FREQUENCY OF CLASSIFIER CONSTRUCTIONS IN AMERICAN SIGN LANGUAGE

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ABSTRACT

Classifiers in spoken languages are generally viewed as overt morphemes within a noun phrase that serve to classify referents according to real or imputed characteristics. A 'classifier language' is so designated because it has classifier constructions, which are believed to comprise a morphosyntactic subsystem in these languages. Controversy surrounds many aspects of classifiers in spoken language.

Classifiers in signed languages are, perhaps, even more controversial. Classifiers in signed languages have been categorized in a variety of ways, and some researchers debate the term, as well as their very existence. Although the terminology has been questioned, it is believed that classifiers are frequent in all signed languages, including American Sign Language.

Corpora have been implemented in a variety of useful ways in spoken languages, while corpus studies in signed languages are a relatively fledgling endeavor. This study used a corpus of narratives in American Sign Language from the National Center for Sign Language and Gesture Resources (NCSLGR) to determine how frequent classifier constructions are in narrative discourse, compared to other items.

Every item in the corpus was counted. Counts were taken within several individual categories, in order to compare the percentage of classifier constructions, as well as classifier types.

Classifier constructions were found to comprise 7.68% of total items in the corpus. The four most frequently occurring types of classifier in the corpus are: semantic classifiers, instrument classifiers, body classifiers, and descriptive classifiers. A variety of issues may affect the percentage of classifier constructions, as well as the classifier types used, including participants, sample size, and the type of discourse involved.

It is hoped that that frequency information of this kind will lead to better description, and improved typology of classifiers in signed languages.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PREFACE

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1.0 INTRODUCTION

Classifiers, in both spoken and signed languages, prove to be interesting, complex, and poorly understood. While similarities exist between classifiers in spoken languages and signed languages, there are some qualitative differences. Classifiers are believed to be universal in signed languages, but great differences of opinion exist as to proper typology and definition, and it is not known to what degree classifiers are used in signed languages, or whether all types exist and/or exist to the same degree in all signed languages. Linguistic research on signed languages is relatively new, and a great deal of work remains to be done; sociolinguistic research on signed languages is even newer and work in this area continues, despite a lack of adequate description in some areas of SL research.

William Stokoe's pioneering work on ASL beginning in the 1960's marked the beginning of recognition of ASL as true language. The somewhat late entry of ASL into linguistic inquiry meant that some important descriptive work, popular at an earlier stage in the development of the field of linguistics, has not been done. Few descriptions of frequency in ASL exist, and much debate still surrounds classifiers in signed languages; this study will contribute much-needed data in both of these areas, contributing to the growing body of literature on the linguistics of signed languages.

1.1 CLASSIFIERS IN SPOKEN LANGUAGES

The work of Keith Allan (1977) was seminal in research on classifiers in spoken languages. In this work, Allan defined classifiers based on two criteria, "(a) they occur as morphemes in surface structures under specifiable conditions," and "(b) they have meaning, in the sense that a classifier denotes some salient perceived or imputed characteristic of the entity to which an associated noun refers (or may refer)." Classifier languages are distinguished from non-classifier languages, in part, by having classifiers, some of which are confined to classifier constructions.

Classifiers have meaning in Allan's (1977) definition if they "denote perceived or imputed characteristics of the entity (or entities) to which the associated noun refers." Allan states that these characteristics may include such distinctions as human/non-human, animate/inanimate, as well as size, shape, and consistency. In addition, Allan offers seven categories of classification, noting that the categories may overlap: material, shape, consistency, size, location, arrangement, and quanta. Each of the categories may be further divided into sub-categories and, though they have meaning, they do not have the status of full lexical items.

The 'shape' classification category, for example, can be subdivided dimensionally into long, flat, and round, or according to Allan, for greater precision, 'saliently one-dimensional, two-dimensional, and three-dimensional' (1977). "The saliently one-dimensional subcategory is often associated with rope-like objects, and with trees and wooden objects," and often combines with the 'consistency' classification, "such that 'rope-like' is composed of 'saliently one-dimensional' and 'flexible' (Allan 1977).

Based on findings in a variety of spoken languages, Allan (1977) defined four major types of classifier language: numeral, concordial, predicate, and intra-locative. Examples follow from Allan's original article.

Numeral classifier languages, according to Allan (1977), contain obligatory classifiers in many quantity expressions (as well as anaphoric or deictic expressions). Allan offered the following example from Thai (from Haas 1942):

(1) *khru· lâ·j khon* 'teacher three person' = 'three teachers'
(2) *má·sì· tua* 'dog four body' = 'four dogs'

Allan (1977) believed that a variety of Bantu and Australian languages exemplified concordial classifiers, in which classifying formatives affix to nouns, modifiers, predicates, and proforms, but conceded that controversy surrounded the denotation of Bantu languages as classifier languages per se. The following example from Allan (1977), in which 'ba' is the plural human classifier, derives from the Bantu language Tonga (from Collins 1962):

(6) *ba-sika ba-ntu bo-bile* '*ba*+have+ arrived *ba*+man *ba*+two' = 'Two men have arrived.'

Predicate classifier languages, an example of which is Navajo, according to Allan (1977), have verbs of motion/location that contain a theme that varies according to properties of the object in the event. The following Navajo examples are given (from Hoijer 1945):

(9) *béésò sì-ʔą́* 'money perfect-lie (of round entity)' = 'A coin is lying (there)'
(10) *béésò sì-nìl* 'money perfect-lie (of collection)' = 'Some money (small change) is lying (there)'
(11) *béésò sì-ɬtsòòz* 'money perfect-lie (of flat flexible entity)' = A note (bill) is lying (there).'

Intra-locative classifier languages embed noun classifiers in obligatory locative expressions that must accompany nouns, according to Allan (1977). He offered only three languages, but of different language families, of this type—Toba, Eskimo (Allan's term), and Dyribal. Allan claims that Dyribal (cf Dixon 1972) possesses four noun classifiers, one of which is a null form, "suffixed to the locative morphemes 'visible and here', 'visible and there', and 'not in view'"(1977).

While Allan's (1977) work was formative in research on classifiers, it has not been uncontroversial or entirely agreed upon in spoken (or signed) language research. Further definitions, clarifications, and typologies for classifiers currently exist, not always in perfect harmony with Allan's analysis.

Andrea Aikhenvald (2003) defines classifiers as "overt morphemes that constitute a grammatical system and serve to arrange nominal referents into semantically defined classes." She further states that "[a] language has classifiers if it possesses *Classifier Constructions* [emphasis in original]". Aikhenvald's definition is relatively similar to Allan's (1977), but she offers a different typology based on the fact that classifier types may overlap in a given language; her typology includes noun class/gender, noun classifiers, numeral classifiers, relational classifiers, possessor classifiers, locative classifiers, and verbal classifiers.

Grinevald's (2003) typology of nominal classification systems places systems in a continuum. She contends that research on classifiers suffers from conflation of terms and identification, and attempts to dissect the systems into different types in order to minimize confusion. Grinevald's continuum places "lexical" classification systems (e.g. class terms and measure terms) at one end of the continuum, "grammatical" classification

systems at the other (e.g. gender), and "lexicogrammatical" systems (e.g. classifiers) in the middle. Unlike some others (cf Allan 1977; Aikhenvald 2003), Grinevald (2003) separates noun class systems from classifiers, and criticizes work that uses a more generic definition.

Grinevald (2003) divides classifier systems into types within the noun phrase: noun classifiers, numeral classifiers, and genitive classifiers. She also includes verbal classifiers as a major type, and describes subtypes within these major types of nominal and verbal classifiers, and offers examples from a number of spoken languages. Grinevald (2003) does not specifically address the languages she offers up as exemplars of these systems, which raises some issues; she does, however, mention the possibility of ethnocentric approaches to non-Indo-European languages (Grinevald 2003).

Additionally, Grinevald assumes the existence of the 'noun phrase' in the languages with nominal classifier systems (Grinevald 2003 p. 93). It seems at least possible, especially given the assumption that classifiers fall into a 'lexicomorphosyntactic' category, that there may not be an NP proper when a classifier is used. The type of language in question would be relevant here, as well.

Again, Grinevald (2003) admits her bias, and also the need for sign researchers to provide accessible information to outside researchers. In addition, it should be noted that she borrows from the work of Ted Supalla, 1986 for her conception of size and shape specifiers, or SASSes[1]. Grinevald (2003) compares the SASSes of ASL with the numeral classifiers of Burmese. However, she believes that SASSes are "used for the denomination of objects of the world," which is an oversimplification at best. In some

[1] SASSes are classifiers that describe attributes of animate and inanimate objects. Throughout this study, the term 'descriptive classifier' or DCL will be used for this type of classifier (Smith, Lentz, & Mikos 1988).

cases a sign may employ a SASS, but in other cases a SASS may be employed even when there is a separate lexical item. In addition, numeral classifiers are obligatory, and it is their classificatory function that proves to be the most salient (Sandler & Lillo-Martin 2006).

Grinevald (2003) raises some good points on directions for research. She suggests that paradigmatic as well as syntagmatic information needs to be gathered/provided for signed languages. Currently, there is no comprehensive list of classifiers for any signed language. She is correct to point out that for whole entity classifiers (my term, referred to herein as Semantic Classifiers—see section 2.3 for detailed information about Semantic Classifiers) the typical examples that are always (and maybe only) used are persons and vehicles. Also, information about when and where and how exactly these classifiers are used would be useful in the fields of linguistics, as well as language teaching.

She attempts a comparison of spoken and signed languages, with possibly mixed success, but she admits her bias from the outset, and places a call for information to make her assessment (and that of others) better (Grinevald 2003).

1.2 CLASSIFIERS IN SIGNED LANGUAGES

Classifiers in signed languages are usually handshapes that function as morphemes, and classifier constructions are complex predicates that may express any or all of the following: motion, position, stative-descriptive, or handling information (Emmorey 2002). Body classifiers, unlike other types, make use of the upper body to resemble a

referent (Supalla 2003). In addition, classifier constructions in signed languages may (sometimes simultaneously) denote figure, ground, and secondary reference objects (Talmy 2003). These descriptions of classifiers/classifier constructions attempt to define them in the least controversial manner possible, though they cannot be wholly without controversy.

In their early work on the structure of ASL, Klima and Bellugi (1979) state that classifiers "are manipulated to specify spatial locations and arrangements, and manners, directions, and rates of movement." Further description by Klima and Bellugi describes classifier constructions largely in terms of mimetic depiction and pantomime. While it currently may be out of vogue to describe classifier constructions in this manner, it is illustrative (particularly to the non-signer) to consider a description of classifiers as "mimetic elaboration of signs within the core vocabulary of ASL, recognizably different from regular modulations on signs," (Klima & Bellugi 1979). This is, however, a great oversimplification.

Within a classifier construction, "[t]he movement and location of the hands in signing space can schematically represent the motion and location of objects in the world in an isomorphic fashion," (Emmorey 2002). Further, the handshapes used in classifier constructions are chosen "based on semantic and visual-geometric properties of an object," as well as characteristics of the actions to be depicted, altogether making them highly iconic (Emmorey 2002).

Although they are very iconic, classifier constructions should not be conflated with gesture, as a number of morphosyntactic constraints apply. A classifier construction may consist of more than one type of classifier, and may simultaneously depict two

separate predicates. However, not all types of classifier may combine with all other types, and some types of movement are disallowed with some types of classifier (Emmorey 2002).

In Figure 1, below, from 'Scary Story' (Duffy, Neidle, Lee & Schlang 2007a), the dominant hand (right) in the 'B,' configuration with the arm upright, represents a tree (figure), while the non-dominant hand (left) in the 'B' configuration represents ground. This entire configuration moves toward the signer to indicate a person walking through the forest/a tree-lined path. Figure 1 shows this classifier construction (Figure 1 shows a semantic classifier, with a locative classifier. See section 2.3 for detailed information about classifier types, with examples).

Figure 1. Classifier Construction with 'Figure' and 'Ground'

The use of the term 'classifier' in signed languages is problematic, but also firmly entrenched (Emmorey 2002). In signed languages, the classifier handshape does, in a way, 'classify,' but the term 'classifier construction' is generally used to denote the complex structure that is formed (Emmorey 2002, Sandler & Lillo-Marin 2006), though other terminology has been variously adopted (cf Schembri 2003).

Classifiers in signed languages may be most similar to verbal classifier constructions in spoken languages, but they are still unique (Sandler & Lillo-Martin 2006). Verbal classifiers in spoken languages are morphemes that represent general nominal categories that then attach as affixes to the verb; these may evolve out of noun-incorporation (Sandler & Lillo-Martin 2006).

Some researchers, however, have claimed that analogy with a misinterpretation of verbs in Navajo accounts for the use of the term 'classifier,' in signed languages (see Schembri 2003). Emmorey (2002) notes that the hand configuration that has come to be considered a 'classifier' in signed languages, is not necessarily a classifier in a more traditional sense, as it does not form part of the noun phrase, or attach as an affix to a verb stem.

At issue, as well, in sign linguistics is "whether the handshape or the movement (or perhaps both) should be considered the stem of a classifier predicate," (Emmorey 2002). In her analyses, Emmorey (2002) states that neither handshape, nor movement was treated as primary, but they were treated as a morphological unit that combined to form a classifier predicate.

The classifier system in signed languages is somewhat anomalous in regards to linguistic structure, but also integral to understanding signed languages (Sandler & Lillo-Martin 2006). Classifiers in signed languages form a linguistic system, or morphosyntactic subsystem, and a closed set (Emmorey 2002). While the handshapes used in classifier constructions (e.g. the 'classifier') form a closed set, the orientation, movement, and location are highly productive (Valli & Lucas 2000). In signed languages, there are "competing forces of communicability, modality specific iconicity,

and individual language-specific grammaticization," (Aronoff, Meir, Padden, & Sandler 2003) that make signed language classifier constructions unique.

Classifier constructions provide a rich source of derivation in signed languages, similar to spoken languages with verbal classifiers that develop out of noun-incorporation, in which there is the "coexistence of productive, componential forms with non-productive opaque forms" (Sandler & Lillo-Martin 2006). Classifier constructions exist alongside 'frozen' lexical signs, in which elements of the construction can be discerned. For verbal classifiers (in spoken languages), the function of classification might be secondary to a more stylistic function, possibly making them more comparable to signed language classifiers (Aronoff, et al 2003).

Aikhenvald (2003) rightly suggests that many questions surround classifiers in signed languages. She suggests areas for future research that include definitions, inventories, similarities and differences with spoken language classifiers, and functions (Aikhenvald 2003). In addition, Aikhenvald (2003) notes that further research on classifiers in signed languages (in the aforementioned areas) may lead to "modifications to the focal points for the typology of classifiers proposed on the basis of spoken languages."

Colette Grinevald offers a typology for classifiers that takes into account their diversity as well as the overlap in these systems. Grinevald provides a succinct and coherent description of classifiers in spoken languages. Her article, though perhaps only intended as an overview, actually takes into account a number of factors often ignored in other works on classifiers including the intertwining and overlap of lexicon, morphology, and syntax, as well as the possibility of ethnocentrism in many accounts of understudied

languages. Grinevald (2003) admits a bias for spoken language classifier/classification systems, but she offers an analysis of her typology as it may apply in American Sign Language (ASL).

While classifiers may be a rich source of derivation, they are substantively different from 'signs' in a number of ways. The basic components of a sign in signed languages are handshape/hand-configuration, movement, and location; for a sign, these components are relatively fixed (Klima & Bellugi 1979). A sign is composed of these three components, and minimal pairs can be formed for signs that vary on any one of these parameters.

For example, the signs for MOTHER and FATHER both employ the '5' hand-configuration (the five fingers extended and separated, palm facing to the right, if right-handed), and a tapping movement, but the location for the articulation of MOTHER is the chin, while it is the forehead for FATHER. If the hand-configuration for FATHER is changed to a raised index finger, '1,' the sign that results is GERMAN. If the movement of MOTHER is changed from tapping on the chin, to sweeping across the chin, the resulting sign is FARM. The components of a sign, its hand-configuration, movement, and location (except for dialectal, phonetic, or phonological variations) remain constant in the production of a sign.

Further constraints also apply to signs, namely, the Symmetry Condition and the Dominance Condition, which are also believed to be universal in signed languages (Sandler & Lillo-Martin, Emmorey 2002). The Symmetry Condition states that if both hands move in the production of a sign, the handshapes, movement and orientation must be the same; the Dominance Condition entails that if two handshapes are employed in the

production of a sign, the dominant hand will be active (movement) while the non-dominant hand is passive (Battison 1978).

Classifier constructions in signed languages have variability in their handshape, movement, and location, differentiating them from signs; in addition, they may freely violate the Symmetry and Dominance conditions (Sandler & Lillo-Martin 2006, Emmorey 2002). For example, a classifier construction that denotes a person riding a horse may use the 'B' hand configuration for the non-dominant hand to represent the horse(hand extended, fingers together, palm facing rightward) and a 'V' handshape (index and middle finger extended) representing the legs of person straddling a horse, with an accompanying bouncing movement to indicate the motion of the rider on the horse. Additionally, many verbs in ASL may be inflected for aspect, which changes the movement parameter of a verb; classifier constructions cannot be so inflected (Sandler & Lillo-Martin 2006).

Several dichotomies present themselves in regards to the classifier system of signed languages. Although highly iconic, many aspects of the classifier system are acquired relatively late by children, and mastery is not achieved until the age of 8 or 9, suggesting a high degree of morphological complexity (Emmorey 2002). However, all signed languages use classifier constructions, even newer signed languages such as Israeli Sign Language (see Aronoff, Meir, Padden & Sandler 2003). Further evidence suggests that older Deaf children most accurately produce classifiers with (arguably) the least iconic depiction (whole entity classifiers, referred to herein as "Semantic Classifiers") (Emmorey 2002).

There is a great deal of debate about the composition and nature of classifiers, as well as the proper typology in which to fit classifiers in signed languages. Schembri (2003) provides a table entitled 'Classification of Classifiers in Signed Languages,' which details the classifications of ten separate researchers, with ten substantively different typologies. There are seemingly as many typologies as there are researchers on the subject.

1.3 RAMIFICATIONS OF SIGN LANGUAGE CLASSIFIERS FOR CLASSIFIER TYPOLOGY

Grinevald (2003) mentions that in some understudied Amazonian languages, the elements commonly thought of as 'classifiers' may serve a purpose of "referent identification and referent tracking." She notes that "it is a characteristic of prototypical classifier systems to stand at a clear midpoint between the lexicon and grammar, in that they are semantically motivated systems of recognizable lexical origin, with morphosyntactic relevance in the language," which seems appropriate, but she may not apply these ideas properly to sign languages. This may be particularly true in the way she describes Size and Shape Specifiers (SASSes).

Adam Schembri (2003) offers criticism on typologies of classifiers, including Allan's (1977) seminal work on the topic for spoken languages, as well as Colette Grinevald's work. Specifically, Schembri (2003) takes issue with Allan's use of the term 'morpheme' in classifier constructions, as well as his conflation of noun class and classifier systems. It is important to point out flaws with Allan's work, in part because of the influence it had in the study of classifiers, and in part because the inclusion of

languages which may not properly be viewed as having classifier systems confuses the issue, and undermines his definitions.

Grinevald's typology of classifiers, largely based on spoken languages, receives criticism from Schembri (2003) for lack of specificity in definitions, as well as their problematic application in signed languages. Schembri's (2003) work seeks to point out that comparison between signed and spoken languages is problematic, and contests the use of the term 'classifier' in signed languages. He adopts the term 'polycomponential verb' (PV), instead of using 'classifier construction,' contending that the handshape units in PVs are not classifier morphemes, nor perhaps morphemes at all.

Further, Schembri (2003) points out that, perhaps due to the difficulties of linguistic description in this area, there has "been little agreement about the different subclasses of handshape units in PVs, with different researchers suggesting very different analyses." Schembri (2003) entertains the notion that the handshape unit (commonly called a classifier) in a PV, though it resembles other types of noun classification in spoken languages, isn't actually a classifier.

The use of the term 'polycomponential verb (PV)' seems to confuse the issue somewhat, though this is the opposite of its intended effect. Grinevald's typology (according to Schembri (2003)) defines classifiers as overt morphemes. Schembri (2003) takes issue with this because the handshapes in PVs may be multimorphemic, or not (e.g. monomorphemic), but in any case are controversial. Although Schembri (2003) aims to clarify the issue, the addition of new terminology in an area overrun with competing terms may be unwarranted. However, Schembri accurately assesses the fact few aspects

of these complex constructions have been agreed upon in the literature (for signed or spoken languages).

In his examples of the possible multimorphemic handshapes used for vehicle classifiers in Swedish Sign Language (and ASL), Schembri (2003) ignores the fact that the parts of the handshape (i.e. the tips of the fingers represent the front of the vehicle, etc.) don't necessarily become meaningful outside their use in PVs. He admits that the multimorphemic analysis is problematic

At issue as well in Grinevald's typology is the requirement that classifiers form a morphosyntactic subsystem. Schembri (2003) rightly points out the problem of separating the notion of phoneme from morpheme in classifier handshapes. In some ways the phonological parameters of signs seem to have morphosyntactic applications in classifier constructions, or PVs in Schembri's (2003) terminology. However, when Schembri (2003) points out that the handshape units (classifier morphemes) in PVs form an integral part of derivational morphology in signed languages, he seems to ignore the fact that it is not necessarily the handshape itself, but the entire PV that may lexicalize.

Schembri (2003) also notes problems in the application of Grinevald's description of classifiers as semantically motivated, and not applying equally to all nouns. First, Schembri (2003) finds the application of the term 'classifier,' in verbs of handling, problematic due to the fact that changes in handshape do not "only classify the theme argument" but also the agent. However, this may not be problematic for signed languages, in which simultaneity is such a salient feature. The change in handshape does seem to be semantically motivated (depending on the type of object being handled) and

the fact that agent and theme are simultaneously realized may only reflect a modality difference.

In addition, Schembri (2003) points out that the notion of classifiers, when applied to the handshape used in PVs of motion and location, is problematic because the handshape "seems not to be one associated with classification, but representation." He goes on to discuss the possibility that these handshape units may be more properly regarded as symbols. If, however, as Schembri (2003) claims, "the constraints of sign formation appear to not only influence the choice of available handshape units, but also the choice between using a PV or a lexical sign," the idea that there is, in fact, a morphosyntactic subsystem seems to be supported

Schembri (2003) raises some interesting points in the ongoing debate about classifiers in signed and spoken languages. While signed languages initially suffered under the view that they were not real languages, and were essentially different from spoken languages, it has been shown that they are in fact natural human languages exhibiting structure similar to that found in spoken languages. Much time and effort has been spent on showing that signed and spoken languages share more similarities than differences. However, some essential differences must be taken into account when comparisons take place.

Differences in modality must be taken into account when comparing features of signed and spoken languages. In some ways it is detrimental to assume that they are essentially the same, and regarding signed language classifiers Schembri states that "this morphosyntactic subsystem may be not only intermediate between a lexical and a grammatical system (like classifier systems), but unique in its fusion of linguistic and

visuospatial properties, and thus quite unlike anything we see in the world's spoken languages" (2003).

The resources available in a visual-gestural system may require more attention when comparing the notion of classifiers in signed and spoken languages. While it may be that classifiers, as they have been traditionally viewed in spoken languages, can't be compared with the system of classifiers in signed languages, it may also be the case that the nature of visual representation requires a change in the traditional notion of what classifiers are and are not.

1.4 CORPUS LINGUISTICS

Corpora provide useful information about language. "A corpus essentially tells us what language is like," in a more reliable fashion than intuition allows (Hunston 2002). Corpora have been implemented in a variety of ways in spoken language research, but currently there are few widely available corpora for research in signed languages generally, or ASL specifically. In particular, corpora can be used to determine frequency information, which leads to better understanding of language use, and has implications for language learners.

Having some understanding of word frequencies is "useful primarily at the outset of future studies: they can provide hints as to where the researcher should start looking for interesting differences," (Ringbom 1998). It is nearly impossible, except perhaps in very broad terms, "to be conscious of the relative frequency of words, phrases, and structures," (Hunston 2002).

For spoken languages, corpora have revolutionized the writing of dictionaries and grammar books; corpora may show "the diversity of use, and the importance, of very frequent words," and this allows for more detailed information to be provided about these words in learner dictionaries (Hunston 2002). In addition, frequency information can be used in the language classroom to introduce frequent patterns earlier and more often (Hunston 2002).

While classifiers are believed to be frequent in all signed languages, including ASL (Emmorey 2002), this does not necessarily lead to the use of classifiers in ASL classes. Knowledge about the frequently occurring classifiers in ASL could lead to improved teaching methods; this is important for the Deaf, as well as interpreters for the Deaf. Fewer than 5% of deaf children are born to Deaf parents (Mitchell & Karchmer 2004), meaning that many (if not most) Deaf people have their first exposure to sign language in the school, so it is important for them to learn the classifier system; knowledge of classifier frequency would allow important constructions to be introduced early on. It is important for interpreters for the Deaf, which are required by law in most spheres where a Deaf person has the need, to understand the language they are to interpret, and classifiers are an important aspect of ASL.

1.5 THE CURRENT STUDY

ASL classifier constructions are known to be frequent (Emmorey 2002), but current research does not offer an analysis of sign to classifier frequency or frequency by type. By examining a small corpus of ASL narratives, from the National Center for Signed

Language and Gesture Resources and the American Sign Language Linguistic Research Project at Boston University, I hope to shed light on these issues.

The purpose of this study is to discover how frequently occurring classifier constructions are, as determined by the percentage they represent in ASL narrative discourse, out of all items. To that end, all items in the narrative discourse are included in the count of total items. This includes gestures, regardless of degree of conventionalization, false starts, and items that can be contentious among sign linguists, namely pronouns and adverbial/locatives, as well as reduplications. In addition, this study aims to determine which classifier types are the most frequently occurring.

Knowledge of classifier frequency may provide better understanding of signed languages generally, further information in terms of typology, and additionally information that may be useful in the teaching of ASL, both to the Deaf, and interpreters for the Deaf.

The remainder of this thesis consists of four (4) parts. In section 2, I describe the methods used in this study, which includes detailed information about the data under investigation. Section 3 details the results of analysis, and Section 4 discusses these results. Section 5 offers a conclusion.

2.0 METHODOLOGY

In this section, I outline the methods used in this study. Section 2.1 describes the American Sign Language Linguistic Research Project (ASLLRP) and the National Center for Sign Language and Gesture Resources, from whom the data under investigation derive. Section 2.2 offers details about the data investigated. Section 2.3 describes the classifier typology used by researchers with the ASLLRP, and adopted for this study. Section 2.4 details the analytical methods used for this research.

2.1 THE AMERICAN SIGN LANGUAGE LINGUISTIC RESEARCH PROJECT

The American Sign Language Linguistic Research Project (ASLLRP), under the direction of Carol Neidle at Boston University, and in conjunction with the National Center for Sign Language and Gesture Resources (NCSLGR) aims to "make available several different types of experimental resources and analyzed data to facilitate linguistic and computational research on signed languages and the gestural components of spoken languages," according to their website (www.bu.edu/asllrp).

The ASLLRP collected a sizeable corpus of ASL data via the facilities at the NCSLGR, and continues to make these data available as they are annotated. The most recent data made available include fifteen short ASL narratives annotated using SignStream™, a software program developed for "the linguistic annotation of visual language data," (Neidle 2007).

The SignStream™ annotations contain detailed information about the narratives collected, as well as participant information. Each narrative is divided into utterances, and each utterance comprises annotations that include English glosses for each utterance, an English translation, and details of eye-gaze, head-tilt, role-shift, and a variety of other phenomena salient to research on signed language (See Appendix B). Utterances consist of approximately one or two sentences, and vary in duration, as well as the number of items (Note: 'utterance' may be less a theoretical construct, than a manageable unit for annotation purposes). The annotations are not exhaustive, due to certain limitations and to the focus of the research, but the researchers attempted to make notations descriptive, rather than have them express theoretical beliefs (Neidle 2002).

2.1.1 Annotation Conventions

Detailed information about the conventions used in SignStream™ for annotations, as well as the logic and meaning behind the choices made, is available in two project reports of the ASLLRP. These are Report 11, SignStream™ Annotation: Conventions used for the American Sign Language Linguistic Research Project (2002), and Report 13, SignStream™ Annotation: Addendum to Conventions used for the American Sign Language Linguistic Research Project (2007), both by Carol Neidle. Many of these conventions are relatively standard throughout the sign linguistics literature.

While a variety of information is contained in the annotation of each utterance in the NCSLGR corpus (See Appendix B), the annotation field of primary concern for this study is the one containing English glosses. This is not intended to be an exhaustive discussion of glossing conventions, but a description of those that will be used throughout this study.

Signs, as is common practice, are glossed in capital letters, (e.g. CAR), while gestures are glossed using lower-case letters, and in quotation marks, with a description of the meaning of the gesture, and sometimes the hand configuration involved (e.g. B-L"go ahead") (Neidle 2007). Fingerspelled 'words' are in capital letters, preceded by 'fs,' (e.g. fs-COFFIN), while fingerspelled loan signs[2] are in capital letters preceded by the number sign (e.g. #CAR).

In the database, classifiers are identified by an abbreviation of the classifier type (see section 2.3), and a description of the construction in quotes; the hand configuration used in the construction is often, though not always, given for the dominant, and often, if applicable, the non-dominant hand. For example, if a semantic classifier, implementing the 'bent-V' hand configuration were employed to describe persons seated around a table, the annotation would be: SCL:bent-V"people sitting around a table."

In keeping with the notion that consistency provides ease of comparison, and for general ease of analysis, I adopted the annotation conventions used in the NCSLGR corpus. This includes the classifier typology used to annotate the data.

The classifier typology used by Neidle (2002) derives from the Signing Naturally texts used for the teaching of ASL (Smith, Lentz, & Mikos 1988). This particular typology is not without problematic issues, but it benefits from popularity of its source; it is well-known. In addition, given the murkiness of the waters in classifier research, it is difficult to proclaim any particular typology superior, or inferior, to others.

[2] Fingerspelled loan signs, also called lexicalized fingerspelling involve the lexicalization of a fingerspelled 'word.' This may involve the addition of movement and/or the deletion of fingerspelled letters (Battison 1978).

2.2 DATA INCLUDED IN THIS STUDY

The fifteen narratives contained in the corpus were elicited from two participants, Ben Bahan and Mike Schlang. Both Ben and Mike are Deaf, native signers of ASL, who come from Deaf[3] families. At the time of collection (2001), Ben was 43 years of age, and Mike was 22. Researchers placed a limitation on the allowable duration for narratives, but not the content; participants chose the narratives themselves [personal communication with Dr. Carol Neidle, Boston University/ASLLRP]. Table 1, below, lists each of the fifteen narratives, the topic of the narrative, the duration of the narrative, the number of utterances in the narrative, as well as the participant to whom the narrative is attributed.

Currently, the narrative corpus from the NCSLGR is only available on CD-ROM, but it will soon be made available online. Each CD-ROM, Volumes 3 through 7, includes three narratives. Volume 3 includes narrative 1, "Close Call," narrative 2, "Speeding," and 3, "Three Pigs," signed by Ben Bahan (Neidle, Lee, Duffy & Schlang 2007a, 2007b, 2007c)

Volumes 4 through 7 of the corpus contain narratives 4 through 15, told by Mike Schlang. Narratives 4, 5, and 6 are "Accident," "Biker," and "Boston-LA," on Volume 4 (Neidle, Lee, Schlang & Duffy 2007a, 2007b, 2007c). Narratives 7, 8, and 9, on Volume 5 include "Ali," "Dorm Prank," and "Whitewater," and included on Volume 6 are narrative 10, "Football," narrative 11, "LAPD," and narrative 12, "Siblings," (Neidle, Duffy, Lee & Schlang 2007a, 2007b, 2007f, 2007c, 2007d, 2007e). Finally, Volume 7 includes "Road Trip 1," "Road Trip 2," and "Scary Story," narratives 13, 14, and 15 (Duffy et al 2007a, 2007b, 2007c).

[3] The term 'deaf' with a lowercase 'd' generally refers solely to audiological status, while 'Deaf' is used for the members of the community, linked by signed languages.

Table 1: Description of Narratives

NARRATIVE	TOPIC	DURATION	UTTERANCES	PARTICIPANT
1) 'Close Call'	*This narrative involves driving on the highway, and nearly hitting a deer.*	2:10	52	Ben
2) 'Speeding'	*This narrative, from Deaf folk lore, tells the story of a Deaf driver and a hearing hitchhiker. The Deaf man gets away with speeding when the police stop him, but the hitchhiker isn't so lucky when he pretends to be Deaf.*	2:02	49	Ben
3) 'Three Pigs'	*The classic tale of three pig brothers who build their houses out of straw, wood, and brick respectively, and the fate of those houses when the wolf comes around.*	2:34	68	Ben
4) 'Accident'	*Mike tells the story behind his bandaged ring finger; it involves sharp machinery, a trip to the hospital, and the wearing of plastic bags on his hand while showering.*	4:41	72	Mike
5) 'Biker'	*A friend of Mike loves motorcycles, despite the injuries he incurs.*	1:20	16	Mike
6) 'Boston-LA'	*Mike grew up in Boston, but attended college near Los Angeles (California State University-Northridge); he compares the two cities in this narrative.*	7:28	83	Mike
7) 'Ali'	*Mike tells how he became a fan of Muhammad Ali, and describes an interview with Ali after his diagnosis with Parkinson's Disease.*	2:37	37	Mike
8) 'Dorm Prank'	*While at CSUN, Mike and some friends tied the door handle of their Resident Assistant (RA) to that of the student across the hall; the police are called and Mike and his friends must pay.*	3:15	54	Mike
9) 'White Water'	*A group of Deaf friends take a white water rafting trip together. Mike, and several others, fall out of the raft.*	3:19	66	Mike

Table 1. **Descriptions of Narratives**, continued

NARRATIVE	TOPIC	DURATION	UTTERANCES	PARTICIPANT
10) 'Football'	*Mike describes how the game of football is played.*	3:37	62	Mike
11) 'LAPD'	*At a party in L.A., Mike steps out to buy cigarettes, and nearly gets arrested. Friends from the party intervene when they see Mike in handcuffs.*	5:03	16	Mike
12) 'Siblings'	*Mike comes from a Deaf family; after his birth, Dana, his sister, insists on discovering whether or not Mike is Deaf. He awakens when Dana bangs on pots and pans, but she later discovers that he is, in fact, Deaf.*	2:55	66	Mike
13) 'Road Trip 1'	*After graduating from CSUN, Mike and some friends decide to drive from L.A. to Boston. The trip involves a flat tire, gambling, and herds of cows.*	4:48	36	Mike
14) 'Road Trip 2'	*On the same road trip from L.A. to Boston, Mike and friends hit a storm and stop at a restaurant that lacks in etiquette, as well as decent food.*	3:11	47	Mike
15) 'Scary Story'	*A ghost story in which a man kills his victim in the forest and eats his heart. He takes the body back to his house, and places it in a coffin, but at night the house shakes.*	4:32	69	Mike

2.3 SIGNING NATURALLY TYPOLOGY

One relatively well-know typology of classifiers, found in Signing Naturally (Smith, Lentz & Mikos 1988), includes seven different types of classifier: descriptive classifiers, locative classifiers, semantic classifiers, body classifiers, instrument classifiers, body part classifiers, and plural classifiers.

Signing Naturally is a standardized ASL curriculum that is widely used (Wilcox & Wilcox 1991). This curriculum, which was developed at Vista Community College in California, features a 'functional/notional' approach that emphasizes the functions of language, e.g. introductions, information requests, describing things, etc. (Wilcox & Wilcox 1991). According to the publisher, DawnSign Press, Signing Naturally is the most widely used ASL curriculum in the U.S. and Canada [personal communication].

Descriptive classifiers (DCL's), referred to as size and shape specifiers (SASSes) by some, describe the attributes of animate and inanimate objects (Smith, Lentz & Mikos 1988 in Neidle 2002). For example, a DCL might be implemented to describe the size and shape of a piece of bread. In Figure 2, below, from 'Road Trip 2,' utterance 33 (Duffy et al 2007b), the '1' handshape, employed by both hands, traces the outline of a square piece of bread. The English gloss for the utterance that uses this DCL is 'The food finally came. I looked again—it had plain wonder bread for a bun, and a tiny little hamburger.'

Figure 2: Descriptive classifier

Locative classifiers (LCL) represent objects in a precise location, and may also indicate movement. For example, in 'Road Trip 1' (Duffy et al 2007a), Mike describes an incident with his car in which the back end hits the ground. In Figure 3, below, this is shown. The English gloss for the portion of the utterance from which this LCL derives is, 'All of a sudden the car dropped down in the back and was skidding.' The dominant hand (Mike's right) represents the back of the car, while the non-dominant hand (Mike's left) represents the ground. It is the non-dominant hand that portrays the locative classifier (LCL), representing 'ground.'

Figure 3: Locative Classifier

Semantic classifiers[4] (SCL's) represent whole entities that form a semantic class of nouns, such as 'vehicle' or 'person.' Additional information about movement, location, number, or state may be encoded in constructions that use SCL's (Smith Lentz & Mikos 1988 in Neidle 2002). For example, the 'bent-V' handshape represents a seated person, and when both hands employ this hand configuration, it may represent persons seated next to one another, facing one another, etc. In Figure 4, below, from 'Dorm Prank,' utterance 46 (Neidle, Duffy et al 2007b), Mike employs this 'bent-V' SCL to represent persons seated across from one another. The utterance from which the SCL derives is glossed, 'We sat down and I explained to the hall coordinator.'

Figure 4: Semantic Classifier

Body classifiers (BCL's) use the body to 'perform' the verb of a sentence; this usually involves role-shift[5]. For example, in narrative 7 'Ali,' (Neidle, Duffy et al 2007a)

[4] Use of the term 'semantic' (by e.g. Supalla; Smith, Lentz & Mikos, etc.) for these classifiers is somewhat unfortunate, and does not imply that other classifier types are not semantic in nature.

[5] Role shift is a phenomenon in signed languages in which a signer uses his/her "body, head, and eye gaze to report the actions, thoughts, words, and expressions of characters within the discourse," (Metzger 1995).

a body classifier is employed to represent Muhammad Ali grabbing the collar of a reporter, as shown in Figure 5, below. This BCL derives from an utterance glossed as, 'Ali walked toward the reporter, grabbed him by the collar, pulled him close, and shook his fist in the reporter's face.'

Figure 5: Body Classifier

Instrument classifiers (ICL's) correspond to the manipulation of objects by a part of the body (generally the hands) (Smith, Lentz & Mikos 1988 in Neidle 2002). In Figure 6, Mike uses an ICL (his right hand, 'A' handshape) to describe having his finger wrapped up after it is injured, in 'Accident,' utterance 59 (Neidle, Lee, Schlang & Duffy 2007a). The English gloss for the utterance that uses this ICL is, 'After he finished, he wrapped up my finger.'

Figure 6: Instrument Classifier

Body part classifiers (BPCL's) represent a specific part of the body performing an action (Smith, Lentz & Mikos 1988 in Neidle 2002). For example, an inverted 'V' handshape may be manipulated to represent walking legs. In 'Whitewater,' utterance 35 (Neidle, Duffy, et al 2007f), the 'B' hand configuration is used to represent feet; Mike's dominant hand (his right) represents the foot digging into the side of the raft, while whitewater rafting in Figure 7, below. This BPCL is implemented in an utterance glossed as, 'I dug my foot into the side of the raft so I wouldn't fall again.'

Figure 7: Body Part Classifier

Plural classifiers (PCL's) indicate specific and non-specific numbers of animate or inanimate objects (Smith, Lentz & Mikos 1988 in Neidle 2002). In narrative 3 (utterance 8), 'Three Pigs' (Neidle, Lee, Duffy & Schlang 2007c), Ben employs the '3' hand configuration to represent "three pigs walking together," as shown in Figure 8. For the utterance that uses this PCL, the English gloss is, 'The three pigs wet out looking for a location.'

Figure 8: Plural Classifier

2.4 ANALYTICAL METHODS

Each narrative in the corpus was viewed, first in its entirety, then utterance by utterance. Every item in every utterance, based on the annotations provided by the ASLLRP, was counted and entered in a database. Individual counts were made of every classifier construction and each classifier type for each utterance, as determined by the provided annotations, as well as fingerspelled items, pronominal items, adverbial/locative elements, and "5-expressions." Other items in the narrative that are not necessarily

'lexical' signs were included in the total item count, but noted; these items tended to be more 'gestural' in nature, or to be focal elements.

The frequency of individual lexical items was not determined; this includes items annotated as fingerspelled loan signs. However, items that could potentially cause dispute were counted individually; this does not imply that they are not, in fact, lexical signs in all cases. These include: reduplications, fingerspelling, pronouns, adverbial/locatives, "5-expressions," focal elements, indefinite particle (cf Conlin, Hagstrom & Neidle 2003), and 'other,' to be detailed below.

Reduplication, for these purposes, refers to repeated signs/items. An item in a narrative might be annotated "DRIVE + +," where each plus sign (+) represents a repetition of the sign "DRIVE." Each repetition was counted as a separate item in the total count, and the number of these repetitions for each utterance (though, not every item) was noted. If an item that was counted separately in the corpus (e.g. a pronoun, 5-expression, etc.) was also reduplicated, it was counted only once for each category (e.g. [5 "that's how it is"+] would be counted as one 5-expression and one reduplication). This kept items from being counted an inordinate amount times.

Fingerspelling was included in the total, but each instance of fingerspelling (that was not annotated as a fingerspelled loan sign) was counted. Fingerspelling involves the use of a manual alphabet, based on English orthography. Fingerspelled items are not wholly separate from ASL signs, but "the formational constraints proposed for native signs apply to varying degrees to fingerspelled forms as well," (Emmorey 2002).

Pronouns in ASL take the same form as pointing gestures, used in both spoken and signed languages (Emmorey 2002). To indicate the first person, singular 'I,' a signer

uses the index finger to point to his/her own chest, and to indicate a second person singular 'you,' a signer points to the person addressed (Emmorey 2002). A third person referent, if present, may be pointed to, or a place in signing space may be established to represent the referent.

The status of pronouns in ASL is somewhat disputed; some, (cf Liddell 2003) have claimed that they are 'points,' and some (cf Meier 1990) have questioned the distinction between second and third person pronouns. Elements in the corpus that were annotated as pronouns of any type, including first, second, and third, as well as possessive pronouns were counted together as pronouns, though I make no claims about their exact status and nature in ASL. Neidle (2003) admits, in detailing the annotation conventions used, that a distinction was drawn between pronouns and possessive pronouns, but that they could also have all just been labeled pronouns, with reference to person (1^{st}, 2^{nd}, 3^{rd}, etc).

Adverbial/locative elements suffer from a similar problem as pronouns, namely, whether they are actually just 'points.' Due to the particular modality, signers use space in a variety of complex ways to discuss space, with a variety of spatial formats, choices of perspective, and frames of reference (Emmorey 2002). The elements in question in this study generally use the index finger, though sometimes also the thumb, to indicate the spatial location of an object or event.

"5-expression" is a term I adopted to refer to items in the narrative that inhabit a place somewhere between a gesture and a sign. These items involve a '5' hand configuration, and often some type of body movement, as well as facial expression. Some examples include 5"I don't know," 5"that's how it is," and 5"sheepish." These

items make up a relatively sizeable portion of the corpus, which is part of the reason they were given a separate category. Figure 9, below, from Narrative 1, 'Three Pigs,' utterance 33 (Neidle, Lee, Duffy, et al 2007c) shows an image of a gesture that was annotated "5'panic.'"

Figure 9: Annotation 5"panic"

Focal items draw attention to another sign, or gesture, or fingerspelling. Generally, this involves the index finger pointing to the hand that performs fingerspelling. However, other hand-configurations can be used, and focal items are not always directed toward fingerspelling. Figure 10 below, shows Mike drawing attention to his injured left hand with his right hand (annotated as 5 "focus") in narrative 4, 'Accident,' utterance 23 (Neidle, Lee, Schlang et al 2007a).

Figure 10: Focus Item

The indefinite particle, which has a similar articulation to the sign for "WHAT," expresses uncertainty, according to Conlin, Hagstrom, and Neidle (2003). According to the authors, the ASL indefinite particle "functions to widen the domain of possibilities under consideration along some contextually determined dimension" (Conlin, Hagstrom & Neidle 2003). I make no claims about the exact status of this particle, except that it may be controversial, and therefore it was counted separately. Figure 11 shows an indefinite particle, signed by Mike in Narrative 13, 'Road Trip 1,' utterance 17 (Duffy, Neidle, Lee & Schlang 2007a).

Figure 11: Indefinite Particle

The “other” category was reserved for items that became part of the total item count, but did not fit into any of the other categories. These items include gestures, with accompanying facial expressions and/or body movements with annotations such as “wave” and “not give a darn.” This category also includes false-starts and anticipatory movements. For a complete list, see Table 2.

Instances in which one could interpret a greater or lesser number of classifier constructions, I opted for the lower count. This involves a degree of interpretation not contained within the corpus annotations, and therefore, in some instances (Scary Story particularly, but other narratives as well) different interpretations are possible. Though partly subjective, if a construction seemed clearly delineated as a discrete action, I counted it as a one classifier construction. In Appendix A, I list the cases in which a different interpretation could be (or was) made.

The NCSLGR corpus contains several instances in which a classifier construction is repeated, and noted with the plus (+) symbol as a reduplication. These occurrences counted only once in the total count of classifier constructions. While there are specific formational constraints for signs, it seems plausible that repetitions in classifier constructions demonstrates some flexibility in the classifier system of ASL, and that the notion of ‘classifier construction’ could include a degree of repetition within its boundary. This also kept the count of classifier constructions from heedless inflation.

Total items, excluding classifiers were tallied for each narrative; a tally was performed for classifier constructions for each narrative as well. For each narrative, the percentage of classifier constructions was figured as a percentage of total items, rounded out to two decimal places. In addition, total items in the corpus, including and excluding

classifier constructions, and the total number of classifier constructions were tallied, and the percentage that classifier constructions represent in the whole corpus was determined. These results are detailed in Section 3, below.

3.0 RESULTS

This section details the results of the analysis. The raw counts of items in each category, as well as the percentage these counts represent in each narrative and the whole corpus, will be given. Section 3.1 is the Corpus Overview, which offers details of the corpus, excluding classifiers. The relevant counts and percentages of classifiers are covered in Section 3.2, Classifiers in the Corpus.

3.1 CORPUS OVERVIEW

This section offers the results of investigation, minus those for classifiers, which will be included in section 3.2. Section 3.1.1 offers the results for lexical signs, reduplications, and fingerspelling. These are displayed graphically in Tables 2a and 2b; a regression analysis of the number of signs and duration is shown in Figure 12. Section 3.1.2 gives the results of analysis for adverbial/locatives and pronouns, displaying results in Table 3. Section 3.1.3 has the results for 'other' items, '5-expressions,' indefinite particles and focus items. Descriptions of 'other' items in each narrative are shown in Table 4, while counts and percentages for these, and the aforementioned categories in 3.1.3 follow in Tables 5a and 5b. A regression analysis of total items and duration is shown in Figure 13.

3.1.1 Lexical Signs, Reduplications, & Fingerspelling

Table 2a lists the raw counts of lexical signs, reduplications, and fingerspelling, in the NCSLGR corpus, for each narrative, as well as the corpus as a whole. Table 2b lists the percentages that the raw counts total in the corpus. The total number of items per narrative, and for the whole corpus are included for comparison.

Table 2a: Raw Counts of 'Lexical Signs,' Reduplications, and Fingerspelling

NARRATIVE	TOTAL ITEMS	'LEXICAL SIGNS'[6]	REDUPLICATIONS	FINGER-SPELLING
1)	197	99	11	2
2)	247	148	20	0
3)	426	285	22	1
4)	695	440	26	41
5)	185	116	1	21
6)	1145	825	42	76
7)	373	230	13	27
8)	512	319	15	26
9)	384	230	6	19
10)	541	357	6	53
11)	755	455	5	37
12)	419	255	15	30
13)	675	431	29	41
14)	484	283	53	20
15)	280	87	20	1
TOTAL:	7318	4560	284	395

Table 2b: Percentages of 'Lexical Signs,' Reduplications, and Fingerspelling

NARRATIVE	TOTAL ITEMS	'LEXICAL SIGNS'[*]	REDUPLICATIONS	FINGER-SPELLING
1)	197	50.26%	5.58%	1.02%
2)	247	59.92%	8.10%	0%
3)	426	66.90%	5.16%	0.23%
4)	695	63.31%	3.74%	5.90%
5)	185	62.70%	0.54%	11.35%
6)	1145	72.05%	3.67%	6.64%
7)	373	61.66%	3.49%	7.24%
8)	512	62.30%	2.93%	5.08%
9)	384	59.90%	1.56%	4.95%
10)	541	65.99%	1.11%	9.80%
11)	755	60.26%	0.66%	4.90%
12)	419	60.86%	3.60%	7.16%
13)	675	63.85%	4.30%	6.07%
14)	484	58.47%	10.95%	4.13%
15)	280	31.07%	7.14%	0.36%
TOTAL:	7318	62.31%	3.88%	5.40%

[6] Use of the term 'lexical sign' in this table, and throughout the text, does not imply that other items are not lexical, or that they are not signs.

[*] See footnote 5.

Out of 7, 318 items in the corpus, 4,560 are signs. The number of 'lexical signs' ranges from 87, in narrative 15, to 825 in narrative 6. Narrative 6 is the longest narrative in the corpus at nearly seven and a half minutes (refer to Table 1), but narrative 15, at four minutes and thirty-two seconds (refer to Table 1) is not the shortest.

These signs comprise 62.35% of the corpus as a whole. The percentage that lexical signs represent in a narrative ranges between 31.07%, in narrative 15, to 72.05% in narrative 6. As stated, narrative 6 is the longest in the corpus, and it also contains the greatest number of 'lexical signs' (825), as well as the highest percentage of 'lexical signs.' Narrative 15, though it is not shortest in duration, has the least amount of signs (87), as well as the lowest percentage of signs, 31.07%.

Reduplication, as stated in section 2.4, refers to a sign (or gesture) being repeated; each of the repeated signs was counted once, in its respective category, and the number of repetitions was counted separately, but added to the total count of items. As Table 2a shows, there were 284 reduplications in the NCSLGR corpus. While narrative 5 (the shortest narrative in duration—see Table 1) features only 1 reduplication, narrative 14 has 53 reduplications, the most of any narrative in the corpus.

The total number of reduplications in the corpus (284) represents only 3.88% of the total items, as shown in Table 2b. The percentage of reduplications per narrative ranges between .54% in narrative 5, to 10.95% in narrative 14. In general, the number, as well as the percentage of reduplications per narrative is relatively low.

There are 395 fingerspelled items in the corpus, which comprises 5.4% of the whole corpus. As Table 2a shows, narrative 2 contains no fingerspelled items, and narratives 3 and 15 have only one. The greatest number of fingerspelled items, 76, is

found in narrative 6, totaling 6.64% of the narrative. The greatest percentage of fingerspelled items is 11.35%, which is found in narrative 5.

3.1.2 Adverbial/Locatives & Pronouns

Table 3 displays the raw counts and of adverbial/locatives and pronouns, as well as their percentages in each narrative and the whole corpus. The count of total items in each narrative, and the whole corpus is included for comparison.

Table 3: **Raw Counts and Percentages of Adverbial/Locatives and Pronouns**

NARRATIVE	TOTAL ITEMS	ADVERBIAL/ LOCATIVE COUNTS	ADVERBIAL/ LOCATIVE PERCENTAGES	PRONOUN COUNTS	PRONOUN PERCENTAGES
1)	197	8	4.06%	21	10.66%
2)	247	4	1.62%	15	6.07%
3)	426	15	3.52%	24	5.63%
4)	695	1	0.14%	96	13.81%
5)	185	2	1.08%	26	14.05%
6)	1145	31	2.71%	96	8.38%
7)	373	2	0.54%	61	16.35%
8)	512	1	0.20%	96	18.75%
9)	384	7	1.82%	71	18.49%
10)	541	4	0.74%	69	12.75%
11)	755	2	0.26%	135	17.88%
12)	419	0	0%	66	15.75%
13)	675	11	1.63	82	12.15%
14)	484	4	0.83%	60	12.40%
15)	280	0	0%	15	5.36%
TOTAL:	7318	92	1.26%	933	12.75%

Adverbial/locatives occur 92 times in the NCSLGR corpus, as shown in Table 3. This accounts for only 1.26% of the corpus overall. The highest percentage of adverbial/locatives in a narrative is found in narrative 1, which has 8. Narratives 12 and 15 contain no adverbial/locatives.

Pronouns occur relatively frequently throughout the corpus. As shown in Table 3, 933 pronouns were counted in the NCSLGR corpus; that is 12.75% of the corpus overall. Pronouns account for as much as 18.75% of a narrative as in narrative 8, and as little as 5.36% in narrative 15.

3.1.3 Other Items, '5-Expressions,' Indefinite Particles, & Focus Items

There were items in the corpus that did not fit neatly into a category. These items include gestures (excluding '5-expressions'), false starts, anticipatory movement, focal elements, and the specific 'quote' gesture/sign. These items, which totaled 35, made up a small percentage of the corpus overall (,48%, see Table 5b) and were condensed into a single category. Table 4, below, offers a brief description of these items in each narrative. Shaded areas indicate that these items are not represented in a particular narrative. Table 5a gives the count of these items in each narrative and the percentage that they, as a category, represent in each narrative, as well as the corpus as a whole.

Table 4: Descriptions of 'Other' Items

NARRATIVE	DESCRIPTION OF ITEMS (excluding focus items)
1)	
2)	"up ahead," B-L"go on," (1h) "leave there"
3)	
4)	"quote"
5)	
6)	"quote," "wave" (3 times), flat-B"go ahead"
7)	anticipation of WISH
8)	false-start, "gees," "oh my god"
9)	"quote"
10)	false-start (2 times)
11)	
12)	R"hoping," (3 times), applause, false-start
13)	false-start, "it's okay," "pull over," "wave" (2 times), "relief," "not give a darn"
14)	L"well," "oh," false-start (2 times), "leave," B-L "move back,"
15)	"jump up"

As Table 4 shows, several narratives (1, 3, 5, 11) include none of these 'other' items. The highest percentage of these items, in narrative 2, is 1.21%. Overall, these items represent less than one half of one percent (.48%, see Table 5b) of the items in the corpus as a whole, or 35 items out a total 7, 318 items. In Table 4, gestures, which are in lower-case letters surrounded by quotes, are sometimes preceded by a hand configuration, e.g. R"hoping" in narrative 12, where 'R' is the hand configuration for the letter 'r' (e.g. fingers crossed) in the manual alphabet.

False starts (similar in idea to spoken language, but enacted manually) appear in narratives 8, 10, 12, 13, and 14. Narrative 7 contains an item annotated as 'anticipation of WISH,' meaning the sign for 'wish,' which is similar to a false-start, but attributable to a specific sign.

The "quote" gesture is produced in a manner similar to the way hearing speakers gesture to intend that a spoken word or phrase is quoted (or sarcastic/questionable). This gesture is highly conventionalized, but was annotated as a gesture, and therefore included as such here. It was produced in narratives 4, 6, and 9.

Tables 5a and 5b show the raw counts, and percentages, respectively, of '5-expressions,' indefinite particles, focus items, and 'other' items. These items account for a relatively small percentage of the corpus.

Table 5a: Raw Counts of '5-expressions,' Indefinite Particles, Focus Items, & 'Other Items

NARRATIVE	TOTAL ITEMS	5-EXPRESSIONS	INDEFINITE PARTICLE	FOCUS ITEMS	"OTHER" ITEMS
1)	197	1	1	0	0
2)	247	15	8	0	3
3)	426	17	4	0	0
4)	695	40	2	2	1
5)	185	9	1	0	0
6)	1145	38	10	2	5
7)	373	21	0	2	1
8)	512	22	0	3	3
9)	384	23	1	5	1
10)	541	25	0	7	2
11)	755	57	7	2	0
12)	419	27	0	0	5
13)	675	29	1	11	7
14)	484	31	1	3	6
15)	280	27	1	1	1
TOTAL	7318	382	37	38	35

Table 5b: Percentages of '5-expressions,' Indefinite Particles, Focus Items, & 'Other' Items

NARRATIVE	TOTAL ITEMS	5-EXPRESSIONS	INDEFINITE PARTICLE	FOCUS ITEMS	"OTHER" ITEMS
1)	197	0.51%	0.51%	0%	0%
2)	247	6.07%	3.24%	0%	1.21
3)	426	3.99%	0.94%	0%	0%
4)	695	5.76%	0.29%	0.29%	0.14%
5)	185	4.86%	0.54%	0%	0%
6)	1145	3.32%	0.87%	0.17%	0.44%
7)	373	5.63%	0%	0.54%	0.27%
8)	512	4.30%	0%	0.59%	0.59%
9)	384	5.99%	0.26%	1.30%	0.26%
10)	541	4.62%	0%	1.29%	0.37%
11)	755	7.55%	0.93%	0.26%	0%
12)	419	6.44%	0%	0%	1.19%
13)	675	4.30%	0.15%	1.63%	1.04%
14)	484	6.40%	0.21%	0.62%	1.23%
15)	280	9.64%	0.36%	0.36%	0.36%
TOTAL:	7318	5.22%	0.51%	0.52%	0.48%

Indefinite particles, focus items, and 'other' items make up a fairly small percentage of the corpus of the corpus overall. Indefinite particles and focus items account for only .51% and .52%, respectively, as can be seen in Table 5b. The total number of adverbials in the corpus is 92, and no narrative has more 31 adverbials, which are found in narrative 6. The highest percentage of adverbial, 4.06% is found in narrative 1. Several narratives contain no indefinite particles, including, 7, 8, and 10, as well as 12, which also has no adverbials. As well, focus items do not occur in narratives 1, 2, 3, 5, and 12. Narrative 13 contains the most focus items (11), as well as the highest percentage, 1.63%.

The '5-expressions,' the gestures that employ a '5' hand configuration, comprise 5.22% of the overall corpus, as shown in Table 5b. In narrative 15, '5-expressions' make up 9.64% of the narrative, while in narrative 1, they are only .51%. In narrative 11, there are 57 of these gestures, which comprise 7.55% of that narrative, as shown in Tables 4a and 4b.

3.2 CLASSIFIERS IN THE CORPUS

Table 6 shows the raw counts of total items (excluding classifier constructions), classifier constructions, total items (including classifier constructions), and the percentage that classifiers represent in each narrative, as well as the whole corpus. In addition, Table 6 gives the average duration, number of items and classifier constructions, and the percentage of classifier constructions that this average represents.

Table 6. Raw Numbers and Percentage of Classifier Constructions

NARRATIVE	**DURATION**	**SIGNS/ ITEMS** (excluding classifiers)	**CLASSIFIER CONSTRUCTIONS**	**TOTAL ITEMS** (including classifiers)	**CLASSIFIER PERCENTAGE** (out of total)
1)	2:10	143	54	197	27.41%
2)	2:02	213	34	247	13.77
3)	2:34	368	58	426	13.62
4)	4:41	649	46	695	6.62
5)	1:20	176	9	185	4.86
6)	7:28	1125	20	1145	1.75
7)	2:37	357	16	373	4.29
8)	3:15	485	27	512	5.27
9)	3:19	363	21	384	5.47
10)	3:37	523	18	541	3.33
11)	5:03	700	55	755	7.28
12)	2:55	398	21	419	5.01
13)	4:48	642	33	675	4.89
14)	3:11	461	23	484	4.75
15)	4:32	153	127	280	45.36
TOTAL	55:32	6756	562	7318	7.68
AVERAGE	3:34	450	37	488	7.58

Classifier constructions account for 7.68% of the NCSLGR corpus. The greatest number of classifier constructions for a single narrative (127) is found in narrative 15, 'Scary Story.' Narrative 15 also possesses the highest percentage of classifier constructions for a single narrative, 45.36%. The fewest classifier constructions (9) are found in narrative 5 (Biker), while the lowest overall percentage of classifier constructions, 1.75%, is found in narrative 6 (Boston-LA). The average number of classifier constructions per narrative (i.e. the percentage of the average number of classifier constructions, 37, out of the average number of total items, 488) is 7.58%.

Both narrative 5 and narrative 15, the narratives with the least and the most classifier constructions, as well as the lowest and highest percentage, respectively, were signed by Mike. Although Mike used more classifier constructions overall, 411, as

opposed to Ben's 146 (see Table 7 below), Ben used a higher percentage of classifier constructions.

Table 7 Total Classifier Constructions and Percentages for Participants

	TOTAL ITEMS	TOTAL CLASSIFIER CONSTRUCTIONS	PERCENTAGE
BEN	870	146	16.78%
MIKE	6448	416	6.45%

As Table 7 shows, classifiers made up 16.78% of Ben's narratives, but only 6.45% of Mike's narratives. Ben's percentage of classifier use is more than twice the percentage in corpus overall 7.68%, and the average percentage 7.58% (see Table 6). Mike's percentage of classifier use (6.45%) is less than the percentage overall, or the average.

Table 8, below, presents the counts of classifier types in the corpus, and in each narrative. It also lists the percentage of classifier constructions that contain each type. As a classifier construction may exhibit more than one classifier type, and it is types (rather than classifiers, per se) that were counted, the percentages of classifier type do not total 100%, nor do the raw counts represent every classifier; a classifier construction could have two different classifier types, but it could also have two instances of the same classifier type, which would count as only 1 type.

Table 8. Classifier Totals by Type

NARRRATIVE	**TOTAL** (CL constructions)	**SCL**	**DCL**	**ICL**	**LCL**	**BCL**	**BPCL**	**PCL**
1) Close Call	54	15	24	9	1	3	7	1
2) Speeding	34	14	3	4	0	7	6	0
3) Three Pigs	58	12	19	10	1	9	10	2
4) Accident	46	7	10	12	2	19	3	0
5) Biker	9	2	1	5	1	0	0	0
6) Boston-LA	20	10	8	3	1	0	1	0
7) Ali	16	6	3	0	2	8	1	0
8) Dorm Prank	27	7	4	14	2	1	0	0
9) Whitewater	21	27	9	8	7	10	2	2
10) Football	18	7	1	5	3	1	2	1
11) LAPD	55	13	2	6	2	26	1	2
12) Siblings	21	10	5	4	0	3	0	0
13) Road Trip 1	33	15	12	5	1	0	1	0
14) Road Trip 2	23	8	8	1	1	2	2	1
15) Scary Story	127	12	27	51	4	38	1	0
TOTAL:	562	165	136	137	28	127	37	9
PERCENTAGE (of total classifier constructions)		29.36	24.20	24.38	4.98	22.60	6.58	1.60

The classifier type represented the most in classifier constructions in the NCSLGR corpus is semantic classifiers (SCL), as seen in Table 8. Every narrative in the corpus has SCL's, and narrative 9, 'Whitewater,' has more constructions that possess SCL's than any other in the corpus, with 27. The fewest classifier constructions with SCL's are found in narrative 5, 'Biker.' The other narratives in the corpus have between 6 and 15 of this classifier type. There are 165 instances of this classifier type in constructions throughout the corpus, and 29.36% of classifier constructions have a SCL.

After SCL's, the most prolific type of classifier is the instrument classifier (ICL). Table 8 shows that ICL's appear in 137 instances, or 24.38% of classifier constructions. Narrative 7, 'Ali,' is the only narrative that does not contain ICL's. The rest of the narratives in the corpus have between 1 (narrative 14) and 51 (narrative 15) examples of ICL's.

Descriptive classifiers (DCL's) follow ICL's in frequency of use in the NCSLGR corpus. DCL's occur at least once in every narrative (see Table 8). The most DCL's turn up in 'Scary Story,' in which 27 classifier constructions containing at least one DCL can be found. Overall, 24.2% of all classifier constructions have a DCL.

Table 8 shows that Body classifiers (BCL's) arise as a type a total of 127 times, or in 22.6% of the classifier constructions in the corpus. 'Scary Story,' narrative 15, exhibits more of this type (38) than any other narrative in the corpus, while narrative 8, 'Dorm Prank,' and narrative 10, 'Football,' have only 1 construction each with a BCL. Three narratives, 'Biker,' 'Boston-LA,' and 'Road Trip 1,' have no BCL's.

Body part classifiers (BPCL's) appear in 37 classifier constructions, or 6.58% of constructions in the corpus. 'Three Pigs,' narrative 3, has 10 classifier constructions with

at least one BPCL, the most of any of this type in the corpus. 'Biker,' 'Siblings,' and 'Dorm Prank,' do not have any of this type. Narratives 6, 7, 11, 13, and 15 each has only one construction containing a BPCL.

As Table 8 displays, only 28 classifier constructions in the corpus make use of locative classifiers (LCL's); this represents 4.98% of constructions. In 'Whitewater,' narrative 9, LCL's can be counted 7 times, the most of any narrative. Twelve of the narratives (1-8, 11-14) have between zero and 2 of this type. Narrative 10 provides 3 instances, and narrative 15 provides 4 instances of LCL's in a classifier construction.

Plural classifiers (PCL's) are the least used type in this corpus. Only 9 classifier constructions include PCL's, a percentage of 1.62%. Out of the 15 narratives, 11 exhibit no PCL's at all; these include narratives 2, 4, 5, 6, 7, 8, 12, 13, and 15. No single narrative has more than two constructions which employ a PCL, as seen in Table 8.

While SCL's, ICL's, BCL's, and DCL's each occur in over 20% of classifier constructions within the NCSLGR corpus, the other three types, BPCL's, LCL's, and PCL's occur in less than 10%, with LCL's and PCL's occurring at least once in less than 5% of classifier constructions.

3.3 DURATION OF NARRATIVES AS A PREDICTOR OF FREQUENCY OF CLASSIFIER CONSTRUCTIONS

In this section, I present the results of regression analyses, to show whether or not there is a significant correlation between duration of narratives and the number of items in narratives. As well, a regression analysis shows whether there is a significant correlation between duration and the number of classifier constructions.

3.3.1 Regression Analysis of Total Items and Duration

One might surmise that the total number of items in each narrative is significantly correlated with the duration of the narrative. A simple regression was performed, as seen in Figure 12, to show that this is, in fact the case.

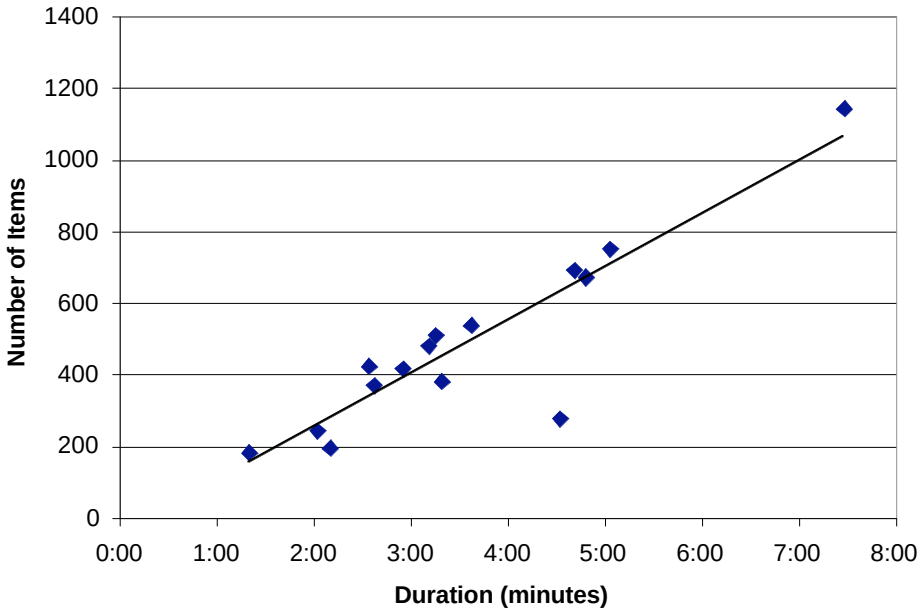

Figure 12: Regression Analysis of Total Items and Duration

In Figure 12, F = 57.591 (df = 1,14). There is a significant correlation ($p<.001$) between the total number of items and duration, with 81.58% ($R^2 = .8158$) of the variance in total items explained by variance in duration.

3.3.2 Regression Analysis of Signs and Duration

A simple regression was performed to determine whether there was a significant correlation between the duration of a narrative and the number of signs per narrative. As might be predicted, there is a correlation, as shown in Figure 13, below.

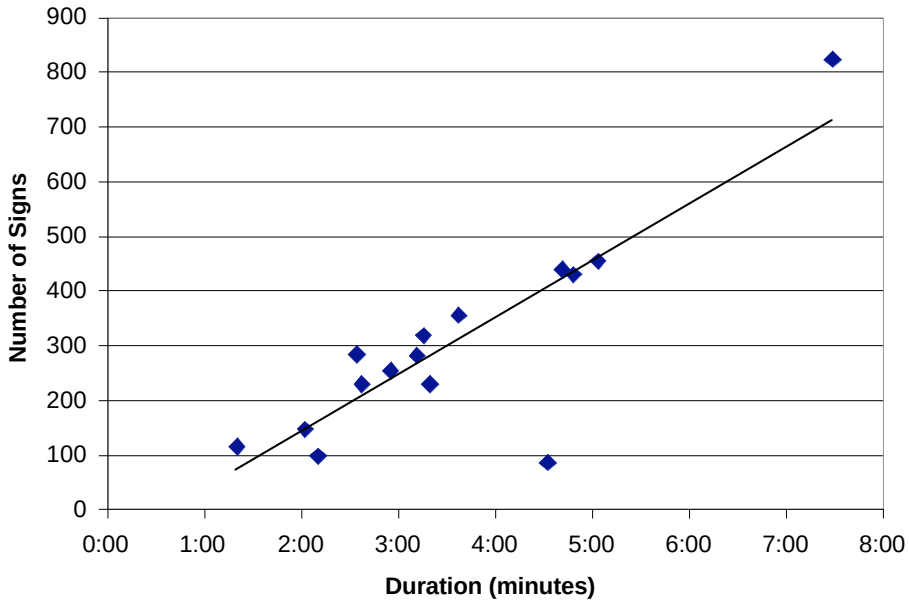

Figure 13: Regression Analysis of Signs and Duration

In this regression analysis, F =34.485 (df = 1,14). There is a significant correlation ($p<.001$) between duration and the number of signs, with 72.62% ($R^2 = .7262$) of the variability in number of signs explained by variability in duration.

3.3.3 Regression Analysis of Classifiers and Duration

As there is a significant correlation between duration and the total number of items, as well as duration and the total number of signs (See Figures 12, 13), it might be expected

that duration is correlated with the number of classifiers. However, a simple regression analysis shows that this is not the case, as seen in Figure 14.

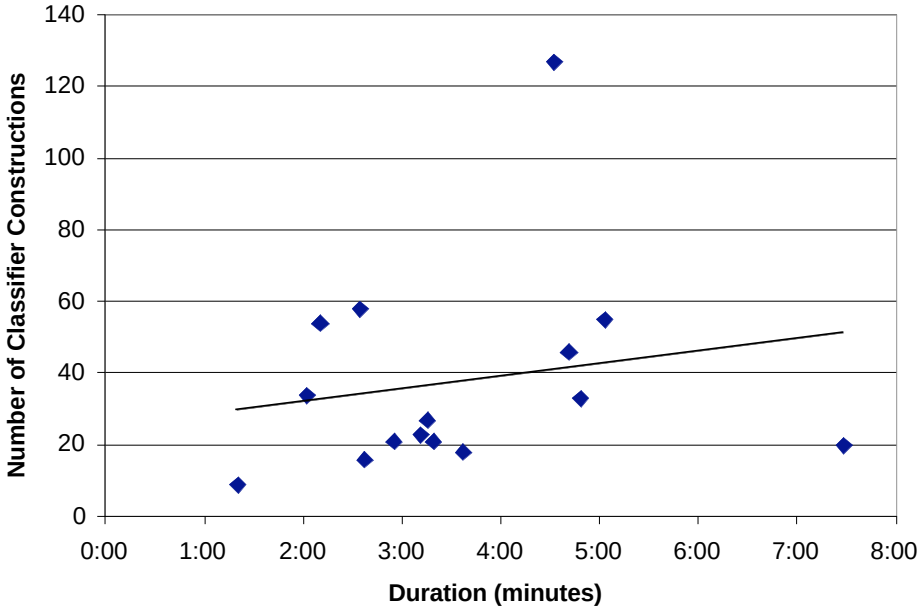

Figure 14: Regression Analysis of Classifier Constructions and Duration

In this regression analysis, F = .465 (df 1, 14). There is not a significant correlation ($p<.001$) between duration and the number of classifier constructions, with 3.46% (R^2 =.0346) of the variability in classifier constructions explained by variability in duration.

3.4 SUMMARY OF RESULTS

Classifier constructions comprise 7.68% of the narrative corpus, overall. The most prevalent types of classifier in construction in the corpus are SCL (29.36%), ICL (24.38%), DCL (24.2%), and BCL (22.6%). The least common classifier types found in

classifier constructions throughout the corpus are BPCL, LCL, and PCL, all of which occur in fewer than 7% of classifier constructions.

Within the NCSLGR corpus, the duration of a narrative is significantly correlated with the number of items overall, as well as the number of signs in each narrative. However, there is not a significant correlation between duration of a narrative, and the number of classifier constructions found within that narrative.

4.0 DISCUSSION

In this section, I discuss the results of the study. The limitations of this study, due to current knowledge, as well as issues with the corpus under investigation will be discussed. In addition, possible avenues for further research are included.

4.1 FREQUENCY OF CLASSIFIERS

The NCSLGR narrative corpus contains 562 classifier constructions, which accounts for 7.68% of the total items in the corpus overall. However, for each participant, the percentage of classifier use was very different. Classifier constructions totaled 16.78% of Ben's narratives, and 6.45% of Mike's narratives.

The percentage that classifier constructions represent in the whole corpus (7.68%) seems lower than might be expected, especially for narrative discourse, and given that they are generally believed to be frequently occurring. However, the number of participants, as well as the number of narratives should be kept in mind. Given the difference in percentage of classifier constructions between these two participants, and the disparate number of narratives contributed by each (3 for Ben versus 12 for Mike), additional participants and narratives could yield very different results. For the time being, the most frequently occurring types in the corpus under investigation will be discussed.

4.1.1 Semantic Classifier Constructions

Semantic classifiers (SCL's), as shown in the previous section (see Table 8), are the most prolific type in classifier constructions within the corpus under investigation. Each of the narratives analyzed possesses constructions with SCL's, and a variety of reasons may account for this fact.

SCL's have been observed to occur more in ASL than another signed language (Israeli Sign Language, ISL) at an earlier stage in its development (e.g. a younger language) than ASL (Aronoff, et al 2003). Aronoff, et al propose that these classifiers, in ASL, have evolved from more transparent forms to more abstract forms, in a process of "desemanticization," (2003). It may be that SCL's are used more because they are more sign-like

As noted, classifiers provide a rich source of derivational morphology; it would be interesting to observe whether signs derived from classifier constructions are more likely to derive from SCL's, given their greater frequency of use. One might expect this to be the case in a signed language in which SCL's are relatively frequent

The narratives that contain the most SCL types include narratives 9, 1, 13, and 2 (Whitewater, Close-Call, Road Trip 1, Speeding). Each of these narratives involves the broad notion of 'travel,' and many of the classifier constructions used in these narratives involve persons and/or vehicles. Broadly, the topic of 'travel' seems to lend itself well to the use of SCL's (particularly representing persons and vehicles). However, this notion alone cannot account for the greater number and percentage of SCL's in these narratives; narrative 14 (Road Trip 2) fits well into the 'travel' topic, but has relatively few SCL's.

While topic may be a significant factor in the frequency of SCL's, other factors besides topic may be involved.

4.1.2 Instrument Classifier Constructions

ICL's (Instrument Classifiers) are the second most frequently occurring type after SCL's. The greatest number of this type occur in narrative 15 ('Scary Story') with 51, and narrative 14, 'Dorm Prank,' with 14 ICL's. Unlike SCL's, the narratives with greater numbers of ICL's are difficult to unify by topic.

As stated, instrument classifiers depict an agent manipulating an object. While it may be plausible, via a change in perspective, to replace a SCL with another classifier type, it may be more difficult to do so with an ICL. For example, it seems possible (at least in some cases) to use a BCL (Body Classifier) to describe the actions of a person, rather than use a SCL to represent a person; however, it is difficult to imagine what type of classifier could easily replace a ICL (one could say a BCL, but there may be a fine line between ICL and BCL—see section 4.3). It may be that in instances where an ICL is used, there are few (if any) other options available.

4.1.3 Descriptive Classifier Constructions

DCL's (Descriptive Classifiers) occur nearly as frequently as ICL's, with 24.2% of classifier constructions throughout the corpus having at least one instance of this type of classifier. The greatest number of DCL's are found in narrative 15 (Scary Story) with 27, and narrative 1 (Close Call), with 24. As with the ICL's, there is little similarity in topic by which to compare the frequency of DCL's; however, there may be more general reasons explaining their frequency throughout the corpus.

DCL's (which are referred by some researchers as Size and Shape Specifiers) have a (arguably) more adjectival quality than other types of classifier construction. It seems that DCL's often describe properties of referents, rather than referents themselves. DCL's may be used in cases where adequate description would otherwise be lacking, or possibly just awkward or overly-voluminous. While it may (and by no means certainly) be possible with any of the classifier types, to replace them with periphrasis, or possibly substitute a different classifier type, it may be the case that for the most frequently occurring types, especially DCL's, that the classifier used is the best, most descriptive, and perhaps most economical option for descriptive purposes.

4.1.4 One Narrative in Detail

Narrative 15, 'Scary Story,' contains more classifier constructions, with 127, and a greater percentage of classifier constructions out of total items, 45.36%, than any other narrative in the corpus. While, in general, Ben's narratives contain a higher percentage of classifier constructions, 'Scary Story,' signed by Mike, is truly unique within the corpus for the sheer number of classifier constructions. What accounts for this fact?

Scary Story is somewhat unique among Mike's narratives in being a story that is in no way connected to a real-world event. Mike's other narratives involve events that took place in his life and/or things he witnessed (though I make no actual claims about the veracity of his narratives). It could be the case that not all narratives are treated equally and/or that not all narratives are treated equally by different persons (See Section 4.5.2).

4.2 DELINEATION ISSUES

In general, counting classifier constructions is relatively straightforward. An utterance usually contains signs, and in some instances a classifier construction, or multiple classifier constructions. Generally, classifier constructions delimit themselves, at least partially, by surrounding signs. However, when one classifier construction is repeated, or when a classifier construction follows another classifier construction, the boundary of one construction blends with the next, in some instances. For example, in 'Scary Story' (Duffy et al 2007c) an ICL construction portraying nailing a coffin shut was used four times in sequence; each instance was counted as a separate construction. In this, and similar cases, I attempted to count 'discrete' actions (which is somewhat subjective) as separate constructions, often by pauses in between constructions, but it could be the case that seemingly discrete, multiple constructions are all contained within a single construction.

This points to a lack of clear delineation as to what qualifies as a 'classifier construction.' While there is reasonable understanding of what is contained within the classifier construction—a classifier (e.g. 'classifying' handshape/ hand configuration, body configuration) and information about state/description, motion, and/or location, it is less clear how much information is or can be contained within a single construction. As stated in Section 2.4, it seems reasonable, given the modality, and given the treatment of repetition generally in signed languages, that some degree of repetition could be 'built in' to a single classifier construction. According to Aronoff, et al (2003), "classifier constructions can span prosodic domains of various sizes, including entire intonational phrases and up to phonological utterances," though they are not words, nor do they have

their own prosodic structure. The determination of what constitutes a classifier construction for counting purposes is particularly salient to discussion of BCL's.

4.3 BODY CLASSIFIERS

While none of the classifier types investigated herein is wholly unproblematic (e.g. undisputed by linguists as to existence and proper categorization), one type seems more atypical of classifiers, in terms of classifier typology, than the others, and this is the body classifier (BCL).

4.3.1 Body Classifier Issues

Body classifiers go by many different names in the literature including 'constructed action' (cf Metzger 1995; Quinto-Pozos 2007) and 'referent projection' (cf Aronoff, et al 2003). To be fair, this is akin to many types of classifier, but BCL's seem more likely to be regarded as separate from the classifier system, regardless.

David Quinto-Pozos (2007) considers body classifiers (or 'constructed action') complementary to a variety of other communication devices in ASL, including classifier constructions. In a study involving production and judgment tasks among ASL users, Quinto-Pozos (2007) found that descriptions produced with body classifiers were judged to be clearer and more correct than versions of the descriptions in which the body classifiers were replaced by signers with other devices. While body classifiers may not be obligatory per se, exclusion of them from the certain descriptions involving animate entities produces awkward, if not necessarily incorrect signing.

Aronoff et al (2003) note that "long sequences of referent projections are seen as more appropriate for storytelling or poetic forms than for conversational ASL." In some of the narratives (7, 9, 11) BCL's show up in 50% or more of the classifier constructions in the narrative, though only 24.2% of the classifiers in the corpus as a whole. In this way, the discourse type may influence the choice of classifier construction used; a high percentage of BCL's would likely not be seen in another type of discourse, but may be regarded as appropriate for narrative discourse.

In some instances, a construction annotated as a BCL appears to contain two different classifier types. For example, in Narrative 14 (Road Trip 2), utterance 35 (Duffy et al 2007b), a classifier construction described as "taking a bite of a burger" is labeled BCL, but it seems possible that the use of the hands to emulate 'holding' a burger could be described as an ICL. For the sake of replicability, and because this distinction (if it is accurate) does not affect the overall count of classifier constructions, I have followed the annotations provided in the corpus. Quinto-Pozos (2007) notes that sometimes it is difficult to determine whether an item should be categorized as an ICL (or "handle polycomponential sign," in his terminology) or a BCL ("constructed action" in his terminology).

4.3.2 Body Parts as Classifiers?

An interesting question arises surrounding body classifiers and the body itself. In theory, classifiers only pair with other classifiers within a classifier construction, and in limited combinations (not all classifier types interact equally with all other types). However, if a classifier combines with a body part, and it is the actual body part to which the signer is

referring, is that body part a BCL, or some other type of classifier, or a meaningful gesture, or something else entirely?

For example, in narrative 4, Mike describes the events surrounding his (obviously) injured finger. Mike implements an ICL with his right hand to describe having his left ring finger wrapped in a bandage (see Figure 6). In the same narrative, and in a similar vein, Mike describes putting a bag on his injured hand in order to keep it from getting wet in the shower. In these cases, is the injured hand/finger a body classifier? A locative classifier? Perhaps the classifier is simply coincidental with the actual hand, and should not be regarded differently from other classifiers because of it. Or, perhaps in these cases, signers make use of gesture that is meaningful in the discourse, but not necessarily linguistically. Whatever the case may be, these instances seem problematic.

4.4 WORKING WITH A CORPUS

Some issues involving the corpus under investigation that could impact upon these findings should be noted. These include: sample size, sample type, and the participants themselves. This study provides a good starting point for analysis of frequency in American Sign Language, but it is preliminary in nature.

4.4.1 Sample Size

First, the NCSLGR corpus, while sizeable as far as ASL research is concerned, especially given the detailed annotations provided, is relatively small (compared to corpora now

available for spoken English). As more data become available, through the NCSLGR, and contributions from additional researchers, this problem will be ameliorated.

4.4.2 Narrative Discourse and Topic

The NCSLGR corpus currently contains only elicited utterances (not investigated in this thesis) and narratives; two dialogues, of approximately twenty-three minutes each, between two native signers have been collected, but are not yet available to the public. It is possible that the results contained herein are generalizeable only to narrative discourse. An obvious extension of this work would be to carry out an analysis on additional data from the NCSLGR/ASLLRP.

In fact, 'narrative' may be too broad a term for this corpus. As stated previously, there is a significant difference between the frequency of classifier constructions in Ben and Mike's respective narratives. While most of Mike's narratives (with the notable exception of 'Scary Story') involve real events that took place in his life (or seemingly so, at any rate), this seems to be the case for only one of Ben's narratives ('Close Call'); of the other two narratives, one is the well-known story of 'The Three Pigs,' and the other is a product of Deaf folk-lore, a relatively well-known story in the Deaf community. It may be that that the type, or purpose of a narrative influences the number of classifier constructions used. If certain types of classifier are deemed more appropriate for narrative discourse, perhaps classifiers in general are more appropriate for certain types of narrative.

It should be noted that the 'real-world' narrative among Ben's narratives, contained a higher percentage of classifier constructions than either of his other two

narratives. The notion that classifiers are more appropriate for certain types of discourse, or sub-types of discourse warrants further investigation. Only one of Ben's narratives is connected to a real event (possibly), and only one of Mike's narratives appears to be a story just for story's sake. While it could also be the case that the notion of 'appropriateness' is treated differently by different people, a conclusion requires more narratives of differing types from these and other signers.

With any of the classifier types, topic may influence the frequency of use. In the NCSLGR corpus, topic was determined by the participants. Topic may also influence the frequency of particular types of classifier construction. However, it is difficult to control for topic without influencing the results. In addition, it is difficult to control for topic at the narrative level, as well as decide what an overarching topic might be (the story of the three pigs told in narrative 3 is, in a sense, about pigs, but that would not be a truly accurate description of the topic). Future work in this area could examine classifier type by topic, perhaps at the utterance/sentence level, as well as non-narrative (or, perhaps, less narrative) discourse.

4.4.3 Participant Issues

Finally, there are only two participants in the current manifestation of the NCSLGR corpus. A larger participant pool is required to rule out individual differences (personal style, etc) and differences among/between different groups. As shown in Table 7, Ben used a significantly higher percentage of classifier constructions (16.78%) than Mike (6.45%). This could simply be due to personal style, or to some other relevant factor such as age. A broader range of signers would allow for comparison of classifier use based on gender, education, class, etc.

In addition, Ben Bahan is a well-known storyteller in the Deaf community and beyond. His face is familiar to anyone who has watched the Signing Naturally video/DVD texts. Ben Bahan is also a linguist. Though I cannot posit a direction for a cause/effect relationship, either of these factors could affect classifier construction frequency.

Both Mike and Ben are native users of ASL from Deaf families. It is common practice in sign linguistics to collect data from 'native' users of ASL (those who acquire ASL from birth), in part to make it comparable to research on native speakers of spoken languages. However, most deaf/Deaf people are born to hearing parents; this, combined with the fact that classifier constructions are acquired relatively late in the acquisition process (Boudreault & Mayberry 2006) may make data from this corpus (and any corpus involving only Deaf-of-Deaf) generalizable to a small percentage of the ASL-using community. A broader knowledge of ASL use would emerge from the use of CODAs (children of deaf adults), as well as self-identified members of the Deaf community, who may have acquired ASL at a later age.

4.4.3.1 Sociolinguistic Data and Corpora

In order for a more complete understanding of ASL classifier constructions (and ASL generally) to emerge, a variety of sociolinguistic data could be examined in conjunction with corpus collection/creation. A variety of sociolinguistic factors have been shown to influence language choices/use in signed language research. Some of these factors include: gender, age, education, Deaf identity (as measured by a variety of features/attributes), race/ethnicity, and sexual orientation.

In some of these cases, e.g. race/ethnicity and sexual orientation, the differences in linguistic choices/usage examined are confined largely to lexical choices. However, given the "special" lexicogrammatical status of classifier constructions, any of these factors may influence the frequency of use, or the choice of a particular classifier type.

4.5 IMPLICATIONS OF CORPUS WORK

Research on corpora garners frequency information for languages. While work of this type is well established for English, it is less well established for ASL. Corpus work that aids in identifying frequent constructions has implications for the language classroom, as well as machine translation.

4.5.1 ASL Language Classes

As noted in Section 1.4, corpora have had a significant impact on the language learning classroom (Hunston 2002). This is especially important for d/Deaf people. A number of detrimental language practices involving varieties of signed and/or spoken English have been implemented in schools/classes for deaf children, some of which continue today, though many schools now use ASL in the classroom (Jankowski 1997). However, the signing skills of a teacher may only be as good as those taught to them.

Continued corpus research will aid in identifying frequently used constructions, including classifiers. This could impact the texts used in classrooms teaching ASL to educators of the deaf, interpreters for the deaf, and the deaf themselves. Given the complexity of the classifier system in ASL, early introduction to frequently occurring forms, and frequent repetition should make the system easier to acquire.

4.5.2 Machine Translation

In addition to the language classroom, corpus work has implications for accessibility for deaf people, specifically related to machine translation. Currently, many aids to accessibility for Deaf people (closed captioning, TTY) require English literacy, which many Deaf people do not possess, or possess at very low levels (Huenerfauth 2005). The use of " [a]n automated English-to-ASL machine translation (MT) system could make information and services accessible when English text captioning is too complex, an English-based user-interface is too difficult to navigate, or when live interpreting services are unavailable," (Huenerfauth 2005). However, one major obstacle to the creation of an MT system for English-to-ASL is the complexity of the classifier system.

By first analyzing corpora to determine the most frequently occurring classifiers/classifier constructions, as well as classifier types, a more thorough investigation of frequently occurring types will aid in efforts of English-to-ASL machine translation. The availability of English-to-ASL machine translation will lead to a truer accessibility for the Deaf community, accessibility that accounts for actual language use and needs.

4.6 TYPOLOGY ISSUES

One issue involved in the classifier typology used for the NCSLGR corpus is the possible overlap of categories. In some instances in the corpus, one could argue that more than one types of classifier adequately suits the construction. One could fault the typology used, but discrete categories prove difficult for many aspects of ASL. For example, Neidle (2002) notes the difficulty in ascribing an item the title of 'sign' versus 'gesture.'

At what point does a gesture become a sign, or a classifier become a sign, or a point become an adverbial? These theoretical questions must be addressed in order for adequate description of ASL to exist; however, they are outside the scope of this research.

It seems possible that some of the much less frequently used classifier types, as described/ used throughout this study could be consolidated. PCL's (Plural Classifiers) occur in only 1.6% of classifier constructions. Often, at least in the corpus under investigation, PCL's refer to multiple persons/animate beings (See Figure 8, "three pigs walking"); however, a single person (the '1' hand configuration) is designated a SCL (Semantic Classifier). These constructions represent very similar things, and could be thought of as belonging to the same category. Of course, it is equally possible that compressing these two categories would create other problems; the SCL '1,' used for a person, only may refer to a single person, whereas the '4' hand configuration may refer to four people, or simply mean 'many' people.

The other relatively infrequently used types of classifier, LCL's (Locative classifiers) and BPCL's (Body Part Classifiers) occur in 4.98% and 6.58% of classifier constructions, respectively. These percentages are relatively low compared to other types, but still significantly higher than the percentage of PCL's; LCL's and BPCL's may not be as easily consolidated into another single category. Consolidation may require a case-by-case examination of each CL, or a more dramatic restructuring of the categories in this particular typology. Further work is required to design a typology that adequately categorizes classifiers.

5.0 CONCLUSION

Classifiers account for 7.68% of the narrative corpus under investigation. The most frequent types of classifier in the NCSLGR corpus are (in order from most to least): semantic classifiers, instrument classifiers, descriptive classifiers, and body classifiers. The least used classifier types in the corpus (in order from most to least) are: body part classifiers, locative classifiers, and plural classifiers.

In order for work on classifiers to adequately proceed, researchers need to arrive at some sort of consensus on the proper description, definition, and terminology to use. Corpora will be invaluable for this type of research, and the lack, up to now, of widely available ASL corpora have stunted research of this type. If researchers are able to view the same information and identify patterns of use, a more consistent typology and better understanding will emerge.

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APPENDIX A

ANNOTATION NOTES

These are notes on choices I've made in how to count certain annotations, and in some cases, changes that have been made:

Narrative 1—'Close Call'

1. In utterances 7 and 10, WHY^NOT (where '^' indicates a contraction) was counted as 1 sign. This sign seems more like a compound in ASL, and all other compounds were counted as one sign. Arguably, this could be two signs.

2. In utterance 42, the original annotation for a classifier construction was: BCL:S "heart beating in chest." I treated this construction as having 2 BPCL's, as in: BPCL: S "heart beating" and BPCL:B-L "chest." In the previous utterance (41), there seemed to be an identical construction with the latter coding, which seemed more appropriate. The change was made for the sake of consistency.

Narrative 6—'Boston-LA'

1. In utterance 31, BOSTON+PERSON (e.g., 'Bostonian') was counted as two signs, rather than a single compound.

Narrative 8—'Dorm Prank'

1. A series of ICL's in utterance 15 involving wrapping, holding, and pulling a rope were counted as one classifier construction; it could be argued that there are as many as four.

2. Utterance 15 also contains an ICL, "testing handle" (of two doors) that was treated as one two-handed classifier construction, but could be regarded as two.

Narrative 9—'Whitewater'

1. In utterance 57, three BCL's, "pulling paddle, grabbing woman," and "pulling woman up," were counted as one classifier construction. There seemed to be no role shift involved, though one could argue that these may be three separate classifier constructions.

Narrative 10—'Football'

1. Utterance 36 contains an item coded #TO (e.g. a fingerspelled loan sign), but appeared to be a fingerspelled item, and was counted as such. In addition, this would generally be regarded as 'English-like' signing.

Narrative 12—'Siblings'

1. In utterances 2, 18, and 66 FIND^fsOUT was counted as two signs, as it does not exhibit similarities to a compound, and is somewhat 'English-like.'

2. In utterance 9, EVERY+fsDAY was counted as two signs, rather than a compound, as this may be a valid compound in English, but does not seem to be an ASL compound.

Narrative 15—'Scary Story'

1. Instances of the DCL, "tree passing by" that did not include a 'ground' classifier were treated as a single two-handed classifier construction (regardless of the number of DCL's annotated), when not interrupted by signs or other classifiers. (In one case, utterance 4, it was coded as a two-handed, alternating DCL). This occurred in utterances 2, 4, 8, & 10.

APPENDIX B

SIGNSTREAM™ SCREENSHOT

This following is a screenshot of Narrative 3, 'Three Pigs,' utterance 8 (Neidle, Lee, Duffy & Schlang 2007c) open in SignStream™. It shows the index of utterances, the video clip opened to utterance 8, and the annotation window underneath.