 14 RE tokens from the entire sample occurred in constellations as introduced. DDs only occurred 4 times as “introducers” in constellations in the familiar-context narratives. As a result, the absence of DDs as introducers in constellations/maximally-explicit context was not surprising. Heat maps describing these allocations facilitate easier comparisons across each context (Figures 5.4 and 5.5).

Figure 5.4 Familiar Context Heat Map Data from RE Tokens in Constellations.

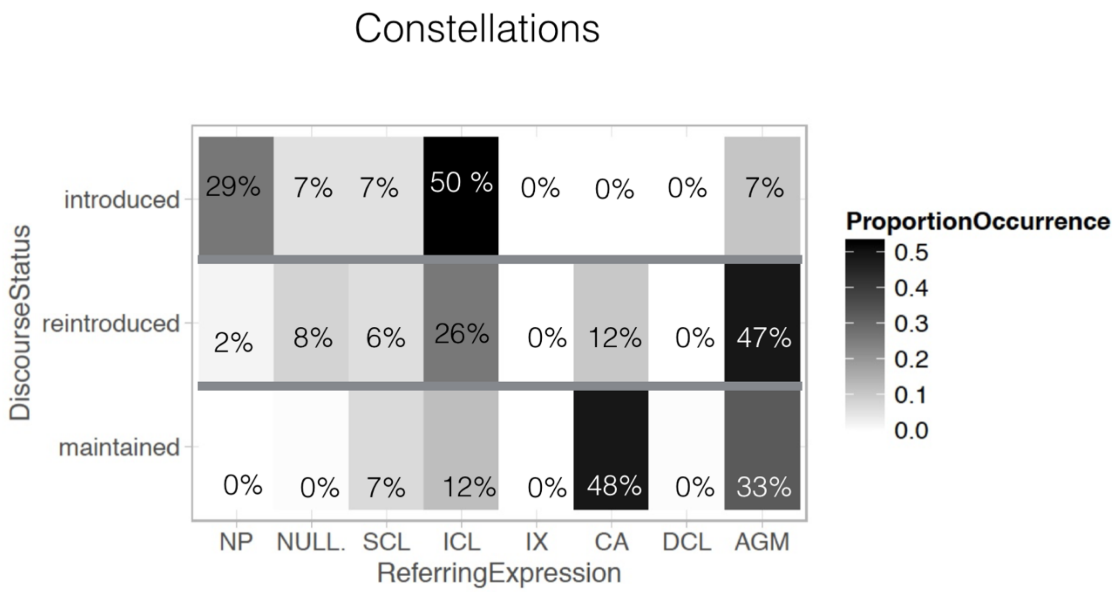


Figure 5.5 Maximally-explicit Context Narrative Heat Map Data from RE Tokens in Constellations.

Again, despite not verifying our predictions that allocations of more explicit REs would appear in greater proportions in reintroduced and maintained status, new data from the present study seems to support the allocations we reported from Chapter 4. In many ways, the heat maps for each narrative context (familiar or maximally-explicit) were interchangeable.

5.6.5. Preferred RE Forms

One of the main questions this study sought to answer was whether the RE forms established as highly informative in Studies 1 and 2 were preferred in maximally-explicit context narratives. We predicted that the proportion of highly informative REs would increase in reintroduced and maintained status. In every case, results indicated that there was no meaningful difference in RE allocation across contexts. As a reference, Tables 5.9 and 5.10 show the proposed hierarchies of accessibility from Studies 1 and 2.

Table 5.9 Proposed Hierarchy of Accessibility in ASL for REs Occurring in Isolation

A hierarchy of accessibility organized (top-down) from most to least explicit. It does not include REs that co-occur.

RE Form	Used for Referents with:
Noun Phrase	Low Accessibility
Descriptive Classifiers/SASSes	
Indexing (IX)	
Constructed Action (CA)	
Null	
Semantic Classifiers (SCL)	High Accessibility

Our expectation was that among REs in *isolation*, REs associated with entities requiring greater explicitness in Table 5.9 (noun phrases, descriptive classifiers, and indexing) would appear in greater proportions in reintroduced and maintained discourse statuses. The heat map results from Section 5.6.4 demonstrate that this did not occur.

Table 5.10. Proposed Hierarchy of Accessibility in ASL for REs Occurring in Constellations

A hierarchy of accessibility organized (top-down) from most to least explicit. It does not include REs in isolation

RE Form	Used for Referents with:
Definite Description (DD)	Low Accessibility
ICL/Handling (ICL)	
Agreement (AGR)	
Semantic Classifiers (SCL)	
Null	
Constructed Action (CA)	High Accessibility

Additionally, we expected that among REs in *constellations,* REs associated with entities requiring greater explicitness (definite descriptions, instrument classifiers, and agreement) would appear in greater proportions in reintroduced and maintained discourse statuses. As we can see from the heat map data, this, also, did not occur.

The next phase of the analysis focused on analyzing accessibility values for entities related to REs occurring in maximally-explicit contexts.

5.6.6. Accessibility Values for REs in Maximally-explicit Context

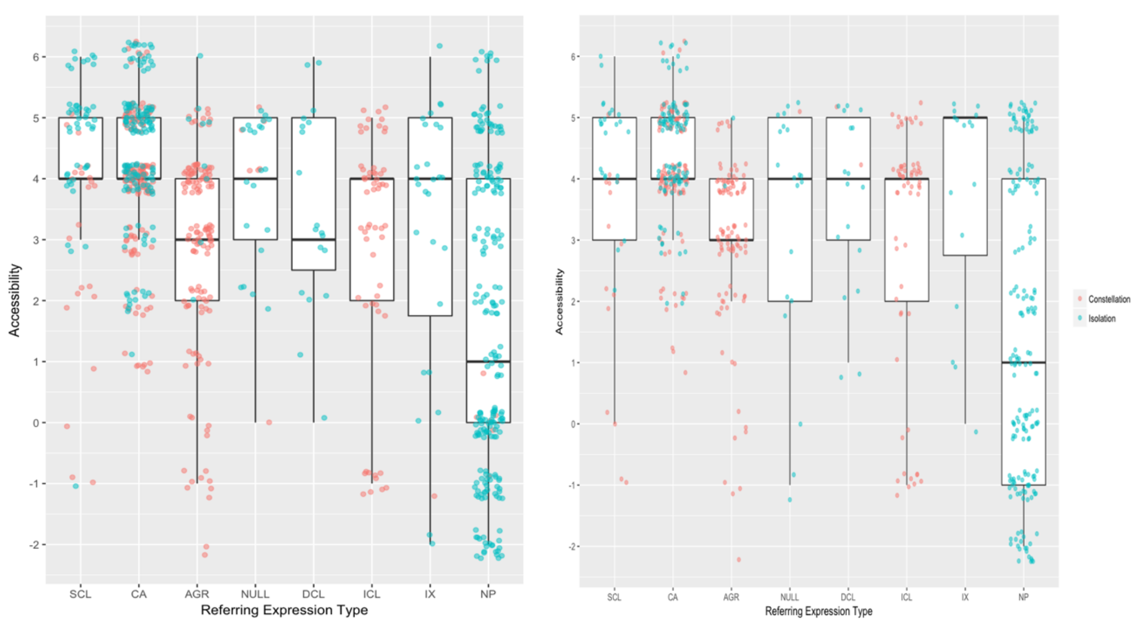
Another goal of the present study was to determine if mean accessibility values for entities related to specific REs changed in maximally-explicit contexts. Every entity in the maximally-explicit narrative samples was assigned an accessibility value using the scale described in Section 5.3 of Study 1 (Toole,1996). Determining these values enabled us to identify whether REs typically signaled highly accessible or less accessible referents. Results from all RE tokens are reported in Figure 5.12, blue dots represent RE tokens occurring in isolation, and pink dots represent RE tokens occurring in constellations.

As we analyze the box and whisker plots for the maximally explicit narratives we can see that many of the same general distributions reported in Study 3 were replicated. For example, DDs, again, occurred almost exclusively in isolation. DCLs and IX were also RE forms highly favored in isolation, rarely occurring in constellations (as was true for the familiar context narratives). Conversely, AGR and ICLs, again, almost never appear in isolation. Constellations are comprised of four main RE-types AGR, ICL, CA, and SCLs.

Figure 5.6 Box Plot for All RE Tokens from Familiar (left) and Maximally-explicit Narratives (right)

Plotting the accessibility values of all REs and the relationship between accessibility value and RE type. Overall means for entity accessibility values for REs in isolation and REs in constellations are reported (darker horizontal lines in each box). The upper and lower "hinges" correspond to the first and third quartiles (25th and 75th percentiles). Accessibility values range from a maximum of 6 (highly accessible entities) to -2 (maximally inaccessible entities).

All RE Tokens Familiar Context **All RE Tokens Maximally-Explicit Context**



The next level of analysis involved separating RE tokens by condition, distinguishing REs in isolation from REs occurring in constellations. This was done in order to discover if new or different mean accessibility values resulted from appearing in either condition. Once again, the results seemed remarkably consistent (see Figures 5.7 and 5.8).

In line with results from Study 3, SCLs and CA, the two RE types that occurred consistently in both isolation and constellations, showed a similar propensity to signal entities with lower mean accessibility values in constellations as compared to the entities they signaled in isolation.

Figure 5.7 Box Plot for RE Tokens in Isolation from Familiar (left) and Maximally-explicit Context Narratives (right).

Darker horizontal lines in boxes represent mean accessibility values of the entities signaled by each RE type.

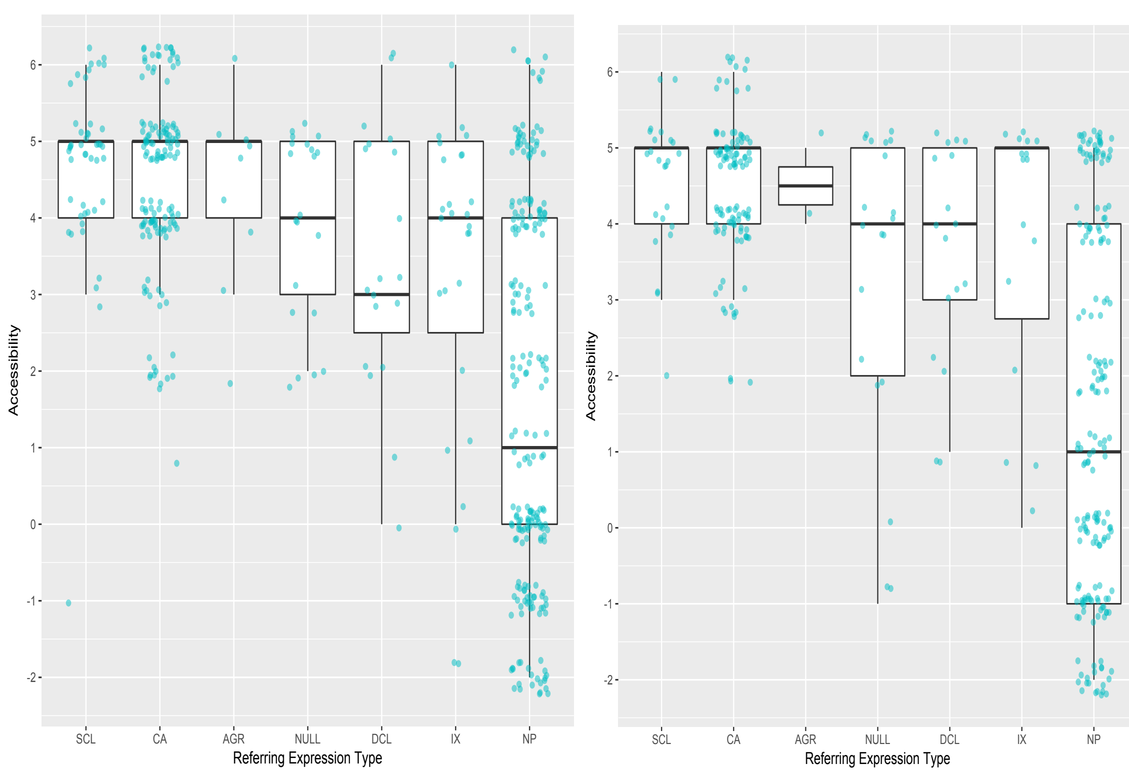


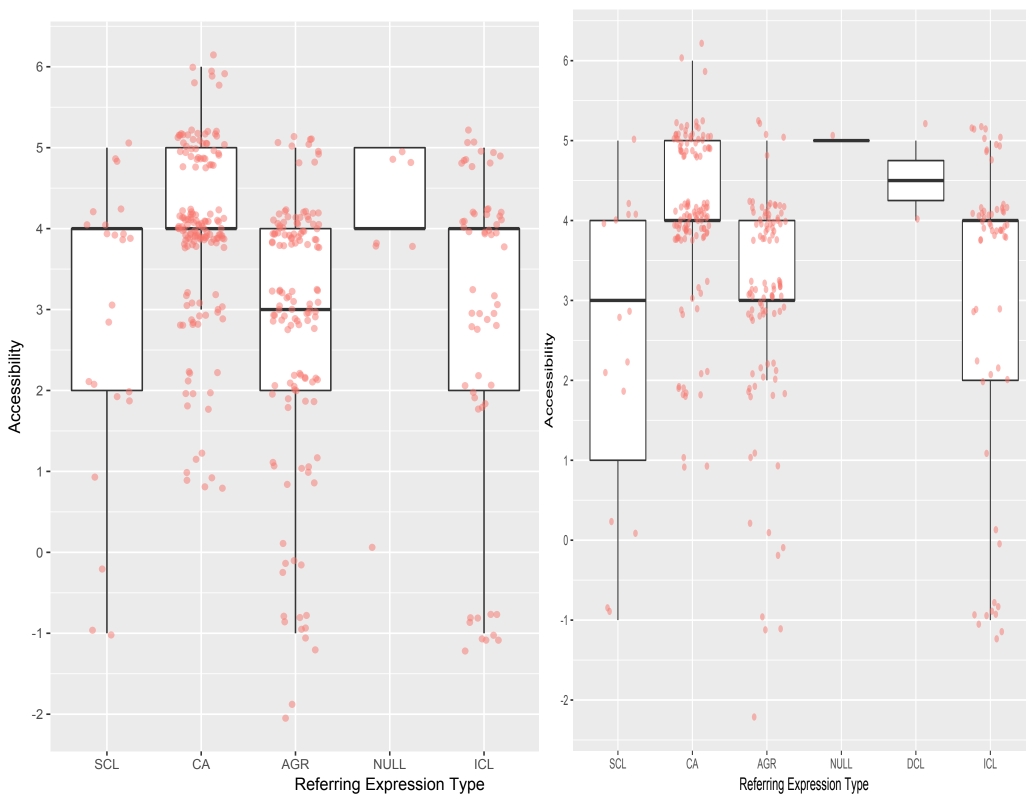
Figure 5.8 Box Plot for RE Tokens in Constellations from Familiar (at left) and Maximally-explicit Context Narratives (at right).

Darker horizontal lines in the boxes represent mean accessibility values of the entities signaled by each RE type.

***Descriptive Classifiers(DCL) did not occur in familiar context narratives.**

***Index (IX) and Definite Descriptions (DD) were not included in the comparisons as they were not frequently occurring in constellations.**

Familiar Context **Maximally-Explicit Context**



The distributions of signaled accessibility values across RE types and mean accessibility values are generally consistent with similar patterns emerging across narrative contexts. These results strongly reinforce three tendencies noted in Study 2:

1) Highly explicit REs occurring in isolation are not favored in constellations.

2) Conversely, REs that signal highly accessible entities are more frequently

included in constellations.

3) RE forms that occur across conditions signal entities that are relatively less accessible (i.e., entities with lower mean accessibility values) when they occur in constellations.

At almost every level of the investigation in Study Three, there were strong consistencies in the results across familiar and maximally-explicit tellings. In order to determine if the parallels we were observing could be statistically verified, a chi-square test of goodness-of-fit was performed. The test was designed to illuminate whether the numbers of REs from each condition (in isolation and constellations) differ significantly across familiar and maximally-explicit contexts, X^2 (DF=1, N = 1521) = .085, p=.7702. No statistical difference between the proportions of RE in isolation or in constellation was evident across familiar and maximally-explicit contexts.

We also applied a chi-square test to determine if the distribution of each RE type was significantly different across conditions (familiar vs. maximally-explicit contexts), our results show that there was also no statistical difference in the distributions of RE types X^2 (DF=7, N=1521) = 3.67, p=.3938.

Finally, a chi-square test was applied to determine if the numbers of REs distributed across each discourse status (introduced, reintroduced, and maintained) across both contexts (familiar and maximally-explicit) was significantly different. No significant difference was found X^2 (DF=5, N=1521) = 2.3404, p=.310305.

5.6.7. Linear Regression Analysis

An additional statistical analysis of the data was applied related to exploring whether the relationships between individual REs and the entities they signaled in maximally-explicit context narratives were different from those they signaled in familiar context narratives. A linear regression comparing each RE and the accessibility values of its signaled entity to every other RE relationship, controlling for RE type. We then compared the results of the maximally-explicit narrative regression analyses to the results from familiar context narratives. For those REs that did not occur at least 5 times in any context (isolated or in constellations), regressions were not calculated (those rows/columns are grayed). These results are summarized in Figures 5.15 and 5.16.

The linear regression results, once again, reinforced that the accessibility values of the entities signaled by DDs in each narrative context, are still significantly different from all other forms. Interestingly, the significant differences we observed in familiar-context for all other RE types did not materialize in the maximally-explicit context. These results suggest that all REs occurring in isolation in the maximally-explicit context narratives (excepting DDs) referred to entities with generally similar accessibility values. It is unclear why the accessibility values from REs in isolation would reveal patterns different from one context to the other (familiar to maximally-explicit). This was unexpected as mean accessibility values for entities signaled by REs were comparable across contexts (i.e., REs in familiar-context and maximally-explicit context signaled similar accessibility values, yet the significant differences only emerged in the familiar isolated data). This result could be a function of the reduced statistical power from the smaller sample size in the familiar context data, however, these results should be explored further.

Figure 5.9 Linear Regression Analysis Comparing RE Types in Isolation from Familiar (top) and Maximally-explicit Context Narratives (bottom).

This chart indicates the how accessibility values of entities related to individual REs occurring in isolation differ from all other forms. ß refers to the amount of change in the accessibility following one unit of change in the independent variable (e.g., CA versus IX). The greater the difference of t values from 0, the greater likelihood that there is a significant difference between the two RE forms in question. If the difference is statistically significant, p values are <.05.

NP	NP						
IX	ß=1.6065 t= 4.049 p= < .001***	IX					
DCL	ß=1.8950 t=4.074 p= ,.001***	ß=0.2885 t=0.496 p= 0.62037	DCL				
NULL	ß=2.3737 t=5.342 p= <.0017***	ß=0.7672 t=1.357 p= 0.17558	ß=0.4787 t=0.778 p= 0.4371	NULL			
AGR	ß=2.824e+00 t=4.446 p= <.001***	ß=1.1481 t=1.535 p= 0.12555	ß=0.8596 t=1.093 p= 0.2750	ß=0.3810 t=0.492 p= 0.623	AGR		
CA	ß=2.8812 t=13.571 p= < .001***	ß=1.2747 t=3.114 p= <0.01**	ß=0.9862 t=2.072 p= 0.0388*	ß=0.5075 t=1.114 p= 0.266	ß=0.1265 t=0.189 p= 0.850	CA	
SCL	ß=3.1169 t=9.875 p= < .001***	ß=1.5105 t=3.205 p= 0.001**	ß=1.2220 t=2.305 p= 0.0216*	ß=0.7433 t=1.452 p= 0.147	ß=0.3623 t=0.5111 p= 0.609	ß=0.2358 t=0.712 p= 0.47687	SCL

NP	NP						
IX	ß=2.3167 t=4.600 p= <0.001***	IX					
DCL	ß=2.1549 t=4.399 p= <0.001***	ß=-0.1618 t=-0.241 p= 0.810	DCL				
NULL	ß=1.8667 t=4.102 p= <0.001***	ß=-0.450 t=-0.695 p=0.488	ß=-0.2882 t=-0.453 p= 0.6511	NULL			
AGR					AGR		
CA	ß=3.0572 t=12.934 p= <0.001***	ß=0.7406 t=1.430 p= 0.154	ß=0.9023 t=1.789 p= 0.0745	ß=-0.009434 t=-0.007 p= 0.99454		CA	
SCL	ß=3.1083 t=7.409 p= <0.001***	ß=0.7917 t=1.270 p= 0.205	ß=0.9534 t=1.558 p= 0.1202	ß=0.041667 t=0.029 p= 0.97662		ß=0.051101 t=0.117 p= 0.9069	SCL

We turn now to comparisons of the constellation distributions across the two contexts. In comparing REs occurring in constellations across narrative contexts (Figure 5.10), the significant differences we observed in familiar context RE types and signaled entity accessibility values were mirrored in the maximally-explicit context. We can see the same significant differences between the accessibility values signaled by Constructed Action REs and those signaled by Instrument Classifiers, we also see the same significant differences between accessibility values signaled by Constructed Action REs and those signaled by Agreement. Finally, we see similar significant differences between the accessibility values signaled by Semantic Classifiers and those signaled by Constructed Action. These results demonstrate that the RE pairs mentioned above signal entities with significantly different accessibility values, justifying their independent status on a hierarchy of accessibility for RE tokens occurring in constellations. It is important to note that in both narrative contexts, DDs did not occur frequently in constellations.

Figure 5.10 Linear Regression Comparing RE Types in Constellations from Familiar (top) and Maximally-explicit Context Narratives (bottom).

This chart indicates the how accessibility values of entities related to individual REs occurring in isolation differ from all other forms.

NP	NP					
ICL		ICL				
NULL		ß=0.977833 t=1.606 p= 0.1091	NULL			
AGR		ß= -0.0548 t= -0.229 p= 0.8192	ß= -1.0327 t= -1.750 p= 0.08101	AGR		
CA		ß=1.1012 t=4.698 p= <.001***	ß=0.1234 t=0.210 p= 0.83392	ß=1.15609 t=6.393 p= <.001***	CA	
SCL		ß= -0.009745 t= -0.026 p= 0.9793	ß= -0.9876 t= -1.504 p= 0.13352	ß=0.04514 t=0.131 p= 0.8957	ß= -1.1110 t= -3.266 p= 0.00119**	SCL

NP	NP					
ICL		ICL				
NULL		ß=1.95082 t=1.341 p= 0.1810	NULL			
AGR		ß=-0.04918 t=-0.210 p= 0.8340	ß=-2.0000 t=-1.379 p= 0.168914	AGR		
CA		ß=1.05738 t=4.673 p= < 0.001***	ß=-0.8934 t=-0.617 p= 0.537964	ß=1.10656 t=5.685 p= <0.001***	CA	
SCL		ß=-0.71585 t=-1.721 p= 0.0863	ß=-2.6667 t=-1.789 p= 0.074598	ß=-0.66667 t=-1.668 p= 0.0963	ß=-1.7732 t=-4.491 p= <0.001***	SCL

5.7. Discussion

In reflecting on the data from the present study, it is important to recall that our results did not support many of the predictions made before the investigation. We anticipated that the effect of introducing a new audience, unfamiliar with the context of the story, would result in narrators applying noticeably different allocations and referring strategies designed to better coordinate common ground (Isaacs & Clark, 1987). We expected that narrators, in an attempt to be maximally-explicit, would include more referring expressions, and would use a greater proportion of explicit REs in both reintroduced and maintained discourse statuses. However, this was not the case. At almost every level of analysis, the results were strikingly consistent between Studies 2 and 3 (the present study), and statistical analysis demonstrated that each study's data were not significantly different.

In considering why our predictions did not prove accurate, several considerations come to mind. One explanation for the lack of significant differences between familiar and maximally-explicit narratives could be attributed to the impulse of our subjects to employ maximal-explicitness in their first (or familiar context) narratives. Despite setting up conditions where the subjects were aware of their audience's intimate familiarity with the story, all subjects were also fully aware that they were being recorded. Additionally, all subjects knew that their narratives were to be used for research purposes. These factors may have contributed to all subjects being on their "best narrative behavior" in familiar contexts. Because they may have already intended to be clear and explicit in delivering their narratives, this could explain the absence of notable distinctions between familiar and maximally-explicit versions. A related, and unavoidable, factor is that the subjects in each context were the same, and patterns of narrative delivery were, naturally, similar. These conclusions are reasonable, however, an additional element that may have played a role in the consistency of the results could be related to the stimulus itself.

As we have described, The Balloon Story (Hoffmeister, et al., 1999) was relatively more complex than the stimuli used in the previous research on REs in ASL, including 3 competing animate entities (all male), and 2 inanimate entities- (both balloons). However, it may be that the 6-panel stimulus was still too limited, and too simple to elicit the kind of changes we expected from maximally-explicit narratives. Future attempts to elicit differences in narrative versions should consider more effective ways to generate distinctions between narrating to audiences known to be familiar, and audiences known to have limited information about the stimulus. In addition, these considerations also lead us to speculate that other genre-types (especially academic, expository texts) would be an ideal future direction for this research. Simple narratives may not be well-suited for differentiating high levels of explicitness.

Taken as a whole, the results from Chapter 5 provide more evidence to support many of the overall findings of this dissertation:

1) The expanded hierarchy of accessibility in ASL we propose, building on the work of Frederiksen & Mayberry, (2016), seems to be valid across simple and more complex ASL narratives.
2) The extended inventories of REs (proposed in Chapter 4) are useful for fully recognizing the poly-componential referring potential of ASL.

3) There is merit to distinguishing between REs in isolation and REs that co-occur, as the distinct patterns we described in Chapter 4 are realized across various narrative conditions.
4) REs in constellations signal less accessible entities than they typically do on their own (in isolation).

In conclusion, this study provides a valuable framework for future studies on the allocations of REs in ASL and, more specifically, to determine if there are novel referring strategies that ASL users adopt when intending to be maximally-explicit. In order to yield more robust findings, we suggest using academic texts and other more complex genres/discourse practices better-suited to encourage explicitness.

Chapter Six

Conclusion

6.1. Brief Review: Background and Rationale

Described in fundamental terms, this dissertation has explored one part of the various ways that people use American Sign Language to promote coherence in discourse. This type of language study, centering on how the grammar and lexicon of a language is deployed in human interaction, is a study in linguistic pragmatics (Clark, 1996; Ariel, 1988; 1990). The focus of this dissertation has been on referring expressions (REs), which are an important part of the pragmatic system of any language. REs essentially serve as *signals* that we send to our addressees during discourse. These signals, chosen from a range of RE types in the language, reflect our expectations and perceptions about how accessible an entity should be to our addressee. These expectations are determined by environmental and linguistic contexts in addition to shared knowledge and cultural awareness. However, the pragmatic work of referring is not completed once particular signals are deployed, as those signals must then be appropriately interpreted by our addressees. In other words, the act of referring requires joint action between speakers/signers and listeners/perceivers in order to accomplish effective, coherent communication.

The complexity of referring is compounded when we consider the range of contexts (discourse statuses) that entities can occupy in the discourse, because each context is often associated with typical signals (REs). As first described in the literature on REs in English, these discourse statuses can be summarized as three basic values. An entity can be *introduced* (i.e., an entity's first mention in the discourse); an entity can also be *reintroduced* (i.e., the entity is discourse old, but after having gone out of focus, is brought back into focus), and, finally, an entity can be *maintained* (the entity is kept in focus, occupying a *front-and-center* position in the discourse) (Ariel, 1990). In order to signal the status that entities occupy in the discourse, we deploy particular REs associated with signaling new status, reintroduced status, or maintained status.

As we consider all the factors that must be taken into account when we refer (including considerations related to the context of the situation, the range of RE signals at our disposal, and the discourse status occupied by the entity) it reveals the substantial level of intricacy that characterizes the referring process.

It is important to note that much of what we know about pragmatics in general, and the pragmatics of referring in particular, is based on research from spoken language (e.g., Ariel, 1988;1990; Clark, 1997; Gundel et al., 1993; Arnold, 2010). However, referring in ASL presents new and interesting opportunities to understand the complexity of the pragmatic process because the range of RE types in ASL is more extensive than those typically found in spoken languages (see Liddell, 2003; Sandler & Lillo Martin, 2003 for summative references). Table 6.1 Illustrates the inventory of ASL REs from the present study and their abbreviations.

Table 6.1 Inventory of REs from the Present Study and Abbreviations

Inventory of Referring Expressions in the Present Study and Abbreviations
Definite Descriptions (DD)
Semantic Classifiers (SCL)
Instrument or Handling Classifiers (ICL)
Descriptive Classifiers or Size and Shape Specifiers (DCL/SASSes)
Indexing (IX)
Constructed Action (CA)
Agreement: verbs of agreement, eye gaze. (AGR)
Null

In addition, the visual-spatial modality of ASL allows for co-occurring articulators, which makes it possible to deploy simultaneous references to multiple entities (Liddell, 2003; Winston,1991). The range of options and considerations that go into effective referring in ASL make it a complex and potentially informative subject of study. Despite recent studies focused on various pragmatic elements of ASL, including referring expressions, there is still much to learn.

6.2. Dissertation Design

This thesis is a three-article dissertation. Each article represents a separate, yet related study that, taken together, represent a comprehensive study of REs in ASL.

6.3. Study One

6.3.1. Study One: Brief Review of Design

Study One of this dissertation focused on replicating the recent research of Frederiksen & Mayberry (2016) (hereafter, F&M) which represents the most extensive study of REs in ASL to date.

Our replication study investigated whether the results F&M described, related to general allocations of RE signals and their organization in a proposed hierarchy of accessibility, would hold up in an expanded analysis. Using *The Balloon Story* (Hoffmeister et al., 1999), we were able to elicit more complex narratives from 19 Deaf, native users of ASL including 3 competing animate entities, 2 competing inanimate entities, and a more complicated story-line (see Figure 3.4). Additionally, we included a wider range of RE tokens. In order to apply consistency across studies, all co-occurring REs (i.e. RE signaling multiple entities simultaneously) were omitted from the study. We will return to the implications of co-occurring REs in Study 2.

In line with F&M, Study One's analysis applied Ariel's Accessibility Theory framework in order to discover consistent patterns of RE allocation across discourse statuses (Ariel, 1990). Using this framework, we were able to use general trends of occurrence in order to discern REs typically favored as signals for entities in particular discourse statuses, allowing us to gain insights into the kinds of signals typically sent by REs in ASL.

Our investigation also introduced a tool for assigning numerical accessibility values to each entity in the discourse (Toole, 1996). This added an additional dimension to the analysis, allowing for valuable and informative discriminations that were not always possible from the allocation data. This tool also allowed us to apply formal statistical analyses to complement the data on RE allocation patterns. To our knowledge, this represents the first occasion where entity accessibility values were included in an analysis of REs in ASL or any signed language. We also expanded the analysis to determine if our findings from the replication study compared to an investigation of complex, professional narratives from ASL literature.

6.3.2. Study One: Brief Review of Results

Our analysis offers an example of how expanded replication studies can be an important component to the cumulative science on the pragmatics of ASL. Despite interesting and informative variations, the overall results showed that the relationships between individual REs and their signaled entities (occupying particular discourse statuses), described by F&M was robust enough to be replicated after including an expanded range of REs, regardless of their role in the syntax.

Through systematic analysis including several levels of inquiry, we were able to compare the present study's overall allocations of REs across various discourse statuses with those of F&M. The general allocation trends across each study were similar, however, some of the differences we noted were attributed to the relative simplicity of the F&M stimulus. In other words, because the plot of the Balloon Story (the present study's stimulus) was more complex, including more competing characters and entities, there was a natural tendency to encourage more REs in discourse statuses typically reserved for less accessible entities. Conversely, in the F&M data, in both reintroduced and maintained statuses we saw a stronger tendency for deploying REs that rank as less informative on the proposed hierarchy (CA, AGM, and Null forms, which signal highly accessible entities). These results point to the essential role of the stimulus in shaping the kinds of narrative data we elicit.

An additional finding from these results was that IX (a RE-type that F&M did not include in their proposed hierarchy) figured prominently in our data. Our results also suggested that CA occurred in patterns different than AGR, offering preliminary evidence that these RE-types were distinctly behaving referring forms.

The next level of our analysis involved applying Toole's (1996) Accessibility Scale to our data in order to gain more detailed insights into how REs relate to entities in the discourse. By assigning numerical values to each entity in the discourse, these data were able to characterize more precise distinctions that were not always possible from analyzing the allocation data. The detailed results of our statistical analysis are highlighted in Chapter 3.

Our statistical results showed that there were significant differences among the select RE types in terms of the average accessibility value of the referents they signal. We applied accessibility value data, statistical analysis, as well as the allocation data to compose a hierarchy of accessibility. We then compared our results to F & M's proposed hierarchy.

Table 6.2 The Present Study's Proposed Hierarchy of Accessibility for REs in Isolation.

RE forms and the accessibility signal they send about entities to which they refer, as arranged on a continuum. This table adds one new form, indexing (IX) in bold, and two redefined forms constructed action (CA) and agreement (AGR) (separated from a larger category) (both italicized).

RE Form	Signals that an entity has…
Definite Descriptions (DD)	Low Accessibility
Descriptive Classifiers (SASSes)	
Indexing (IX)	
Constructed Action (CA)	
Null	
Semantic Classifiers (SCL)	
Agreement (AGR)	High Accessibility

Our results showed that the overall structure of the F&M hierarchy was replicated with some important modifications. The overall ranking for each RE-type was consistent, however, our inquiry added to the inventory of REs, building upon the F&M results. These included IX as an independently occurring RE, and posed CA and AGR as unique RE-types in an expanded hierarchy.

Our final level of inquiry sought to address the relatively simple quality of both narrative stimuli. This motivated an analysis of three sophisticated ASL narratives composed by master storytellers. After applying the same analysis to the ASL literature narratives, we discovered that the range of RE types that occurred, the RE allocations across discourse statuses, and entity accessibility values signaled by REs in these samples was consistent with the findings from the Balloon Story narratives. This suggests that our findings may be robust enough to generalize across various narrative forms.

Three interesting and informative distinctions were noted between the Balloon Story data and the ASL literature narrative data. First, it is likely the case that these master storytellers are able to employ alternate strategies to reintroduce entities into the discourse without having to rely as heavily on DDs as did participants from our Balloon Story analysis.

Second, a higher proportion of IXs and a correspondingly lower proportion of DDs was directly related to the inclusion of a narrative of personal experience (*Wrong Daughter*). In this example, told from 1st person perspective, the narrator was, herself, a character in the narrative. As a result, there was a disproportionately occurring number of IX-me tokens. This provides more evidence for how the structure of narratives and narrative stimuli can shape the patterns of RE deployment, making this an important consideration for future studies about REs in ASL.

Finally, our analysis of entity accessibility values signaled by select RE types across narrative forms showed 3 RE types (DD, CA, and SCL) that signaled entities with significantly lower accessibility values in the ASL Literature narratives than they did in the Balloon Stories. This suggests again, that *master storytellers* may be able to use their language facility to successfully signal more inaccessible entities than *ordinary communicators* typically do. Additionally, it may be that the lower accessibility values were a function of the differences in the complexity and length of the ASL literature narratives as they included more competing entities and were substantially longer.

6.3.3. Study One: Conclusion

Study One is an example of how expanded analyses can be an important component of cumulative science on referring and accessibility in ASL. We were able to replicate the findings of F&M that ranked REs in a proposed hierarchy of accessibility for ASL while using a more complex story, including a wider range of RE types, and eliciting narratives from a large sample of native ASL users. We were also able to build on their findings, expanding the inventory of REs and refining distinctions between RE-types previously subsumed into a larger superordinate category.

Our data showed that as the number of competing entities increases in a narrative, the number of more explicit REs rises. Our findings were also replicated in sophisticated ASL literature narratives suggesting that the expanded hierarchy and the relationships we described between RE-types and entity accessibility values was robust, and generalizable to a wider range of narrative types.

6.4. Study Two

6.4.1. Study Two: Brief Review of Study Design

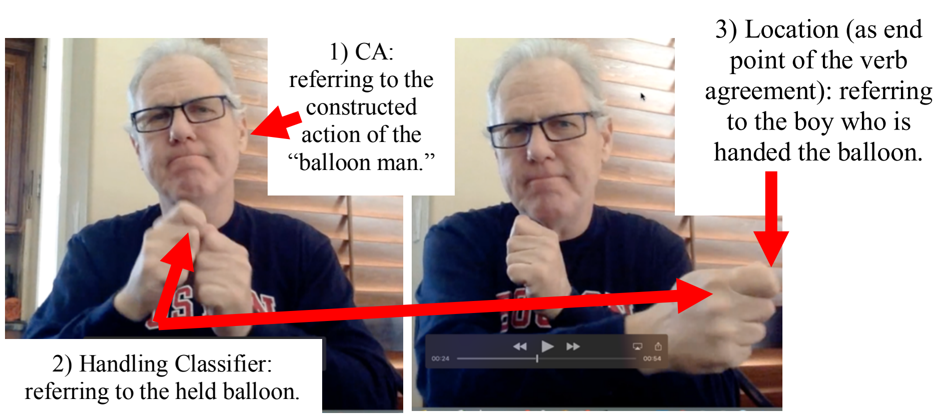
Study Two addressed the range of co-occurring REs that were not included in Study One. Recall that the design and execution of the replication study called for separating the total number of REs from the Balloon Stories into two categories to use data that was more consistent with the original F&M study. One category included REs that referred to single entities in the discourse, occurring as stand-alone REs (termed here REs in *isolation*) which were included in the Study One analysis. The other category included REs that co-occurred, where multiple (2 or 3) entities were signaled simultaneously in the discourse (termed here *constellations*), and were not included in Study One's analysis.

Our research question was related to whether REs that co-occurred (within constellations) behaved in a similar fashion to the REs that occurred as isolated forms. Our goal was essentially to find out if there was something unique about co-occurring REs. Importantly, the architecture of ASL allows for representing entities using either linear or concurrent devices. Linear forms occur sequentially, as in spoken language, where one entity is indicated using one of the REs available to ASL (REs in isolation). Concurrent forms leverage the poly-componential affordances of ASL to represent multiple entities simultaneously using complex, co-occurring RE devices.

Our approach was based on applying ideas from a theoretical framework of visual processing that proposed an informational and economical privilege available to seeing (as opposed to hearing) inherent to the visual modality (Arnheim, 1969). Arnheim describes how when we see, we cannot help but see entities *in relation to one another* (i.e., we process the visual world in what he terms *constellations*). In the same manner, the modality and architecture of ASL may be able to take advantage of this informational and economical privilege in ways that spoken languages cannot. In other words, we intended to explore whether there was an effect of using visual-spatial affordances to depict entities, and their relationships, simultaneously (as constellations), that was different from depicting entities in linear forms.

Figure 6.1 Example of a Constellation.

In the constellation below, multiple references to entities (Balloon Man, the Balloon, and the Balloon Boy) are also presented simultaneously. This is made possible by affordances of the visual-spatial architecture of ASL.



6.4.2. Study Two: Brief Review of Results

Study Two's multi-level analysis explored whether the allocation patterns we observed in Study One were consistent with the patterns for REs occurring in constellations. Results showed striking differences in allocations across each condition (REs occurring in isolation and REs occurring in constellations). Our findings demonstrated divergent patterns across similar discourse statuses when we compared the isolated data to the constellation data. In many cases, the patterns of individual REs were "reversed" across discourse statuses by condition, and these results motivated further study using the accessibility value data.

Results of the numerical and statistical analysis demonstrated many of the same results. Interestingly, in each case where REs occurred in both conditions, the mean accessibility values of the entities they signaled decreased from the isolation condition to the constellation condition. In addition, findings suggested that individual REs were sometimes specific to each condition.

Statistical analysis comparing the accessibility values signaled by each RE type to the accessibility values signaled by other RE types, revealed new relationships between REs when they occurred in constellations as opposed to occurring in isolation. These data strongly reinforced the conclusion that there was an effect of occurring in a constellation that changed the signaling behavior of REs. Further statistical inquiry again showed that occurring in a constellation generally resulted in lower mean accessibility values, suggesting that REs in constellations may signal entities with lower accessibility values than they do when occurring in isolation.

6.4.3. Study 2: Conclusions

In line with Arnheim's theoretical framework (1969), we suggested that occurring in constellations adds to a RE's informativeness because we can see entities *and* their relationships to one another simultaneously. Friedman (1975) alluded to this idea as she described how ASL can represent "metaphoric icons" or "metaphoric visual representations" by taking advantage of the visual relationships that, together, comprise a "semantic component of their referent" (p. 960). These relationships may allow REs to leverage their dense, economical architecture in order to promote explicitness by benefitting from a pattern of *redundancy* made possible by concurrent architecture of constellations. In effect, each component of a constellation has some relational information about its partner(s) that enhances each component's explicitness and signaling potential.

Additionally, these distinct *behaviors* of REs in constellations described by the novel distributions and statistical analysis led to a new, proposed hierarchy of accessibility in ASL for REs occurring in constellations.

Table 6.3 Proposed Hierarchy of Accessibility in ASL for REs Occurring in Constellations

A hierarchy of accessibility organized (top-down) from most to least explicit. This model only includes REs tokens occurring in constellations. ICL represents an addition to the inventory of REs in ASL.

RE Form	Signals that an entity has...
Definite Description	Low Accessibility
ICL/Handling CL	
Agreement	
Semantic Classifiers	
Null	
Constructed Action	High Accessibility

In this proposed hierarchy, we further extend the inventory of REs (adding ICLs) and create a new framework for approaching each condition of referring in ASL (REs occurring in isolation and REs occurring in constellations). Given all the evidence, we proposed that occurring in a constellation is a unique *condition*. As such, any comprehensive investigation of REs in ASL must take into account whether REs occur in isolation or in constellations.

6.5. Study Three

6.5.1. Study Three: Brief Review of Background and Rationale

Study Three was intended to elicit maximally-explicit ASL narratives from native users in order to discover unique referring strategies and to better inform what we know about accessibility and explicitness in ASL. We created a new context where we asked 15 of the 19 subjects from Study 1 to tell the Balloon Story again to perceivers who were unfamiliar with the narrative (termed here maximally-explicit context). The maximally-explicit narrative was told to an addressee who was overtly unaware of the story and who had no access to the Balloon Story stimulus. In this way, we hoped to encourage overly explicit referring strategies and, thus, better inform our decisions about composing proposed hierarchies. In addition, we hoped to gain important insights into strategies to promote explicitness in ASL discourse.

6.5.2. Study Three: Brief Review of Results

Despite predicting that we would see changes in RE allocations and novel referring strategies, the results of the maximally-explicit narratives did not consistently show significant differences between each context (familiar and maximally explicit narratives). We did see a significant increase in the number of propositions from familiar to maximally-explicit context, but in almost every other level of analysis, results were remarkably consistent. Statistical analysis also provided evidence that there were no significant differences between the results from the familiar context narratives and the maximally-explicit context narratives.

6.5.3. Study Three: Conclusions

We anticipated that narrating to an audience unfamiliar with the context of the story would result in participants applying noticeably different referring strategies designed to better coordinate common ground (Isaacs & Clark, 1987). However, the resulting RE allocations and signaled accessibility values between familiar and maximally-explicit contexts were strikingly consistent. We expected that narrators, in an attempt to be maximally-explicit, would include more referring expressions, and would use a greater proportion of explicit REs in both reintroduced and maintained discourse statuses. However, this was not the case.

We attributed the lack of significant differences between familiar and maximally-explicit narratives to the impulse of our subjects to employ maximal-explicitness in their first (or familiar context) narratives. As we look back, participants knew that their narratives were to be used for research purposes and were, perhaps, already on their "best narrating behavior" in familiar contexts. This could explain the absence of notable distinctions between familiar and maximally-explicit versions. In any event, despite not validating our predictions, these results did validate the findings from Studies One and

Two and served to reinforce many of the conclusions of this dissertation.

6.6. Brief Overview of Conclusions

As we consider our overall investigation, several important conclusions have been identified. One major finding of this dissertation is that the structure of the proposed hierarchy of accessibility outlined by Frederiksen and Mayberry (2016) is reliable, and with expansions and modifications, has been shown to be generalizable across various narrative forms. This is a valuable framework because we now have a much better picture as to how referring occurs in ASL. Importantly, our system of referring fits well with frameworks outlined by established research in the domain of referring (Ariel, 1988;1990; Gundel, et al. 1993). These results can help support more complex, future studies of REs in ASL and other signed languages.

A related conclusion is tied to our keen awareness of the tension that exists between multiple competing factors in establishing the ecology of any narrative environment, all of which contribute significantly to the process of referring. For example, we were able to demonstrate that the number and type of entities in a narrative sample are critical elements impacting RE allocations and accessibility values. We show that considerations about who characters are, whether they are in competition with one another, whether they are presented in 1st, 2nd or 3rd person, and whether they have names or not, all contribute to important dimensions of referring. Additionally, the narrators themselves (master storytellers vs. typical individuals) also have an impact on the pragmatic strategies we do or don't see. Certainly, the narratives themselves play a role in the kinds of referring that occurs (e.g., are the stories based on 6-panel stimuli or 4-

minute examples of classic ASL literature?). All of these components contribute to a shifting ecology that researchers in this domain must take into account for any comprehensive study of referring in ASL.

Additionally, we have proposed that a distinct condition exists in ASL referring that is related to its modality-specific affordances. This condition suggests that REs that occur in isolation are different in meaningful ways from REs that occur in constellations. Borrowing from Arnheim's theory of visual processing, we suggest that ASL's poly-componential architecture, that allows for signaling multiple entities *and their relationships to one another* simultaneously, creates a *referring privilege*. This privilege, by virtue of the informational redundancy that exists in visual-spatial and iconic relations, results in individual REs being able to signal less accessible entities as members of constellations than they typically signal on their own.

6.7. Brief Overview of Contributions

The comprehensive inquiry into REs in ASL has resulted in several contributions to the research.

1)We successfully replicated the results of F&M (2016) with a more complex story, expanded data and a substantially greater number of participants.

2) We introduced new analytical tools to the investigation of REs in ASL that allow for deeper, statistical analysis (Toole, 1996).

3) Building on the work of F&M, we extended the inventory of REs in ASL by adding two new RE token types (Instrument Classifiers and Descriptive Classifiers), and provided evidence for distilling a category created by previous research into two

additional, independent RE forms (Constructed Action and Agreement), thus expanding their proposed hierarchy of accessibility in ASL.

4) We proposed a new condition for ASL referring that distinguishes between REs that occur in isolation and REs that occur in constellations. This proposal includes important implications for how the architecture of ASL impacts what we know about accessibility and explicitness.

5) We proposed a new hierarchy for Accessibility in ASL for REs occurring in constellations.

6) We have advanced the current knowledge as it relates to referring in ASL, and have created several opportunities for more complex approaches in future research on referring in signed languages.

6.8. Limitations, and Next Steps

6.8.1. Overview of Limitations

Although this study applied a comprehensive analysis, it would be valuable for future studies to include a greater number of subjects. The present study included 19 participants which may have limited the scope of our conclusions.

Additionally, in future studies, a stimulus designed to elicit longer narratives with more competing entities might enhance the data. One of the unavoidable shortcomings of the present study's narrative samples was related to the limited quantity of reintroduced referents. Going forward adding additional competing entities and a more intricate plot would create a context where more explicitness was required to distinguish entities from each other. In addition, the stimulus generated a narrative sample that included regular and consistent referring expressions., It would be beneficial to design a new stimulus intended to elicit a broader range of specific RE-types in future studies.

Because the present study was unable to generate maximally-explicit narratives that differed to any significant degree from our initial narratives (in terms of referring strategies), it would be valuable to create controlled, novel scenarios where maximal explicitness could be more effectively encouraged.

6.8.2. Overview of Next Steps

Our next steps will include future studies of how REs are deployed in ASL academic, expository texts. The investigation will build on this dissertation's findings and will consider various factors that impact referring including animacy as well as the considerations outlined above. This research will also apply cross-linguistic comparisons where the trends and strategies we identify in ASL video-texts are compared to those realized in written English expository texts.

We will also extend the results of this dissertation as we consider its various implications. For example, future studies will explore how what we have learned from this dissertation can enhance teaching strategies, support effective ASL video-composition techniques, contribute to more refined assessment of Deaf children's narratives, and promote accessible and comprehensible input for Deaf children including those who are late-language learners (i.e., children in need of maximally-accessible language input opportunities).

In conclusion, it is my hope that the results of this dissertation represent important contributions to the research, to the field of Applied Linguistics, and can be translated into meaningful applications for Deaf children and Deaf Education.

BIBLIOGRAPHY

Aarons, D., Bahan, B., Kegl, J., & Neidle, C. (1992). Clausal structure and a tier for grammatical marking in American Sign Language. *Nordic Journal of Linguistics*, *15*(02), 103-142.

Aksu-Koç, A., & Nicolopoulou, A. (2015). Character reference in young children's narratives: A cross linguistic comparison of English, Greek, and Turkish. *Lingua*, *155*, 62-84.

Almor, A., & Eimas, P. D. (2008). Focus and noun phrase anaphors in spoken language comprehension. *Language and Cognitive Processes*, *23*(2), 201-225.

Almor, A., & Nair, V. A. (2007). The form of referential expressions in discourse. *Language and Linguistics Compass*, *1*(1-2), 84-99.

Almor, A., & Phillips, M. (2006). Category DD anaphors in spoken language comprehension. In *Annual Psychonomics Society Meeting, Houston, TX.*

Anible, B. & Morford, J. P. (2015). Look both ways before crossing the street: Perspectives on the intersection of bimodality and bilingualism. *Bilingualism: Language and Cognition*, 1-3.

Ariel, M. (1988). Referring and accessibility. *Journal of Linguistics*, *24*(1), 65-87.

Ariel, M. (1990). *Accessing DD antecedents* (Croom Helm Linguistics Series). London: Routledge.

Ariel, M. (1996). Referring Expressions and the. *Reference and Referent Accessibility*, *38*, 13.

Ariel, M. (2001). Accessibility theory: An overview. *Text Representation: Linguistic and Psycholinguistic Aspects*, *8*, 29-87.

Arnheim, R. (1969). *Visual thinking*. University of California Press.

Arnold, J. E. (2008). Reference production: Production-internal and addressee-oriented processes. *Language and Cognitive Processes*, *23*(4), 495-527.

Arnold, J. E. (2010). How speakers refer: The role of accessibility. *Language and Linguistics Compass*, *4*(4), 187-203.

Arnold, J. E., & Griffin, Z. M. (2007). The effect of additional characters on choice of referring expression: Everyone counts. *Journal of Memory and Language*, *56*(4), 521-536.

Bahan, B. J. (1996). *Non-manual realization of agreement in American Sign Language* (Doctoral dissertation, Boston University).

Bahan, B., & Supalla, S. (1992). *Bird of a Different Feather: For a Decent Living--# 33*. DawnPictures.

Bahan, B., & Supalla, S. (1995). Line segmentation and narrative structure: A study of eyegaze behavior in American Sign Language. *Language, Gesture, and Space*, 171-191.

Bahan, B., Kegl, J., Lee, R. G., MacLaughlin, D., & Neidle, C. (2000). The licensing of null arguments in American Sign Language. *Linguistic Inquiry*, *31*(1), 1-27.

Bel, A., Ortells, M., & Morgan, G. (2014). Reference control in the narratives of adult sign language learners. *International Journal of Bilingualism*, 1367006914527186.

Bel, A., Ortells, M., & Morgan, G. (2015). Reference control in the narratives of adult sign language learners. *International Journal of Bilingualism*, 19.5. 608-24.

Bellugi, U., & Fischer, S. (1972). A comparison of sign language and spoken language. *Cognition*, *1*(2), 173-200.

Berman, R. A., & Slobin, D. I. (1994). *Relating events in narratives. A crosslinguistic developmental study.* Hillsdale, N.J.: Lawrence Erlbaum Associates.

Botting, N. (2002). Narrative as a tool for the assessment of linguistic and pragmatic impairments. *Child Language Teaching and Therapy*, *18*(1), 1-21.

Chafe, W. L. (Ed.) (1980). *The pear stories: Cognitive, cultural, and linguistic aspects of narrative production*. Norwood, N.J.: Ablex.

Clark, H. H. (1996). *Using language*. Cambridge University Press.

Clark, H. H. (2005). Coordinating with each other in a material world. *Discourse Studies*, *7*(4-5), 507-525.

Clark, H. H. & Krych, M. A. (2004). Speaking while monitoring addressees for understanding. *Journal of Memory and Language*, 50(1), 62-81.

Clark, H. H., & Brennan, S. E. (1991). Grounding in communication. *Perspectives on Socially Shared Cognition*, *13*(1991), 127-149.

Clark, H. H., & Carlson, T. B. (1981). Context for comprehension. *Attention and Performance IX*, 313-330.

Clark, H. H., & Schaefer, E. F. (1989). Contributing to discourse. *Cognitive Science*, *13*(2), 259-294.

Clark, H. H., & Wilkes-Gibbs, D. (1986). Referring as a collaborative process. *Cognition,* 22, 1–39.

Clark, H.H. (1996a). Communities, Commonalities and Communication in *Rethinking Linguistic Relativity*. John J. Gumperz and Stephen C. Levinson. Eds. Cambridge: Cambridge University Press.

Cormier, K., Schembri, A., & Woll, B. (2013). Pronouns and pointing in sign languages. *Lingua*, *137*, 230-247.

Cormier, K., Smith, S., & Sevcikova, Z. (2013). Predicate structures, gesture, and simultaneity in the representation of action in British Sign Language: evidence from deaf children and adults. *Journal of Deaf Studies and Deaf Education*, *18*(3), 370-390.

Cormier, K., Smith, S., & Zwets, M. (2013a). Framing constructed action in British Sign Language narratives. *Journal of Pragmatics*, *55*, 119-139.

de Villiers, P. (2004, February). Assessing pragmatic skills in elicited production. *Seminars in Speech and Language, 25*(1), 57-71.

Dudis, P. G. (2004). Body partitioning and real-space blends. *Cognitive Linguistics*, *15*(2), 223-238.

Emmorey, K., & Lane, H. L. (Eds.). (2013). *The signs of language revisited: An anthology to honor Ursula Bellugi and Edward Klima*. Psychology Press.

Emmorey, K., & Reilly, J. S. (2013). *Language, gesture, and space*. Psychology Press.

Engberg-Pedersen, E. (2003). From pointing to reference and predication: Pointing signs, eye gaze, and head and body orientation in Danish Sign Language. *Pointing:*

Where Language, Culture, and Cognition Meet. Mahwah, N.J.: Erlbaum. Pp. 269-292.

Fox, B. (1987). Anaphora in popular written English narratives. *Coherence and Grounding in Discourse*, *11*, 157-174.

Frederiksen, A. T., & Mayberry, R. (2015). Tracking reference in space: How L2 learners use ASL referring expressions. In *Proceedings of the 39th Annual Boston University Conference on Language Development* (pp. 165-177).

Frederiksen, A. T., & Mayberry, R. I. (2016). Who's on First? Investigating the referential hierarchy in simple native ASL narratives. *Lingua, 180,* 49–68.

Friedman, L. A. (1975). Space, time, and person reference in American Sign Language. *Language*, 940-961.

Fukumura, K., & van Gompel, R. P. (2011). The effect of animacy on the choice of referring expression. *Language and Cognitive Processes*, *26*(10), 1472-1504.

Gee, J. P. (1985). The narrativization of experience in the oral style. *Journal of Education*, *167*(1), 9-35.

Gee, J. P. (1992). *The social mind: Language, ideology, and social practice*. JF Bergin & Garvey.

Gee, J. P., & Grosjean, F. (1984). Empirical evidence for narrative structure. *Cognitive Science*, *8*(1), 59-85.

Gee, J. P., & Kegl, J. A. (1982). Semantic perspicuity and the locative hypothesis: Implications for acquisition. *Journal of Education*, *164*(2), 185-209.

Givón, T. (1983). *Topic continuity in discourse: A quantitative cross-language study* (Vol. 3). John Benjamins Publishing.

Goodwin, M.H. (1990). *He-Said-She-Said; Talk as Social Organization among Black Children*. Bloomington, IN: Indiana University Press.

Grice, H.P. (1975). Logic and conversation. In P. Cole & J.L. Morgan (Eds.), *Syntax and semantics 3: Speech acts.* New York: Academic Press. Pp. 41–58.

Gundel, J. K., Hedberg, N., & Zacharski, R. (1993). Cognitive status and the form of referring expressions in discourse. *Language, 69*(2), 274-307.

Halliday, M. A. K., & Hasan, R. (1980). *Text and context: Aspects of language in a social-semiotic perspective. (Sophia Linguistica 6)* Tokyo: Graduate School of Languages and Linguistics, Sophia University.

Heath, S. B. (1982). What no bedtime story means: Narrative skills at home and school. *Language in Society*, *11*(1), 49-76.

Hickmann, M., & Hendriks, H. (1999). Cohesion and anaphora in children's narratives: a comparison of English, French, German, and Mandarin Chinese. *Journal of Child Language*, *26*(2), 419-452.

Hickmann, M., 2003. *Children's discourse: Person, space and time across languages.* Cambridge: Cambridge University Press.

Hoffmeister, R. J. (1978). *The Development of Demonstrative Pronouns, Locatives and Personal Pronouns in the Acquisition of ASL by Deaf Children of Deaf Parents*. Doctoral Dissertation, University of Minnesota.

Hoffmeister, R. J. (1987). The acquisition of pronominal anaphora in ASL by deaf children. In *Studies in the acquisition of anaphora* (pp. 171-187). Springer Netherlands.

Hoffmeister, R. J., Bahan, B., Greenwald, J., & Cole, J. (1999). American Sign Language Assessment Instrument (ASLAI). *Unpublished manuscript, Center for the Study of Communication & the Deaf, Boston University*.

Hymes, D. (1981). Ethnographic monitoring. *Culture and the bilingual classroom: Studies in classroom ethnography*, 56-68.

Janzen, T. (2006). Visual communication: Signed language and cognition. *Applications of Cognitive Linguistics*, *1*, 359.

Kail, M., & Hickmann, M. (1992). French children's ability to introduce referents in narratives as a function of mutual knowledge. *First Language*, *12*(34), 73-94.

Karmiloff-Smith, A., 1981. The grammatical marking of thematic structure in the development of language production. In: Deutsch, W. (Ed.), *The Child's Construction of Language.* New York: Academic Press. Pp. 121-148.

Kegl, J. (1978). Indexing and pronominalization in ASL. *Manuscript, Massachusetts Institute of Technology*.

Kegl, J. (1987). Coreference relations in American sign language. In *Studies in the Acquisition of Anaphora* (pp. 135-170). Springer Netherlands.

Kegl, J., & Schley, S. (1986, May). When is a classifier no longer a classifier? In *Annual Meeting of the Berkeley Linguistics Society*, *12,* 425-441.

Kegl, Judy A., 1986. Clitics in American Sign Language. In: Borer, H. (Ed.), *Syntax and semantics 19: The syntax of pronominal clitics*. New York: Academic Press. Pp. 285–309.

Kyle, J. G., & Woll, B. (1985). *Sign language: The study of deaf people and their language.* Cambridge University Press.

Labov, W. (1972). The transformation of experience in narrative syntax. *Language in the Inner City*, *354*, 96.

Ladusaw, W. (2012). Meaning (Semantics and Pragmatics). Retrieved April 09, 2017, from http://www.linguisticsociety.org/resource/meaning-semantics-and-pragmatics

Levy, E. T., & McNeill, D. (1992). Speech, gesture, and discourse. *Discourse Processes*, *15*(3), 277-301.

Liddell, S. K. (1995). Real, surrogate, and token space: Grammatical consequences in ASL. In K. Emmorey and J.S. Reilly (Eds.) *Language, gesture, and space*. Hillsdale, N.J.: Lawrence Erlbaum Associates. Pp. 19-41.

Liddell, S. K. (1998). Grounded blends, gestures, and conceptual shifts. *Cognitive Linguistics*, *9*, 283-314.

Liddell, S. K. (2000). Indicating verbs and pronouns: Pointing away from agreement. In K. Emmorey and L. Harlan (Eds.) *The signs of language revisited: An anthology to honor Ursula Bellugi and Edward Klima*. Mahwah, N.J.: Erlbaum. Pp. 303–320.

Liddell, S. K. (2003). *Grammar, gesture, and meaning in American Sign Language.* Cambridge University Press.

Liddell, S. K. (2003). Sources of meaning in ASL classifier predicates. In K. Emmorey (Ed.) *Perspectives on classifier constructions in sign languages*. Mahwah, N.J.: Lawrence Erlbaum Associates. Pp. 199–220.

Liddell, S. K., Vogt-Svendsen, M., & Bergman, B. (2007). A cross linguistic comparison of buoys: Evidence from American, Norwegian, and Swedish Sign Language. In M. Vermeerbergen, L. Leeson and O. Crasborn (Eds.). *Simultaneity in signed languages: Form and function.* Amsterdam: John Benjamins. Pp. 187-216.

Lillo-Martin, D. (1986). Two kinds of null arguments in American Sign Language. *Natural Language & Linguistic Theory*, *4*(4), 415-444.

Lillo-Martin, D. & Klima, E. S. (1996). Pointing out differences: ASL pronouns in syntactic theory. *Ariel*, *137*, 96-11.

Lillo-Martin, D. C. (1991). Universal grammar and American sign language. In *Universal Grammar and American Sign Language* (pp. 1-48). Springer Netherlands.

Lillo-Martin, D., & Meier, R. P. (2011). On the linguistic status of ‘agreement ‘in sign languages. *Theoretical Linguistics*, *37*(3-4), 95-141.

Lucas, C. (Ed.). (2014). *The sociolinguistics of the deaf community*. Elsevier.

McKee, R., Schembri, A., McKee, D., & Johnston, T. (2011). Variable “subject” presence in Australian Sign Language and New Zealand Sign Language. *Language Variation and Change*, *23*(3), 375-398.

Meier, R. P., & Lillo-Martin, D. (2010). Does spatial make it special? On the grammar of pointing signs in American Sign Language. In D.B. Gerdts, J.C. Moore, and M.

Polinksy (eds.) *Hypothesis A/Hypothesis B: Linguistic Explorations in Honor of David M. Perlmutter.* Cambridge, MA: MIT Press. Pp. 345-360.

Metzger, M. (1995). Constructed dialogue and constructed action in American Sign Language. *Sociolinguistics in deaf communities*, 255-271.

Morgan, G. (1999). Event Packaging in British. *Storytelling and Conversation: Discourse in Deaf Communities*, *5*, 27.

Morgan, G. (2003). Transcription of child sign language. *Deafness & Education International*, *5*(3), 157-166.

Morgan, G. (2005). Transcription of child sign language: A focus on narrative. *Sign Language & Linguistics*, *8*(1), 119-130.

Morgan, G. (2006). The development of narrative skills in British Sign Language. B. Schick, M. Marschark, & P. Spencer Eds. *Advances in the sign language development of deaf children*. Oxford: Oxford University Press. Pp. 314-343.

Morgan, G., & Woll, B. (2003). The development of reference switching encoded through body classifiers in British Sign Language. In K. Emmorey (Ed.) *Perspectives on classifier constructions in sign languages*. Mahwah, N.J.: Lawrence Erlbaum Associates. Pp. 297-310.

Mulkern, A. E. (1996). The game of the name. In T. Fretheim and J.K. Gundel (Eds.) *Reference and referent accessibility*. Amsterdam, Philadelphia: John Benjamins. Pp. 235-250.

Ochs, E., & Schieffelin, B. (1989). Language has a heart. *Text-Interdisciplinary Journal for the Study of Discourse*, *9*(1), 7-26.

Ono, T., & Thompson, S. A. (2003). Japanese (w) atashi/ore/bokuI': They're not just pronouns. *Cognitive Linguistics*, *14*(4), 321-348.

Padden, C. A., Meir, I., Hwang, S. O., Lepic, R., Seegers, S., & Sampson, T. (2013). Patterned iconicity in sign language lexicons. *Gesture*, *13*(3), 287-308

Perniss, P. M. (2007). Achieving spatial coherence in German Sign Language narratives: The use of classifiers and perspective. *Lingua*, *117*(7), 1315-1338.

Perniss, P., & Özyürek, A. (2008). Representations of action, motion, and location in sign space: A comparison of German (DGS) and Turkish (TİD) Sign Language narratives. In J. Quer (Ed.) *Signs of the time: Selected papers from TISLR 8*. Seedorf: Signum Press. Pp. 353-378.

Perniss, P., & Özyürek, A. (2015). Visible cohesion: A comparison of reference tracking in sign, speech, and co-speech gesture. *Topics in Cognitive Science*, *7*(1), 36-60.

Poizner, H. (1983). Perception of movement in American Sign Language: Effects of linguistic structure and linguistic experience. *Attention, Perception, & Psychophysics*, *33*(3), 215-231.

Rathmann, C., Mann, W., & Morgan, G. (2007). Narrative structure and narrative development in deaf children. *Deafness & Education International*, *9*(4), 187-196.

Sandler, W., & Lillo-Martin, D. (2006). *Sign language and linguistic universals*. Cambridge University Press.

Schieffelin, B. B., & Ochs, E. (1986). *Language socialization across cultures* (No. 3). Cambridge University Press.

Scollon, R., & Scollon, S. B. (1981). *Narrative, literacy, and face in interethnic communication* (Vol. 7). Ablex Publishing Corporation.

Shepard-Kegl, J. (1985). Locative relations in American Sign Language word formation, syntax and discourse. Doctoral Dissertation, Massachusetts Institute of Technology.

Smith, N. V. (Ed.). (1982). Mutual knowledge. London: Academic Press.

Stokoe, W.C., Jr. (1960). Sign language structure. In G.L .Trager (Series Ed.), *Studies in linguistics, Occasional Paper 8*. Buffalo, NY: University of Buffalo Press.

Stokoe, William C. 1978. *Sign language structure: The first linguistic analysis of American Sign Language.* Silver Spring, MD: Linstok Press.

Supalla, T. (1986). The classifier system in American sign language. In C.G. Craig (Ed.) *Noun classes and categorization*. Amsterdam, Philadelphia: John Benjamins Publishing Company. Pp. 181-214.

Supalla, T. R. (1982). *Structure and acquisition of verbs of motion and location in American Sign Language*. Doctoral Dissertation, University of California, San Diego.

Swabey, L. A. (2002). *The cognitive status, form and distribution of referring expressions in ASL and English narratives*. Doctoral Dissertation, University of Minnesota.

Swabey, L. A. (2011). Referring Expressions in ASL Discourse. In Roy, C. B. (Ed.). *Discourse in Signed Languages*. Gallaudet University Press. Pp. 96-120.

Tang, G., Sze, F., & Lam, S. (2007). Acquisition of simultaneous constructions by deaf children of Hong Kong Sign Language. In M. Vermeerbergen, L. Leeson and O. Crasborn (Eds.). *Simultaneity in signed languages: Form and function.* Amsterdam: John Benjamins. Pp. 283–316.

Tomlin, R. S. (1987). Linguistic reflections of cognitive events. *Coherence and Grounding in Discourse*, *11*, 455-479.

Toole, J. (1996). The effect of genre on referential choice. In T. Fretheim and J.K. Gundel (Eds.) *Reference and referent accessibility*. Amsterdam, Philadelphia: John Benjamins. Pp. 263-290.

Valli, C., & Lucas, C. (2000). *Linguistics of American sign language: An introduction*. Gallaudet University Press.

Vermeerbergen, M., Leeson, L., & Crasborn, O. A. (Eds.). (2007). *Simultaneity in signed languages: Form and function*. John Benjamins Publishing.

WALL-E *Jpeg*. (WALL-E and EVE). http://media.gamerevolution.com/images/misc/Image/wall-e-hands-together.jpg

Wilcox, P. P. (2000). *Metaphor in American sign language*. Gallaudet University Press.

Wilcox, P. P. (2004). A cognitive key: Metonymic and metaphorical mappings in ASL. *Cognitive Linguistics*, *15*(2), 197-222.

Wilcox, S. (2004). Cognitive iconicity: Conceptual spaces, meaning, and gesture in signed language. *Cognitive Linguistics*, *15*(2), 119-148.

Winston, E. A. (1991). Spatial referencing and cohesion in an American Sign Language text. *Sign Language Studies*, *73*(1), 397-410.

Winston, E. A. (1999). *Storytelling and conversation: Discourse in deaf communities* (Vol. 5). Gallaudet University Press.

Wulf, A., Dudis, P., Bayley, R., & Lucas, C. (2002). Variable subject presence in ASL narratives. *Sign Language Studies*, *3*(1), 54-76.

Zwitserlood, I., Perniss, P. M., & Özyürek, A. (2013). Expression of multiple entities in Turkish Sign Language (TİD). In *Current Directions in Turkish Sign Language Research* (pp. 272-302). Cambridge Scholars Publishing.

CURRICULUM VITAE

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