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Audience Effects in American Sign Language Interpretation

A Dissertation Presented

by

Julia Weisenberg

to

The Graduate School

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Requirements

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Doctor of Philosophy

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Abstract of the Dissertation

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There is a system of English mouthing during interpretation that appears to be the result of language contact between spoken language and signed language. English mouthing, is a voiceless visual representation of words on a signer's lips produced concurrently with manual signs. It is a type of borrowing prevalent among English-dominant bilingual-bimodal sign language interpreters who use American Sign Language (ASL) and spoken English when interpreting for deaf consumers (Davis, 1989; Weisenberg, 2003). It is distinct from other systems of grammatical mouthing observed in native deaf signers. Bilingual-bimodal interpreters have the advantage of *simultaneity*: the two channels of expression are distinctly different: one, a visual-gestural channel, the other, oral-aural. When sign language interpreters organize abstract oral English discourse into a concrete visual-spatial form, they borrow from their dominant language, English. This study tested audience effects during interpretation from spoken English to ASL. Interpreters shifted their style to accommodate their addressees. A style shift was measured by the rate of English mouthing. Based on an analysis of variance (ANOVA) $F(1,3) = 6.25, p = .08$, the study demonstrates that the perceived cultural identity of the audience has more of an effect on English mouthing than topic, $F(1, 3) = .046, p = .84$. A pattern of mouthing reduction was also discovered. At least two experimental contexts contained technical terminology that was repeated. When there were no manual equivalents in ASL, interpreters interpreted these terms by overlapping mouthing with a manual sign of approximate meaning. Once they had expressed the combination, the mouthing was reduced or removed completely. This study confirms what is a commonly held notion in audience design, that speakers adjust their language in reaction to their addressees, and also opens up an inquiry to the use of the sign language interpreting context as a means of examining neologisms and language variability.

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1 Introduction

QUESTIONS

One question that initially drove the formation of this study was “Why do sign language interpreters use English mouthing?” An individual unfamiliar with sign language or interpretation might naively assume that manual signs should be sufficient to convey a message to a deaf audience, given the fact they cannot hear, and use their hands to communicate, not their mouths. In the education of interpreters, English mouthing is witnessed frequently. In fact students of interpretation are explicitly taught how to shape their mouths, how to coordinate mouthing with manual signs, and trained on how to evaluate the audience to determine the degree of usage. However, sign language interpreter trainings often refer to both contexts and consumers as contributing to choice of English mouthing. So, a second question was “What triggers sign language interpreters to use mouthing? Is it *who* they are working with or *what* message they are conveying?” An experiment was designed where one could manipulate lectures and audience (independent variables), and then measure mouthing (dependent variable). The null hypothesis would be that the consumer would have no effect on English mouthing. One would expect to find the same rate of English mouthing in a translation task where the interpreter perceives the audience to be culturally Deaf (affiliated with Deaf culture) and an equivalent task where the audience is perceived to be non-culturally Deaf (affiliated with hearing culture). Additionally, it was hypothesized that the audience would have a greater effect on English mouthing than the topic.

A third question that formed the basis of this project was “What are the functions of mouthing in interpretation and what does it look like?” With several hours of data, it would be possible to examine the functions of mouthing more closely. This project had two main goals: (1) to examine the frequency of English mouthing by bilingual bimodals interpreters when the deaf audience and topic are changed; (2) to investigate the patterns of English mouthing to identify its usefulness as a borrowing. The results showed that the audience does have an effect on mouthing. When interpreters believe the consumer to be non-Deaf, they increase their mouthing.

SIGN LANGUAGE INTERPRETERS AS SUBJECTS

The interpreting situation provides a unique look at sign change in general because sign language interpreters are thrust into this sign-spoken language contact situation on a daily basis. Consumers with whom they work are varied in their cultural backgrounds and choice of language, whether it be signed or spoken, or combinations of both. Interpreters are different from their deaf consumers because they are bilingual bimodal users of both a spoken and a gestural language. The sign language interpretation task and the interaction of

the interpreter and his/her audience offer a sociolinguistic Petri dish in which to analyze the interaction of mouth and hands. This is particularly important to the current research of speech and gesture as an integrated system. The more evidence gathered showing that humans coordinate the hands and mouth, the further theories of the biology of language can be refined.

SIGNIFICANCE OF THE RESEARCH

Speech and gesture work as an integrated system. It has been documented that 90% of gestures normally coordinate with speech (McNeill, 1992). Gesture and speech are semantically co-expressive. A certain gesture type will tend to appear alongside a specific speech type. For example, representational gestures will traditionally appear within speech that is serving a narrative function with concrete objects and actions. Metaphoric gestures will appear co-produced with speech, reflecting abstract notions of the utterance (McNeill, 1992). Gesture and speech are temporally synchronous. The stroke of the gesture aligns with its corresponding word (Kita, 1993; Nobe, 2000). The time between onset of a gesture and onset a word is systematic (Morrel-Samuels & Krauss, 1992). It has also been noted that when speech is interrupted, during stuttering, gestures likewise stop (Mayberry & Jaques, 2000). In short, whether it is a case of gesture aiding the speaker or the addressee, there exists a complementary relationship between speech and gesture. The current study of bilingual bimodals' coordination of hand and mouth contributes to the overall theory of speech and gesture as a complimentary system in humans.

Sign language linguistics has moved beyond its initial stages, in which linguists such as William Stokoe demonstrated how American Sign Language (ASL) had syntax, phonology, morphology, and semantics. Early sign language linguists focused on describing the structural properties, so that ASL could be compared with other languages, and there was concern for proving ASL to be a legitimate language. Later research turned to the diglossic nature of ASL, and concern arose for preserving the pure form of ASL (Padden & Humphries, 2005). Today the legitimacy of ASL is no longer in question. It would have been taboo in early sign language linguistics to discuss the mouth, and how deaf people integrate sound and signs. Demonstrating how ASL users integrate English phonetics and manual gesture only strengthens the status of ASL in the world's languages.

Today as newer developing sign languages are examined, such as Nicaraguan Sign Language and Al Sayyid Bedouin Sign Language, as well as older sign languages of the world, sign language linguistics is exploring the language in its immediate environment. As more hearing people learn sign language, and technology improves communication between deaf and hearing people, there is more likelihood of contact language, mixing, borrowing, and integrating of the gestural and aural channels. Not all sign languages make equal use of mouthing; for example, Bedouin signers of Al Sayyid Sign Language do

not exhibit as much mouthing as the signers using Israeli Sign Language (M. Aronoff, personal communication, April 6, 2009). American deaf signers appear to use more mouthing than Russian sign language users (D. Kolmogorov, personal communication, February 15, 2009). The new generation of sign language linguists will continue to examine all the uses of the body in signing, but specifically, the relationship between the hands and mouth. The present study is simply one more piece in the puzzle of how language users exploit all means to communicate.

Trying to find similarities between mouthing gestures and manual gestures will likely prove fruitless. Just as speech and gesture in non-signers seem to only have success when somehow combined, the same holds true for mouthing coupled with manual gestures. The two systems are very different, yet enhance or support each other (Sandler, in press).

A third contribution of this study is to the theory of audience design in psychology as will be explained in detail in later chapters. Speakers accommodate their addressees, picking up cues about addressees through their speech or gesture, and speakers adjust their words accordingly. Sometimes speakers intend to invite or make another comfortable. Other time, speakers attempt to distance themselves or exclude others. This is a fundamental part of human communication. It is noteworthy that the present study shows that there is an audience effect in bilingual sign communication. Regardless of modality, speakers are affected by those with whom they communicate. This study is the first of its kind to look at audience design in the bilingual bimodal area.

Last, the current project makes a contribution to the field of interpreting. Having worked as a professional interpreter for the last fifteen years, I believe it is important to conduct useful research, thereby reciprocating for the education and experience the field has given to my colleagues and me. Mouthing is among the most difficult skills to master in interpretation. It is somewhat ironic that mouthing, an aspect of sign communication that stems from the phonological, is what can often cause an interpreter to be judged as native-like by speakers of a gestural language. Learning to interpret in the deaf community has never been a simple case of mastering manual signs. Interpreting has always required that one know how and when to integrate the mouth and hands. Currently, there are few, if any, in-depth studies of interpreter mouthing. The interpreting field demands more studies of this type, particularly with approved experiments, to further examine how interpreters interact and adjust to their deaf audience.

HAND AND MOUTH INTEGRATION

There has been an ongoing inquiry regarding the degree to which the hands and mouth integrate in sign language (Sandler, in press; Vogt-Svendsen, 2001; Hohenberger & Happ, 2001). It is difficult to determine what linguistic status mouthing has. In fact, some linguists believe mouthing is an integral component of sign languages while others completely reject the idea, dismissing

mouthings as having no status in the language (Hohenberger & Happ, 2001). A current claim is that part of the natural human language instinct involves the hand and the mouth working together to create symbolic images, or “symbolic symbiosis”(Sandler, in press). Iconic gestures in spoken language are well documented in the literature, as are iconic mouth gestures (for example, Israeli Sign Language); even among recently studied village sign languages such as those using Al-Sayyid Bedouin Sign Language, there exist iconic mouth gestures (Sandler, in press). Besides iconic mouth gestures, other functions of mouthing have been reported, including English mouthing in the present study. The existence of mouthing and signing coordination further strengthens the case for the instinct to use the hand and mouth in producing language (Sandler, in press). Recent research in the evolution of language has proposed a biological link between hand and mouth. For example, theories of manual gesture combined with speech in human language evolution have been proposed (Armstrong et al., 1995). Conversely, research has suggested that humans first gestured then spoke (Arbib, 2005). Others have looked into mirror neurons in monkeys, which suggest a similar link between hand and mouth (Rizzolatti et al., 1998). Articulation and voice modulation may have stemmed from certain manual actions (ex. moving food to the mouth) (Gentilucci, et al., 2004). It is also possible that the environment that deaf people live in can affect the degree to which the mouth and hands integrate; for example, geographical isolation from hearing people and encounters with sound concepts could result in a reduced use of mouthing (M. Aronoff, personal communication, April 6, 2009).

It is important that researchers continue to examine how gesture, be it manual or non-manual, and the linguistic signal coordinate, so that we can build on and refine our theory of bimodal language in humans.

1.1 Outline of dissertation

Before exploring the design and results of the experiment, it is necessary to begin with an understanding of the people involved in bilingual bimodal discourse. So, a review of the literature on bilingual language alternation has been provided for both spoken language and sign language. Secondly the current study focuses on a special type of bilingual bimodal, sign language interpreters. They are professional service providers, and therefore subject to regulations governed by agencies and organizations that monitor their proficiency and professionalism. It is essential, therefore, to provide the reader with a background on the interpreting profession, and a brief history about the relationships between interpreters and deaf people. Since the subjects in this experiment are using spoken English and ASL, and serve deaf individuals of varying cultural backgrounds, it is also crucial to summarize the history of deaf people in North America, and the linguistics and evolution of ASL. The current study hypothesizes that bilingual bimodal interpreters select their language with their audience’s needs in mind, and so the concept of audience design from the

fields of psychology and sociolinguistics must likewise be explained. In addition, the degree of audience effect was measured by English mouthing overlapped with manual ASL gestures, so the current project must also describe what this system of English mouthing looks like, and how it differs from other systems of grammatical mouthing already observed in the language of native Deaf signers. The outline of the dissertation will be as follows: Chapter 1 presents an overview of borrowing in spoken language and signed language. Chapter 2 offers a background in American Sign Language and Sign Language interpreting. Chapter 3 provides a review of the intersection of gesture and speech, and the characteristics of English mouthing versus other systems. Chapter 4 examines the relationship between speakers and addressees, and how addressees can affect a speaker's language choice. Chapter 5 gives the structure of the current experiment methods of data collection, results, and implications. Chapter 6 concludes with a summary and directions for future research.

1.2 Introduction to Borrowing

TYPES OF BILINGUALISM

Language contact creates bilingual speakers because generally language groups do not exist in complete isolation from each other. Historically, immigration, geographical location, and trade have been factors that perpetuate the need for bilingual abilities (Grosjean, 1982). Defining bilingualism is difficult due to the fact that there can be varying degrees of proficiency. However, a bilingual is traditionally a person who uses or is able to use two languages with equal fluency. Bilingual behaviors include code-mixing, code-switching, and borrowing. Code-mixing is a commonly used term to refer to the speech of a bilingual that has lexical items and grammatical features from two languages in one sentence; whereas, code-switching, refers to the repeated rapid production of several languages in a single speech event (Muysken, 2000). Unfortunately there has been some overlap of the terms in the literature on bilingualism. Code-mixing has been difficult to distinguish from code-switching. This may be due to the fact that researchers are unclear as to how label intrasentential alternation (within sentences) versus intersentential alternation (between sentence boundaries). It has been argued that code-mixing is the appropriate term for intrasentential alternation where lexical elements from one language are inserted into the grammatical structure of another within a sentence, clause, clause, or constituent (Sridhar & Sridhar, 1980; Muysken, 2000). While some researchers contend the two terms should be distinguished (Poplack, 1990), others feel the two phenomena are indistinguishable (Myers-Scotten, 1993).

LEXICAL BORROWING

Lexical borrowing, or simply *borrowing*, is the process of taking lexical material from one language and adapting it to the morphological, syntactic, and

phonological patterns of the recipient language (Poplack & Meechan, 1995). Loanwords are such established borrowings, for example. They are usually linguistically integrated, they replace native language synonyms, and they are widespread in the language, even by monolinguals from the borrowing (recipient) language.

REASONS FOR ALTERNATION

These types of language interactions can occur for a variety of reasons. Sometimes they occur to signal social-group membership (Myers-Scotton, 1993; Gumperz & Hernandez-Chavez, 1978). Other times it can be due to the inability to find an appropriate word or expression in one language (Scotton, 1979). Other instances include the association of one language with a particular topic (i.e. money) (Lance, 1979). Speakers can also attempt to exclude someone from a conversation (Scotton, 1979; DiPietro, 1977), or to display authority (Scotton & Ury, 1977).

The ease with which many bilinguals use two or more languages has inspired extensive research in bilingual competence and the patterns of switching, mixing, and borrowing. For example, within the last decade, several studies have attempted to demonstrate that switching does not occur randomly, but rather is governed by syntactic rules and universal principles (Toribio, 2001; Sunderman, 1996; DiSciullo, Muysken & Singh, 1986).

The predominant source of data for research on language alternation has been bilinguals utilizing spoken languages, yet there exists a form of simultaneous language alternation used by the bilingual population of sign language interpreters which has received little attention (but Davis, 1989; Lucas & Valli, 1989). Language alternation is being used as a general term encompassing code-mixing, code-switching, and borrowing.

LANGUAGE ALTERNATION IN SIGN LANGUAGES

Sign languages and spoken languages have contrasting modalities, the former conveyed through an auditory modality, the latter communicated through a visual-spatial modality (Berent, 2003). The insertion of lexical items from one language into the grammatical structure of another is normally viewed as a sequential process. Insertion refers to a process by which lexical items or entire constituents from one language are put into the structure of another language. Sign language interpreters, however, are bilingual and bimodal. This unique type of speaker has the ability to insert an English morpheme into an American Sign Language (ASL) sentence. The English morpheme can come in the form of a silent production on the lips of the bimodal, while the hands can be rendering an ASL sign. So the result is a concurrent production of constituents from both languages. At this sign-phonetic juncture we see evidence of a unique form of borrowing. The very nature of the modality contrast permits this type of insertion, and likewise excludes possibilities of such insertions in spoken languages.

1.3 Theories of borrowing

DEFINITIONS OF BORROWING

When bilinguals are in the company of other bilinguals, they generally have agreed upon some form of communication, but they also always have options. They can switch to another language or they can borrow from another language and adapt that borrowed material into the recipient language (Grosjean, 1982). For example a French-English bilingual has the option to say: “Ca m’etonnerait qu’on ait *code-switched* autant que ca, “ or “Ca m’etonnerait qu’on ait CODE-SWITCHE autant que ca.” In both cases the sentences indicate, “*I can’t believe that we code-switched as often as that.*” (Grosjean 1982, p.308). In the first example, the speaker has code-switched. In the second example, there is lexical borrowing.

Grosjean (1982) proposes that code-switching “can be of any length (a word, a phrase, a sentence) and is a complete shift to the other language, whereas a borrowing is a word, or short expression that is adapted phonologically and morphologically to the language being spoken. “ (p. 308). Poplack & Meechan (1995) refer to borrowing as “the adaptation of lexical material to the morphological and syntactic patterns of the recipient language (p. 200). Muysken (2000) defines borrowing in a similar fashion “Code-mixing involves inserting alien words or constituents into a clause; borrowing entering alien elements into a lexicon (p.69). In all cases, a borrowing is seen as an element that has phonology and morphology that differs from the borrowing language, and hence has the potential to be integrated. Secondly a borrowing is most often seen as a single lexical item that finds its way into the larger lexical pot.

There is a difference between clause level and word level mixing. In terms of borrowing, foreign words can be adopted into a lexicon. In code-mixing two grammars and two lexicons are utilized to make a sentence (Muysken, 2000). For example, a French loan *autootje* is borrowed into Dutch:

Wat een te gek autootje (pronounced [‘ewtotje]
‘What a terrific car.’ (p. 70)

This word is pronounced using a Dutch diphthong; it has a Dutch suffix and Dutch neutral gender (Muysken, 2000). It is used frequently when speaking about cars, and would probably pass as Dutch by most speakers (p. 70).

In the following example, a French word has not been integrated into the Dutch vocabulary morphologically or phonologically:

Ze geven niet ge- uh...niet genoeg *pour cette jeun...jeunesse*.
‘They do not give enough for this...youth.’
(Treffers-Daller, 1994, p.213)

So these are clear-cut cases, however it is not always so simply determined. In a recording from a French-Dutch bilingual family living in Amsterdam, it becomes difficult to determine whether it is code-mixing or borrowing:

(24) Oh, Micheline, je viens pas au club parce que qu'il faut que j'aille au *oogarts* [standard French: *chez le...*].

'Oh, Micheline, I can't come to the club because I have to go to the Ophthalmologist.'

(25) Il ya du *bloot* qui est joli et du *bloot* qui' n'est pas joli.

'There is /nude/ that is nice and /nude/ that is not nice.'

(26) Je hebt *bijouteries*, je hebt kleren.

'You have /jewelry/, you have clothes.'

As Muysken (2000) points out, the *alien* word is not really specific to one culture, though perhaps particular to that family. The words are integrated syntactically (see the use of *au* and *du*) but not phonologically. This very reason has led some researchers to suggest dropping the idea of distinguishing code-mixing from borrowing. Words can be inserted into the syntactic tree of one language even though the inserted word has components that are from a different language (Muysken, 2000).

It is also necessary to consider whether an element is *listed*. Being *listed* refers to how a particular element or structure is part of a list that has been accepted by the speech community (Muysken, 2000; DiSciullo & Williams, 1989). These elements are put on a scale from creative to productive. There are many agglutinative languages and polysynthetic languages that can regularly produce new forms using borrowed elements (Muysken, 2000).

Sankoff & Poplack (1984) distinguished features of code-mixing and borrowing in the following way:

Table 1 Features of code-mixing and borrowing

		Borrowing	Code-mixing
No more than one word adaptation:	Phonological	+	-
	Morphological	$\pm/+$	$\pm/-$
	Syntactic	+	-
Frequent use		+	-
Replaces own word		+	-
Recognizes as own word		+	-
Semantic change		+	-

Elements integrate at different levels. For example, in (29 a) *guest* could be considered a nonce borrowing since it has not been adapted. In (29 b) *maitre d'* could be considered an established borrowing for some English speakers. (29 c) the word *denial* is fully integrated in English, and in (29 d) the affix *hood* can be combined with *priest* which suggests that *priest* is likewise a fully integrated member of the English lexicon (Muysken 2000).

(29) a. *Guest* ellaam paattein.

All see [1sg-PST]

'I saw guests and all.'

1990, p.82)

(Tami/English; Sankoff et al.,

b. The *maitre d'* helped us find a table.

c. denial

d. priesthood

(Muysken, 2000, p.73)

Some categories of words are borrowed more easily than others. Nouns appear to be the most frequently borrowed category (Poplack et al.,1988; Nortier & Schatz, 1992). A categorical hierarchy has been attempted (based on Haugen, 1950, but adapted by Muysken, 2000):

nouns-adjectives-verbs-prepositions-coordinating

quantifiers-determiners-free

pronouns-clitic

conjunctions-

conjunctions

pronouns-subordinating

This type of hierarchy would predict that a word like the French *automobile* would be more easily borrowed into English than a French conjunction such as *que*. In general this does appear to be true. Muysken (2000) is quick to criticize this hierarchy though, claiming that no explanation is given as to how these categories were chosen, and furthermore, there are specific cases in languages

where these categories do not hold true. Muysken (2000) also predicts that fusional languages will resist borrowing. Nouns, which generally are not inflected, are frequently borrowed, while verbs are not (p. 77). In agglutinative languages, the same asymmetries exist, but some amount of verbs can be borrowed. In sum though, the noun seems to be the favored part of speech for borrowing.

REASONS FOR BORROWING

The reasons for borrowing are similar to the reasons for code-mixing or code-switching. Sometimes a bilingual speaker can not find a specific word in one language, and so looks to the other language (s)he knows. Other times the language that is spoken simply does not have the preferred word, or the language may in fact have it, but the bilingual hasn't learned it yet; other reasons could be that in the bilinguals mind, one word seems more familiar despite knowing the two terms from each language, and so the bilingual chooses the term more familiar to him (her); lastly, borrowing sometimes occurs as a the "most available word" when speakers are tired or stressed (Grosjean, 1982, p. 311). In some immigrant groups, lexical borrowing can reflect that person's desire to acculturate. This is particularly true if the majority culture is more prestigious (Grosjean, 1982). Those Japanese living in Hawaii who identified with American society and wished to acculturate quickly, adopted more English words and used them frequently, including pronouns, time expressions, and kinship terms (Higa, 1979, as cited by Grosjean, 1982). In summary, lexical borrowing allows a sort of freedom in labeling objects and concepts that are perhaps inadequately expressed in the other language. In this sense, bilinguals may be at an advantage in having a double supply of lexical items at their disposal.

1.4 Borrowing in American Sign Language

INTERPRETER RESPONSIBILITIES

Sign language interpretation requires that the interpreter comprehends the source language, drop the original lexical form and syntax in order to determine the meaning of the overall message, and then restructure this meaning using the target language (Colonomos, 2004; Seleskovitch, 1978; Cerney, 2005) While Chapter 2 will provide a more in depth examination of the interpreting process, it is important to explain at this point that there has always been and continues to be debate over what professional sign language interpreters should or should not be doing in various interpreting situations. One of the reasons for this is that it has taken the field a long time to move beyond the conduit model of interpreting (Cerney, 2005). Professional leaders, mentors, teachers, and the deaf community are beginning to recognize that interpreters are not simply passing information along in neat packages. On the contrary, human communication is very complex. As the literature will reveal, non-verbal as well as verbal communication can affect how interlocutors understand a message. Interpreters

must be aware of both linguistic and metalinguistic factors when interpreting. The entire process is very interactive, and places the interpreter in a position of power, yet with heavy responsibilities and decision-making. Because every interpreter's experience is different and skill level in ASL and English varies, no two interpreters can render the same target interpretation despite being given the same source. Interpreting is an interactive exchange of information; the information is exchanged between two languages; interpreters spontaneously create a target interpretation; and they maintain the content and intent of the source material (Cerney, 2005). Cerney (2005) suggests the term *spontaneously create* because interpreters bring their prior knowledge and experience to the task in order to understand the source material to be interpreted. Their choice of signs, or words, and other aspects such as intonation, stem from that knowledge and ability in the target language.

LANGUAGE ALTERNATION IN THE DEAF COMMUNITY

Code-mixing, code-switching, and lexical borrowing are common in the conversations of bilingual communities (Gumperz, 1982; Poplack, 1980). Lee (1983) found that the types of code-switching that occurs in deaf communities reflected that of bilingual speaking communities. For example, deaf signers could switch from ASL to more English-like signing depending on the topic, addressees, and settings they were in (Lee, 1983).

If the earlier definition of code-switching is accepted to mean a part of a discourse where there is a complete switch from one language to another, including phonological and morphological features, then an attempt can be made to define code-switching for bilingual bimodals. Code-switching in the bilingual bimodal realm would be a situation where a hearing person stops speaking and begins signing, or stops signing and begins speaking. An example of this might be a hearing mother who is signing ASL to her deaf husband. She is then interrupted by her hearing daughter to whom she begins speaking English.

CODE-MIXING IN BIMODAL SITUATION

Taking this a step further, a definition for code-mixing in a bimodal situation can be attempted, given the traditional notion of code-mixing to mean a speaker who is using a primary base, or matrix language, and inserting lexical elements from another language into this base. Code-mixing in the bimodal realm could potentially include the insertion of English mouthing while simultaneously producing ASL lexical items with the hands. Conversely, it could also include the simultaneous production of fingerspelling on one hand with the articulation of an ASL lexical item on the other. Lucas & Valli (1989) provide such an example.

Grosjean (1982) raised the question of when a lexical borrowing is considered to have passed into the general language repertoire. There is no definitive answer though cases can be examined individually. For example, in *je passe le weekend a la maison* (I'm spending the weekend at home) and *Ca a poppe* (It popped), it is a reasonable assumption that *weekend* has become part of the general French vocabulary, while *popper* is not a generally accepted verb (p. 309)

FINGERSPELLING AND LEXICAL BORROWING

Fingerspelling accompanied by corresponding English mouthing could be mistaken for a form of lexical borrowing. A definition of fingerspelling and its specific characteristics are discussed more thoroughly in Chapter 2. Fingerspelling is the manual representation of English letters by varying handshapes. Battison (1978) suggested that fingerspelling often involves the phonological and morphological restructuring of the handshapes. Sometimes handshapes are deleted or assimilated, and these originally fingerspelled words then become loans (Battison, 1978). Recall that in borrowing, a lexical item is borrowed and inserted into another language. Then there are usually some adjustments made that can change the form and meaning in the recipient language. For example, the fingerspelled word d-a-t-e has four ASL morphemes, but this is a merging of an orthographic system (English) with a phonological system (ASL) (Davis, 1989). ASL morphemes are being utilized to show the orthography. However, in a similar manner to lexical borrowing, fingerspelled words can become lexicalized over time and form established loans.

ADOPTING ENGLISH VOCABULARY

ASL speakers have two different strategies for adopting English vocabulary. If the native ASL lexicon provides a semantically equivalent native root sign, speakers of ASL will combine this semantic root with the borrowed English letters represented through fingerspelling. This output can be viewed as quasiphonetic-semantic in the sense that fingerspelling is normally accompanied by mouth movements corresponding to English sounds, and is therefore very close to a phonetic representation. This type of borrowing is observed in initialized loans. They can be divided into two types: (a) those that have only a foreign word in the input² and (b) those that have a native root plus a foreign word.

² Type (a) will not be addressed here. There appear to be only four items of type (a): the color signs PURPLE, GREEN, YELLOW, and BLUE. These do not appear to have a semantic root, however, it would be difficult to categorize them as another type of loan, such as 'established', since they preserve the initial English letter and 'established loans' generally preserve two letters. In terms of (a) and (b), ASL parallels spoken languages such as Chinese which has more than one strategy for dealing with foreign vocabulary. Chinese speakers can

Near-native ASL loans take the form of nouns, pronouns, verbs, adjectives, and interjections. An example is #BREAD, which is signed using two hands, the middle fingers and thumbs touching repeatedly. This unmarked handshape, commonly referred to as “8”, somewhat resembles the letters “B” and “D” which would have appeared earlier in the assimilation process, at the B-R-D stage.

An example of an established loan is #BACK, which was originally fingerspelled as B-A-C-K, yet after numerous productions within native discourse, became B-K, the form found in contemporary use. If a semantic native root sign does not exist, speakers will adopt the English word in its entirety via fingerspelling. This visual representation of English is normally articulated in the torso area, on the ipsilateral side of the body, in line with the dominant shoulder. Fingerspelling each letter of the English word is usually abandoned after the third production within a discourse because signers naturally begin to delete some handshapes and alter other parameters as well (Brentari & Padden, 2001). In most cases, the edges of the English word are preserved while medial segments are deleted, for example, B-K for BACK.

Initialized loans fall somewhere between fully assimilated loans such as #BREAD #WHAT, and #SAY-NO which for present purposes will be termed “near-native ASL,” and “established” loans like #BACK, #SALE, #OK, #DO-DO, #VICE-PRESIDENT, #MEGABYTE, and #BULLSHIT. Near-native ASL loans are considered assimilated to the degree that traces of English letters are barely discernible. In fact native signers usually do not recognize the word as a borrowing. This degree of assimilation is not peculiar to sign language, as Korean speakers utilize the word /namp^ho/, “lamp,” borrowed from English, yet do not recognize the word as a borrowing (Y. Kang, personal communication, December 1, 2002). Near-native #BREAD and established loan #BACK can inflect for person or number (Padden, 1998): the palm orientation of the signer’s hand will be directed towards the object as in “I give you feedback” or “I give the book back to her.”

Initialized loans exhibit derivational and inflectional morphology. On the other hand, “foreign” loans do not exhibit inflectional morphology. These are still in the assimilation process like #EARLY, #BUSY and #MORPHOLOGY and often contain most of the letters from the original English word and have predominantly marked handshapes. The foreign loan #MORPHOLOGY would initially be signed with all letters, M-O-R-P-H-O-L-O-G-Y, and after the second or third production reduce to M-P-H-L-Y. Both established and foreign loans tend to preserve the edges of the borrowed English morphemes but do not utilize a

combine a semantically equivalent native root with an English morpheme; for example, *yin-te-wang* (‘net’) for *internet* or *jiu-bar* (‘liquor’) for *bar* (where *yin-te* and *jiu* represent the Chinese pronunciation of the English morphemes) or by forcing the foreign word to conform to native phonological constraints, *sha-fa* (‘sofa’) or *lei-da* (‘radar’) (Miao, 2001)

semantic root. Initialized loans are formed by combining a semantic equivalent root sign with the left edges of the English morphemes. For example, the verb TRAIN consists of the root sign PRACTICE plus the initial letter “T”. Similarly, the noun VIDEOTAPE is constructed from the root TO-FILM plus English “V” and “T”. We observe a similar outcome in Chinese, where an English word “democracy” is initially adopted as “de-mo-ke-la-xi,” but later becomes more nativized as “min-zhu” (people-government); similarly “wei-ta-ming” (vitamin) becomes “wei-sheng-su” (protect-life-element) (Miao, 2001). A semantic ASL root is often selected to serve a variety of borrowings; for example, TEAM and DEPARTMENT both utilize the root GROUP; STAFF and FACULTY share the root MEMBER; RESIDENT and CLIENT share PERSON (Padden & Brentari, 2001).³ Initialized loans NEGOTIATE (N + DIALOGUE) or PORTFOLIO (P + FOLDER) differ from an established loan like #BACK in that the former consists of a semantic root plus an English word in the input, while the latter has only the English word in the input.

LEXICAL BORROWING BETWEEN FOREIGN SIGN LANGUAGES

Lexical borrowing can also occur when signers interact with users of a foreign sign language. American deaf signers as well as bilingual bimodals like sign language interpreters have borrowed the accepted sign used by deaf people of their respective countries. For example, American deaf signers have an Americanized version of the sign for JAPAN, yet consistently American deaf signers used the sign borrowed from Japanese deaf persons. The sign is made by moving the index finger and thumb upward to contact each other. The result is that now it is common to see the Japanese sign for JAPAN used by American deaf people and interpreters. In fact the older version is considered too stereotypical and even insulting to the ethnicity of Asian deaf people. Since the biennial conferences of the World Federation for the Deaf began in the last century, the international deaf community has always been interacting and forming pidgins between deaf people of mutually unintelligible sign languages. Many European sign languages share some historical link to Abbe de L’Epee’s school in France (Cerney, 2005). In addition the visual nature of sign languages and the cross-linguistic use of space allows for international deaf people to attempt some form of communication with other deaf individuals, and therefore, borrowing is not uncommon. In summary, borrowing in American Sign Language can appear in the form of English mouthing, loanwords of varying stages of morphological integration, and even lexical items from other foreign sign languages. While the current project recognizes loanwords and foreign borrowings as legitimate phenomenon, they are not the focus of this research, as they do not predominantly compose the interpreted material of sign language

³ Padden & Brentari (2001) claim that some signs referring to *status, *trait, and *color have no native counterpart.

interpretations. However, mouthing appears to be very widespread in interpretation as well as the signing of deaf bilinguals.

SIGN LANGUAGE INTERPRETERS USE OF BORROWING

Sign language interpreters are excellent sources of data for language contact phenomena precisely because the nature of their work requires them to be in situations where deaf and hearing people interact and are using languages that have different modalities. The borrowing that sign language interpreters do contrasts from that of spoken language bilinguals on a number of levels. Foremost is the fact that the interpreter is the individual deciding when borrowing is needed in a message. However, the message itself is not generated by the interpreter, but by the two interlocutors for whom the interpreter is contracted. The interpreter is merely a conduit for this message, yet exerts a great deal of control. In spoken language bilingualism, language alternation has been traditionally thought of as a speaker-controlled phenomenon. For example, in the following discourse between two English-German-Spanish trilinguals, the decision to switch to English is made by the interlocutor based on lack of facility in German.

Mother: 'Na, wie war's beim fuBball?' (How was the football?)
Pascual: 'Wir haben gewonnen. Unsere Seite war ganz toll. Ich war der goalie. I stopped eight goals. They were real hard ones. ('We won. Our team was brilliant. I was...') (And turning towards the pan on the cooker he continued) 'Was gibt's zu essen?' (What are we eating today?)

(Calsamiglia & Tuson, 1984, p. 114)

In contrast, had this situation involved an interpreter, mouthing of the word goalie would only occur if the interpreter deemed it necessary based on the sociolinguistic background of the two interlocutors or because the interpreter had determined that to convey the concept of goalie in ASL required the borrowing of English mouthing.

This leads to the second distinction between borrowing in a sign language and borrowing in a spoken language. Borrowing during a spoken language discourse normally occurs when the individuals involved are bilingual. The situations involving interpreter borrowing are crucially different in that the deaf person and hearing person may or may not be bilingual. In fact, in order to necessitate the hiring of a sign language interpreter, one of the parties involved must be a monolingual (the hearing, non-signing person). Interpreters themselves are usually English-dominant bilinguals who serve a deaf audience assumed to have some bilingual proficiency, although proficiency varies widely (Berent, 2003; Davis, 1989). The interpreters must make choices about the language they will use in their interpretation. These choices are a result of a contextual screen they apply to the interpreting task. This contextual screen, or

filter, includes personal schema, knowledge and understanding of concepts, and judgments about how concepts will be perceived by the deaf and hearing interlocutors, whose cultural perspectives often differ (Metzger, 1999; Napier, 2002; Humphries & Alcorn, 2001).

A third distinction between spoken language borrowing and sign language interpreter borrowing is the fact that borrowing is almost an expected outcome of interpretation since the interpreter is required by his professional code to satisfy the needs of the deaf consumer. In traditional bilingual interactions, situational, and personal factors can influence when a spoken language bilingual will code-mix, code-switch, or borrow. For example, when interlocutors have a shared educational, ethnic and socio-economic background, they may code-switch often (Gumperz, 1982). The formality of a situation may cause a spoken language bilingual to adhere to monolingual standards. Attitudes towards language alternation vary. Some bilinguals are quite comfortable with it, while others try to avoid it. However, in situations involving a sign language interpreter, the interlocutors' attitudes are never a factor. In a sense, they are at the mercy of the interpreter, who if skilled, will appropriately perform cultural and linguistic expansions to bring a level of comfort as well as understanding to them. Likewise, the interpreter is not supposed to borrow for personal reasons. The interpreter's ethnic, educational, or sociolinguistic background should in theory, not influence the frequency of English mouthing. The demand for English mouthing seems to be client-driven and supersedes any personal attitudes the interpreter may have towards borrowing.

Previously English mouthing by bilingual bimodal interpreters was thought to serve as a signal of formal register or to mark information as critical to the task at hand (Weisenberg, 2003). For example, in an academic setting, select vocabulary words may be fingerspelled and simultaneously mouthed to warn a deaf student that their knowledge of these words will be tested. This is reminiscent of the "they code" used for more formal, stiffer language suggested by Gumperz (1976). However, the crucial difference in an interpretation setting is that the interpreter is only serving as a conduit, transmitting the notion of expertise or formality from the speaker to the addressee. For both English-dominant bilingual interpreters and English-dominant bilingual deaf consumers, mouthing can serve as a crutch, since they will feel most comfortable expressing thoughts in their first language. However, when this occurs, interpreters (and consumers) are usually simultaneously signing using an English-based sign system (SEE1, SEE2, SE, or CASE)⁴, and in some cases, the English is vocalized or appears without sign support. In contrast, interpreters who mouth English while simultaneously producing concepts in ASL, find the process of mouthing more time consuming and physically exhausting to the interpreting task (M. Eaton, personal communication, September, 2007).

⁴ Signing Essential English (SEE1), Signing Exact English (SEE2); Conceptually Accurate Signed English (CASE). For more specifics, see Chapter 3

JUSTIFICATION FOR MOUTHING AS BORROWING

Currently it is hypothesized that English mouthing in bilingual bimodals is a type of borrowing for several reasons. Borrowing involves the insertion of single lexical items from a donor language that are filtered through the recipient language (Poplack & Meechan, 1998). Insertions are typically (a) content words (b) morphologically integrated constituents, (c) objects or complements rather than adjuncts, (d) *nested* (i.e., the fragment preceding the insertion and the fragment following are grammatically related), and (e) single constituents (Muysken, 2000). It has been proposed that the matrix language determines the features of the inserted lexical item (Myers-Scotten, 1993). The English mouthing of sign language followed had similar characteristics in that it appeared with content words rather than function words; it was nested; it occurred on single constituents, and it did occur with objects or compliments rather than adjuncts. Since English mouthing is distinctly different from the grammatical mouthing typical of native deaf signers (commonly called non-manual markers NMMs), it is debatable whether it can be considered morphologically integrated. Initially it is adapted to fit the bimodal condition in the sense that the interpreter does not utilize his vocal cords, but only renders the word visibly on the lips. Furthermore it might be considered integrated by the fact that not all phonemes of the original English word can be identified. Last, as English lexical items were repeated in the source material of the experiment, the mouthing that overlapped with that lexical item was reduced over the eight minutes. Some phonemes were dropped, though word-initial phonemes were preserved. In this way a claim could be made that it did become morphologically integrated over time. The mouthing mostly appeared coordinated with a manual ASL sign that had the same meaning (i.e. (5) "For example, everybody **knows** that **water** is **H₂O**" (bold indicates mouthing; Subject 2, non-deaf, technical lecture (01)) (Weisenberg, 2003, p. 23).

Professional interpreters interviewed by Humphries & Alcorn (2001) revealed the techniques they employ to determine which language to use with a deaf consumer. Interpreters admittedly struggle with their judgments and language choice is not definitive:

Interpreter 1:

"Sometimes it goes back and forth especially working with people that are really bilingual, have strong ASL skills, strong English skills. Sometimes I kind of wonder what it is they really want. How do I make the decision? If I've never met them before? Talking with them before the interview starts. Sometimes asking, if I think it is appropriate, *If you want me to mouth more, just let me know because I'm really quite flexible. If you feel you want more ASL...I kind of try to stay away from asking them Do you want me to sign ASL? Do you want me to sign English? ...I think that to ask them a question can actually be almost oppressive in and of itself. If I'm working with a teamer [partner], I'll ask them, you know, What's*

your goal when you're working with this person? Is ASL your goal?
If they [teamer] go first, just kind of seeing what their [deaf person] reaction is to what they're doing and then try to match it if it's working."

Interpreter 2:

"I base the decision usually on who the consumer is, and what their preferences are. But I also find that some settings require a little bit more contact variety...aspects of what might be called contact variety...the educational setting where you would be conveying the concept, but then maybe needing to include English vocabulary because it's going to come up on exams or the deaf person needs to know that vocabulary because it's used in the field..."

Interpreter 3:

"...Depending on who the client is...If they are grass roots ASL, you have to drop form. I find that when I work with some ESL deaf people, *contact* is their preference. They want the English in there, and they follow form. And so really you have to match what their language preference is."

It is evident from the interpreters' comments that language alternation is an inevitable, almost required behavior in interpreting. Certain educational contexts or assumptions about deaf audience literacy create a greater demand for English mouthing.

1.5 Research goals

BENEFITS OF THE DESIGN

The current project originally began as an exploration of what appeared to be code-mixing, and therefore research goals reflected the assertion that the appearance of phonetically-intact English mouthing by bilingual bimodals was in fact code-mixing. It was fortunate that the design of the experiment allowed for a large amount of data. The speakers who provided the source material presented lectures rich with complex ideas, idioms, natural hesitations, occasional false starts and repairs, and humor. These are just some of the elements that make for an ideal corpus data, in that it was possible to observe a broad range of sign language interpreting strategies in the eight minutes of interpreted material provided by each subject. In fact some phenomenon had to remain outside the scope of the study to maintain the clarity of studying English mouthing, but could be returned to in a future study. While the details of the experiment design are

provided in Chapter 4, it should be noted that the manipulation of the variables of topic and cultural identity of the audience ultimately proved to be the most valuable features of the design.

Upon further examination of the data, and application of ANOVA, it became evident that the mouthing produced by the subjects was influenced by whom the subjects perceived their audience to be. By identifying where the mouthing tended to occur and with which lexical items, it became clear that the concurrent production of English mouthing and ASL signs was a case of borrowing to satisfy the needs of the audience.

The current project addresses the question of whether the expectations bilingual bimodals have about their audience can affect their rate of borrowing. An investigation was conducted to determine if interpreters' rate of English mouthing was affected more by assumptions about their audience's needs than by the topic of the source material. Furthermore, this study sought to examine the English mouthing more closely to determine what its characteristics are and how it is used when bilingual bimodals are interpreting from Spoken English to ASL. So in summary, this project had two main goals: (1) to examine the frequency of English mouthing when the addressee and topic are changed, and (2) to investigate the patterns of English mouthing to identify its particular usefulness as a borrowing.

2 Background -American Sign Language

This chapter introduces some background knowledge for discussions in the following chapters. Section 2.1 gives a history of American Sign Language and how it has shaped contemporary deaf culture and its members' identities in the United States. Section 2.2 discusses the history of the sign language interpreting field, major approaches to sign interpretation, and consumer-interpretation relations. A brief introduction to cross-linguistic strategies is presented in 2.3. Lastly, section 2.4 discusses the major phonological aspects of ASL.

2.1.1 History of American Sign Language

“As long as we have deaf people on earth, we will have signs.” These famous words spoken by George Veditz, in 1913 have graced the pages of undoubtedly many American Sign Language (ASL) and deaf culture curriculums. One would be hard-pressed to find a graduate of an interpreter training or deaf education program who has not heard or even seen excerpts of this classic National Association of the Deaf (NAD) film in which a deaf leader expresses his concern for the preservation and respect of “our beautiful sign language” as “the noblest gift God has given to deaf people”⁵ At that time the use of sign language in the education of the deaf was under serious question, both in the United States and abroad, as was the overall recognition and treatment of deaf people as equal, functioning citizens in any public sphere.

STATUS OF ASL TODAY

Today the state of ASL and deaf people in general is quite different. ASL is formally studied and accepted as a full-fledged language in the field of linguistics. It is offered in high schools and higher education as a foreign language. As recently as 2006, the country witnessed a second *revolution* of sorts at the prospect of another non-Deaf president at the internationally-known Gallaudet University in Washington D.C.⁶ The medical profession now routinely offers cochlear implants surgery to deaf children to supposedly reduce the barriers to language and literacy. The deaf community remains divided on this issue with staunch supporters of a sign language environment passionately fighting the use of these devices in what they fear will be the end of *deaf culture* and ASL. Though the future of ASL and deaf culture is unknown, nationally there has been a reduction in the enrollment of deaf children in deaf residential

⁵ The Preservation of the Sign Language, George W. Veditz; (National Association of the Deaf, 1913; Translated from the film by Carol A. Padden). RID archives.

⁶ The first being that of 1988, *Deaf President Now* opposing the appointment of Dr. Zinser, a non-signing, hearing educator

schools, and equivalent programs, even entire closings, coupled with an increase in specialized cochlear-implant classes. Deaf children are more regularly mainstreamed and the lines between deaf, hearing, hard-of-hearing, cochlear-kids, or multi-handicapped-deaf are blurring in institutional learning (Padden & Humphries, 2005).

INTERPRETER TRAINING PROGRAMS

Interpreter training programs have cropped up everywhere pouring in many sign language interpreters to accommodate the linguistic needs of deaf employees, parents, professionals, and children as they maneuver through the dominant culture of hearing-America. Deaf people are studying and working in linguistics, business, education, computer-science, fashion, arts, and science. Deaf people are conducting their business affairs via video-phones with the aid of interpreter-relay services. The term *equal access* is burned into every professional manual pertaining to deaf or hard-of-hearing individuals. Try to deny a deaf person an interpreter at a doctor's appointment or public event and their hands will fly up to remind you about their ADA⁷ rights.

VALUES IN THE COMMUNITY

Amid all of this achievement was the same value that drove the deaf people of George Veditz's time and has remained the underpinning of what they coined *deaf culture*: connection. For centuries deaf people had been denied it, and when they finally obtained it, it was impossible to pry them free of it. The desire to remain connected to other each other and the information world led to deaf pioneers crusading to get ASL the recognition they believed it deserved. If the majority that controlled education, hearing people, could be convinced of the legitimacy of ASL, then the deaf community could claim its language and with it, culture, and actively lobby to have it instituted as the official language of deaf education. Having some control over how its future generations were to be educated brought hope of equality in employment and overall quality of living (Padden & Humphries, 2005).

WILLIAM STOKOE AND RESEARCH OF ASL

The acceptance of ASL was accelerated by William Stokoe's research of ASL at Gallaudet College⁸ around 1960. Stokoe was a hearing scholar who like other structural linguists of that time, were steeped in corpus data, conducting contrastive analyses of the world's language and compiling language typologies. While teaching at Gallaudet, Stokoe observed a difference in the deaf students' signing from more formal environments like the classroom to leisure activities off-campus. We now know that this type of code-switching is a natural occurrence in

⁷ American With Disabilities Act (ADA) 1990

⁸ Now known as Gallaudet University

the deaf community. Stokoe ended up publishing a dictionary of ASL signs with the goal of describing the structural properties so that ASL could be compared with other languages. It was the first publication to describe signs in linguistic notation rather than English translations. In fact the establishment of *American Sign Language* as the official name for this visual-gestural language of America came from Stokoe and his cohorts who felt it necessary to distinguish it from the other documented foreign sign languages (Padden & Humphries 2005; Hoffmeister et al., 1996).

DIGLOSSIA AND ASL

So while America was in its own social and political revolution in the 1960s, so too was the deaf community over ASL. The older deaf generations were still calling it simply *sign language*; scholarly deaf graduates from Gallaudet were relegating ASL to a grass-roots-only level, claiming educated deaf used a more literate form of ASL that incorporated English into its syntax and phonological structure; linguists were busy proving how ASL had linguistic structure while also emphasizing how different it was from spoken languages. Then research began to focus on the continuum of ASL forms that appeared as a result of language contact with the majority language- English. Terms like *pidgin signed English* (PSE) began to appear, and with research into the diglossic nature of ASL, prejudices against forms of signing began to develop. Then questions arose as to who should be permitted to use ASL, and was the use of ASL an automatic ticket for membership. When lines were drawn, where did deaf people raised orally fall? Interpreters? Children of deaf adults? A new convention of capitalizing the word Deaf meant those deaf individuals who were *culturally-deaf* in contrast to those who were just audiotologically deaf. Deaf people struggled with what it meant to be *Deaf* and to have a *Deaf identity* and by the time the *Deaf President Now!* protest took place in 1988, the community itself was confused as to where the fight to protect ASL and its culture would take them (Padden & Humphries, 2005).

ASL AND MODERN TECHNOLOGICAL ADVANCES

While the legitimacy of ASL may no longer be in question, its usefulness in securing equal rights of a minority still echoes in almost every political action the Deaf community takes. ASL has now been hit head-on by the corporate world with technological innovations like the video-phone and its related video-relay services, which will undoubtedly pose challenges to the deaf community as attempts are made to control the language of its users by entities like the Federal Communications Commission (FCC).

Regardless of the purpose of ASL and its obvious power in driving social change for those who use it, one fact that cannot be ignored is its relative young age. It has existed in the U.S. for approximately two hundred years, but only studied in the field of linguistics for about forty years. It is important to keep in

mind the atmosphere in which formal education of the deaf in America unfolded and hence what we now study as ASL.

FORMAL EDUCATION OF THE DEAF

It began around 1815 with the founding of the American School for the Deaf, (American Asylum for the Deaf) in Hartford Connecticut. American Deaf education is historically linked to Abbe de L'Eppe, the inventor of the gestural method of instruction in French who founded a famous school for the deaf in Paris in the 1760. Laurent Clerc was a product of this institution and brought to the United States the techniques he learned there. Old ASL was a combination of natural sign languages already in use in the U.S. and French signs brought over by Laurent Clerc. ASL has its historical roots in French Sign Language (LSF), with about sixty-five percent of modern ASL having signs of FSL origin⁹.

PHILOSOPHY OF DEAF EDUCATION

The philosophy of deaf education had Darwinian roots. Darwin's publication in 1859, *Origin of the Species*, had affected the way people viewed human history and human destiny. Evolutionary thinking began to pervade American culture around the time that the oralist movement was making its way into deaf education. Individuals began to question the relative status and worth of spoken versus gestured language. Sign language came to be seen as a language low on the scale of evolutionary progress, preceding in history even the most *savage* of spoken languages, and supposedly forming a link between the animal and the human. Darwin himself wrote of gestures as a form of communication used by the deaf and dumb and by savages.¹⁰

By 1870 there were residential schools available for deaf children but programs to teach oralism had not yet been established. Oralist Alexander Graham Bell had a great influence on the banning of signing in U.S. schools for the deaf. His mother and wife were deaf. He published numerous papers against deaf-deaf marriages, and the use of sign language in schools. Bell's influence extended from the 1880s-1970s. He believed deaf people would perpetuate their inferior genes and contribute to the downfall of society. The idea was to keep deafness contained and manageable. The oralist movement, initiated by Bell, began to spread to Europe and culminated with the Milan Conference in 1880 which banned sign languages in all schools for deaf in both Europe and the continental United States. The National Association of the Deaf (NAD) formed in 1880, however continued to fight for the reinstatement of sign language in deaf children's education (Padden & Humphries, 2005; Padden & Humphries, 1988; Hoffmeister et al., 1996).

It has taken nearly eighty years of resilience for the deaf community to finally have a voice in education and fundamental human rights of its members.

⁹ Hoffmeister et al., (1996)

¹⁰ Hoffmeister et al., 1996, p. 98

During this time however, the community was not without its own internal conflicts. Audism¹¹ and its consequential oppression added to the marginalization of the deaf and had lasting negative effects. Deaf people adopted a fatalist attitude regarding their own futures; they often became emotionally dependent on their benefactors; they desired, yet feared empowerment; their marginalization became normalized; and horizontal violence arose, as mentioned earlier, where members began unfairly stereotyping each others' language varieties of ASL (Humphries & Alcorn, 2001). Because ASL is a minority language in the context of dominant American English culture, and more than ninety percent of deaf people are nonnative signers, language contact varieties exist and code-switching is prevalent. Deaf people's identity is shaped by their attitudes about English and their own sign language.

2.1.2 Language Variation Among Signers

The United States deaf population is quite heterogeneous. If deaf children are fortunate enough to be born to deaf families that use a sign language, and therefore acquire it in a natural, authentic, functional setting, their literacy development parallels that of the spoken language environment (Singleton & Newport, 1994; Ross and Newport, 1996). However, this constitutes only ten percent of the entire estimated deaf population of two million. Even if a deaf child is exposed to signing by intimates, the actual signing may not be native-like since the parents' own educational experience and attitudes about language influence their linguistic behavior in the home. In addition, the deaf child's educational experience, which could range from a bilingual-bicultural philosophy to a strictly oral one, will likewise affect language use. Nevertheless, it has been shown that even in an environment where the sign input is impoverished, native language acquisition can still occur (Singleton & Newport, 1994). As presented in 2.1, deaf education has swung widely from exclusive sign instruction to complete banning of gesture, to the acceptance and use of ASL as a natural language, and most recently to the use of total communication¹² or a bilingual-bicultural philosophy¹³. The interaction of English speakers and with ASL users of such varying backgrounds has resulted in types of contact-signing. When speakers of different languages come in contact, they usually consider one of the languages more prestigious. In fact, one is thought to be "more beautiful, more expressive,

¹¹ An attitude based on pathological thinking resulting in a negative stigma toward anyone who does not hear (Humphries & Alcorn, 2001, p.5.17)

¹² This is a method of using all modes of communication, ASL or manually-coded English, to provide a deaf child with any modality necessary to support language development. It often results in the use of simultaneous signing with overlapping speech, where the signs chosen approximate the spoken utterance.

¹³ Recognizes Deaf people as members of an oppressed minority; accepts ASL as a language and Deaf culture as one that includes the norms, values, and traditions of its community.

more logical, and better able to express abstract thoughts, and the other language is felt to be ungrammatical, concrete, and coarse" (Grosjean, 1982, p.121).

ENGLISH-BASED SIGN SYSTEMS

Despite the empirical validity of ASL as a language, fully capable of expressing any abstract idea, negative attitudes still exist. Historically ASL was judged to be "ungrammatical, concrete, iconic, and pantomimic" (Grosjean, 1982, p.122). This negative view generated several English-based sign systems (i.e. Exact Signed English (ESE), Seeing Essential English (SEE I), Signing Exact English (SEE II), created by hearing educators to manually encode spoken English for the purpose of visually representing it to deaf children. Use of *contrived* signs remains an emotionally charged issue in the deaf community, even resulting in mocking and labeling of the deaf who use it. Serious Deaf activists believe that by choosing artificial signs instead of those from the ASL core lexicon, one is perpetuating the myth that ASL is impoverished. Some claim this mixture of ASL and English is simply an inevitable consequence of an evolving bilingual community (Bragg, 1989).

CONTACT SIGNING

In contrast, there is a natural form of contact signing commonly referred to as Pidgin Sign English (PSE) that displays features of both (ASL) and English, (Lucas & Valli, 1991). Further it has been argued that hearing signers use a form of PSE (PSE_h) that is distinct from the type used by deaf signers (PSE_d); the former exhibiting "greater English influence" and the latter having "more ASL grammatical structures" (Lucas & Valli, 1991, p.203). Nevertheless, deaf people, by virtue of situation, content, or function, engage in code-switching behaviors. They are used to adjusting their language to their interlocutors whose signing deviates from native ASL; these could be professional sign language interpreters who are second language learners of English, English speaking monolinguals with little or no signing experience, hard-of-hearing people who learned ASL after the critical period of acquisition, or even the culturally Deaf who choose to utilize less native-like ASL syntax in certain professional contexts.

In sum, Sign language communication in the United States is a continuum from pure forms, which are based on the language's original syntax and phonological form¹⁴ (handshape, movement, place of articulation in the signing plane) to more Anglicized types¹⁵ and finally to forms that are entirely based on English syntax¹⁶.

¹⁴ Examples are Old ASL, a combination of indigenous gestures and LSF, and Modern ASL.

¹⁵ Conceptually Accurate Signed English (CASE), PSE_d, PSE_h

¹⁶ Signed English (SE), Signing Exact English (SEE²), Signing Essential English (SEE¹), Rochester Method)

2.1.3 Cultural Identity in the Deaf Community

There is much literature attesting to the inherent relationship between language and culture (Brown, 2000; Nieto, 1999; Tang, 2006). Culture plays an important role in communication because it contributes to the development of one's shared life experience. Putting unique life experiences aside, people from the same culture have, at the very least, some common ground from which to relate and communicate. Language is an assumed component of a community's culture (Tseng, 2002). Language symbolically represents the community's culture and history as well as their ways of relating to the world and others (Jiang, 2000).

LINGUISTIC AND CULTURAL MINORITY

It is widely accepted that sign language use in the United States has variation, and that a signer's choice of language reflects their membership in the community and their attitude about it (Lucas & Valli, 1989). It has been reported that deaf people tend to utilize more English-based varieties when interacting with the mainstream-hearing people (Markowicz & Woodward, 1975; Johnson & Erting, 1989). The Deaf community is now recognized as a cultural and linguistic minority group (Humphries & Alcorn, 2001), and as such, it has been said that it exhibits behaviors common to discriminated populations (Baker-Shenk, 1985). They have regrouped to maintain their language and culture with growing populations in Maryland and Rochester New York, deemed the new deaf capitols. They have created a well-organized, tightly knit community including deaf religious congregations, stores, merchants, clubs, societies and organizations, newspapers and magazines, television shows, and schools and a nationally-recognized university.

DEAF EMPLOYEES AND MARGINALIZATION

Traditionally deaf people were employed in the printing press trade largely due to the fact that illiteracy in English did not inhibit this type of work and environmental noise was not a factor since they couldn't hear. Now there has been an influx of deaf employees to the computer industry and related technical fields again due to the fact that programming can be carried out in isolation where communication problems between deaf people and the hearing public are not a factor.

At some points in history the greater society has been hostile towards the Deaf, perhaps today more indifferent, but always there exists the underlying opinion that the Deaf should integrate, that the use of ASL should be tolerated if nothing but for the end result of becoming literate in English. In contrast, regardless of the geographic area in which Deaf people have settled, or in what trade they have been employed because of hearing loss, they have never viewed their deafness as a disability, but as a set of attitudes and behaviors. They have a shared life experience based on being visually-oriented persons.

For them the use of ASL has helped shape their concepts of self and identity. Like other bilingual communities, learning English naturally proves beneficial for employment and daily social interactions, but they make no personal claim to it. If anything on a daily basis their frustrations with dealing with non-signing speaking persons just reinforce their minority status, and with it all the consequences: lower socio-economic class, institutionalized oppression, and fatalism (Humphries & Alcorn, 2001). Difficulties in speech production and comprehension are two very important aspects impeding deaf peoples' success and continue to cause their marginalization.

SOCIALIZATION BEHAVIORS

Knowing when to use ASL and when not to are natural expected behaviors in Deaf life. Language choice signals whether a deaf person holds values that are closer to hearing American society or to the core Deaf community. Keeping ASL in the core community and using contact varieties with outsiders maintains the ethnic boundaries (Johnson & Erting, 1989). Because the majority of deaf children are born to hearing parents, modeling of socialization behaviors only occurs once these children come in contact with other deaf peers in institutionalized education. In some cases it only happens in adulthood. Deaf children of deaf parents however would be learning socialization rules from infancy, and for this reason it has been claimed that this type of person ("Deaf of Deaf") is a conduit of Deaf *ethnic patrimony* for new members and are, for the most part, the ones who have been transmitting it through generations (Johnson & Erting, 1989).

In summary, deaf people as a linguistic and cultural minority naturally formed a community whose shared common identity was founded on a visual-gestural language and their minority status against the mainstream. Like other minorities they created an organized support network, including regrouping in certain geographic areas. The inability to hear was a trait to be celebrated by the Deaf and an obvious biological necessity for membership. As a result of inevitable contact with hearing American society, the community learned to protect its language and maintain boundaries by choosing varieties of signing that could be used in certain contexts.

AFFILIATION WITH HEARING CULTURE

As explained above in section 2.1.1, in the 1980s questions arose as to whether the use of ASL was an automatic ticket for membership into the community. The community began a new convention of capitalizing the word Deaf to mean those deaf individuals who were culturally-deaf in contrast to those who were just audiotologically deaf. Today many more hearing parents have their deaf children undergo surgery for the cochlear implant, and in these cases, the children are raised in completely oral program, do not use sign language, and affiliate almost exclusively with other hearing people (Garey & Hott, 2007). Therefore sign language interpreters will find themselves working with a

variety of consumers, from those who are grassroots ASL signers, to those who are completely oral, and know little, if any, sign language. In fact the Registry of Interpreters for the Deaf (RID) offers a certification performance examination in Oral Transliteration specifically to transliterate for individuals who do not use sign language, but require silent phonetic mouthing of spoken English (Registry of Interpreters for the Deaf, 2009). Deaf individuals could affiliate more with hearing culture than with the culturally-Deaf community if they have experienced oral speech training during their youth, have received cochlear implant surgery, have partial hearing loss rather than profound loss, exhibit a more English-based signing style, and/or refer to themselves as *hard-of-hearing* (Humphries & Alcorn, 2001).

It is common, and expected, that an interpreter will judge a consumer's cultural affiliation and literacy based on physical observations such as the appearance of a hearing aide, or cochlear implant transmitter (a visible magnet which attaches to the head), for example. Likewise, they will judge consumers by their style of signing after engaging them in a brief conversation. If the interpreter can not physically meet the consumer until the precise commencement of the interpreting assignment, (s)he will gather information from the interpreting agency about the individual, in an effort to plan language use to meet that person's needs (Frisberg, 1990; Humphries & Alcorn, 2001). Recall that in section 1.3, interpreters admitted to making language choices based on consumer identity. One interpreter remarked, "Sometimes I kind of wonder what it is they really want. How do I make the decision? If I've never met them before? Talking with them before the interview starts. Sometimes asking, if I think it is appropriate..." Another interpreter said, "I base the decision usually on who the consumer is, and what their preferences are..." The third interpreter commented, "Depending on who the client is...If they are grass roots ASL, you have to drop form..." (Humphries & Alcorn, 2001)

For D/deaf individuals language choice, whether toward pure ASL or more toward an English variety, symbolizes the values of its user, and is an expected, modeled, and perpetuated behavior in the community.

2.2.1 History of Sign Language Interpreting

It is likely that sign language interpreters have always existed as long as there were deaf persons who needed to communicate with hearing, non-signing people. There were no interpreter preparation programs or sign language classes before the 1950s, since the linguistic interest in ASL began with William Stokoe's research at Gallaudet University during that decade. What we know from early records is that in Canada and the United States interpreters were primarily relatives of a deaf person, teachers of the deaf, or clergy (Groce, 1985; Frisberg, 1986).

FORMATION OF RID

The history of professional sign language interpreting can be traced back to a national meeting at Ball State Teachers College in Muncie, Indiana in 1964. At this landmark gathering, the interpreters who had been employed to work at the conference ended up staying to discuss the general growing demand of sign language interpreters and established a list of qualified interpreters (Humpries & Alcorn, 2001). The National Registry of Professional Interpreters and Translators for the Deaf was founded shortly thereafter. The name was later changed to the Registry of Interpreters for the Deaf (RID) and incorporated in 1972. The founders of the organization drafted bylaws, a constitution, a national list of interpreters, began discussing an evaluation and certification process, and actively worked to educate the public about the need for and use of sign language interpreters.

Today the RID strives to maintain excellence in interpretation and transliteration services among people who are Deaf, or Hard of Hearing, and people who are hearing, for effective communication, and it provides a professional network and support system for interpreters and transliterators. The mission of RID is to provide international, national, regional, state, and local forums and an organizational structure for the continued growth and development of the professions of interpretation and transliteration of American Sign Language and English. Its goal is to promote the profession of interpreting and transliterating American Sign Language and English. It is the certifying body for all sign language interpreters, offering a national testing system with numerous specialty areas, a certification maintenance system, papers and publications on ethical practices, training for new and professional interpreters, scholarships and awards for students of interpretation, mentoring, and internships.

INFLUENCE FROM SPOKEN LANGUAGE INTERPRETING FIELD

When formal sign language interpreter training programs began to spring up around 1970, curricula development drew heavily from the field of spoken language interpreting which could be traced back to the post-World War I Paris Peace Conference of 1913 (Frishberg, 1986). Before 1940 most interpreters were performing consecutive interpretation. This meant that one person would render a message orally, and then pause while the interpreter transmitted the message into the other language. Though the first headphone system was developed during the late 1920s, at most international events, it was rare to have simultaneous interpreting done because private sound systems were difficult to obtain (Ramler, 1988; Frishberg, 1986). The headphone system though was used extensively at the famous Nuremberg trials in 1946. However, the type of sound-proof, sectioned booths that are commonly seen at the United Nations today, which reduce visual and auditory distraction for both interpreters and participants, had not yet been invented. When testimonies of war crimes were

given by the German leaders, interpreters worked simultaneously into Russian, French, and English using a four channel electronic system developed by IBM (Cerney, 2005). Consequently the use of simultaneous interpretation became the official model of the United Nations.

Spoken language interpreters were highly regarded as professionals, yet sign language interpreters were viewed as charitable “helpers” of the deaf. It was natural that as the sign language interpreting profession grew, its members sought to highlight the similarities of their work with that of spoken language practitioners. The development of sign language interpreting models was in fact based on the research available about the spoken language interpretation process beginning with the first known work by Eva Paneth in 1957 which showed that *interpretation* was in fact different from *translation*. When research on interpreting in sign languages formally began in the 1970s, sources of information regarding process time and analysis would become a significant issue to model development since the target (English) and the source language (sign language) were conveyed in entirely different modes.

2.2.2 Models of Interpreting

MESSAGE PROCESSING

The national organization Registry of Interpreters for the Deaf (RID), which certifies interpreters, defines interpretation as “the process of changing messages produced in one language [English or ASL]...into another language [English or ASL] (Siple, 1997, p.87). A sign language interpreter is expected to render a faithful message using the preferred language of the deaf person whom they are serving (Frishberg, 1990, p.196). To transmit a message from ASL into English, the interpreter must receptively process the visual-spatial language from a deaf consumer. The sign string is then analyzed for meaning. The meaning is freed from the constraints of ASL lexicon (“dropping form”) and temporarily stored as a mental image (Colonomos,2004; Humphries & Alcorn, 2001; Stewart et al.,1998). To convey this mental representation in the target (spoken) language, the image must be “redistorted” through the lexicon of English (Colonomos, 2004). Both parties are said to understand each other when the interpreter has achieved what is called *dynamic equivalence* - the mental representation of both the Deaf and hearing consumer are identical (Borden, 1996; Humphries & Alcorn, 2001). In interpreting from spoken English to sign language, the process is simply reversed - auditory input is analyzed, represented mentally, and redistorted through the visual-spatial modality. The contrast in modalities and grammatical differences between the two languages pose a challenge to interpreters. These differences are outlined in table 2 below.

Table 2 Challenges of Interpreting Between ASL and English

Grammar & Lexicon	American Sign Language	English
Discourse structure	(1) uses visual prosody (composed of pauses and phraseology, and visual intonation patterns) ¹⁷	(1) uses auditory prosody
	(2) uses physical space	(2) uses auditory-vocal modality
	(3) proceeds from the specific to the general ¹⁸	(3) proceeds from the general to the specific
word-order	SVO and topic-prone ¹⁹ (person, place or subject that is focused is in primary position in utterance, accompanied by brow raise, pause, and then the comment)	SVO
Pronoun	(1) number specific	(1) gender specific; encode number
	(2) incorporates referent information	(2) not permitted
	(3) Eye gaze to referential loci is possible but not mandatory	(3) not permitted
Voice Verb agreement	no passive voice	both passive and active voice
	mostly with objects and often subjects; ASL verbs incorporate referent information through agreement; only possible in	only with subjects; third person singular in the present tense

¹⁷ Friedman (1976); Klima & Bellugi, (1979); Isenath, (1990)

¹⁸ Darragh-McLean, M. (1998).; Feyne (2009); Mindess (1999); Humphries & Alcorn (2001)

¹⁹ Humphries & Alcorn (2001); also referred to as *topic-prominent* by Li & Thompson (1976)

Tense shift	one class of ASL verbs	
	uses time-specific markers before each verb	marks tense by changing verb form (morphology)
null arguments	permitted (once verbs are marked for agreement – Subject. and Object can be omitted)	not permitted
Temporal aspect morphology²⁰	Handshape and orientation stay the same, but the sign structure changes from a hold to a movement, and therefore the location likewise changes. Aspects include, <i>continually, regularly, and prolonged-period</i>	Uses affixation, morphemes give information about how the action is performed
classifier morphemes	Uses a special set of signs used in the spatial grammar that provides information about the relationship of a noun to another, a noun's description, or how something moves	non-existent
Adjectives Adverbs	pre or post-nominal	pre-nominal
	(1) post-verbal	(1) pre or post-verbal
	(2) expressed through non-manual markers (eyebrow, eye, cheek, nose, tongue, and/or mouth positions); mainly on lower face ²¹	(2) non-existent; only expressed lexically

Referring to Table 2, it is evident that in the process of forming an equivalent target language message, the interpreter will have difficulty with structures that are non-existent in one language or when negotiating a less familiar modality. The 3-D nature of ASL reflected in verb-agreement, ASL morphology, role-shifting, classifiers, and referents make interpreting very challenging (Humphries & Alcorn, 2001).

²⁰ Baker & Cokely (1980); Valli & Lucas (1995)

²¹ Liddell (1980)

DEVELOPING MODELS

The interpreting field has experienced its share of linguistic models. Researchers and practitioners wanted to create such models to better understand what an interpreter does, to provide tools for interpreters to optimally perform their work, and to effectively train future generations. Many of these models have been tested in the field, and in interpreting and mentorship programs. The majority of the models reviewed here are based on a conduit metaphor, or sometimes referred to as *machine*. That is to say they examine the process of information retrieval, change, and output (Cerney, 2005).

Over the last thirty years, interpreting professionals have worked within several metaphors that have helped shape their models. Cerney (2005) makes a distinction between *model* and *metaphor*, since the term *model* has often been incorrectly used to describe the philosophies interpreters held about their own role and the role of the participants. Since these philosophies often involved comparing one's work to something else, the term metaphor will likewise be adopted in the spirit of Cerney (2005).

Before launching into a description of the well-known interpreting models, it is necessary to understand their origins in the four metaphors which have appeared in the last three decades, namely (1) Helper (2) Conduit (3) Communication Facilitator (4) Bilingual & Bicultural. These metaphors have influenced not only interpreters' practices, including tenets of its code of ethics, but the dynamics between the deaf community and interpreters.

This background is provided in order to fully appreciate and understand the cognitive demands of the interpreting task.

INTERPRETING METAPHORS

1964-1969 - Helper

Many of the early interpreters were in fact relatives of deaf persons, members of the clergy, or teachers of the deaf. Because interpreted communication arose from intimate familial or spiritual relationships, ethical boundaries were often blurred as the profession was emerging. Interpreters became overly involved with the deaf for whom they were interpreting, and considered themselves *helpers* of a handicapped population, whose cultural behaviors were often viewed as aberrant (Humphries & Alcorn, 2001; Cerney, 2005).

1970-1975 – Conduit (Machine) Model

Having come off the heels of the Helper metaphor, interpreters went to the opposite extreme in collectively deciding they were to assume no responsibility for any processing above and beyond the lexical level. Rather they displayed an almost robot-like role in their task, where interpreting was more of a 'pass it on

and get out' process. Interpreters were to function as a telephone wire, acting like a bridge between the two interlocutors (Solow, 1981; Weisenberg, 2007). Put another way the quantity of information retrieved and processed was given more value than the quality of the message transmission. Subsequently, the deaf began to view interpreters as 'rigid and inflexible' (Humphries & Alcorn, 2001).

1972- Communication Facilitator

During this period, the focus was on the interpreting process. Caution and care were given to an interpreter's appearance and placement. Viewed as the better language choice, English was still dominating the output process, but ASL was employed with less intelligent deaf persons (Humphries & Alcorn, 2001). The political climate of the time – deaf persons have rights to communication because they have entered the mainstream as handicapped individuals – opened up many more areas in which interpreters could practice, and caused a reexamination of how accurately language should be transmitted to satisfy the new legislation supporting deaf people's rights to equal access of information. Interpreters were then perceived as playing a very active role in interpreting, making predictions about the source message, and applying their own schemas to the decoding stages (Roy, 1989; Wilcox & Wilcox, 1985).

1990- 2000 – Bilingual-Bicultural

This most sociolinguistic metaphor recognizes deaf people as a linguistic minority. ASL is the official language of output. Interpreters are expected to have respect for and understanding of deaf culture, to be more sensitive to communication dynamics, and to consider cultural norms in message interpretation. Interpreters now process both implicit and explicit information, and they are permitted, where appropriate, to make cultural and linguistic adjustments during the encoding stage. It is in this last metaphor, that interpreters are the most active in determining the meaning of the source text, and are routinely applying schemas to help them predict text and make better judgments regarding message equivalence.

The following section will provide a background for the various process models in the field of interpretation. The majority of them were constructed from an original interest in the conduit metaphor and attempted to show how meaning was processed, and hence how language was altered from the input to the output.

COLONOMOS MODEL

The Colonomos Model was developed in the early 1990s by pioneer interpreter educator Betty Colonomos, and based somewhat in the Vygotsky approach to language learning (Colonomos, 2004). The model requires three steps: (1) concentrating (2) representing (3) planning. In the concentrating stage, the interpreter is attending to and analyzing the source language. Attending

usually involves active listening to or viewing of the source language and avoiding both internal (negative emotions, fears) and external distracters (room noise, persons moving). In analyzing, the interpreter is determining how the meaning of the source language will be decoded. The last component of concentrating is referred to as 'dropping form'. This means that in the source message, the lexical items themselves restrict the potential of the interpreter's mental representations, especially in the sense that the interpreter's goal is to decode an oral message to subsequently recode it in a visual-gestural language, or vice versa. In the most traditional case of interpreting from English to ASL, the relationship between English words can affect the interpreter's conceptual representations of those referents when attempting to convert those representations to manual gestures (Colonomos, 2004)

In the second stage, 'representing', the model addresses the issue of dropping form further by teaching interpreters to rely on kinesthesia. For example, interpreters are trained to create mental images of emotions and actions, and in some cases to physically reenact the movements or emotions of the speaker. They learn to quickly self-reflect, and identify with the speaker, if possible, and to permit those emotions to surface to create a more authentic representation as if the real-life environment referred to by the speaker truly existed. Interpreters consciously create moving images in their mind, almost like a film strip, of actions, character viewpoints, and emotions (Colonomos, 2004).

In the final stage, 'planning', the interpreter begins to construct the target language output. Rather than rehearsing (ex. overtly gesturing, mouthing words), the interpreter begins to create a text framework, for example, organizing the actual words (s)he will choose to open and close the output message. It is here that specific lexical items are selected to refer to the conceptual representations that were created in the 'representing' stage. During this stage also, the interpreter may elect to make modifications or revisions based on the speaker variables (culture, style of presentation) and contextual factors (participant dynamics, setting). Modifications may include cultural expansion or shrinkage, where concepts in the source language, which would not translate easily, are rephrased or omitted in the target language (Colonomos, 2004).

Within this model there are a number of variables for the interpreter to consider. For example, when communicating, every speaker has a goal which is embedded in the context. Both the context and the speaker can influence communication. Speaker variables include language, culture, ideas, feelings, personality, and style of presentation. Likewise, the context includes factors such as the setting, language, culture, and the interlocutors themselves, all of which contribute to affecting communication between them.

INGRAM MODEL

Ingram proposed a one way processing model that examined encoding on four levels: form, lexicon, syntax, and semantics and how interpreters tried to seek equivalence from the potential multiple levels of the source language to the target language.

The most notable contribution of Robert Ingram's 1980 model of interpreting was that it caused professionals in the field to acknowledge that interpretation was indeed a complex process, that decoding and recoding depended a lot on the context and the interpreter's understanding of that context. Secondly it showed that processing did not occur in a vacuum: the interpreter and the parties involved could all equally affect the process and that every context had its own share of "noise" which could impede communication (Cerney, 2005).

COKELY MODEL

In 1984 Dennis Cokely launched a model which was similar in some respects to Ingram's model in that it approached processing from a linguistics perspective, but delved deeper into the interpreter's use of memory (Cerney, 2005; Cokely, 1984). In addition to syntactic and semantic decoding, and requisites for contextual knowledge, it also included the necessity of cultural knowledge. Cokely refined the linguistic processing to three levels: (1) lexical and phrasal, (2) sentence (3) discourse. Unlike Ingram's one-way model, Cokely's is multidirectional, suggesting that an interpreter can determine the stage at which the interpretation failed and work out solutions for that particular area. Under this model analysis and correction of errors is done by internal processing. Cokely likewise defined four types of errors: (1) perception, (2) memory, (3) production, and (4) lack of knowledge in source or target language. In short, his model highlights the interpreter's mental processing more than the interlocutors themselves and/or the physical environment in which the communication is taking place (Cokely, 1992). The interpreting sequence is as follows:

1. Message reception: interpreter receives incoming message
2. Preliminary processing: initial recognition; meaningful and meaningless elements are sorted out
3. Short-term message retention: incoming message must be stored until sufficient portions of it are received to reach the next stage
4. Semantic intent realized: the interpreter grasps the speaker's intentions
5. Semantic equivalence determined: find the appropriate translation in the language or mode of target language
6. Syntactic message formulation: select the appropriate form for message
7. Message production: transmit the message in sign language/spoken language

The interpreter perceives the source language, recognizes it, chunks it, understands it (semantic intent realized, which has been coined the "aha" moment), analyzes the message for the target language, rehearses the meaning in the target language (pre-monitoring stage), then finally produces the meaning

in the target language (post-monitoring stage) (Stewart et al., 1998; Cokely, 1992).

GISH MODEL

Sandra Gish (1994) Gish Model to Information Processing

Some major points of the Sandra Gish model include: The interpreter is in control of the interpretation. The interpreter also analyzes incoming information for meaning; is in control of the size of the source section to be interpreted (objective/unit); and is in control of production choices (Darragh-McLean, 1998; Gish, 1987).

According to this model as well, the interpretation must meet specific criteria:

- ◆ Each production sentence must be grammatical and complete.
- ◆ Each sentence must be equivalent to the speaker's meaning.
- ◆ There must be a pause between sentences.
- ◆ All sentences produced must be congruent in light of the speaker's intent (goal) and the message as a whole (theme)

Some other major points include that if the interpreter cannot get the details (if the message is coming in too fast, or they cannot interrupt for some reason), at least the interpreter can get the units, the objectives, or the sub-objectives. Interpreters should strive to produce equivalent messages based on meaning

Furthermore, interpreting one clear thought is better than interpreting many jumbled ones. Interpreters are encouraged to own their decisions and to appear confident (even if they are not) (Darragh-McLean, 1998; Gish, 1987)

Interpreters realize they change the environment in which we work just by their very presence, so they need to make the participants feel as comfortable as possible. Interpreters can easily find out the *goals* by (1) reading ahead/preparing (2) asking the speaker/signer (3) figuring it out themselves

SUMMARY OF MODELS

Aside from the Colonomos model, which contains the most sociolinguistic perspective of the four, the models focus primarily on the levels of processing, the skills needed to decode, impeding factors and their control. While the models vary in labels and approaches, there are some common components that will be crucial to the broader discussion of interpretation and mouthing in the current project.

First the interpreter is taking in the source language while monitoring the environment. Lexical units are grouped into manageable units (this was termed 'chunking') while the interpreter strives to find meaning in it. This chunk is then analyzed to discover the speaker's goal, his/her implicit intent, and sometimes - the implicit. Along with this analysis comes a slew of contextual factors that can

bias the comprehension. Interpreters then consciously and deliberately delete and edit source message lexical items and other communicative behaviors. The interpreters consider the schemas of both the deaf and the hearing interlocutors and attempt to match cultural norms if possible. Finally the interpreter searches the target language for lexical units and communicative behaviors that can be used to convey an equivalent message of the source language without compromising the communication dynamics (Humphries & Alcorn, 2001).

2.2.3 *Translationese*

Interpreting is a very interactive task that requires constant judgments by the interpreter. While the conduit models have tried to examine the process by simplifying it to decoding and encoding, it is evident from the introduction above that communication is far more complex than just words. Interpreters take into account postures, tones, eye contact, and cultural expectations. It is impossible for them in a sense to “be seen but not heard”. In fact because no two interpreters have the same skills and experience, it is generally understood that every target text an interpreter creates will not be reproducible by another interpreter (Cerney, 2005)

The repeated act of interpreting and training has an effect on the style of signing interpreters use. Toury (1980) noted that spoken language interpreters’ heavy use of cohesion devices such as ellipsis and substitution has led to a phenomenon known in the field of interpreting as *translationese*. This phenomenon sometimes happens when interpreters overcompensate while attempting to remain true to the original meaning of the source message, and subsequently produce unnatural or awkward sounding target messages. Translationese has generally been discussed in the field of written translation, but can apply to sign language interpreting as well. Sign language interpreters likewise have had their interpretation-style signing labeled as a kind of ‘hybrid’ (Sallie Bruno, personal communication, September 2003).

In an effort to accommodate their audience, who could either be the recipient of the target message, deaf or hearing depending on the situation, interpreters will shift the style of their language. This has been observed in public-contact service industries such as hotels, shops, or restaurants, where the employees are expected to win the approval of their clients, and therefore accommodate the speech of their addressees (Bell, 1984). Interpreting is yet another type of service industry. Bell (1984) explains how institutional employees have been so well trained to respond to the clientele’s needs that their own natural speech styles are difficult to identify. In cases where the clientele is consistently of one speech group or there’s little time for employees to shift speech style because of rapid client traffic, employees will settle on a middle-ground speech, losing their individual differences. This results in a “house style”. They will converge to this one uniform style for use with not only clientele but also other personnel (p.170).

The use of an identifiable ‘interpreting accent’ is likely the result of continually working with deaf clients of a particular background, or even the use

of standardized cohesive devices from interpreter training. However, it would be remiss to simply settle on this as the only explanation and ignore the uniqueness of interpreters as skilled bilingual persons who happen to have both a visual and a gestural language at their disposal.

It is well known that Deaf people use more English-based varieties when interacting with the mainstream (Markowicz & Woodward, 1975; Lucas & Valli, 1989). Knowing when to or when not to use ASL is a natural expected behavior in Deaf life. But likewise it is an expected behavior of interpreters. Interpreters use cross-linguistic strategies like lexicalized mouthing, phonetically-intact English mouthing and fingerspelling because speech and gesture can be produced simultaneously in a type of layering (Weisenberg, 2003; Davis, 2003).

Interpreters are an excellent source of study for language contact phenomena precisely because the nature of their work requires them to be in contact situations that elicit language-mixing behaviors. The language mixing that they do contrasts from that of spoken language bilinguals in several ways. Foremost is the fact that it is they who are deciding when mixing is needed in a message whereas in the field of bilingualism, mixing has been traditionally thought of as a speaker-controlled phenomenon (Weisenberg, 2003). The message itself is not generated by them but by the two speakers for whom they are contracted. They are merely a conduit for this message, but assume the added responsibility of determining speaker intent, foregrounding information, and other linguistic tasks.

In sum, they are very active conduits, consciously judging how they can best accommodate the addressee based on a multitude of contextual and linguistic factors because the addressee, unfortunately, cannot receive the message directly from the source itself. And this repeated process can elicit an interpreter accent, or hybrid of sorts. To better understand the duality of this powerful yet subjugated position interpreters find themselves in daily, it is necessary to examine the relationship between deaf persons and interpreters, and how this ultimately affects communication.

2.2.4 Dynamics of Interpreter Deaf Relations

The earliest interpreters tended to be family members of deaf individuals or members of the clergy. As explored in section 2.2.2, the first model of sign language interpreting evolved from a “helper” metaphor. This model therefore had roots in paternalism and audism. Audism, coined by deaf author Tom Humphries²², refers to a collective attitude stemming from the focus on the physiological deficit of hearing loss, and the resulting erroneous labeling, infantilization, and stigmatization of deaf people.

The historical trend has been to categorize deaf people as defective, disabled, or imperfect, rather than attempting to simply recognize them as *different* individuals (Humphries & Alcorn, 2001). From this, a long lasting

²² (Humphries, 1977)

generalization about deaf people arose, stereotyping them based only on the preconceived notions of deafness. Some consequences of this stereotyping have led to the following: (1) assumptions that normal hearing children should be the role models for deaf children, (2) devoting time and funding to seek cures for deafness, (3) emphasis on speech development over gestural communication, avoiding the use of ASL, (4) banning deaf-deaf marriages and/or deaf socialization, and (5) belief that professionals like speech therapists and interpreters are valuable only in the sense that they help normalize deaf people (Humphries & Alcorn, 2001). In this pathological view of deafness then, an interpreter is simply a remedy for hearing loss – a way to “fix” the problem, just as one might use any assistive listening device, except in this case it is a person.

Beginning a career in sign language interpretation can be somewhat of a quagmire based on the deeply rooted antiquated notions of the role of interpreters to deaf persons. And while modern interpreting practitioners work diligently to eradicate these misconceptions, it is not uncommon even today to encounter emotional abuse of interpreters, reverse discrimination, and ridicule. In essence it is a double-edged sword. The deaf population expects interpreting services, and is legally entitled to it under the Americans With Disabilities Act (ADA), yet at the same time, it has been known to resent our presence in the daily lives and business of its members.

There are still a disproportionate number of deaf people who are unemployed and/or alienated from their families due to lack of communication. Interpreters are working with people who historically have had very little power or control over their own affairs. As Humphries and Alcorn (2001) explain, “Many of the deaf individuals you will work with as an interpreter will carry with them the scars of ongoing disenfranchisement.” (p. 6.3).

Regardless of how respectful, well-trained, and unobtrusive an interpreter attempts to be, one can not avoid the fact that a deaf consumer of the service would likely prefer to not have a third person privy to their communication. It is basically a violation of his privacy. The negative attitudes towards interpreters are only reinforced when unfortunately an unethical interpreter does something to contribute to the underlying resentment. For example, some interpreters have broken the code of ethics by publicly sharing information about a deaf person that could have only been obtained through the interpretation itself (Humphries & Alcorn, 2001). One of the ways the deaf community’s culture has survived all these years is through trust and connection. When an interpreter is invited into that circle, no matter how reluctantly, it is considered the worst violation should (s)he disclose personal information obtained through serving as the interpreter, and it is usually a “one strike and you’re out” fate in the profession.

Interpreting then is a minefield. Aside from battling the deeply rooted scars of a disenfranchised group of individuals, by always striving to prove that interpreters are indeed a group to be trusted, interpreters have the added burden of becoming a dumping ground for all the oppression. Yet the difference is that because they take an oath to keep all information confidential, there are very few if any resources for them to unload these emotional conflicts. Because they work with the majority and privileged culture and the minority underprivileged every

day, they are constantly dealing with conflicts of culture and norms. And though they are trained to tackle these, sometimes the presence of a third person in an already conflicted interaction can intensify the conflict (Humphries & Alcorn, 2001).

VICARIOUS TRAUMA

Interpreters witness the ways that the oppressor culture, in this case hearing persons, currently dominates the education and economic world. Interpreters are forced to interpret scenarios where deaf people are turned away from employment because of their deafness, they convey through their hands and face the ignorance of the medical profession when dealing with unsuspecting parents of a deaf child, they become the voice of deaf persons veraciously lobbying for the legal rights to work, better education for the children, and equal access in the media (Humphries & Alcorn, 2001). Because of this constant exposure to and literally “through” their bodies of disrespect for deaf people, interpreters can become victims of *vicarious trauma* (Eldredge, 2008). By definition this is a trauma that occurs when repeatedly observing clients’ traumatic experience to the point that it feels as though it is occurring to them. Interpreters are particularly susceptible to this because of the code of confidentiality tenet, and that they often still cling to the idea that they can be neutral. The reality is that it is impossible to be neutral. Interpreters will overhear abuse, witness repeated oppression of deaf people, feel empathy, and have others show feelings towards them, just as in any human interaction. The conduit metaphor was abandoned decades earlier, and interpreters are by far not just a robot packaging and unpacking information bits.

Humphries & Alcorn (2001) point out that interpreters are often the “target of the backlash of the oppressed” (p. 6.10) They have to witness deaf people’s comments about ignorant hearing people, interpret jokes aimed at interpreters or other hearing people, and interpret criticisms of themselves as the interpreter to the other parties in the dialogue.

In conclusion, Interpreters are dealing with conflict and their role is confusing. Deaf people themselves often struggle to sort out their feelings for interpreters from their general feelings towards the majority hearing culture. Both parties are in a love hate relationship. While legislation such as the ADA and PL94-142 Education for All Handicapped Children Act opened up much work for interpreters, at the same time, deaf people were witnessing the closing of many deaf schools, or in the least, the danger of closings from children enrolling in mainstreamed school programs. Interpreters are earning a living from these educational mainstreamed employment opportunities, and some deaf individuals might go so far as to say they are profiting from their deafness. Interpreters must maintain dignity, know their limitations, and make daily judgments of how they can attempt to perhaps be allies of the community they work with while performing their linguistic duties. Interpreters’ ties to and membership in the dominant culture, of English speaking individuals, will have an effect on the language choices they make when they are engaged in interpreting. The choice

of signs they use, decisions to utilize English loanwords, or even mouthing patterns all potentially affect the message as well as the relationship between the deaf consumer and the parties involved.

2.3.1 Preference for Semantic Equivalence

REALITY OF EQUIVALENCE

Winston & Monikowski (2000) point out that in determining equivalence in sign language interpreting, practitioners have been led astray, in that they judge messages “good” or “bad”, or that there could only be one successful message interpretation. When in truth, equivalence is quite relative. Equivalence only can mean “the closest approximation to the source language meaning” (p.47). Larson (1984) proposes asking three questions in order to assess equivalence: (1) Is the meaning of the target language the same as that of the source language? (2) Is the message clearly understood by the audience for whom the message was intended? (3) Is the form natural? (p. 49) Interpreters must also turn to their consumers to determine the effectiveness of their work (Winston & Monikowski, 2000)

STEPS IN MESSAGE ANALYSIS

Traditionally interpreter training has spent considerable time on training interpreters to analyze words, signs, and sentences, and this results in the deaf community’s complaint about new interpreters: “They include many facts, but the overall meaning is somehow missing. The missing elements are the coherence of the discourse, the goal of the speaker, and the point of the presentation.” (Winston & Monikowski, 2000, p.16). Therefore it is imperative that interpreters learn the typical schemas and structures to discourse so that they can take a gestalt approach to analyzing the message, find the essence of it, and become effective at producing a successful approximation of a speaker’s words.

The process of interpretation comes in several stages, and semantic equivalence is just one aspect of the process, though more specifically, part of the final stage. Semantic equivalence is emphasized at this point in the discussion for several reasons. First in working between two languages, it is not unreasonable to assume that there may be a concept in the source language for which there is no equivalent in the target language. Secondly, in the field of sign language interpreting, for example, technical contexts are encountered frequently, such as computer training, which have attracted a high number of deaf persons. Here a sign might not exist for certain jargon. In this case, the interpreter must search for a synonym root sign, or even a series of signs to approximate the meaning. Furthermore they may elect to overlap that root sign with other linguistic strategies such as fingerspelling, English phonetic mouthing, or initialization (the use of fingerspelled handshapes coalesced with the root

sign). Lastly, the current study contains contexts that are of a technical nature, and its focus is specifically the strategy of mouthing; therefore, it is essential to initially discuss how an interpreter absorbs the information, analyzes it, and judges what to produce. At this juncture the stages of interpretation in relation to semantic equivalence will be discussed.

SOURCE AND TARGET LANGUAGE RESTRUCTURING

The first step in interpretation is to take in the source language, and as discussed in earlier sections, there are many environmental and internal “noises” that can impede this process. Much also depends on the ability to use cloze skills, have bilingual competence, and understand the reciprocal signals in each of the cultures participating (Humphries & Alcorn, 2001).

The emerging efforts for semantic equivalence reveal themselves in the second stage of interpreting: analyzing the deep structure. Here they attend to the linguistic register being used in the setting, both the overt and possibly covert goals of the speakers, affective information, and the relationships between participants (p, 10.9). This type of analysis requires higher order thinking, like critical thinking skills that are often needed when participants do not always clearly articulate their ideas, or where ideas are vague. Interpreters need to do a substantial amount of inferring, to often listen for nuances, and ambiguities, beyond just the explicit information. (p. 10.12)

Semantic equivalence comes into play further in the third stage of interpretation. In this stage interpreters apply a contextual screen. This means they consider cohort groups and how to adjust the interpretation if members of the dialogue do not share the same beliefs based on the historical and social conditions of their era of birth. They look to see if the schemas of the two individuals are similar, and if not, of course that causes more of a challenge. Other contextual factors that have to be considered are the formality of the setting, the norms and protocol for that event, the overall goals of the participants (Humphries & Alcorn, 2001).

In the fourth stage the interpreter begins to decide how to convey the message. Whether one believes in true semantic equivalence or not, one important goal is that “the consumers of the interpreted message should have the same sense of the speaker/signer as that of the consumers of the direct message” (p.10.19). Here the interpreter makes deliberate choices for signs or words.

In the fifth stage of interpretation the signs and words are realized visibly or audibly.

In attempting semantic equivalence interpreters have several strategies at their disposal. In the following section, the use of the manual alphabet handshapes, known as fingerpselling, in combination with root signs will be explored.

2.3.2 *Fingerspelling*

HISTORY

The use of the body and hands to represent the alphabet, rather than paper, is particularly well-suited for the deaf who need to have a visible form of communication, but has been referenced throughout history, with the Greeks and Romans for example (Padden & Gunsauls, 2003). In the seventeenth century, it has been reported that within monasteries, monks often used alphabetic gestures and manual signs to communicate visibly while adhering to their vows of silence. When the peoples of ancient civilizations discovered that writing the alphabet on paper created a permanent record of languages that could be studied, it offered an alternative means to preserve histories, other than traditional oral tales. Before the end of the fourth millennium B.C., a primitive form of writing was in use in the Nile valleys of Egypt. Wedge-shaped marks were impressed with a stylus on soft tablets which were then baked by the sun. Also the Egyptians used papyrus, which came from the sedge, a tall grass with a solid stem. The stems were cut and pressed into paper to be used as writing material (Boyer, 1968; Newman, 1956). In fact the origin of the word paper, *papyrus*, means “that which belongs to the King”, implying that the one who had paper, and thus could read would have a powerful tool at his disposal (Dellicarpini, 2003). Written language has no doubt altered communication between human beings, as in the ever-present emailing and texting that occurs today. In contrast, manual alphabets enabled intimacy, with language exchanged face-to-face between individuals literally on their bodies (Padden & Gunsauls, 2003).

The interplay of intimacy and power comes into play in the deaf community where as early as 1913, in a film called *The Preservation of the Sign Language*, deaf leader and activist George Veditz, displayed his concern for the spread of oralism. He uses a fair amount of fingerspelling in this speech (approximately fifteen percent), and it has been proposed that he may have stirred deaf people to show their opponents their English literacy through fingerspelling, and their abilities to manage both languages in the battle to defeat oralism and argue for the use of manualism in deaf schools (Padden & Gunsauls, 2003).

Other historical educators such as Abbe´ de l’Epe´e, founder of the first public school for deaf students in Paris in the mid-1700s used sign to teach and apparently utilized a manual alphabet to teach orthography and written language (Padden & Gunsauls, 2003; Hoffmeister, et al., 1996). Then in 1817 Laurent Clerc, a former student of Abbe´ de l’Epe´e helped to establish the first school for deaf children in the United States, where Old American Sign Language evolved as a mixture of existing native signs in use, with the French Sign Language and manual alphabet introduced by Clerc (Hoffmeister, et al., 1996).

Lane (1984) explains that in the very first schools for deaf students in Spain, France, and Italy, deaf pupils were taught to use the manual alphabet.

ROCHESTER METHOD

In 1879 the Rochester Method was introduced in the United States which may have also promoted the use of fingerspelling among deaf children and adults and influenced its entry into the language (Padden & Gunsauls, 2003). The Rochester Method was a system in which each word was fingerspelled with the exception of the word “and” which was normally signed; this was considered a very precise but impractical way of representing English (Humphries & Alcorn, 2001).

OCCURRENCE OF FINGERSPELLING

There are varying reports of the exact percentage of fingerspelling in American Sign Language. Padden (1991) claims 7-10% of the overall vocabulary in common conversation. Others judge it to be approximately 12 to 35 percent of signed discourse in ASL (Padden & Gunsauls, 2003) But it is well-known that it appears across gender, age, class, and ethnicity. Not all sign languages of the world share this percentage though; signers of other languages have reportedly remarked that ASL signers fingerspell often and rapidly compared to that of French or Italian signers (Padden & Gunsauls, 2003). American Deaf people tend to fingerspell names of cities and towns and famous individuals more often apparently than signers from other countries who prefer to use manual sign (Arkady Belozovsky, personal communication, May 29, 2008). So the uses of fingerspelling are not consistent cross-linguistically.

The traditional description of fingerspelling in ASL is that it comprises borrowed foreign vocabulary from English used to represent proper names, places, and other words for which no sign exists (Padden, 2001). Also completely spelled phrases or sentences are sometimes used for effect or emphasis. Fingerspelling is used as a “cross-modal borrowing”, a way to represent spoken vocabulary into a manual language (Padden & Gunsauls, 2003, p. 14). Fingerspelling is a set of various handshapes each corresponding to a letter of the English alphabet generally, though not always, produced linearly in the signing space, with the signers dominant hand (or non-dominant hand or both simultaneously, in some cases). It is not iconic, though there are some shapes such as “C” that reflect the curved shape of its English counterpart. Padden & Gunsauls (2003) remark that fingerspelling is not just borrowing but rather has become a “*signifier* of contrastive meaning through the exploitation of the structural properties that set it apart from signs.” (p. 15).

CROSS-LINGUISTIC PATTERNS OF FINGERSPELLING

The frequency with which fingerspelling appears in the signed discourse of ASL patterns somewhat with other signed languages such as Swedish and British Sign Language. In contrast, Italian Sign Language uses a different method. An Italian signer will produce a root sign for a noun, for example, but will

simultaneously accompany the manual sign with mouthing of the equivalent Italian word (Padden & Gunsaulis, 2003)

So, mouthing serves to distinguish meaning, and avoid confusion, in particular for manual root signs for which there are numerous possible meanings. To illustrate this one can examine the sign “leaf” which in Italian Sign Language is used for a variety of herbs, but to identify it accurately, the receiver of the signed message will see the signer mouth “rosmario” (rosemary), “basilica” (basil), or “salvia” (sage) depending on the context (Padden & Gunsauls, 2003). In addition to this example, Boyes-Braem (2001) reports that Swiss German signers use mouthing to represent spoken vocabulary about 80%-90% of the time, and may likewise employ it as a modifier of adjectives, adverbs, and modals. Danish Sign Language users typically spell the first and last letter of a word, rather than the complete word, for example “F-D” for “Ford” [cars] (Birch-Rasmussen, 1982, as cited by Padden & Gunsauls, 2003). British Sign Language also appears to have one phonetic alphabet and one manual alphabet, and exhibits deletions of some letters during production (Brennan, 2001, as cited by Padden & Gunsauls, 2003).

FINGERSPELLING AND LIP MOVEMENT

Both native deaf signers and bilingual bimodal hearing signers have at their disposal fingerspelling or mouthing to convey and distinguish meaning when producing a sign for which there might be more than one meaning. Now that a description of fingerspelling has been provided and its usage, it should be noted that fingerspelling is traditionally accompanied with some lip movement. It is the exception, and not the rule, to observe a native deaf signer who shows no lip or mouth movement whatsoever. Similarly bilingual bimodal signers will produce lip and mouth movements corresponding to the phonetics of the English letters concurrently with a manual sign.

FINGERSPELLING AND CONTACT SIGNING

The frequency with which English intrudes into the signed discourse, whether that be through mouthing or fingerspelling, varies depending on context and the interlocutors. Lucas & Valli (1989), Woodward (1972), and Fischer (1978) have discussed evidence of a form of contact signing or *pidgin* that results from the interaction of deaf signers and hearing individuals. The superstrate language, English, usually provides the syntax, with the vocabulary coming from the substrate, ASL. This diverges from the traditional notions of pidgins, where the reverse occurs. Deaf bilinguals are people who have not only learned ASL through their primary caregivers, or perhaps also from other deaf adults and peers in residential or mainstreamed schools, but have also been exposed to spoken and printed English through the mass media. Bilingual bimodal hearing signers, likewise have learned ASL from the deaf community and in formal educational settings, but typically have English (or another spoken language) as their dominant language. A note should be made though that this would not be

the case for hearing persons who were raised in a deaf household where ASL was the primary language. These individuals would be considered ASL-dominant bilinguals.

Deaf native ASL users will switch to a form of signing that includes more English features when they have determined, from some initial evidence that their interlocutor can hear. Code-switching and/or code-mixing is therefore driven by the ability or inability to *hear*. (Lucas & Valli, 1989). There is also evidence of bilingual bimodal hearing signers code-mixing when no longer in the presence of deaf people (Lucas & Valli, 1989). This degree of hearing status of a signer's audience will of course be examined in the current research, but for now, a tentative claim can be made that the presence or absence of English features in sign production is somewhat dependent upon the audiological status of the signer's interlocutor.

INTERPRETERS AND LINGUISTIC TRANSFERENCE

Sign language interpreters, who are themselves bilingual bimodal signers, exhibit code-mixing, code-switching, and lexical borrowing as linguistic transference during interpretation, and that transference occurs much more frequently than interference. Linguistic interference as defined by Davis (1989) is the transference of rules of one language to another, as opposed to linguistic transference in which material is transferred from the source language while the rules of the target language are maintained (as cited by Napier, 2002). When interpreting from spoken English to ASL, interpreters have the option to encode some English into their target language (ASL), and often context, participants, and setting can affect the degree to which encoding occurs (Davis, 1989; Napier, 2002). Napier (2002) proposes that linguistic transference is a decision made consciously during any interpretation, and that it is essentially a *coping strategy* (p.77). Strategies used by interpreters include omissions, additions, substitutions, literal translation, and borrowings (Ivir, 1998).

2.3.3 *Mouthing and Semantic Root Overlap*

CONCEPTUALLY ACCURATE SIGNED ENGLISH

Another form of signing which exhibits mouthing accompanied by manual signs is the system of Conceptually Accurate Signed English (CASE). This term is used exclusively by sign language interpreters within the field of interpretation. Others have referred to it as a type of natural evolution, an *Anglicization of ASL* (Bragg, 1989). Artificial sign systems typically are composed of three elements: ASL signs, English mouth movements, and manual inventions, and are incomplete representations of English, or ASL. They generally follow English syntactic order (substrate). Deaf children trying to acquire a language using these systems see visible English and visible ASL signs, which is potentially conflicting, since only one should be the superstrate language (Cerney, 2005). Unlike other artificial signing systems, CASE was built on the premise that

meaning supersedes sound, so conceptually accurate signs are produced concurrently with inaudible English mouthing, with signing adhering to English syntactic order. The number of manual signs does not always match the number of source English words. So for example, a silently mouthed word could appear along with several manual signs. In contrast to other sign systems, where the manual verb or noun might be chosen based on sound alone, the following sentences: *I will make dinner; Go make your bed; Did you make that coat rack?* would all be rendered in CASE with a manual verb or noun reflective of the true meaning, while in terms of mouthing, the signer's lip movements might be consistent across all three examples.

INITIALIZED SIGNS

ASL *initialized loans* also appear in the discourse of both deaf and hearing bilingual bimodals. These are frequently accompanied with mouthing of their corresponding English word. Initialized loans are formed by combining a semantic equivalent root sign with the left edges of the English morphemes. For example, the verb TRAIN consists of the root sign PRACTICE plus the initial letter 'T'. Similarly, the noun VIDEOTAPE is constructed from the root TO-FILM plus English 'V' and 'T'. We observe a similar outcome in Chinese, where an English word 'democracy' is initially adopted as "de-mo-ke-la-xi," but later becomes more nativized as "min-zhu" (people-government); similarly "wei-ta-ming" (vitamin) becomes "wei-sheng-su" (protect-life-element) (Miao, 2001). A semantic ASL root is often selected to serve a variety of borrowings; for example, TEAM and DEPARTMENT both utilize the root GROUP; STAFF and FACULTY share the root MEMBER; RESIDENT and CLIENT share PERSON (Brentari & Padden, 2001).

If a semantic native root sign does not exist, speakers will adopt the English word in its entirety via fingerspelling. This visual representation of English is normally articulated in the torso area, on the ipsilateral side of the body, in line with the dominant shoulder. Fingerspelling each letter of the English word is usually abandoned after the third production within a discourse because signers naturally begin to delete some handshapes and alter other parameters as well (Brentari & Padden, 2001). In most cases, the edges of the English word are preserved while medial segments are deleted, for example, B-K for BACK. Bilingual bimodal Interpreters often must opt to utilize initialized loans and/or fingerspelling when interpreting from English to ASL in settings where technical jargon is prevalent.

Whether viewed as a strategy, choice, or natural result of language contact, it is clear that mouthing and other borrowing of English occurs in the discourse of ASL. There appears to be some regularization dictated by the syllable structure of ASL, so a brief review of ASL syllables will be provided.

2.4.1 Handshape and movement in ASL syllables

One important constraint on borrowing foreign words is that they conform to the native language's syllable template. It is widely accepted that complex onsets are universally more marked than simple onsets and complex codas are more marked than simple codas (Kager, 1999). In Boumaa Fijian, codas are disallowed, so we see evidence of syllable repair through vowel epenthesis: 'kaloko' (clock) and 'aapolo' (apple) (Dixon, 1998). Languages can also avoid complex onsets, as observed in Japanese speakers treatment of loanwords *furendo* ('friend'), *sutoro:ku* ('stroke'), and *gurasu* ('glass') (M. Volpe, personal communication, November 2002); also in Egyptian Arabic *tiransilet* ('translate') and *bilastik* ('plastic') (Broselow, 1982). Since ASL is a visual - manual language, the traditional way of thinking of syllable structure in terms of a nucleus, onset, and coda must be modified. Secondly, syllable structure in spoken language is normally analyzed in a linear manner, (e.g. CV, CCVC), yet signs are often composed of handshapes that are produced simultaneously. In short, studies such as Sandler (1989), Mandel (1981), Perlmutter (1993) and Brentari (1998) have shown that the concept of a syllable can be applied to ASL.

Following this, an ASL syllable is determined by sequential phonological movements and native signs cannot be more than one movement, or one syllable. A native *sign* is defined as a manual utterance employing one or both hands, in which the digits form a non-complex HS and move in a single path (Weisenberg, 2003). This single path movement is equal to one morpheme. However, a sign can be polymorphemic - the HSSs, palm orientation, and POA of the hands each function as affixes to contribute meaning - yet monosyllabic due to the single path movement (Padden, 1998). An example of a monomorphemic, monosyllabic sign is UNDERSTAND; a polymorphemic monosyllabic sign is I-GIVE-YOU. No signs currently exist in the language which lack movement, therefore we can generalize that a well-formed sign is one that has movement.

The motivation for a one syllable maximum for all ASL signs is based on the fact that there is a greater percentage of signs containing simple movements (monosyllabic signs) than any other type (Padden, 1998; Stokoe et al., 1965)²³.

Brentari (1998) has claimed that there is two-syllable maximum, providing examples such as CURRICULUM and PROJECT. However, these signs are loans, and syllable violations in loanwords are not unusual. Bisyllabic signs can result from derivational processes, where a monosyllabic root verb is given an added movement morpheme to create a noun, such as AIRPLANE (2 movements) derived from TO-FLY (one movement). A sign like PAPER, which has two movements, can be explained by examining its verbal root TO-CRUSH

²³ In Stokoe's *Dictionary of American Sign Language on Linguistic Principles* (DASL) 82% of the sign corpus contained simple movements compared to only 18% which had complex movements. A *complex* movement involves more than one co-occurring path movement; a *simple* movement has a single path movement.

(pulp). Secondly, plain root verbs containing one movement can receive added movement as inflection, for example, LOOK-FOR (one, sequential circular movement) to LOOK-FOR-REPEATEDLY (circular, repeated movement with trilled fingers). In sum, the only apparent violators of the one syllable maximum are loans and morphologically derived signs; native roots all appear to be monosyllabic. UNDERSTAND and SPECIAL are monosyllabic native roots involving one movement.

As explained earlier, fingerspelling is a manual representation of the letters of an English word using various HSs. Deaf signers have phonemic awareness and these HSs are always accompanied by mouth movements corresponding to sounds (Padden, 2001). In spoken languages, the strong tendency to preserve segments in word-initial position is based on empirical evidence that the first part of a word is often given the greatest degree of length and amplitude (Casali 1997; Steriade 1995; Jun 1995). The ability to actually hear these initial phonemes depends on the degree of hearing loss of a deaf individual; however, what remains constant is that deaf signers need to perceive the initial sound, regardless of modality, for the same reasons that non-deaf speakers do: language processing.

In sum, coalescence of letter handshapes and manual semantic root signs in ASL is common, and when it does occur, the literature has suggested that the syllable constraints of ASL may have affected which fingerspelled letters remain.

3 Mouthing

3.1 Introduction

This section presents an overview of the integration of gesture and speech and the various types of gestures presently researched. Understanding the supportive role of gesture in spoken language communication is crucial to a discussion of the ways in which mouthing is used by those individuals who communicate with a visual-gestural language, where the hands are otherwise engaged. Mouth movements in bilingual-bimodals differ from traditional notions of grammatical mouth movements in signers, such as adverbials, so it is necessary to define these and distinguish them from each other.

3.2 Non-manual elements in sign language

Nonmanual markers (NMMs) refer to those aspects of American Sign Language that do not involve the use of the hands, such as movement of the cheeks, eyebrows, nose, mouth, torso, and tongue.

These types of facial expression can be both grammatical and affective. Emotions such as happiness, surprise, doubt, disgust, and anger, for example, can be read from such facial movements as raised or furrowed eyebrows, smiling, frowning, lip curling, nose crinkling, narrowing of the eyes, and so forth. Contrary to spoken languages such as English, facial expression can also be used to mark linguistic structure, specifically having a definitive, clear onset co-occurring with the grammatical structure (Liddell, 1980; Reilly, McIntire & Bellugi, 1991). For the most part NMMs function as adverbs. However, they can also be utilized to mark a certain clause structure such as a *yes-no* question, *wh* question, or negation. In ASL, lowered eyebrows together with a slight lean forward and a tilted head mark a *wh*-word clause. Many other lip and mouth configurations carry adverbial or adjectival meaning when co-produced with an ASL verb or noun, respectively (Anderson & Reilly, 2002). For example, a signer can have his tongue protruding through his teeth while signing a verb; this conveys a meaning of *carelessness*. A signer can also puff his cheeks out when describing the width or shape of a particular noun, indicating that this entity is large or thick. It is also known that signers focus on their addressees face, rather than the hands during conversations (Siple, 1978). Furthermore, signs which are produced at the head area with complex handshapes are considered more salient than those produced at the periphery or lower in the signing plane (Weisenberg, 2002). Because signers must focus their attention on the face of their addressee and quickly process both affective and grammatical facial movements, they have enhanced face processing abilities. Studies have shown that deaf persons outperform non-signing hearing individuals as well as bilingual bimodal hearing persons in discrimination tests of subtle differences in mouth

configurations, indicating they have a heightened sensitivity to changes in the mouth which hypothetically could originate from lipreading skill coupled with habitual reading of grammatical facial features (McCullough & Emmorey, 1997).

So aside from affective facial expressions that pattern that of users of spoken language, ASL seems to have three distinct categories of NMMs: lexical marking, adverbial marking, and syntactic marking.

LEXICAL MARKERS

Lexical markers are specific facial expressions that accompany a sign. They must co-occur with a sign; in their absence, the sign is considered ill-formed. For example, the lexical item NOT-YET, must always be marked with a slack protruding tongue. Without this marker, the meaning changes to LATE. The second type, adverbial NMMs, is not obligatorily affixed to signs, but rather is chosen according to the speaker's intent. For example, the same lazy tongue marker, when attached to a verb such as DRIVE, indicates the action of driving carelessly. Here it is serving to modify the action. Although the verb may have a different meaning without the marker, it is still well-formed. Both adverbial and lexical NMMs are produced over a single sign and cannot spread over phrasal domains.

Lastly, syntactic NMMs such as the wh-marker (involving a head tilt, eyebrows furrowed, lips pursed) or the negation marker (eyebrows furrowed, side-to-side head shake) may optionally spread over the c-command domain of the node with contains the manually articulated negation sign NOT. ASL does not require the use of the sign NOT to produce a well-formed negated utterance. However, if it is not there, the spread of the negative NMM is obligatory as in:

neg
 MARY NOT BUY CAR
 "Mary is *not* buying a car." (emphatic meaning)

MARY [NOT [BUY CAR]_{VP}]_{NegP}
 "Mary is not buying a car."

*MARY [NOT] _{neg} BUY CAR (no NMM)

Neg
 *MARY [+neg] _{neg} BUY CAR (NMM does not spread across entire phrase)

(Note: the length of the line indicates co-occurrence with a sign or signs)

Another grammatical NMM, reminiscent of that used in yes-no questions, is found in sentences where ASL signers state the topic first followed by a comment. This is referred to as topicalization. The topic is accompanied by

raised eyebrows and widened eyes. The NMM is coextensive with the topic sign, and no spreading occurs into other phrases, as in the following example:

brow raise
 BOY LIKE ICECREAM
 'As for the boy, he likes icecream.'

For second language learners of ASL, learning to use NMMs appropriately can be extremely difficult since they are unaccustomed to many of the expressions and muscular movements. Deaf people can easily identify a native speaker by his/her use of such lexical and grammatical markers. The following table provides examples of grammatical NMMs in American Sign Language²⁴.

Table 3 Non-Manual markers and corresponding meaning

English Sentence	NMM/sign	Reason
1. 'I saw a drunk man stumble out of a bar last night.'	Careless	Adverbial, optional, in absence of NNM, sentence meaning would change
2. 'Come on...you can do it. Take a risk!'	FOMP i.e. 'take a risk'	Lexical; mandatory
3. 'The boy came from a country far away.'	Tongue waggle i.e. 'far'	Lexical; mandatory
4. 'Look...look! Her shirt is open.'	LR-LR i.e. 'inconspicuous look'	Conversation regulator; mandatory
5. 'Good to see you...Take care.'	Thumb up 'take care'	Mandatory; lexical
6. 'That dictionary is so big. It has 2000 pages.'	CHA i.e. 'thickness; mass'	Lexical; mandatory
7. 'After weeks of studying, I finally passed my English exam!'	PAH i.e. 'finally'	Mandatory; lexical
8. 'I agree [with you on that].'	Nose crinkle i.e. 'I agree'	Mandatory; conversation regulator
9. 'Where's the class?'	Wh question: eyebrows down, head tilt	Grammatical; mandatory
10. 'Do you understand my question?'	Yes-no question: eyebrows up; head tilt	Grammatical; mandatory
11. 'My bus is going to leave soon; I have to hurry...'	ZZZ; i.e. 'hurry/haste'	Lexical; mandatory

²⁴ Bridges (1998)

3.3 Gesture and Language

Gestures are typically thought of as movements made by the hand or arm during speaking, and it appears that gestures are communicative (Kendon, 1994). For purposes of this research, it is important to make the distinction between gesture and *emblems*. Emblems typically do not depend on speech, and the meanings that are attached to the handshapes are consistent across contexts (McNeill, 1992; Muller, 1998). The ‘thumbs-up’, ‘shush’, and ‘ok’ handshapes are all examples of emblems. These can be understood by people either co-produced with an utterance, or independent of a sentence. The origin and function of gestures is still under much debate; however, there is a common assumption that gestures contribute to communication in some way. Landmark work by David Efron (1972) brought gesture to the forefront. Kendon (1980) and McNeill (1985) turned our attention to gestures as an essential part of a speaker’s utterance. McNeill claimed gestures were verbal. It is possible that gesture can be used as a way to study the relationship between language and thought. It has been claimed that gesture adds some substance to the speaker’s cognitive being, and that your cognitive being is changed by the integration of speech and gesture (McNeill & Duncan, 2000).

GESTURE TYPES

It is important to review the gesture typology as a springboard to distinguishing mouth gestures in bilingual-bimodals from traditional concepts of gesture. Gestures have been classified in varying ways depending upon the gesture researcher. For purposes of the current project however, gesture types will be reviewed in the spirit of McNeill (1992).

The first category is *representational gestures* (McNeil, Cassell & McCullough 1994). These are also known as *lexical gestures* (Krauss, Chen & Gottesman, 2000). Within the category of representational gestures are *iconic* gestures. These represent body movements, or the movements of objects or people through space and the shape of animate or inanimate objects. They are performed during the speech act, so in a sense, they are transparent in that their meaning depends on the context. Bavelas (1994) has described them as “opportunistic and improvisational”. The second type of representational gestures is *metaphoric* gestures. They are movements of the hand that show some resemblance to a concrete object or action (Casasanto & Lozano, 2006)

These often accompany problem solving tasks such as over mathematical formulas or more philosophical analyses, where non-concrete ideas are weighed or compared, for example. Adults tend to produce two types of metaphoric gestures: the first are smooth, continuous movements such as sweeps or arcs, revealing a continuous movement or a change over one non-interrupted event. A second type is composed of discrete movements, for example three successive taps that reveal change during a series of steps. So adults using metaphoric

gestures are presenting abstract ideas and their conceptualization is revealed in the choice of the motion.

The second major category is *deictic* gestures (McNeill, 1992). Deictic gestures are motions of the hand used to indicate objects, people, and locations with real-world orientation (McNeill, 1992). The gestures can indicate a person or object that is presently visible, or can indicate a point in the real-world where these things once stood. For example, someone could point to a doorway, to refer to an individual who was previously present in the conversation, but has subsequently left via that doorway. Furthermore, that person could be referred to repeatedly using this point in space selected by the speaker. So in this way, deictic gestures can be quite abstract.

The third and final category is *beat* gestures (Kendon, 1983; McNeill, 1987; 1992) also known as *motor gestures* (Krauss et al., 2000). These traditionally coincide with the intonation of an utterance in particular the stroke of the gesture aligns with the peak of a phrase. They are pointing movements used to indicate persons, objects, directions, or locations. Beat gestures are short, quick movements that reflect the phonetic structure of the utterance, not the actual semantics. They can accompany a word under emphasis.

THEORIES OF GESTURE FUNCTION

There are two prominent theories of gesture function. One rests on the idea that gestures serve as a support for the speaker. Our gestures aid in lexical retrieval. Speakers may use gesture when trying to access words from their lexicons (Freedman, 1972). There are claims that gestures aid in conceptual planning for speech (Alibali, Kita & Young, 2000).

Evidence for what has been coined "*for the speaker*" is found in studies that have shown that when speakers are prevented from gesturing, they become dysfluent (Kraus, Dushay, Chen & Rauscher, 1995; Rauscher, Krauss & Chen, 1996). Furthermore, speakers gesture more with unrehearsed speech than with rehearsed speech (Chawla & Krauss, 1994); people perform dual tasks better when they are permitted to gesture (Goldin-Meadow, Nusbaum, Kelly & Wagner, 2001). The other well-known theory, termed "*for the addressee*" proposes that speakers will change the orientation of their gestures depending on where the addressee is located (Özyürek, 2000). When speakers can not see their addressees, they gesture less (Cohen, 1977; Cohen & Harrison, 1973), and people gesture less with old listeners than with *new* listeners. (Jacobs & Garnham, 2007).

It is well known that over time speakers in a dialogue will agree on certain verbal phrases. This repetition is known as lexical entrainment (Brennan & Clark, 1996). Similar cases have been found in gesture. When speakers and addressees can see each other, their rate of similar gestures is higher than when they cannot (Kimbara, 2006). When speakers view mimicked speech and gesture, they will consequently produce more mimicked speech and gesture (Parrill & Kimbara, 2006). Furthermore speakers will attend to and take-up emblematic gestures

even if they only see them once, from a speaker who is not directly addressing them (Kuhlen & Seyfeddinipur, 2008). Absorbing gesture in this manner suggests that gesture is processed in a way similar to that of speech and perhaps both speech and gesture from an integrated system.

3.3.1 Gesture and speech as an integrated system

Gesture must be coded and interpreted within the context it was produced. As explained earlier, one gesture may carry different meanings depending upon the corresponding words. The current experiment is concerned with representational gesturing of the mouth, specifically silent phonetic lip movements co-produced with American Sign Language (ASL) manual signs. To reiterate, bilingual-bimodal persons are producing signs with their hands, co-occurring with deliberate lip movements that are as intentional as their spoken word counterparts. In other words, the two are functioning as an integrated system with a mutual goal of communication.

There is evidence to support the claim that speech and gesture form an integrated system. It should be noted, however, that researchers such as Krauss contend that gesture's contribution to communication has been somewhat inflated. The first bit of evidence comes from the fact that approximately 90% of gestures normally occur with speech (McNeill, 1992).

Secondly gesture and speech are semantically co-expressive. A certain gesture type will tend to appear alongside a specific speech type. For example, representational gestures will traditionally appear within speech that is serving a narrative function with concrete objects and actions. Metaphoric gestures will appear co-produced with speech, reflecting abstract notions of the utterance, as with a speaker who raised his hands in an offering motion to his addressee and saying "It was a Sylvester and Tweety cartoon" (McNeill, 1992, p. 14).

Lastly, gesture and speech are temporally synchronous. The stroke of the gesture aligns with its corresponding word (Kita, 1993; Nobe, 2000). The time between onset of a gesture and onset a word is systematic (Morrel-Samuels & Krauss, 1992). It has also been noted that when speech is interrupted, for example, during stuttering, gestures likewise stop (Mayberry & Jaques, 2000).

The way in which gestures are made is very different from the way spoken words are created, and this naturally is not surprising, since the two modalities are so strikingly different. Additionally Kendon (2000) has suggested "There is so-to-speak, no need for gesture to develop spoken-language-like features to any great degree, so long as spoken language is there for it to be used in conjunction with" (p. 61). Notably, the more frequently a gesture is used in isolation, the more conventionalized it becomes, hence, the existence of emblems like "OK."

3.4 Sign language evolution

Historical evidence reveals that ASL is not a closed system, but rather has evolved over the last hundred years. Woodward (1978) compared the lexicons of ASL and French sign language (LSF) and found similarity in approximately 50-60%, so French Sign Language played a major role in shaping ASL. However, it is likely that there were various sign language dialects already in use in North America at the time of the opening of the first deaf school in Connecticut in 1817. In recent literature, historical descriptions of deaf people and their communities of New England and Canada have been found showing deaf people in fact were not grounded in isolated pockets, but rather traveled, formed their own communities, married hearing people, and exhibited very social lives (Carbin & Smith, 1996; Lane, Pillard, & French, 2000). In short, modern ASL grew from indigenous signing coupled with the French signs that were brought over by educator Laurent Clerc.

NEOLOGISMS

New signs are always entering the lexicon, reflecting the current social atmosphere. For example, sign names for our current president Barack Obama are already found in the Deaf community (Grigg, 2008) and software and technologies associated with video-relay services are also prevalent, for example TEN-DIGIT NUMBERING, TRANSMIT, VIDEOPHONE, CALL-WAITING, DUAL-SCREEN MODE, and DISPLAY (Sorenson Communications, 2009)

ICONIC TO ARBITRARY

Frishberg (1975) discusses the changes in ASL signs from iconic to more arbitrary gestures. By comparing the descriptions of signs written by French scholars of the early 19th century with descriptions provided by J. Schuyler Long in 1918 and later by William Stokoe in 1965, Frishberg (1975) was able to account for parameter changes in ASL. In general the pattern she noted was one of increasing symmetry, fluidity, and displacement of sign location for reasons of perceptual salience and articulatory ease. For example, the sign DEPEND was formerly produced with the right index finger supported on an open handshape of the non-dominant left hand. In modern ASL the handshape of the non-dominant left hand is identical to the right, and this tendency to assimilate to the shape of the dominant hand is still active in ASL today. Articulating with symmetrical handshapes of each hand makes the sign more salient for the addressee, as well as allowing the speaker-signer to “program both hands at once” (Frishberg, 1975, p.701).

DISPLACEMENT

In terms of displacement, research shows that signs articulated on the face eliminate the second hand over time, and the place of articulation of the sign moves from the center to the outer edges of the face. For signs that were originally articulated on the body below the neck, there is a tendency for the sign to become more centralized and follow a path of movement along a vertical axis to the chin. An example of displacement in the face area is PICKLE, which originally was produced at the mouth area, but has since migrated to the chin. Other signs such as DEVIL, COW, and CAT which were once produced with two hands, now require only one (Frishberg, 1975, p. 703). An example of displacement to a vertical axis is a sign such as LIKE or PLEASE which have migrated from the area over the heart to the center of the chest. Frishberg notes that this could be reflective of a change in the culture's attitude about the origins of emotions. Siple (1973) explains that because signers look at the eyes of their addressees when signing in conversation, a prediction is that signs on the face will tend to have more complex handshapes, while those in the peripheries will generally exhibit more unmarked handshapes and be produced with two hands (see Weisenberg, 2002)

FLUIDITY

Another historical trend in ASL noted by Frisberg (1975) is that signs assimilate and become more fluid. The transition between compound signs becomes smoother while the handshapes assimilate. For example, the sign INFORM, originally was a compound in ASL, consisting of two signs, KNOW (one-handed) and BRING (two-handed). The compound has now been blended into one outward movement. Another example is GOLD, a compound made from the sequence of EARRING (pulling the earlobe) plus YELLOW (a twisting motion of the hand in a Y-handshape). The modern articulation of GOLD involves the ILY handshape (composed of Y plus the extended index finger) touching the ear and moving downward with a subtle twist (Frishberg, 1975, p. 707). In old film clips of deaf signers, a signer expressed the concept of WE by first pointing to his own chest, then sometimes as many as three or four other persons (either in true proximity or imagined, and therefore just deixis in the signing plane). So the compound was articulated as ME + YOU¹ + YOU² + YOU³, and so forth (p.710). The sign HOME was composed of EAT (an O-hand in an iconic gesture of putting food in one's mouth) followed by the second hand exhibiting BED (an open, flat hand on the side of the face). The handshape of the second hand has assimilated from an open flat hand to an O-handshape, so the modern version of HOME is an O-hand tapping on the cheek in two locations.

As new words are introduced to English and ASL, one of the environments in which new signs emerge is during interpretation. No claim is made that this is the only environment, but it is an active one based on the fact that the majority of the public and private sector is still hearing-dominated, and deaf employees constitute the minority, and so the two are typically communicating using an interpreter as a conduit.

Interpreters facilitate communication between two languages in a variety of settings, including educational institutions, businesses, medical facilities, sports and fitness-related environments, media and other entertainment domains. In the late eighties, companies such as IBM experienced an influx of deaf employees with over 200, however those numbers have fallen to as little as thirty (anonymous, 2008). Across the country the number of deaf persons enrolling in computer training courses increased. With the advent of video-relay services such as Sorenson Communications, and webcam technology, deaf employees have been working as customer support technicians and installers of video-relay equipment (MdDeafDc, 2007). Wherever there has been an increase in deaf employees, there has likewise been a higher demand for interpreters to facilitate meetings, trainings, and other negotiations.

Since there is not always a direct English word-to-ASL sign correspondence, interpreters often have to search for equivalents in ASL when interpreting from spoken English into ASL. Just as the *Drosophila* fly is the workhorse for genetics research due to its gene mapping potential in a short life cycle, so too can a single sign-language interpreting event replicate the more lengthy process of a sign evolution in a much shorter *life cycle*. As more technical terms have been introduced to ASL, users of the language have been forced to create new signs, incorporating core-language synonyms with English initialization, English mouthing, and/or fingerspelling (Brentari & Padden, 2001). Interpreters are part of that creation process. They are engaging in these mini-evolutions on a daily basis. The degree to which interpreters affect the lexicon of ASL is beyond the scope of the current research, but what is evident at least is that in the course of working and communicating with a deaf audience, a *communication-pact* of sorts is established between the interpreter and the audience, and English mouthing plays a communicative role in the establishment of these invented signs. The steps²⁵ that an interpreter takes when hearing an English term for which no ASL sign exists, or that which is unknown are the following:

Step 1: Represent the English term visually using fingerspelling and request a sign from the audience. Search for a gestural synonym (or series of) for the term and *test* this choice on the audience.

²⁵ acknowledgments to Fred Roy for helping to refine and rephrase these steps

Step 2: Shorten the synonym sequence and overlap it with English equivalent mouthing.

Step 3: Integrate the mouthing by reducing lip and overall jaw movement to match the initial sounds of the original English word. Drop English equivalent mouthing if audience indicates the concept is understood.

The interpreter typically asks the deaf consumer (heretofore referred to as the 'audience') to offer a sign (s)he prefers. The interpreter begins the negotiation process by fingerspelling the term, and then testing several signs in rapid succession, either with or without English mouthing to locate an acceptable sign with the audience. The interpreter uses the invented sign(s) only if it is acceptable to the audience. The invented sign(s) decided upon generally last as long as the audience and the interpreter wish, or until a more appropriate sign is discovered or converted for use. Interpreters are known for asserting themselves in the selection of the new sign unless otherwise corrected by the audience. If the audience does object, then the interpreter and the audience "enter into a professional strength of wills" to determine which of them has the correct choice for the communication; interpreters have been known to defer to the audience, typically if that individual strongly objects (Fred Roy, personal communication, April 9, 2009).

In the following section, the specific types of mouthing found in sign language interpretation will be in focus, now that the system of negotiations between interpreters and their audience has been explained.

3.5 Mouthing insertions

Bilingual bimodals are hearing individuals who know both a signed language and a spoken language. This type of bilingualism is unique in that the two languages utilize different sensory-motor systems during comprehension and production. A typical bilingual can hear both languages, but if this bilingual were to attempt to use two languages, there would be an obvious competition, since only one language can be articulated at a time (Emmorey & Mc Cullough, 2009).

As the previous section revealed, native users of ASL exhibit NMMs that are both affective and grammatical. Bilingual bimodals will likewise acquire both the non-manual grammatical markers and affective facial expression as they are learning American Sign Language as a second language.

Most commonly bilingual bimodals are children of deaf households, or often referred to as 'hearing native signers', since it is quite rare to find a hearing child acquiring sign language from parents who do not sign (Emmorey & McCullough, 2009). Historically this set of the population became interpreters at a young age, serving as the go-between for their parents and the hearing world. Often these people became professional sign language interpreters as adults. Fluency in English and ASL is required in order to practice in the United States as a sign language interpreter. However language skill alone is not sufficient for professional interpreting. According to the Registry of Interpreters for the Deaf:

Sign Language/spoken English interpreters are highly skilled professionals that facilitate communication between hearing individuals and the Deaf or hard-of-hearing. They are a crucial communication tool utilized by all people involved in a communication setting. Interpreters must be able to listen to another person's words, inflections and intent and simultaneously render them into the visual language of signs using the mode of communication preferred by the deaf consumer. The interpreter must also be able to comprehend the signs, inflections and intent of the deaf consumer and simultaneously speak them in articulate, appropriate English. They must understand the cultures in which they work and apply that knowledge to promote effective cross-cultural communications (Registry of Interpreters for the Deaf, 2009).

Sign language interpreters therefore are specific types of bilingual bimodals, who learn both grammatical non-manual markers and affective facial expression during their training. Historically the field of sign language interpretation has attracted bilingual-bimodals who have been natively signing from a young age. However, it is likewise common in present times, to encounter bilingual-bimodals who are English-dominant bilinguals, having learned ASL as their second language. A form of non-manual expression that is used by bilingual bimodals is *mouthing*. Mouthing is the voiceless visual representation of words on a signer's lips, produced concurrently with manual signs. Again, to reiterate, mouthing is particularly prevalent among English-dominant bilingual users of ASL such as professional sign language interpreters, but it is well documented in the literature that cross-linguistically mouthing in deaf native signers is regularized, serving an adjectival and/or adverbial function in the sign language (Wilbur, 2000 for ASL; Vogt-Svendsen, 1981 for Norwegian Sign Language; Padden 1990 for Italian Sign Language; Engberg-Pederson, 1993 for Danish Sign Language) and that these mouthing patterns do not correspond to the phonetics of the majority spoken language, but are more likely a grammaticalization of universal gestures (see Janzen & Shaffer, 2002).

A commonly held assumption is that mouthing of a spoken language while signing is the result of language contact. It is possible in bilingual bimodals because of simultaneity: the two channels of expression are distinctly different: one, a visual-gestural channel, the other oral-aural. Whether a bilingual-bimodal is displaying mouthing of the NMM type, described earlier, or simply silent phonetic English lip movements, there is agreement in the literature that for deaf natives, native ASL bilingual-bimodals, or English-dominant bilingual-bimodals, mouthing appears to be systematic. Some previous claims on mouthing are that it is (1) code-mixing employed to elucidate the translation (Davis, 1989); (2) intrasentential code-mixing driven by discourse dominance (Weisenberg, 2003); (3) borrowing used to fill lexical gaps in the discourse (Boyes-Braem, 2001); (3) a paralinguistic element whose appearance is influenced by the signer's motoric

fluency or by spoken language-sign language syllable congruencies (Wilbur & Peterson, 1998).

CATEGORIES OF MOUTHING

At this juncture, it is critical to restate that there appear to be two systems of mouthing: (1) phonetically-intact mouthing²⁶ and (2) partial mouthing²⁷ (or alternatively, the grammatical mouthing associated with NMMs.) The term 'partial mouthing' is chosen due to the fact that traditionally the lip formation can have traces of lip rounding, or display familiar places of articulation to an addressee, yet not contain a complete phonetic string of consonants and/or vowels. For example, a signer may use the NMM 'L-R, L-R' to signal to an addressee to look at someone inconspicuously; a claim could be made that the flapping of the tongue has some remnants of the place of articulation for a glide /l/, but this has now become a grammaticized movement. The first system, phonetically-intact mouthing is significant because it surfaces in English-dominant bilingual bimodals, and is measured as the dependent variable in the current study. Examples of system (1) appear below:

Mouthing: [silicon] n_ to_ el_ [right
ASL gloss: fs-S-I-L-I-C-O-N CL:1 (rt) CL:B (lft) → ELEMENT CL:CC→
(‘squares in rows’) CL:1

Mouthing: ne_ xt to] [carbon]
ASL gloss: (rt) CL:B (lft), fs-C-A-R-B-O-N
Spoken English text: ‘Silicon is an element, it is a metalloid, and not
coincidentally, it’s right next to carbon.’

(Subject 2, non-deaf+technical) [01]
Weisenberg (2003)

Subject JN silently mouths the word ‘silicon’ on her lips while fingerspelling the word (S-I-L-I-C-O-N). Fingerspelling, a manual representation of letters, appears to be a wide-spread device among deaf signers resulting from language contact with the surrounding spoken language community (see Sutton-Spence 1994). The subject mouths ‘right next to’ while manually articulating the concept of ‘element-adjacent to-element’. The subject utilizes a classifier handshape (CL:1), remaining in the locus of the signing space where the element ‘silicon’

²⁶ Phonetically intact mouthing is indicated by brackets [].

²⁷ Partial mouthing is indicated by parentheses ().

was previously indexed. The subject's other hand forms a different classifier handshape (CL:B) and moves horizontally left, coming to rest at a locus that she identifies as 'carbon'. Phonetically intact mouthing accompanied by fingerspelling of 'silicon' is expected since the term 'silicon' is newly introduced. Fingerspelled words begin to undergo lexicalization after approximately the third production (Brentari & Padden, 2001) and during this phase, mouthing likewise seems to be reduced.

An example of system (2), partial-mouthing, appears below:

Mouthing: *silicon* (n_ to_ el_) *right*
 ASL gloss: fs-S-I-L-I-C-O-N CL:1 (rt) CL:B (lft) -> ELEMENT CLCC->
 ('squares in rows') CL:1

Mouthing: *ne_ xt to carbon*
 ASL gloss: (rt) CL:B (lft), fs-C-A-R-B-O-N
 Spoken English text: *'Silicon is an element, it is a metalloid, and not coincidentally, it's right next to carbon.'*

(Subject 2, non-deaf +technical [01]), Weisenberg (2003)

Subject JN silently mouths the initial consonant of 'next' while setting up the signing space to reflect the locations of the elements using a classifier construction (CL:1 (rt) CL:B (lft)). She uses a reduced form of mouthing, the first part of the polysyllabic word, when manually signing ELEMENT.

In the current project, the claim is made that phonetically-intact mouthing is a type of borrowing. Borrowings involve the insertion of single lexical items from a donor language that are filtered through the recipient language (Poplack & Meechan, 1998). Insertions are typically (a) content words (b) morphologically integrated constituents, (c) selected elements (e.g., objects or complements) rather than adjuncts, (d) nested (i.e., the fragment preceding the insertion and the fragment following are grammatically related), (e) single constituents (Muysken, 2000; Myers-Scotten, 1993). The phonetically-intact English mouthing (system 1) that sign language interpreters utilize is theorized to be a type of borrowing because it meets the above criterion. Phonetically-intact mouthing is coordinated with a manual ASL sign that has the same meaning (mouthing appears in bold):

” For example, everybody knows that water is H₂O”

(Subject 2, non-deaf, technical [01]) Weisenberg (2003), p. 23).

SIGN LANGUAGE INTERPRETING

Sign language interpreters are concerned with their deaf consumers' level of comprehension, especially when organizing highly abstract English discourse into a more concrete visual-spatial mode. They often resort to borrowing directly from English. They determine whether they should insert phonetically-intact mouthing or not depending on their audience. The interpreter's ability to successfully accomplish translation in general can also be affected by factors such as the familiarity with the source text, a speaker's rate of speech, and the fact that speech is linear. Interpreters also pay attention to *cohesion*. Cohesion is defined as a network of relations that permits the listener to comprehend the interpreted discourse and is an important component in spoken language interpreting (Shlesinger, 1995). By virtue of their work sign language interpreters must be able to identify these links in the source language and reproduce them in the output language, or there is the potential for the audience to misunderstand the message as it was originally intended.

Given these facts, an experiment was designed to test the effects of audience on sign language interpreters' rate of borrowings. In section 5 are the results of the current experiment which show that sign language interpreters adjust their rate of English mouthing depending on their audience: a non-deaf audience causes a higher rate of mouthing than a deaf audience, and that in general, the perceived cultural background of the addressee has more of an effect on style shift than the topic under translation.

INTERPRETER MOUTHING VERSUS OTHER TYPES

The type of mouthing by bilingual bimodal interpreters is not grammatical mouthing referred to as non-manual signals or iconic mouth gestures as previously discussed by others (Sandler, in press; Hohenberger & Happ, 2001; Ebbinghaus & Hessmann, 2001). It is a silent phonetic type of mouthing used by bilingual bimodals in the process of interpretation. It is a complimentary phenomenon (timing of oral gesture and manual gesture line up). The original English meaning is preserved in the mouthing, and the mouthing and manual sign convey similar meaning.

The visual and oral modalities synchronize well for communication. Bilingual interpreters have the ability to borrow from an auditory language into a visual form. This is unlike spoken language borrowing which can only manifest in the auditory channel. Oral education has been suggested as a possible influence on the use of mouthing by native deaf signers, as has regional and individual

variation (Keller, 2001). Because interpreter mouthing appears quite frequently during an interpretation, a valid question is whether bilingual bimodal interpreters fall back on English mouthing because phonetic lip movement stems from their primary language, or if literacy in English could affect the use of mouthing. This would be similar to the influence of ASL on English speakers. Previous literature has discussed how second language users of ASL are prone to exhibiting more grammatical facial expressions such as raised or furrowed eyebrows when speaking English than speakers who have had no prior exposure to ASL (Emmorey & McCullough, 2009). In other words, if hearing bilinguals can exhibit facial gestures from exposure to ASL, could they just as readily exhibit mouth movements from their primary language when communicating in their second language? It would be erroneous to blame frequent mouth movements by interpreters solely on intrusion from the primary language. Mouthing has been documented in many of the world's sign languages (Keller, 1999). Ebbinghaus & Hessman (2001) regard the mouthing component as primary, with the sign being subordinate, made specific only by its accompanied mouthing. Mouthing by deaf signers seems to vary, and is not mandatory for comprehension. For example, when signers of different countries attempt to communicate, they usually drop mouthing altogether since it can cause confusion (Moody, 2007; Hohenberger & Happ, 2001). English mouthing during signing is not particular to interpreters. However, whatever mouthing and signing is observed during interpretation is the product of an interpreter's process of reconstructing the thoughts of another person. Therefore the mouthing may not be used in the same way as when interpreters express their own thoughts voluntarily. The integration of hand and mouth might require different cognitive processing for bilingual bimodals who are not engaged in interpretation, and also different processing for deaf signers.

4 Audience Design

4.1 Background of audience design

The concept of *audience design* originated from the landmark works of Allan Bell (1984) and Clark and Murphy (1982). Audience design refers to the hypothesis that speakers *design* their utterances to primarily accommodate their addressees. Put another way, speakers are aware of the needs and knowledge of their addressees, and adapt to them. In addition, speakers expect their own speech be tailored for *their* specific addressees, and not just for anyone.

For example, in New Zealand, public broadcast radio had two stations YA, 'National Radio', which had a higher status audience, and a local station, ZB, which had a lower status audience. In New Zealand English intervocalic /t/ can be pronounced as an alveolar voiced flap or stop instead of a voiceless stop. So a word such as *writer* could be pronounced as *rider*. Bell (1977) found that newsreaders had a higher percentage of voiced intervocalic /t/ during broadcasting time on local station ZB. Newsreaders shifted on average 20 percent between stations YA and ZB. The shifts were consistent and could be done in a very short time too. For example, a newsreader could have as little as ten minutes between bulletins on different stations. In each case it was the same newsreader; the studio used was the same; the topic of the news was similar. In fact, in some cases the scripts were even the same. So, only the audience was different in each case, and caused a change in the newsreader's speech (Bell, 1984).

SPEAKER AWARENESS OF ADDRESSEE

Speakers are aware of the knowledge of their addressees. Studies have shown that speakers have distinct ways of marking information that is new to their addressees versus information that is old (Galati & Brennan, in preparation). For example, in Galati and Brennan's experiment, subjects were asked to retell the same story twice. The first retelling was directed to their old addressee. The second time they retold the story, it was directed to a new addressee. In the verbal modality, the researchers compared events realized, words, details, perspectives and word lengths. In the non-verbal modality, they compared the amount of space used during gesturing, and the iconicity of gestures across all three retellings. They discovered that both speech and gesture were attenuated when directed to the old addressee, and therefore concluded that the attenuation was driven by the addressee's needs.

DETERMINING ADDRESSEE NEEDS

In order for speakers to design their utterances after their addressees needs, they need to know what their needs are. One important contributor to this assessment is the idea of *common ground*. Common ground refers to the speaker's and addressee's shared knowledge, beliefs, and suppositions (Clark &

Carlson, 1981). Since interlocutors cannot read each other's minds, they can use different sources of information.

(1) *community membership*– if addressees belong to a certain community, they are assumed to have a certain type of knowledge.

(2) *physical co-presence* – if both speaker and addressee have a common shared experience, they can assume their respective experiences as being included in the common ground.

(3) *linguistic co-presence* – once the speakers and addressees have engaged in a conversation in which some fact has been presented or some object mentioned, then they can each assume the knowledge of that fact or object as part of the common ground too. (Clark & Murphy, 1982)

ACCOMODATION

Now that it has been established that speakers are sensitive to their addressees' needs, the next question to ask is how a speaker accommodates their addressee.

One way that speakers accommodate is by varying their choice of language.

Typically sociolinguists examine both *internal* and *external* factors when studying language variation. There are internal *linguistic* factors such as the influence of preceding or following sounds or words. Also there exist internal *structural* factors such as the part of speech or position in the sentence. For example, standard English is known for not having a rich verbal morphology; in the present tense there is only one marker, verbal –s (Kayne, 1989). In non-standard dialects of English, such as Appalachian English, plural lexical subjects can be matched with present tense verbs having the suffix –s. However, plural pronominal subjects cannot. In this case, the use of a plural subject together with a present tense third-person singular verb, "...gals is purty", is a variation that is influenced by the structure, as opposed to some external influence such as gender or ethnicity of the addressee.

(1) a. Them boys *putson* some miles. (Hackenberg, 1972)

b. Them gals *is purty*, but they're crazy as Junebugs. (Montgomery & Hall, 2004)

External factors are usually non-linguistic and include such things as ethnicity, socioeconomic class, education, and gender. Sociolinguistic studies over the last thirty years or so have revealed that linguistic variation correlates with variation in a speaker's class and gender (Labov, 1966, 1990; Trudgill, 1972; Zimmerman & West, 1975; Eckert, 1990).

CHANGE IN SPEECH STYLE

One example of audience design is a change in speech style. Style is often a measurable variable in language variation studies. This is the speaker's response to their audience. In the spirit of Bell (1984) it is assumed that when one says that language varies due to style, it is the equivalent of saying that a speaker's language varies; in other words, style is subject to sociolinguistic variation. A speaker's language style can shift according to the person to whom they are speaking. For example, subjects spoke more formally when they thought their addressees were socially superior (Vanecek & Dressler, 1975). Additionally, speakers of African American English will show a higher percentage of copula deletion, "She __ goin' to the store," when their addressees are from their black peer group than when their addressees are white, and unfamiliar to them (Alim, 2005, p.155).

If speakers are sensitive to their addressees needs, a logical assumption is that this sensitivity arises from the act of attending to the addressees through visual or auditory cues. A question though is whether a change in attention could somehow affect a change in style. For example, one might assume that a speaker who is blocked from seeing his addressee, might show different changes in style from a speaker who has a clear sight-line to his addressee. Classic works like Labov (1972) have pointed to a relationship between attention and style. These older studies though do not provide a clear definition for *attention*, and there is still no widely accepted definition of it across disciplines. This could be due to the fact that attention is composed of many separate processes, and that perhaps there is not one common thread among them. As a brief example, Sohlberg & Mateer (1989) proposed a clinical model of attention with five parts: focused attention, sustained attention, selective attention, alternating attention, and divided attention. The well-known psychologist William James (1881) remarked that attention "implies withdrawal from some things in order to deal effectively with others..." Determining an exact definition for attention is beyond the scope of this study; however for the current discussion, it is assumed that speakers *selectively concentrate* on some visual and auditory cues from their addressees.

ATTENTION AND STYLE CHANGE

In examining the relationship between attention and stylistic variation, experiments have shown that speakers will reduce their use of certain linguistic variables (especially socially stigmatized variables) the more attention they are paying to their speech. Labov (1972) noted that in the speech of New Yorkers, there is a tendency among some speakers to realize interdental fricatives as voiced stops /dh/, for example, *deez*, *dem*, and *dose* for the words *these*, *them*, and *those*. Labov believed that speakers would use a formal style when reading aloud since reading is generally associated with more formal contexts. Speakers generally pay more attention to their speech when reading and therefore the percentage of stigmatized features is usually lower. When comparing a casual

speech style versus a reading style, overall speakers produced less /d/ for interdental fricatives regardless of socioeconomic class (working class, lower middle class, and middle class) (Labov, 1972).

It is important to examine what factors specifically cause a change in attention, in particular, the situation in which the speech is occurring. It appears that the inability to attend visually to one's addressee has more of an effect on style shift than for example the inability to monitor one's own voice (Mahl, 1972; Bell, 1984). Bell (1984) also argues that non-audience factors such as topic have less of an effect on style shift than audience factors. So, it is apparent that speakers are responding to their audience, and are dependent on them.

Audience design is part of all levels of a speaker's linguistic choices, for example, switching languages, forms of speech, pronoun choices, honorifics, and measurable style shift (Bell, 1984, p.161). Speakers and addressees tend to agree on the selection of certain repeated expressions (Brennan & Clark, 1996; Metzig & Brennan, 2003). This is commonly referred to as lexical entrainment. The general phenomenon that people tend to use the same lexical expression when repeatedly referring to the same object has also been described by Carroll, 1980; Clark & Wilkes-Gibbs, 1986; Krauss, 1987; Krauss & Weinheimer, 1964, 1966; Schober & Clark, 1989. The term *lexical entrainment* goes back to Garrod & Anderson (1987). Audience design can also affect other levels of communication, including the nonverbal. For example, interlocutors show a higher rate of similar gestures when they can see each other (Kimbara, 2006). Watching mimicked speech and gesture leads subjects to produce more mimicked speech and gesture (Parrill & Kimbara, 2006). An even stronger case is made for visual attention by Kuhlen & Seyfeddinipur (2008) in that people adopt the gestures of speakers who are not even their conversational partners, and even if they have only seen the gesture produced once.

Giles and Smith (1979) likewise concluded that speakers accommodate their speech style to their addressees. This is considered linguistic convergence, which means that speakers modify their speech in subtle ways to sound *more* like an addressee from another group or social identity. Speakers want the approval of their addressees, and if the pressure is strong, speakers converge "a little more than halfway." (p. 165)

PERSONAL QUALITIES OF AUDIENCE

An important question at this point is what it is exactly about the audience or addressee that causes the speaker to want to change. Bell (1984) suggests that (1) the speaker considers the personal qualities of the addressee; (2) assesses the style level of the addressee's speech; (3) assesses levels for specific linguistic variables.

A personal quality such as ethnicity can falsely lead a speaker to assume their addressee will have a certain speech pattern. In turn, speakers can phonologically converge. In Beebe (1981) setting and topic were tightly controlled, and just the identity of the addressee was manipulated. Subjects showed linguistic convergence based on the addressee's ethnicity alone.

Beebe's had 61 Chinese-Thai children and seventeen adults whose second language was Thai. They were interviewed in Thai first by one interviewer, who was ethnically Thai, and then a second interviewer who was also a native speaker of Thai, but who was ethnically Chinese. The ethnic Chinese interviewer spoke Thai with a Chinese accent. Beebe examined six vowel pronunciations in the subjects' second language Thai output. Results showed that the subjects realized five of the six vowels using a more Thai accent when being interviewed by the ethnic Thai interviewer than by the Chinese interviewer. When they spoke to the ethnic Chinese interviewer, they used more of a Chinese pronunciation of the vowels. In other words, wanting to maintain solidarity with their Thai social group caused the subjects to produce less-Thai-like speech with the Chinese interviewer. The subjects made a false assumption about her identity, and consequently a second false assumption that she would *not* be a native speaker of Thai, when in fact she was. In sum, speakers and addressees converge when they assume they have a similar ethnicity.

SPEAKER-ADDRESSEE RELATIONSHIP

Bell (1984) states that a strong theory of audience design needs to examine the speaker-addressee relationship. For example, when interlocutors do not know each other, the relationship is low, so status is more valuable. However as a relationship is formed, status becomes less important (p. 169). Status is a perceived rank in a stratified system. Factors that can influence how one earns that rank or inherits it can include education, age, ethnicity, and speech. Thakerar, Giles & Cheshire (1982) created an experiment to test the effects of unequal status on native language speech. Subjects were paired in such a way that one interlocutor had more training, and hence expertise, than the other (dental training). They were asked to discuss a topic that would obviously reveal the one interlocutor's lack of expertise. The degree of standardness of their speech was analyzed. They were both native speakers of English, so it was assumed they could each produce standard and non-standard speech. To determine *standardness*, measures included judgments by listeners, speech rate, word-final non-standard pronunciation of glottal stops versus standard /t/. Findings indicated that low-status subjects produced more standard speech while high-status subjects produced less standard speech.

This pressure to converge is also found in situations where there are more than two interlocutors. As Bell (1984) states, "The larger a speaker's audience, the greater the pressure to be understood and win approval... Service institutions such as shops, restaurants, businesses, modes of transport, and hotels are supposed to win the approval of their clients" (p. 170). In institutional service where there is a social range of clients, speakers are so accommodating to their clientele addressees that it is not unusual to have difficulty determining the natural speech of the speaker. In other cases where the contact is brief and personnel see the same clientele, all the service people develop a "house style", the average speech of the average client (Bell, 1984). The service people converge to this one style. Labov (1966) did research in the Lower East Side of

New York City. He looked at the frequency of final and preconsonantal /r/ as pronounced in words like “fourth.” Particularly in New York the pronunciation of /r/ is considered a prestige variant. In addition /r/ appears fairly frequently in speech, so the data could be collected quickly. Labov examined the speech of sales assistants from Klein’s (considered a cheaper store and low on the fashion scale), Macy’s (moderately priced and in the middle of the fashion scale), and Saks Fifth Ave (having high-priced merchandise and on the high-end of the fashion scale). Labov posed a question that was designed to draw the response *fourth floor*. For example:

Labov: Where’s the men’s department?

Shop assistant: On the *fourth floor*.

Labov: Excuse me?

Shop assistant: on the FOURTH FLOOR.

Pretending not to have heard the salesperson correctly, caused the person to repeat the word more carefully, or with more emphasis, and therefore perhaps the full pronunciation of /r/ rather than the deletion of /r/ as is found in casual speech of New Yorkers. Labov’s findings revealed that salespeople from Saks used the prestige variant /r/ the most; those assistants from Klein’s used it the least, and Macy’s sales assistants had the higher percentage of shift toward the prestige form when asked to repeat. This showed that the prestige form positively correlated with formality and social class.

Bell (1984) is quick to point out though that in Labov’s 1966 study, the actual addressee in each of the stores, Macy’s, Klein’s, and Saks Fifth Ave, was Labov himself; however, the *expected* addressee was different. The sales assistant likely made an assumption about Labov based on his presence in the store and the social status of the clientele expected in that store each day. When the service person realized the ideal didn’t exist, (s)he started to diverge. For example, the sales person might have picked up a cue from Labov’s speech that he was in Saks, yet not a member of the upper class. So in some cases, what might have occurred was linguistic divergence, with the salesperson modifying his speech to sound less like Labov. The pressure to converge is even greater in the mass media, where speakers might be addressing a large audience and representing their respective institutions, as was the case of the New Zealand radio broadcaster in Bell’s study.

The identity of the addressee strongly influences language switching (Fishman, Cooper & Ma, 1971; Gal, 1979). The greater the differences there are between the languages, the greater the possibility of misinterpretation, hence, the greater the pressure to accommodate the audience.

Factors that determine style shift and originate from the identity of the addressee are called audience factors. Factors that determine style shift but do not stem from addressee identity are called non-audience factors. An example of non-audience factors is topic or setting. Blom & Gumperz (1972) found that a change in topic causes a switch from a local to a standard dialect. However, It is unlikely that a shift in style would correlate exclusively with topic or setting, but

not addressee (Bell, 1984). Studies have examined the effects of addressee, topic, and setting on language choice. Monolinguals can shift the style of their speech due to change in topic and setting, but shift their style more for addressees; however, bilinguals shift their style because of their addressees (Sankoff, 1980; Dorian, 1981; Gal, 1979; Fishman et al., 1971). Speakers also tend to relate topics or settings with classes of people. In other words, they shift style when discussing particular topics or when in specific settings, as if they were in fact with these addressees in these very places (Bell 1984, p.181). For example, intimate topics cause a speech style suitable for family or friends.

With this background established a reasonable assumption is that speakers assess their addressees both linguistically and socially. They feel pressure from their addressees to shift their language style, and even more so if their addressees are bilingual. Overall the addressee plays a larger role in causing this shift than other non-audience factors such as setting or topic.

TOPIC VERSUS AUDIENCE IN SIGN LANGUAGE INTERPRETING

It was on this basis that an experiment was designed to test the effects of audience identity versus topic and setting on the style shift of sign language interpreters. Sign language interpreters are bilingual bimodals who are typically in the public eye. As bilingual bimodals, they can draw from a visual-gestural language as well as a spoken language. They work with clients of varied cultural identities. Setting, topic, and addressee identity therefore are three issues that come into play in any given interpreting situation. They have the potential to affect the language choice of the interpreter. Interpreters work in varied settings, with different clients, and interpret various topics. In situations where there are hearing persons who do not sign and deaf or hard-of-hearing persons who cannot speak, then there is a potential need for an interpreter and the potential for any topic.

Sign language interpreters might experience a heightened pressure to converge towards their addressee because the tenants of their professional code states that they must match the language of the clients they are serving. Degrees of deafness can affect a client's cultural affiliation and hence his language choice. As bilinguals interpreters have the potential to use borrowing or other cross-linguistic strategies in trying to design their language for their audience.

An expected result of this experiment would be that interpreters would audience-design, and that their convergence towards their addressee could be measured by a variant specifically associated with bilingual-bimodals: mouthing. However, as Bell and others have remarked, topic and setting cannot be entirely dismissed. Since sign language interpreting involves all three: audience, topic, and setting, potentially any of these could be contributors to a style shift. Therefore, an experiment would need to control for these in order to determine which exerts more influence on the interpreters style shift, quantified by mouthing. Put another way, the sign language interpretation task, and the interaction of the interpreter and his/her audience offered a sociolinguistic Petri

dish in which to analyze style shift. At this juncture the design of the experiment will be explained.

5 Audience Effect: Experiment

5.1 Introduction to the experiment

The term *consumer* refers to the deaf or hard-of-hearing person to whom an interpreter is assigned. A consumer could also refer to the hearing person with whom the interpreter is working. Sign language interpreters usually interpret between two or more individuals who use mutually unintelligible languages. In the United States, the two languages used in interpretation are commonly American Sign Language (ASL) and spoken English. Interpreters are typically assigned to a consumer by an *interpreting agency*, but educational institutions such as universities, public schools, colleges, and trade schools can likewise place interpreters with deaf or hard-of-hearing people who are using that institution. It is known in the interpreting profession that a deaf consumer's cultural status is a deciding factor of target language output since the interpreter is ethically bound to represent the message in the language preferred by the client (Humphries & Alcorn, 2001). However it is unknown to what degree topic and setting contribute to the interpreter's choice to borrow from English when interpreting from spoken English into ASL. Borrowing can come in different forms in spoken languages, as the previous chapters have explored. Sign language interpreters use English mouthing as a type of borrowing from English. For the purposes of the present study, borrowing is measured by the incidence of English mouthing. It is unclear whether topic and setting, for example, outweigh the effects of the addressee.

The null hypothesis is that the addressee should have no effect on the rate of an interpreter's mouthing. If this hypothesis were correct, one would expect to find the same rate of mouthing in a translation task where the interpreter perceives the audience to be culturally-Deaf²⁸ (affiliated with deaf culture) and an equivalent task where the audience is perceived to be non-culturally deaf (affiliated with hearing culture). If anything we could expect topic or setting to affect mouthing (Bell, 1984).

5.2 Virtual audience design

Until this point descriptions of speaker and addressee interactions, whether from an interpreting perspective (interpreters and deaf consumers) or from traditional notions of audience design in psychology or sociolinguistics, have primarily dealt with co-presence, or face-to-face social interactions. However, the current experiment was designed with virtual addressees. In other words, the sign language interpreters were merely told that they were interpreting for a specific type of deaf consumer. In reality, no deaf consumers were present

²⁸ The term *culturally-deaf* refers to individuals who consider themselves members of a cultural and linguistic minority with its own set of norms and values that differ from the majority, *non-deaf* culture.

during the experiment. At this juncture, it is important to justify the choice for this design, and implications of virtual audience effects.

Interpreters and deaf people operate in small circles, especially in populated areas such as New York, and its suburbs. Inviting real deaf subjects to participate in the experiment would increase the likelihood of the interpreters and these consumers to adjust signing style based on familiarity (the same interpreters often work with the same consumers) or past experience (either positive or negative). Additionally, it would be more difficult to control for cultural background and language use of the addressee if real deaf participants had been used, creating nuisance variables in the experiment.

Exposing sign language interpreters to a virtual deaf audience is not uncommon in the field of interpretation. Interpreter training courses frequently make use of videotaped simulated interactions with which students can practice. Likewise, the Registry of Interpreters for the Deaf (RID) NIC exam utilizes a form of virtual audience in the process of testing its interpreters (Registry of Interpreters for the Deaf, 2009). Therefore, with reasonable assurance, it can be claimed that the subjects in the current experiment did not experience any surprise when told they should imagine their audience in front of them based on the artificial demographics provided.

A speaker's idea of an addressee is sufficient to influence the type, size, and rate of gestures used. A recent study by Mol, Krahmer, Maes & Swerts (2009). shows that speakers gesture more towards a human addressee than to an audiovisual summarizer (AViSum). Of further importance of Mol's work is that in one part of the experiment, subjects were told that the addressee was in another room supposedly watching their storytelling through a webcam, but truthfully no person was there. So even the mere presumption of an addressee, either real or virtual, can influence gesture. When speakers thought their stories were being sent to the computer and not a real person, the size of the gestures was smaller, as indicated by less shoulder movement. There were also far less beat, imagistic, and pointing gestures used in the computer interaction than the virtual, face-to-face, and obscured addressee conditions. The only difference in the webcam and the computer condition was what subjects were told; they could not really see the audiovisual summarizer or the supposed addressee, so had no means to verify this information. Also, the differences in gesturing cannot be accounted for by verbal behavior since the number of words used in the computer condition was not significantly different from that of the face-to-face or obscured addressee condition. In Mol's study the differences in gesture frequency, size, and type indicate that gestures are used for the benefit of the addressee, even virtual ones.

Maes, Marcelis & Verheyen (2007). also found that if speakers believe they are addressing a human rather than a computer, they tend to use a great deal more detail in referring to certain objects in a task. In another work by Fridlund (1991), smiling was shown to occur for implicit addressees (as measured by facial electromyography). A significant difference was found between subjects that participated alone versus subjects that simply imagined someone co-present. Subjects were intentionally misled to believe that the room

was equipped for viewing by only one person, and so their partners were supposedly escorted to another viewing room. Like Mol's conditions, subjects in Fridlund's experiment were in both conditions truly alone. Fridlund also contends that humans can behave socially when actually alone, when we imagine social interactions with others in our minds, forecast an interaction with another, anthropomorphize inanimate objects, hit ourselves, or pat ourselves on the back (Fridlund, 1992). Aharoni and Fridlund (2007) also reported that subjects smiled more and employed more fillers when they thought they had a human interviewer versus a computer, when in fact, both conditions used prerecorded material.

In conclusion, the use of an implicit addressee, as in the present experiment, is well justified, as previous studies have revealed that a virtual audience elicits gestures and other facial expressions comparable to a face-to-face condition, and that these measure higher than interactions with a computer.

5.3 Experiment design

PARTICIPANTS

There were a total of four participants (one man, three women) who were recruited as interpreters through printed advertisements and electronic mail. Subjects were asked to fill out a questionnaire to determine level of proficiency in ASL and English. All interpreters were nationally certified by the RID, and had three or more years of experience as an employed interpreter. Three of the interpreters used ASL a minimum of thirty hours per week and socialized with deaf people on a monthly basis. This was a fair indication of their proficiency; they had ample opportunities to sign with deaf people in the community. Socializing and signing with Deaf people does not grant hearing people the status of being *culturally deaf*. On the contrary, hearing people are considered outsiders because of their ability to hear despite their signing abilities or friendships with Deaf people. Two of the subjects had ten or more years of experience using ASL. Two subjects had less than ten years experience using ASL. All indicated English as their first language. None of the interpreters had family members who were deaf indicating they were not native signers of ASL; this also means that the subjects are not culturally Deaf because they can hear, and are native users of English. All of the interpreters had experience interpreting in college or university settings. This fact is important since all stimulus material was at college level.

SOURCE MATERIALS AND EXPERIMENTAL SETTING

The first step in designing the experiment was to obtain *source material* of spoken English to then give to four sign language interpreter subjects, who would then interpret this spoken English source material into ASL. The ASL the

interpreters produced would then be considered the *interpreted material*, and analyzed for the percentage of English mouthing used.

To obtain the source material, two female speakers and one male speaker were asked to provide lectures in English. They were all teachers with experience at the university level. Two of the speakers were ESL teachers. One was a chemistry instructor. Their lectures were monologues, though one graduate student (unfamiliar with the experimental design) from the department of linguistics served as a *dummy* audience member for all three speakers. The graduate student *audience member* was provided to the speakers to make the setting somewhat natural. The speakers could at least receive some non-verbal feedback, as opposed to speaking to a wall. The graduate student audience member was told not to interrupt the speakers, but just maintain eye contact, and occasionally provide some non-verbal feedback such as head nods, or smiles where appropriate.

The three speakers' voices were recorded in a sound proof room of a phonetics laboratory. They were not however videotaped. Speakers did not read from a prepared text, but rather were asked to speak extemporaneously on a familiar topic. Two of the speakers were instructed to lecture on a technical topic from their discipline. They were told to imagine themselves speaking to their students, or the audience to whom they typically taught. The third speaker was asked to talk about a dramatic life event, and asked to envision an audience to whom she typically taught. In all cases the speakers were told to envision non-intimates, and the fact that one actual student was present helped to create the *feel* of a lecture. The third speaker was asked to speak about a dramatic life event since the design of the experiment called for two lectures to be of a technical nature, and two to be of a non-technical nature. This third speaker provided a lecture about how her husband proposed to her, and how the eventual wedding plans evolved. The second speaker provided a non-technical lecture about how to apply for grants. The first speaker provided two technical lectures, one about computer architecture, and one about electron affinity.

In sum, there were three speakers who were called in to provide the source material for the experiment. The source material became the hypothetical interpreting lectures that would then be given to the sign language interpreter subjects. During the experiment, the four hypothetical lectures were labeled A, B, C, and D. The deaf audience and the lecture topic were independent variables (see Figure 1).

Lecture A and B were considered technical lectures. Lecture A was about the principles of electron affinity. Lecture B was about computer architecture. Technical lectures are represented in Figure 1 as *Tech 1*.

Lecture C and D were non-technical. Lecture C provided instruction in applying for an educational grant. Lecture D provided tips on planning a wedding. A non-technical lecture is represented in Figure 1 as *non 0*.

In lecture A and C, the deaf client refers to himself as hard-of-hearing. His cultural identity is non-deaf. This is represented in Figure 1 as *non 0*.

In lecture B and D, the interpreter is working with a client who is second-generation deaf, with deaf children, and a graduate of a deaf-only school. His cultural identity is Deaf, represented in Figure 1 as *Deaf 1*.

Figure 1 Source Material – Lectures and Audience

		Lecture	
		non 0	Tech 1
Consumer	non 0	00	01
	Deaf 1	10	11

PROCEDURE

First, the interpreter subjects were asked to fill out a questionnaire (see appendix) to determine first language use, proficiency in ASL, social time spent with deaf people, and interpreting experience. Then they were given a card that described in words a hypothetical interpreting assignment (Cards are found in the Appendix). These cards were given in random order. In other words, the interpreters were not allowed to choose which topics they wanted. Each card provided the name, age, cultural and linguistic background of the audience, and the setting and topic. Sign language interpreters regularly obtain this information when contracting for an assignment (Frishberg, 1990).

The interpreters were instructed to listen to the recorded spoken English lecture on audiocassette and interpret the source language (English) into the target language (ASL) based on the information about each audience. Each interpreter was required to interpret all four lectures. Again, these were given in random order. They were given a three-minute rest period between cards. The task was repeated four times. The approximate time of each interpreting task was eight minutes. Interpreters did not have any direct contact with the original speakers whose voices made the lectures. Likewise, there were no actual deaf consumers present during the interpretation. Interpreters were signing to a hypothetical deaf audience based on the information they received about this person in the cards. In other words, they were performing *virtual audience design*.

At the conclusion of the fourth interpreting task, the subjects were asked to fill out a retrospective questionnaire, which asked them questions about the factors influencing their choice of signs and mouthing. The whole process took

about an hour. Their signing was recorded digitally with a Canon Optura 200 and streamed into a Macintosh program called iMovie for analysis.

To further clarify the conditions and process of the experiment, an example of one interpreter subject's experience is provided below:

Subject 1 enters the experiment room. He is seated in front of a black backdrop. This color was chosen to reduce room distractors such as wall color, patterns, and other objects. He is given a consent form from the University to sign for permission to utilize and review his data. The camera is positioned in front of him. The cassette player is placed near the camera. He is given a questionnaire to determine first language, ASL proficiency, interpreting experience, and social time spent with deaf people. He is then randomly handed a large index card. The first index card chosen is Lecture B (technical, deaf). One side of the index card is blank. The other side contains all the factual information needed for him to be able to interpret to his imagined deaf audience. Again, the card provides the age, sex, cultural identity, topic, and setting for the simulated interpreting assignment. The subject is given five minutes to read the card. The experimenter then takes back the card, turns the camera on, and begins the first lecture recording. After eight minutes of interpreting from Spoken English to ASL, the experimenter re-enters the room, turns off the camera and cassette player. The interpreter is given a three-minute rest period. Then a second index card is randomly given to the interpreter, and the process is repeated until the interpreter has had a four (4) lectures. At the conclusion of the fourth lecture he is debriefed using a survey, which asks questions about his use of mouthing during the experiment.

Table 4 Total signs realized per subject

Subject	Lecture			
	Non deaf + non technical (00)	Non deaf+ technical (01)	Deaf + non technical (10)	Deaf + technical (11)
	1	695	685	628
2	593	542	620	479
3	831	695	780	588
4	725	666	715	595

ANALYSIS

Each source material lecture was transcribed in English. This was done to calculate the total number of English words spoken by each lecturer. The sign language interpreter subject's signing (the interpreted material) was analyzed frame by frame. It was necessary to examine each frame to record the number of signs actually produced, to make a gloss of the entire eight minute interpreted material for each of the four lectures, and to count and make record of each sign that was accompanied by English mouthing. A gloss refers to a way of writing signs using an approximate English translation, so that the researcher can publish results in a written format. The following measurements were taken: the total signs realized by subjects for a baseline (Table 4) and the total number of mouthings per subject in each lecture (Table 5). The dependent variable was the total number of English mouthings per subject. See Table 6 for percentages of mouthings relative to overall signs produced.

Table 5 Total mouthing per lecture

		Lecture			
		Non deaf + non technical (00)	Non deaf+ technical (01)	Deaf + non technical (10)	Deaf + technical (11)
Subject	1	344	388	179	225
	2	114	154	87	129
	3	478	122	76	67
	4	236	274	276	137

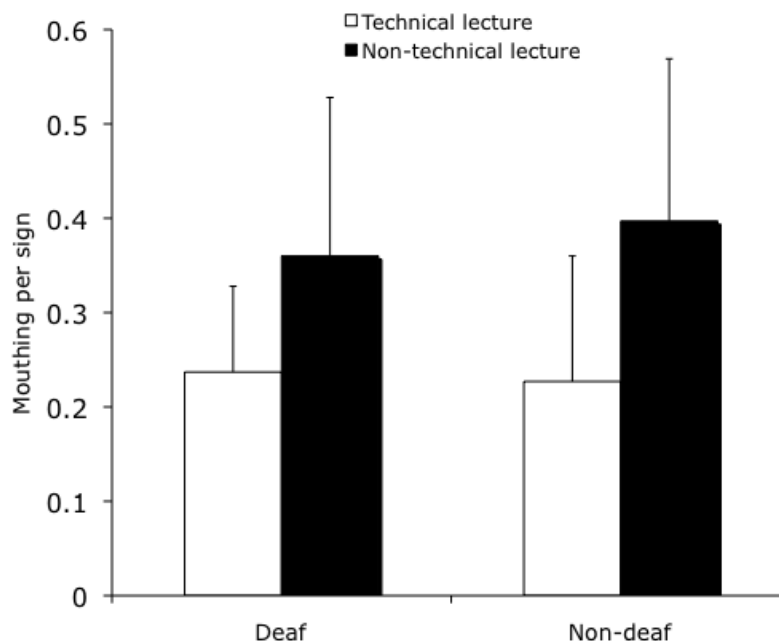
Table 6 Percentages of mouthings relative to overall signs produced

		Lecture			
		Non deaf + non technical (00)	Non deaf+ technical (01)	Deaf + non technical (10)	Deaf + technical (11)
Subject	1	49.4%	56.6%	28.5%	33.2%
	2	19.2%	28.4%	14.0%	26.9%
	3	57.5%	17.5%	9.7%	11.3%
	4	32.5%	41.1%	38.6%	23%

5.4 General results

Even with the low power in this experiment (with only 4 subjects, observed power = .408), a marginal audience effect was discovered, with more mouthings per sign to non-deaf than deaf audience, based on an analysis of variance (ANOVA) $F(1,3) = 6.25, p = .08$. The topic of the lectures did not influence the rate of mouthing, $F(1, 3) = .046, p = .84$. These results are congruent with other studies of audience design (Bell 1984; Clark & Murphy, 1981; Metzging & Brennan, 2003; Lockridge & Brennan, 2002) that show that the audience does have an effect on an addressee. In fact there can be significant changes in comprehension when speakers are put with new addressees. For example in Metzging and Brennan (2003) it was shown that audience design came into play when speakers and addressees were agreeing on certain referring expressions during a task. Having an old addressee utilize a new expression for an object rather than an expression both speaker and addressee had previously agreed upon, caused addressees to take longer to touch objects. There appears to be audience-specific information that is encoded at the same time that expressions are agreed upon and put into memory. In the present study, the audience has more of an effect on an interpreter's mouthing than the topic of the lectures under translation.

Table 7 Average amount of mouthing per sign relative to audience and lecture type *bars indicate s.d.



There were a higher percentage of mouthed content words than function words²⁹. This result reflects findings from studies on spoken language borrowing that show that insertions tend to be content words (Van Hout & Muysken, 1994). For example, in Van Hout and Muysken's analysis of Bolivian-Quechua and Spanish language mixing, of the 363 borrowed Spanish lexical items, 338 were content words (1994). See Table 8 below for percentages of mouthing by part of speech.

Table 8 Overall Percentage of Subject Mouthing By Part of Speech

Part of Speech	Lecture 01 (<i>nondeaf, technical</i>)	Lecture 11 (<i>deaf, technical</i>)	Lecture 00 (<i>nondeaf, nontechnical</i>)	Lecture 10 (<i>deaf, nontechnical</i>)
NOUN	26%	21%	39%	26%
ADJ	26%	18%	39%	26%
AUX	10%	1%	1%	0%
VERB	26%	9%	16%	9%
PRT	22%	6%	9%	5%
ADV	12%	5%	15%	4%
V/CNTR	11%	17%	17%	4%
PREP	10%	7%	15%	6%
IDIOM	8%	2%	13%	4%
PRO	8%	3%	21%	4%
CONJ	7%	3%	10%	3%
PRO/CNTR	5%	0%	14%	0%
DET	4%	2%	0%	3%
INTRJ			25%	

V/CNTR – 'verb contraction' for ex. isn't

PRO/CNTR – 'pronoun contraction' for ex. he's

²⁹ For example, *determiners*: (00=0%; 01=4%; 10=3%; 11= 2%); *prepositions*: (00=15%; 01=10%; 10=6%; 11= 7%); *conjunctions*: (00=10%; 01=7%; 10=3%; 11=3 %) in comparison to *nouns*: (00=39%; 01=26%; 10=26%; 11=21%) or *adjectives*: (00=39%; 01=26%; 10=26%; 11=18%).

Nouns were mouthed more frequently than other categories across all four contexts³⁰. There were cases where mouthing served the grammatical function of resolving vagueness.

On average one sign was produced in translation of every two English words heard.

Finally, recurrent terminology was represented by the interpreters with a sign+mouthing combination, exhibiting a pattern of mouthing reduction while preserving the manual sign over the course of the experimental context.

MOUTHING FUNCTIONS

The experiment provided a means to examine potential functions of mouthing. Interpreters utilize borrowing to resolve vagueness in ASL that could lead to miscomprehension. Resolving vagueness through lip movements has been discussed in other signed languages³¹. For example, in Swiss German Sign Language deaf signers co-articulate the mouthing *bruder* ('brother') with the manual sign GLEICH ('same') to mean 'brother', without which the meaning could be 'subtitle', 'license plate' or 'football' (Boyes-Braem, 2001, p.17).

Associating mouthing with classifiers or fingerspelling would not have been an unusual finding. Both these components of ASL have been identified with mouthing in the past in ASL.

However, in the current experiment, less than ten percent (10%) of the mouthing for resolution of vagueness was co-articulated with classifiers or fingerspelling.

The following is an example of this resolution of vagueness. In the non-technical, non-deaf scenario (00), the speaker refers to a specific application form that must be downloaded. Subjects 1, 3 and 4 co-articulate the manual sign with mouthing. Mouthing is indicated by bold-faced type:

(1) 'I **downloaded** the RFP, which is the **request for proposals**, like I said earlier, and I read through it. (Subject 1)

(2) 'I **downloaded** the RFP, which is the **request for proposals**, like I said earlier, and I **read** through it. (Subject 3)

(3) 'I **downloaded** the RFP, which is the **request for proposals**, like I said earlier, and I read through it. (Subject 4)

(Weisenberg, 2003, p. 25)

³⁰ Mouthing of nouns: (00=39%; 01=26%; 10=26%; 11=21%).

³¹ The claims made here can extend outside the interpreting environment and seem to support previous analyses of bilingual data from deaf native signers (Boyes-Braem, 2001; Ebbinghaus & Hessman, 1996).

The interpreter is obliged to add mouthing to resolve vagueness for the chosen classifier (either MATERIALS-FLOWING-DOWN or PULL-DOWN). Since there is no standardized equivalent manual sign in ASL for the term 'RFP', mouthing is used to ensure that the meaning of 'RFP' is matched with the classifier and other potential meanings are eliminated.

MORE EXAMPLES OF RESOLUTION OF VAGUENESS

(4) English: "...*It's a famous cornerstone of chemistry...*"

ASL: that really basic fs-of chemistry

M: **cornerstone of chemistry**

Subject 1:Lecture: [technical & non-deaf audience]

In this example, the sign used for 'cornerstone' could represent several meanings including 'base,' 'fundamental', and 'foundation'.

(5) English: "...*A lot of people use it when they see something rusting or paint deteriorating...*"

ASL: someone see something rust become old brown CL: break-down

M: **rust** **deteriorate**

Subject 1: Lecture: [technical & non-deaf audience]

In this example, the sign used for 'deteriorate' could represent several meanings including 'breakdown', 'collapse', 'in gear', or 'mesh'. Hence, the mouthing helps to resolve vagueness.

(6) English: "...*There are so many grant opportunities out there and every one of them has different criteria...*"

ASL: me inform you wow money get-chunk get-chunk have wow each different different different CL:5-list +C different its its

M: **grant** **criteria**

Subject 2: Lecture: [non-technical & non-deaf audience]

In the above example, the sign used for 'grant' could represent several meanings including 'windfall,' 'cash-in investment', or 'withdraw', hence the mouthing serves to resolve vagueness.

(7) English: “...*that was funding with what’s called Title II or WIA funding, which is Workforce Investment Act...*”

ASL: money from fs-title two jail work fs-workforce investment fs-act

M: **title two funding work force investment**

Subject 2, Lecture: [non-technical, non-deaf audience]

In this particular example, the sign used to convey ‘investment’ could have several meanings, including ‘stocks’ or ‘install’. Therefore the mouthing serves to resolve this vagueness.

(8) English: “...*atoms form relationships, and those relationships are called chemical bonds...*”

ASL: fs-atoms how combine how make relationship relationship name fs-chemical-bond quote

M: **atoms how bond how make relationship
chemical bond**

Subject 3: Lecture: [technical, non-deaf audience]

In the above example, the sign chosen to convey “bond” could have several meanings, including “combine,” “combine,” or “in gear”. So, the use of mouthing helps to resolve the potential vagueness.

(9) English: “...*materials that have more than one kind of atom always have a specific ratio of each kind of atom rather than just any amount...*”

ASL: itself more than one fs-atom point have what specific number percent

M: **specific ratio**

Subject 3: Lecture: [technical, non-deaf audience]

The sign chosen to represent the concept “ratio” can also have the meaning of “number,” “amount,” “percent,” or “statistic”. Therefore the vagueness is resolved by the addition of mouthing.

(10) English: "...materials that have more than one kind of atom always have a specific ratio of each kind of atom rather than just any amount..."

ASL: things have more than one kind fs-atom one have specific compare slash fs-atoms

M: thing have more than one kind atom have specific ratio

Subject 4, Lecture: [technical, non-deaf audience]

The sign selected by this interpreter to represent the concept of "ratio" could have several meanings including "compare" or "analogy." Mouthing of the English word is therefore used to resolve the vagueness.

(11) English: "...today I'm going to talk about the application process of grants at the federal level. I had experience with this last year..."

ASL: now lecture about g-subscribe application process for different different federal money chunk program experience finish last year

M: now talk about grant application process for federal program last year

Subject 4: Lecture: [non-technical, Deaf audience]

The sign chosen to represent the concept of 'grant' has several possible meanings including "unemployment," "subscription," "pension," or "social security income."

The data also provided examples of cohesion. The interpreter utilizes mouthing to emphasize that a previously introduced concept is now contrasted³².

1. English: "two metals can not form a relationship in which they share electrons, but two nonmetals can... bonds in which atoms share electrons are called covalent bonds."

ASL: mean 2 people lose lose meet share can't. set-up connect can't. not share, not give.

M: share

ASL: But happen, not-metal can.

M: but can

Subject 3: Lecture: [technical, non-deaf]

³² ASL=American Sign Language; M= mouthing. **Bold**=mouthing

The interpreter mouths 'but' while using the manual sign BUT and manually produces CAN while silently pronouncing 'can'.

2. English: *“two metals can not form a relationship in which they share electrons, but two nonmetals can... bonds in which atoms share electrons are called covalent bonds.”*

ASL: understand metal metal connect can't. but not-metal can. Give-back-forth share- each-other.

M: **can**
share

ASL: Fs-but fs-atoms share E connect name fs-covalent-bonds.

M: **called**

Subject 2: Lecture [technical, non-deaf]

MOUTHING METAMORPHOSIS

One result of the experiment was the discovery of a pattern of mouthing reduction. At least two contexts contained technical terminology that was repeated. Often there was no manual equivalent in ASL and therefore subjects had to translate these terms by overlapping mouthing and a manual sign with approximate meaning. Once the interpreter had expressed the mouthing+sign combination a few times, the mouthing was reduced or removed completely.

3. English: *“So what happened was Robbie decided that he was gonna transfer to another university and he chose Rochester Institute of Technology...so I was pretty happy to see him go there.”*

ASL: fs-Robbie decide transfer other university where-ret? Rochester...I...T
(abbrev)

M: **Robbie decide transfer** **institute of technology**

fs-RIT. happy see-him go Rochester fs-RIT [no mouthing]
happy to see him go

Subject 1: Lecture: [non-technical, deaf]

4. English: ...*which is an old saying and really refers, in this case, to electrons...*

ASL: old quote really this fs-case quote refer to fs-electrons "E" (synonym established)

M: **old really refer this case to electrons** [no mouthing]

Subject 1: Lecture [technical, non-deaf]

5. English: "...which is an old saying and really refers, in this case, to electrons..."

ASL: old story since know really point fs-electrons E (synonym established)

M: **saying really electrons electrons**

Subject 2: Lecture [technical, non-deaf]

Later in the same context the interpreter produced the word electrons with reduced mouthing:

6. English: "...*so atoms tend to come together, if you want to use the analogy of human relationships...*"

ASL: so "E" connect same human connect

M: **so e—t—n** [mouthing reduced] **come together**

Subject 2: Lecture [technical, non-deaf]

Further into the same context, the interpreter continued to use reduced mouthing for the concept of *electron*.

7. English: "...*Clorox would do a good job of causing any material to lose its electrons...*"

ASL: fs-clorox cause thing lose lose lose E. will lose its E

M: **cause e—t—n**[mouthing reduced]

Subject 2: Lecture [technical, non-deaf]

5.5 General discussion

We know that in the absence of the aural-oral channel, language will come through a visual-gestural one (Sandler, in press) the two to be produced simultaneously. Speech is linearized while gesture is more holistic. It is apparent that speech and gesture can convey different information. While speech can label and classify an object, a deictic gesture may localize it: *The chair goes right there*. For bilingual signers, the opposite is occurring. The lips can show what the hands cannot. Mouthing gestures can supplement the signing. Furthermore, unique to the sign language interpreting profession is that language borrowing is the means by which interpreters fulfill the requirements of their service. They are expected to use the language preferred by the consumer. Interpreter borrowing is different from that of spoken language bilinguals by virtue of the fact that in an interpreting situation, (1) the interlocutors may or may not be bilingual and (2) the audience makes no decision about when and where to borrow. In contrast, these decisions fall to the interpreter based on their screening of their *audience*.

MOUTHING REDUCTION

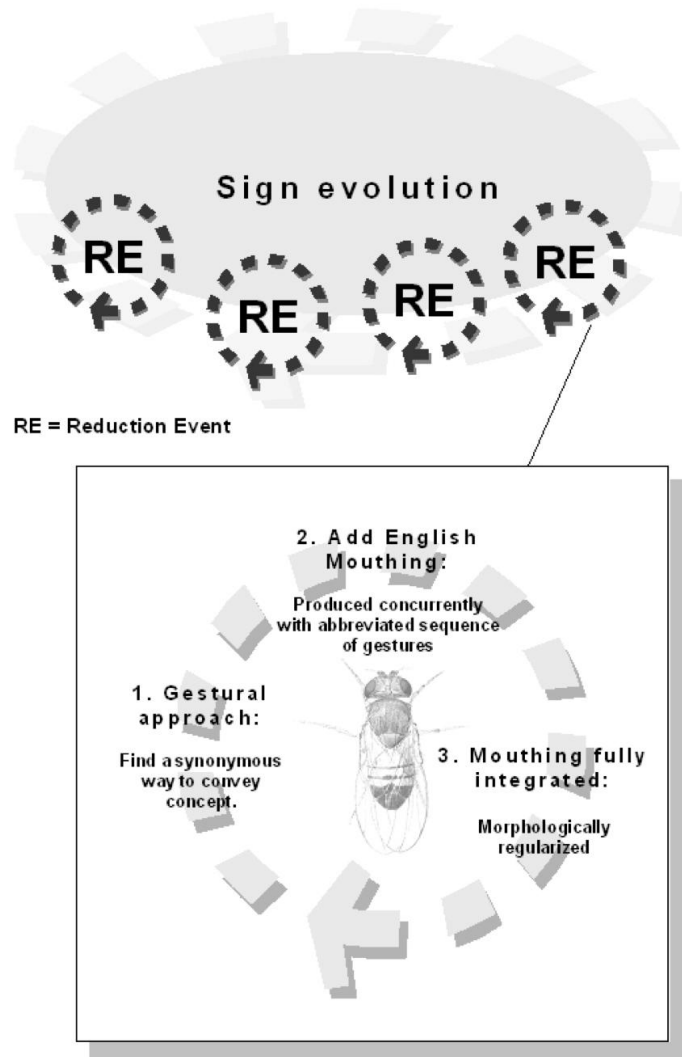
Just as the *Drosophila* fly is the workhorse for genetics research due to its gene mapping potential in a short life cycle, so too can a single sign-language interpreting event replicate the more lengthy process of a sign evolution in a much shorter life cycle. As more technical terms have been introduced to ASL, users of the language have been forced to create new signs, incorporating core-language synonyms with English initialization, English mouthing, and/or fingerspelling (Padden, 2001). Interpreters however are actually engaging in mini-evolutions on a daily basis. The process of mouthing reduction in the creation of neologisms is diagrammed in Figure 7.

When an interpreter encounters a new term for which there is no equivalent in ASL, (s)he will first mentally search for a gestural synonym, or sequence of synonymous gestures in ASL, negotiating via a strength of wills, until the audience and the interpreter concur (Step 1). At some point further along in the interpretation, the interpreter will generally shorten the sequence and overlap it with English equivalent mouthing (Step 2). Later it is common to see the mouthing become more integrated with the sequence. This is evidenced by a reduction in the lip and overall jaw movement to usually just match the initial sounds of the original English word being interpreted (Step 3). If the interpreter receives audience feedback that the concept is in fact clearly understood and acceptable, during the course of interpretation assignment, the interpreter can elect to drop the English mouthing entirely.

The natural process of language is to convey one's message more efficiently and interpreting mimics that process. We might ask if the mouthing reduction in the current experiment points to a larger theory that mouthing undergoes a three-stage process which occurs naturally in the evolution of the

American Sign Language lexicon, yet is replicated on a smaller scale by interpreters during one event.

Figure 2 Mouthing metamorphosis in interpretation



6 Summary and Future Directions

6.1 Summary

Mouthing is a form of borrowing that can be used by sign language interpreters in translation from spoken English to American Sign Language. The factor that conditions the use of mouthing is the audience, in this case whether a consumer of the interpreting service is perceived to be culturally-deaf or not-culturally-deaf. This factor is statistically more significant than the actual difficulty of the English material being translated. There were cases where the interpreters were trying to resolve vagueness by incorporating mouthing with the manual sign. There were also examples of mouthing for cohesion purposes.

The interpreting situation provides a unique look at sign change in general because interpreters are thrust into this sign-spoken language contact situation on a daily basis, and must often create approximates for concepts that do not exist in ASL. Thus using the drosophila analogy, interpreters accelerate what normally occurs over a longer period of exposure to other languages like English. It was speculated that mouthing follows a specific reduction process, though further development of this theory is beyond the scope of the present study.

Not only does this study confirm what is a commonly held notion in audience design, that people are adjusting their language in reaction to people, but also opens up an inquiry to the use of the interpreting context as a means of examining neologisms and language variability.

6.2 Interpreters and video-relay technology

As this study has indicated, interpreters are active participants in the communication of D/deaf people. A relevant question would be whether their presence in the community could affect the evolution of ASL, particularly due to the fact their images are transmitted nationwide through webcams during video-relay interpretation.

It is well known that Deaf people use more English-based varieties when interacting with the mainstream. (Markowicz & Woodward, 1975; Lucas & Valli, 1989) Knowing when or when not to use ASL is a natural expected behavior in Deaf culture, but likewise, it is an expected behavior of interpreters. Interpreters use cross-linguistic strategies like lexicalized mouthing, phonetically-intact English mouthing and fingerspelling because speech and gesture can be produced simultaneously. (Weisenberg, 2003; Davis, 2003) So, if we now take unique bilingual interpreters and put them in a computer-mediated context and transmit their images to remote areas, we can anticipate very interesting effects that would not occur in face-to-face interpreting. Due to video-relay service availability, Deaf people now have frequent contact with the jargon of the business world, and automated systems. They also have frequent exposure now

to regional signing which in the past was infrequent or non-existent. What if the equipment's image transmission was not perfect? What if the users were unfamiliar with the jargon used? What if the world of automation was associated with the dominant language? And what if this new communication process was controlled by an entity who knew little about what interpreters do? One could speculate that language choice, and mouthing to resolve vagueness could be affected by this technology, specifically because the medium involves long-distance imaging, and frequent contact between hearing persons and deaf signers using two very different languages. These are questions that arise from video interpreting. The next step would be to examine computer-mediated communication between deaf and hearing people to document mouthing and language variability.

Recall that this study reviewed how interpreters have adopted many models in the profession. Of special interest is the Machine (Conduit) Model (1970-1975), explained in an earlier section of this study. In this model, the interpreter assumed less responsibility over the communicative task; interpreters functioned, as the label had it, as a 'telephone.' Because of the quantity over quality mentality, interpreters were viewed by Deaf people as 'rigid and inflexible.' (Humphries & Alcorn, 2001). The Federal Communication Commission's (FCC) influence over video relay include the following: (1) it is charged with determining the rate that ensures appropriate compensation to VRS providers and (2) it imposes a model on interpreters of *functional equivalence*³³. When a deaf person connects to a video interpreter, it should be a comparable experience to that of hearing people picking up the phone and getting a dial tone. The obvious paradox is that the FCC's description causes an application of an old framework to this new communicative space and potentially brings with it all the behaviors interpreters worked so hard to change: rigidity, conduit mentality, more weight given to quantity of words than meta-linguistic factors like cultural identity, intent of speakers, and the most important of all, English viewed as superior to ASL. It is known that interpreters already exhibit language mixing in face-to-face interpreting. Now, put them in a context with a resurrected model that says they are once again telephones, and it should be no surprise that they are using borrowing and mouthing. Before the advent of video interpreting, the automated world of "press one if you know your party's extension" was lesser known to the Deaf community. The automated world was dominated by hearing people and the English language. Now, video interpreters are having their images transmitted nationwide and internationally, spreading the language of these recordings with some interesting linguistic effects.

English does not make use of space the way ASL does, and distinctions in video communication are harder to make, which could explain why deaf users or interpreters might choose more English features in their signing. (Keating &

³³ FEDERAL COMMUNICATIONS COMMISSION 47 CFR Part 64, [CC Docket No. 98-67, CG Docket No. 03-123; DA 05-141] and <http://www.nad.org/site/pp.asp?c=foINKQMBF&b=104291>.

Mirus, 2003) Another explanation is that consumers of video-interpreting are eager to expedite their calls. Like any system, there can be delays, so when an interpreter finally appears, it may be that deaf callers want to get their message across quickly, and they are willing to sacrifice language features to do that (Weisenberg & Garcia, 2007). Interpreters' use of a conduit model and automated systems expose deaf callers to alternative forms of signing, including forms co-produced with English mouthing and that follow English syntax. Video interpreters and deaf callers are using new jargon, selecting common signs to achieve equivalency. For example: LIVE+ PERSON or LIVE REPRESENT (a real person, not automated system); HEADSET (operator, video interpreter); X, E-X-T, EXAGGERATE (phone extension) and A+COUNT (account). Older technological signs are even brought back to explain new ones: AUDIOTAPE (answering machine or automated system) and CALL-TO [as in TTY] for making a video-call (Weisenberg & Garcia 2005). Just as cell phone text messaging has introduced Short Message Service (SMS) language of 'TTYL' and 'Gr8, thx, Hw r u?,' interpreters witness WHERE YOU A-T? (Where are you?); E-R-I-C TO K-I-M (This is Eric calling for Kim); or PHONE AUDIOTAPE HIT ZERO (When you get the recording, hit zero).

Video interpreting causes other adjustments. Interpreters utilize desktop tools like the television remote, paper and objects like the camera itself. English-based signing, fingerspelling and English mouthing are also observed. Wh-word/Y-N question facial expressions can be dropped. Hands can be brought closer to the webcam for clarity. Sign location and speed changes. There is increased repetition and checking for understanding. Language mixing is prevalent (D-I-D, THIS IS---), increased fingerspelling and adjustment of references (ME, YOU, HIM). Are video callers referring to the person's image on screen, in the webcam or in reality, for example, behind the person? (Keating & Mirus, 2003) The technology has allowed for an efficiency and speed of communication that is so important to deaf callers that they are willing to drastically change their language in order to achieve it, and interpreters are influencing this process by virtue of the policies they must follow, the limitations of the equipment and their own bilingual strategies.

One traditionally thinks of speakers consciously deciding when to language mix based on factors like identity, context or because a concept is expressed better in one language than another (Grosjean, 1982). But in video interpreting, interpreters are making language choices based on (1) policies of virtual space - a government entity mandates them to function as a "dial-tone"(2) equipment constraints - interpreters are adjusting their language because the message must be transmitted through an imperfect medium. One must consider the research potential of video interpreting and of interpreters themselves, who are now more than ever not invisible, but may even have an active hand in accelerating language change.

References

- Aharoni, Eyal & Alan J. Fridlund (2007). Social reactions toward people vs. computers: How mere labels shape interactions. *Computers in Human Behavior*, 23, 2175–2189.
- Anderson, D. & Reilly, J. S. (2002). FACES: The acquisition of non-manual morphology in ASL. In Morgan, G. & Woll, B. (Eds.): Directions in sign language acquisition. Trends on Language Acquisition Research, 2, pp. 159-181. Philadelphia: Benjamins.
- Anonymous (2008, May 13). DC-Area Examiner Newspaper Took Swipe At Deaf and HOH. Message posted to <http://robertmason.blogspot.com/2008/05/dc-edaminer-newspaper-took-swipe.html>
- Alibali, M. M., Kita, S., & Young, A. J. (2000). Gesture and the process of speech production: We think, therefore we gesture. *Language and Cognitive Processes*, 15, pp. 593-613.
- Alim, S. (2005) *You Know my Steez: An ethnographic and sociolinguistic study of styleshifting in Black American Speech Community*. Durham, NC: Duke University Press
- Arbib, M. A. (2005) The Mirror System Hypothesis: How did protolanguage evolve? In Maggie Tallerman, editor, *Language Origins: Perspectives on Evolution*. Oxford University Press.
- Armstrong, D. F., W. C. Stokoe, and S. E. Wilcox. (1995). *Gesture and the Nature of Language*. Cambridge: Cambridge University Press.
- Baker, C. & D. Cokely, (1980). *American Sign Language: a teacher's resource text on grammar and culture*. Md.: T.J. Publishing
- Baker-Shenk (1985). Characteristics of oppressed and oppressor peoples: their effect on the interpreting context. Proceedings of the 1985 Registry of Interpreters for the Deaf convention. Silver Spring, MD: RID Publications, p. 120-140
- Battison R. (1978) *Lexical borrowing in American Sign Language*. Silver Spring, MD: Linstok Press
- Bavelas, J. B. (1994) Gestures as part of speech: Methodological implications. *Research on Language and Social Interaction*, 27, pp. 201-221

- Beebe, L. M. (1981). Social and situational factors affecting communicative strategy of dialect code-switching. *International Journal of the Sociology of Language*, 32, pp. 139-149.
- Bell, A. (1977) The language of radio news in Auckland: A Sociolinguistic study of style, audience, and subediting variation. PhD dissertation, University of Auckland, New Zealand.
- Bell, A. (1984). Language style as audience design. *Language in Society*, 13, 145-204.
- Bell, A. (2001) Back in style: reworking audience design. Style and sociolinguistic variation. Eckert, P. & Rickford, J. (Eds.). New York: Cambridge University Press
- Berent, G. (2003). Sign language-spoken language bilingualism; Codemixing and modemixing by ASL –English bilinguals. Bhatia & Ritchie (Eds). *The handbook of bilingualism*. Oxford, UK: Blackwell.
- Birch-Rasmussen, S. (1982). *Mundha^ondsystemet*. Copenhagen: Døves Center for Total Kommunikation.
- Blom, J. P., & Gumperz, J. J. (1972). Social meaning in linguistic structure: Code-switching in Norway. In Gumperz, J. J. & Hymes, D. (eds.) *Directions in sociolinguistics*. New York: Holt, Rinehart & Winston. Pp. 407-434.
- Borden (1996) *The Art of Interpreting*. Plymouth, MI: Hayden-McNeil Publishing.
- Boyer, C. B. (1968). *A History of Mathematics*. New York: Wiley & Sons, pp. 9-47
- Boyes Braem, Penny & Sutton Spence, Rachel. 2001. *The Hands are the Head of the Mouth: The Mouth as an Articulator in Sign Languages*. Signum Verlag.
- Boyes-Braem, P. (2001). Functions of the mouthing component. Foreign Vocabulary in Signed Languages, Brentari, D. (Ed). Mahwah, NJ: Lawrence Erlbaum Associates.
- Bragg, B. (1989) *Lessons in Laughter*. Washington, DC : Gallaudet University Press
- Bragg, B. (1989) A Wake up call for hearing signers. A Deaf American Monograph.
- Brennan, M. (2001). Making Borrowing Work in British Sign Language. In

Foreign Vocabulary in Sign Languages: A Cross-Linguistic Investigation of Word Formation, Brentari, D. (Ed.) pp. 49-85. Mahwah, N.J.: Erlbaum.

Brennan, S. E., & Clark, H. H. (1996). Conceptual pacts and lexical choice in conversation. *Journal of Experimental Psychology*, 22 (6), 1482- 1493

Brentari, D. (1998). A prosodic model of sign language phonology. Cambridge, MA: MIT Press.

Brentari, D. & Padden, C. (2001). Native and foreign vocabulary in American Sign Language: A lexicon with multiple origins. In *Foreign Vocabulary in Sign Languages*, Ed. D. Brentari, pp.87-119. Mahwah, NJ: Lawrence Erlbaum

Bridges, B. (1998) *Deaf Tend Yours: The Importance of Non-Manual Signs in ASL*. [presentation] Columbia University, New York, NY: May 16-17.

Bridges, B. & M. Metzger (1996). *Deaf Tend Yours: Non-Manual Signals in ASL*. Silver Spring, MD: Calliope Press.

Brown, D. H. (2000). *Principles of Language Learning and Teaching*. 4th edition

Broselow, E. (1983). Nonobvious transfer: On predicting epenthesis errors. Language transfer in language learning. in L. Selinker & S. Gass, (Eds.) *Issues in second language research*. Rowley, MA: Newbury House. 269-280.

Calsamiglia, H. & A. Tuson. (1984). Use of languages and code-switching in groups of youth in a 'barri' of Barcelona: communicative norms in spontaneous speech, *International Journal of the Sociology of Language* 47, 105-121.

Carbin, C. F., & Smith, D. L. (1996). *Deaf heritage in Canada : A distinctive, diverse, and enduring culture*. Toronto, New York: McGraw-Hill Ryerson.

Carroll, J. M. (1980). Naming and describing in social communication. *Language and Speech*, 23, 309-322.

Casali, R. F. (1997). Vowel elision in hiatus contexts: Which vowel goes? *Language* 73. 3,493-533.

Casey, S. & Emmorey, K. (2009). Co-speech gesture in bimodal bilinguals. *Language and Cognitive Processes*. 24 (2), 290-312.

- Casasanto, D., & Lozano, S. (2006). *Metaphor in the mind and hands*. In Proceedings of the 28th Annual Meeting of the Cognitive Science Society, Vancouver, BC.
- Cerney, B. (2005). *The Interpreting handbook, Part I*. Colorado Springs, CO: Hand & Mind Publishing.
- Clark, H. H., & Murphy, G. L. (1982). Audience design in meaning and reference. In J.-F. LeNy & W. Kintsch (Eds.), *Language and comprehension*. Amsterdam: North-Holland.
- Clark, H.H., & T.B. Carlson. (1981). Context for comprehension. In J. Long & A. Baddeley (Eds.). *Attention and performance IX*. Hillsdale, NJ: Lawrence Erlbaum, pp. 313-330.
- Clark, H. H., & Wilkes-Gibbs, D. (1986). Referring as a collaborative process. *Cognition*, 22, 1-39.
- Chawla. P., & Krauss, R. M. (1994). Gesture and speech in spontaneous and rehearsed narratives. *Journal of Experimental Social Psychology*, 30, 580-601.
- Coerts J. (1992). Nonmanual grammatical markers. An analysis of interrogatives, negations, and topicalisations in the sign language of the Netherlands. Amsterdam: University of Amsterdam
- Cohen, A. (1977). The communicative functions of hand illustrators. *Journal of Communication*, 27, 54–63.
- Cohen, A. A., & Harrison, R. P. (1973). Intentionality in the use of the hand illustrators in face-to-face communication situations. *Journal of Personality and Social Psychology*, 28, 276-279
- Cokely, D. (1984). Towards a Sociolinguistic Model of the Interpreting Process: Focus on ASL and English. Doctoral dissertation. Washington, DC: Georgetown University.
- Cokely, D. (1992). *Interpretation: A Sociolinguistic Model*. Burtonsville, MD: Linstok Press
- Colonomos, B. (2004, June). *Foundations of the Interpreting Process I*, [presentation] Suffolk County Community College.
- Darragh-McLean, M. (1998). Applying the Gish Model in the Educational Setting, [workshop], Oyster Bay, NY: Millneck Interpreting Services, March 3,

- Davis, J. (1989). Distinguishing language contact phenomenon in ASL interpretation. *Sociolinguistics of the Deaf Community*, 85-102. San Diego: Academic Press.
- Davis, J. (2003). Cross Linguistic Strategies Used By Interpreters. *Registry of Interpreters for the Deaf Journal of Interpretation*. Alexandria, VA: RID Publications, p.95-128
- Dellicarpini, M. (2003). *Second Language Acquisition*. [lecture notes] Stony Brook, NY : Stony Brook University.
- Detthow, A. (2000). Transliteration between Spoken Swedish and Swedish Signs. In *Bilingualism and Identity in Deaf Communities*, (Ed. M. Metzger); pp. 79-92, Washington, D.C.: Gallaudet University Press
- Di Pietro, R. (1977). Codeswitching as a Verbal Strategy Among Bilinguals. In F. Eckman (Ed.) *Current Themes in Linguistics: Bilingualism, Experimental Linguistics and Language Typologies*. Washington, DC: Hemisphere
- DiSciullo, A. M., Muysken, P. & Singh, R. (1986). Government and code-mixing. *Journal of Linguistics*, 22,1-24.
- DiSciullo, A. M. & Williams, E. (1989). *On the Definition of Word*. Cambridge, Massachusetts: MIT Press
- Dixon, R. M. W. (1988) *A grammar of Boumaa Fijian*. Chicago: University of Chicago Press.
- Dorian, N. C. (1981). *Language Death*. Philadelphia: University of Pennsylvania Press.
- Ebbinghaus, H. & J. Hessman (1996). Signs and Words: Accounting for spoken language elements in German Sign Language. In *International Review of Sign Linguistics*, 1, pp. 23-56
- Ebbinghaus, H. & J. Hessman (2001). Sign language as multidimensional communication: Why manual signs, mouthings, and mouth gestures are three different things. In Boyes, B. & Sutton-Spence, R. (Eds.) *The Hands Are the Head of the Mouth: The Mouth As Articulator in Sign Languages*, pp. 133-151. Hamburg, Germany: Signum-Verlag.
- Eckert, P. (1990). The whole woman: Sex and gender differences in variation. *Language Variation and Change* 1:245– 67.
- Efron, D. (1972). *Gesture, race, and culture*. The Hague: Mouton. Originally

published in 1942 under the title *Gesture and environment*, by King's Crown press, Morningside Heights, NY.

- Eldredge, N. (2008). Vicarious Trauma Workshop, [presentation] Sorenson Communications. New York, NY, December 3
- Emmorey, K., Borinstein, H.B., Thompson, R., & Gollan, T.H. (2008). Bimodal bilingualism. *Bilingualism: Language and Cognition*, 11(1), 43-61
- Emmorey, K., & McCullough, S. (2009). The bimodal brain: Effects of sign language experience. *Brain and Language*. Vol. 109 (2-3). 124-132
- Engberg-Pederson, E. (1993) Space in Danish Sign Language: The meaning and morphosyntactic use of space in a visual language. Hamburg: Signum-Verlag.
- Feyne, S. (2009). Show Me the Register, [workshop], Brooklyn, NY: Sign Talk Inc., June 21.
- Fischer, S. (1978). Sign Language and Creoles. In Siple, P. (Ed.) *Understanding language through sign language research*, pp. 309-331. New York: Academic Press
- Fishman, J. A., Cooper, R. L., & Ma, R. (1971). *Bilingualism in the barrio*. Bloomington: Indiana University Press.
- Freedman, N. (1972). The analysis of movement behavior during the clinical interview. In Siegman, A. & Pope, B. (Eds.), *Studies in dyadic communication*, pp. 153-175.
- Fridlund, A. J. (1991). Sociality of solitary smiling: Potentiation by an implicit audience. *Journal of Personality and Social Psychology*, 60(2), 229- 240
- Fridlund, A. J. (1992). Darwin's anti-darwinism and the Expression of the Emotions in Man and Animals. In K. T. Strongman (Ed.), *International Review of Emotion* (Vol. 2) (Pp. 117-137). New York: Wiley.
- Friedman, L. 1976. The manifestation of subject, object, and topic in American Sign Language. In (Charles, Ed.) Subject and topic. New York: Academic Press
- Frishberg, N. (1986). *Interpreting: An introduction*. Maryland: RID Publications.
- Frishberg, N. (1975) Arbitrariness and iconicity: Historical change in American Sign Language. *Language* 51:696-719.

- Gal, S. (1979). *Language shift: Social determinants of linguistic change in bilingual Austria*. New York: Academic Press.
- Galati, A. & Brennan, S. E. (In preparation). Audience design and given vs. new information in the production of gesture
- Garey, D. & Hott, L. R. (2007). *Through Deaf Eyes*. [DVD], United States: Public Broadcasting System.
- Garrod, S., & Anderson, A. (1987). Saying what you mean in dialog: A study in conceptual and semantic co-ordination. *Cognition*, 27, 181-218.
- Giles, H. and Smith, P. (1979) Accommodation Theory: Optimal Levels of Convergence, in H. Giles and H. St. Clair (eds), *Language and Social Psychology*. Oxford: Basil Blackwell.
- Gish, S. (1987). "I understood all the words, but I missed the point.": A goal-to-detail/detail-to-goal strategy for text analysis. In McIntire, M. L (Ed.), *New Directions in Interpreter Education: Curriculum & Instruction: Proceedings of the Sixth National Convention of the Conference of Interpreter Trainers*. Silver Spring, MD: RID Publications.
- Gentilucci, M., Santunione, P., Roy, A.C. , & Stefanini, S. (2004). Execution and observation of bringing a fruit to the mouth affect syllable pronunciation. *European Journal of Neuroscience* 19 (1), 190-202.
- Giles, H. & Smith, P. (1979). Accommodation Theory: Optimal levels of convergence. In Giles, H. & St. Clair, R. (Eds.), *Language and social psychology*, pp. 45-65. Oxford: Blackwell.
- Goldin-Meadow, S., Nusbaum, H., Kelly, S. D., & Wagner, S. (2001). Explaining math: Gesturing lightens the load. *Psychological Science*, 12, pp. 516-522.
- Grigg, K. (2008). An Open Letter for President Obama [video]. Retrieved September 11, 2008, from <http://www.deafvideo.tv/video/watch/33905/>
- Groce, N. E. (1985) *Everybody here spoke sign language: Hereditary deafness on Martha's Vineyard*. Cambridge, MA: Harvard University Press
- Grosjean, F. (1982). *Life with Two Languages: An Introduction to Bilingualism*. Cambridge, Mass: Harvard University Press
- Gumperz, J.J. (1976). The sociolinguistic significance of conversational code-switching. *Papers on Language and Context (Working Paper 46)* . Berkeley: University of California, Language Behavior Research

Laboratory.

- Gumperz, J. J. (1982). *Discourse strategies*. Cambridge: Cambridge University Press.
- Gumperz, J. & Hernandez-Chavez, E. (1978). Bilingualism, bidialectalism and classroom interaction. In *A pluralistic nation*, Lourie, M. & Conklin, N (Eds.). Massachusetts: Newbury House.
- Hackenberg, (1972) *A Sociolinguistic Description of Appalachian English*. PhD dissertation, Georgetown University.
- Haugen, E. (1950). The analysis of linguistic borrowing. *Language* 26:210-231.
- Higa, M. (1979). Sociolinguistic aspects of word-borrowing. In *Sociolinguistics studies in language contact*. Mackey, W. & Ornstein, J. (Eds.) The Hague: Mouton.
- Hoffmeister, R., Lane, H. & Bahan, B. (1996). *Journey Into the Deaf World*. San Diego: CA, Dawn Sign Press.
- Hohenberger, A. & Happ, D. (2001): The Linguistic Primacy of Signs and Mouth Gestures over Mouthing: Evidence from Language Production in German Sign Language (DGS). In: P. Boyes Braem & R. Sutton-Spence (Eds.), *The Hands are the Head of the Mouth: The Mouth as Articulator in Sign Language*. Hamburg: Signum, 153-189.
- Humphries, J. (1977). *Communicating Across Cultures (Deaf/Hearing) and Language Learning*. Dissertation. Union Graduate School: Cincinnati, OH.
- Humphries, J. & Alcorn, R. (2001). *So You Want To Be An Interpreter?* Austin, TX: H & H Publishing
- Humphries, J. & Alcorn, R. (2001) *So You Want to Be an Interpreter? Third Edition, [CD]*. Austin, TX: H & H Publishing Co.
- Isenhath, J. (1990). *The linguistics of American sign language*. Jefferson, N. C.: McFarland & Company, Inc.
- Ivir, V. (1989) Linguistic and communicative constraints on borrowing and literal translation. In Beylard-Ozeroff, A, Kravola, J. & Moser-Mercer, B. (Eds.) *Translator's Strategies and Creativity*. pp. 137-144. Philadelphia, PA: John Benjamin
- Jacobs, N., & Garnham, A. (2007). The role of conversational hand gestures in a narrative task. *Journal of Memory and Language*, 56. pp. 291 –303.

- James, W. (1981) *The Principles of Psychology*, Cambridge, MA: Harvard University Press, 1981. [Originally published in 1890].
- Janzen, T. & Shaffer, B. (2002), Gesture as the substrate in the process of ASL grammaticization. In: Meier, R.P. et al. (eds.), *Modality and structure in signed and spoken languages*. Cambridge: Cambridge University Press, 199-223.
- Jiang, W. (2000). The relationship between culture and language. *English Language Teaching Journal*, 54, 328-334.
- Johnson, R. E. & Erting, C. (1989). Ethnicity and socialization in a classroom for deaf children. In Lucas, C. (Ed.) *The sociolinguistics of the deaf community*, pp. 41-84. New York: Academic Press
- Jun, J. (1995). Perceptual and articulatory features in place assimilation: An optimality theoretic approach. Los Angeles, CA: UCLA dissertation.
- Kager, R. (1999). *Optimality Theory*. Cambridge, UK: Cambridge University Press.
- Kayne (1989) Notes on English Agreement. *CIEFL Bulletin* 1:40-67.
- Keating, E. and G. Mirus (2003). American Sign Language in Virtual Space: Interactions between deaf users of computer-mediated video communication and the impact of technology on language practices. *Language in Society*, 32, pp.693-714.
- Keller, J. (1999). Mundbilder in europäischen Gebardensprachen. *Das Zeichen*, 47, 136-143.
- Keller, J. (2001). Multimodal representations and the linguistic status of mouthings in German Sign Language (DGS). In Boyes, B. & Sutton-Spence, R. (Eds.) *The Hands Are the Head of the Mouth: The Mouth As Articulator in Sign Languages*, pp. 191-230. Hamburg, Germany: Signum-Verlag.
- Kendon, A. (1980). Gesticulation and speech: Two aspects of the process of utterance. In Key, M. R. (Ed.) *Relationship of verbal and nonverbal communication*, pp. 207-228. The Hague: Mouton.
- Kendon, A. (1983). Gesture and speech: How they interact. In Weimann, J. M. & Harrison, R. P. (Eds.) *Nonverbal interaction*. Beverly Hills, CA: Sage.

- Kendon, A. (1994). Do Gestures Communicate?: A Review. *Research on Language and Social Interaction*, 27, pp. 175-200
- Kendon, A. (2000). Language and Gesture: Unity or Duality. In D. McNeill, ed. *Language and Gesture: Window into Thought and Action*. Cambridge: Cambridge University Press, pp. 47-63
- Kimbara, I. (2006). Interpersonal influences on gesture production: Evidence for gesture form convergence across speakers in dyadic interaction (Doctoral dissertation, University of Chicago, 2006). *Dissertation Abstracts International*, 67 (2), 397
- Parrill, F., & Kimbara, I. (2006). Seeing and hearing double: The influence of mimicry in speech and gesture on observers. *Journal of Nonverbal Behavior*, 30, 157–166
- Kita, S. (1993). *Language and thought interface: A study of spontaneous gestures and Japanese mimetics*. Unpublished doctoral dissertation, University of Chicago.
- Klima, E. and U. Bellugi. (1979). *The signs of language*. Cambridge, MA: Harvard University Press.
- Kourbetis, Vassilis, & Hoffmeister, R. J. (2002) Name Signs in Greek Sign Language. *American Annals of the Deaf*, July 2002, pp.
- Krauss, R. M. (1987). The role of the listener: Addressee influences on message formulation. *Journal of Language and Social Psychology*, 6, 81-98.
- Krauss, R. M., Dushay, R. A., Chen, Y., & Rauscher, F. (1995). The communicative value of conversational gestures. *Journal of Experimental Social Psychology*, 31, pp. 533-553.
- Krauss, R. M., Chen, Y., & Gottesman, R. F. (2000). Lexical gestures and lexical access: A process model. In *Language and gesture*, McNeill, D. (Ed.), pp. 231- 283. New York: Cambridge University Press.
- Krauss, R. M., & Weinheimer, S. (1964). Changes in reference phases as a function of frequency of usage in social interaction: A preliminary study. *Psychonomic Science*, 1,113-114.
- Krauss, R. M., & Weinheimer, S. (1966). Concurrent feedback, confirmation, and the encoding of referents in verbal communication. *Journal of Personality and Social Psychology*, 4, 343-346.

- Kuhlen, A., & Seyfeddinipur, M. (2008.) From Speaker to Speaker: Repeated Gestures across Speakers. *Berlin Gesture Center*, [Oral presentation], Berlin, Germany.
- Labov, W. (1972) *Sociolinguistic Patterns*. Philadelphia. University at Philadelphia Press.
- Labov, W. (1990). The intersection of sex and social class in the course of linguistic change. *Language Variation and Change* 2:205–51.
- Labov, W. (1966). *The Social Stratification of English in New York City*. Washington DC. Center for Applied Linguistics.
- Lance, D. (1979). Spanish-English bilingualism in the American Southwest. In *Sociolinguistic studies in language contact*, Mackey, W. & Ornstein, J (Eds.). The Hague: Mouton.
- Lane, H. (1984). *When the Mind Hears; A History of the Deaf*. New York, NY: Random Hous .
- Lane, H., Pillard, R. C., & French, M. (2000). Origins of the American deaf-world: Assimilating and differentiating societies and their relation to genetic patterning. *Sign Language Studies*, 1(1), 17-44.
- Larson (1984) *Meaning based translation: A guide to cross-language equivalence*. Lanham, MD. University Press of America
- Lee, D. (1983). Sources and aspects of code switching in a deaf adult and her interlocutors Unpublished doctoral dissertation. University of Texas at Austin.
- Liddell, S. K. (1980). *American Sign Language Syntax*. The Hague: Mouton
- Li, Charles N. & Thompson, Sandra A. (1976). "Subject and Topic: A New Typology of Language." In: Charles N. Li (ed.). *Subject and Topic*. New York: Academic Press, pp. 466-471.
- Lockridge, C. & Brennan, S. (2002). Addressees' needs influence speakers' early syntactic choices. *Psychonomic Bulletin & Review*, 9(3), 550-557.
- Lucas, C. & Valli, C. (1989). *Language Contact in the American Deaf Community*. In Lucas, C. (Ed.), *The Sociolinguistics of the deaf community*, p. 11-40. San Diego : Academic Press.

- Lucas, C. & Valli, C. (1991). ASL or Contact Signing: Issues of Judgment. *Language in Society*, 20 (2), pp. 201-216. Cambridge, MA: Cambridge University Press
- Maes, A., Marcelis, P. & Verheyen, F. (2007). Referential collaboration with computers: Do we treat computer addressees like humans. In Monika Schwarz-Friesel, Manfred Consten, & Mareile Knees (Eds.), *Anaphors in text: cognitive, formal and applied approaches to anaphoric reference* (pp. 49–68). Amsterdam: John Benjamins Publishing Company.
- Mahl, G. F. (1972). People talking when they can't hear their voices. In Siegman, A. W. & Pope, B. (Eds.). *Studies in dyadic communication*, pp. 211-264. New York: Pergamon.
- Mayberry, R. I. & Jacques, J. (2000). Gesture production during stuttered speech: Insights into the nature of gesture-speech integration. In D. McNeill (Ed.), *Language and gesture* (pp. 199–214). Cambridge: Cambridge University Press.
- McNeill, D. (1987). *Psycholinguistics: A new approach*. New York: Harper & Row.
- McNeill, D. (1992). *Hand and mind: What gestures reveal about thought*. Chicago: University of Chicago Press.
- MacSwan, J. (1999). *A Minimalist approach to intrasentential code switching*. New York: Garland.
- Mandel, M. (1981). Phonotactics and morphology in American Sign Language. University of California, Berkeley dissertation.
- Markowicz, H. & Woodward, J. (1975). Some handy new ideas on pidgins and creoles: Pidgin Sign Languages. Paper presented at International Conference on Pidgin and Creole Languages (Honolulu, HI, January 6-11)
- Markowicz, H. & Woodward, J. (1978). Language and maintenance of ethnic boundaries in the deaf community. *Community and Cognition*, Wilbur, R. (Ed.), pp. 29-38
- Mayberry, R. I., & Jaques, J. (2000). Gesture production during stuttered speech: Insights into the nature of gesture-speech integration. In *Language and gesture*, McNeill, D. (Ed.), 199-214. New York: Cambridge University Press.

- McCullough, S. & Emmorey, K. (1997). Face processing by deaf ASL signers: Evidence for expertise in distinguishing local features. *Journal of Deaf Studies and Deaf Education* 2, pp. 212–222.
- McNeill, D. (1985). So you think gestures are nonverbal? *Psychological Review*, 92, pp. 350-371.
- McNeill, D. (1992). *Hand and mind: What gestures reveal about thought*. Chicago: University of Chicago Press.
- McNeill, D. & Duncan, S. (2000). Growth points in thinking-for-speaking. In *Language and Gesture*, McNeill, D. (Ed.), Cambridge University Press, Cambridge
- McNeill, D., Cassell, J., & McCullough, K. E. (1994). Communicative effects of speech-mismatched gestures. *Research on Language and Social Interaction*, 27, pp. 223-237
- (MdDeafDc, September 7, 2007). The Deaf Edge - Sorenson VRS, “not” Deaf CommunityFriendly. Message posted to <http://deafpundit.wordpress.com/2007/09/06/sorenson-vrs-not-deaf-community-friendly-asl-version/>
- Metzger, M. (1999). *Sign Language interpreting: Deconstructing the myth of neutrality*. Washington, DC: Gallaudet University Press
- Metzing, C. & Brennan S. (2003). When conceptual pacts are broken: Partner-specific effects on the comprehension of referring expressions. *Journal of Memory and Language*, 49, pp. 201-213.
- Miao, R. (2001) Chinese loanword phonology at coda positions. Unpublished paper. SUNY at Stony Brook, New York.
- Mindess, A. (1999). *Reading Between the Signs: Intercultural Communication for Sign Language Interpreters*. Yarmouth, Maine: Intercultural Press
- Moody, B. (2007, April 21). International Sign Language. [presentation]. New York, NY.
- Mol, L., Krahmer, E., Maes, A., & Swerts, M.. (2009). The communicative import of gestures: Evidence from a comparative analysis of human-human and human-machine interactions. *Gesture* 9(1), 98-127
- Montgomery & Hall (2004). *The Dictionary of Smoky Mountain English*. Knoxville: University of Tennessee Press.

- Morrel-Samuels, P. & Krauss, R.M. (1992). Word familiarity predicts the temporal asynchrony of hand gestures and speech. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 18, 615-623.
- Müller, C. (1998). *Redebegleitende Gesten: Kulturgeschichte, Theorie, Sprachvergleich*. Berlin: Verlag Arno Spitz.
- Muysken, P. (2000). *Bilingual Speech: A Typology of Codemixing*. Cambridge, MA: Cambridge University Press.
- Myers-Scotten, C. (1993). *Duelling languages: Grammatical structure in code-mixing*. Oxford: Clarendon Press.
- Napier, J. (2002). Linguistic Coping Strategies of Interpreters. *Journal of Interpretation, RID*, pp. 63-91, Alexandria, VA: RID Publications
- Neidle, C, Bahan, B., Kegl, J., MacLaughlin, D, & Lee, R. G. (2000) The Syntax of American Sign Language. Cambridge, MA: MIT Press.
Neurosciences 21, 188-194.
- Newman, J. (1956.) *The World of Mathematics*. New York: Simon and Schuster. pp. 170-178.
- Nieto, S. (1999). What does it mean to affirm diversity in our nation's schools? *The School administrator*, 56 (5), 32-34.
- Nobe, S. (2000). Where Do Most Spontaneous Representational Gestures Actually Occur with Respect to Speech? In *Language and Gesture*, ed. D. McNeill, 186–98. Cambridge: Cambridge University Press.
- Nortier, J., & Schatz, H. (1992). From one-word switch to loan: a comparison of between language pairs, *Multilingua* 11:173-94
- Özyürek, A. (2000). The influence of addressee location on spatial language and representational gestures of direction. In *Language and gesture*, McNeill, D. (Ed.), pp. 64-82. New York: Cambridge University Press.
- Padden, C. (1990). Rethinking fingerspelling. *Signpost*, 4, 2-5.
- Padden, C. (1991). The acquisition of fingerspelling by deaf children. In Siple, P. & Fischer, S. (Eds.). *Theoretical issues in sign language research: Psychology*, pp. 191-210. Chicago: University of Chicago Press.
- Padden, C. (1998) The ASL lexicon. *Sign Language & Linguistics*. Amsterdam: John Benjamins & HAG.

- Padden, C. (2001). Lessons to be learned from deaf readers. [presentation]
Stony Brook, NY: State University of New York at Stony Brook
- Padden, C. & Gunsauls, D. (2003). How the Alphabet Came to Be Used in Sign Language. *Sign Language Studies* 4.1, pp.10-33. Washington, DC: Gallaudet University Press.
- Padden, C. & Humphries, T. (2005). *Inside Deaf Culture*. Cambridge: Harvard
- Padden, C. & Humphries, T. (1988). *Deaf in America: Voices from a Culture*. Cambridge: Harvard.
- Perlmutter, D. (1993). Handshape, syllables, and syllabification in American Sign Language. Manuscript. University of California, San Diego.
- Poplack, S. (1980). Sometimes I'll start a sentence in Spanish y termino en español. *Linguistics* 18: 581-618
- Poplack, S. (1990). Prescription, intuition et usage: le subjonctif français et la variabilité inhérente. *Langage and society*. 54: 5-33.
- Poplack, S. & Meechan, M. (1995). Patterns of language mixture: nominal structure in Wolof-French and Fongbe-French bilingual discourse. In Milroy, L. & Muysken, P. (Eds.), *One speaker, two languages, cross disciplinary perspectives on code-switching*, (pp. 199-232). Cambridge: Cambridge University Press
- Poplack, S. & Meechan, M. (1998) How languages fit together in code-mixing. *International Journal of Bilingualism*. 2(2), pp. 127-138.
- Poplack, S., Sankoff, D. & Miller, C. (1988). The social correlates and linguistic processes of lexical borrowing and assimilation. *Linguistics* 26, 1.47-104.
- Quinto-Pozos, D. (2004). Linguistic interference in a contact situation: Examples from ASL and LSM, University of Illinois at Urbana-Champaign, Theoretical Issues in Sign Language Research 8 Conference; Barcelona, Spain, September 30-October 2, 2004.
- Rauscher, F. H., Krauss, R. M., & Chen, Y. (1996). Gesture, speech, and lexical access: The role of lexical movements in speech production. *Psychological Science*, 7, pp. 226-231.
- Ramler, S. (1988). Origins and challenges of simultaneous interpretation: The Nuremberg trials experience. In Hammond, D. (Ed.), *Proceedings of the 29th Annual Conference of the American Translators Association*. Medford, NJ: Learned Information, Inc.

- Reilly, J. S., McIntire, M. L., & Bellugi, U. (1991) Baby face: A new perspective on universals in language acquisition. In Siple, P. & Fischer, S. D. (Eds.): *Theoretical Issues in Sign Language Research*, Vol. 2: Psychology. International Conference on Theoretical Issues in Sign Language Research. Chicago: University of Chicago Press. Pp. 9-24.
- Registry of Interpreters for the Deaf (2009). *Mission*. Retrieved February 6, 2009. from <http://www.rid.org>
- Rizzolatti, G. and Arbib, M. A. (1998) Language within our grasp. *Trends in Neurosciences*, 21(5):188--194.
- Ross, D. S. & Newport, E. L.(1996). The development of language from non-linguistic input. In A. Stringfellow, D. Cahana-Amitay, E. Hughs, & A. Zukowski (Eds.), *Proceedings of the 20th annual Boston University Conference on Language Development*, pp. 623-645. Boston: Cascadilla.
- Roy, C. (1989). Features of discourse in an American Sign Language Lecture. In Lucas, C. (Ed.), *The Sociolinguistics of the Deaf Community*. San Diego, CA: Academic Press.
- Sandler, W. (1989). *Phonological representation of the sign*. Dordrecht: Foris.
- Sandler, W. (2005). An Overview of Sign Language Linguistics. In Keith Brown (Ed.), *Encyclopedia of Language and Linguistics*, Vol 11, 2d Edition, 328-338. Oxford, UK: Elsevier.
- Sandler, W. (in press). The visual prosody of sign language. In R. Pfau, M. Steinbach, & B. Woll (Eds.), *Sign Language: An International Handbook*. Berlin: Mouton de Gruyter.
- Sandler, W. (in press). Symbiotic symbolization by hand and mouth in sign language. *Semiotica*.
- Sankoff, D. (1980). *The social life of language*. Philadelphia: University of Pennsylvania Press.
- Sankoff, D. & Poplack, S. (1984) Borrowing: the synchrony of integraton, *Linguistics* 22 (1): 99-136
- Sankoff, D., Poplack, S., & Vanniarajan, S. (1990). The case of the nonce loan in Tamil, *Language variation and change*, 2: 71-101.
- Schermer, T. (1990). In search of a language: Influences from spoken Dutch on Sign Language of the Netherlands. Delft: Eburon.

- Schober, M. F., & Clark, H. H. (1989). Understanding by addressees and overhearers. *Cognitive Psychology*, 21, 211-232.
- Scotton, C. (1979). Codeswitching as a safe choice in choosing a lingua franca. In *Language and Society*. McCormack, W. & Wurm, S. (Eds.) The Hague: Mouton.
- Scotton, C. & Ury, W. (1977). Bilingual strategies: the social functions of code-switching. *Linguistics* 193: 5-20.
- Seleskovitch, D. (1978). *Interpreting for International Conferences*. Washington, DC: Pen & Booth.
- Shlesinger, M. (1995). Shifts in cohesion in simultaneous interpreting. *The Translator*, 1(2), pp.193-214.
- Singleton, J.L. & Newport, E.L.(1994). *When learners surpass their models: The acquisition of American Sign Language from impoverished input*. Unpublished manuscript, University of Illinois.
- Siple, L.A. (1997). Historical development of the definition of transliteration. *Journal of Interpretation*. 77-100. Maryland: RID Publications.
- Siple, P. (1978). Visual constraints for sign language communication. *Sign Language Studies* 19. 97-112.
- Sohlberg M, & Mateer C. (1989). *Introduction to Cognitive Rehabilitation*. New York, NY: Guilford Press;
- Solow, S. (1981). *SignLanguage interpreting: A basic resource book*. Silver Spring, MD: National Association of the Deaf
- Sorenson Communications (2009). *Introduction to the VP-200*. Retrieved October, 10, 2009 from <http://www.sorensonvrs.com/apply/vp200.php>
- Sridhar S.N., & Sridhar, K.K. (1980). The syntax and psycholinguistics of bilingual code mixing, *Canadian Journal o. Psychology*, 34/4, 407- 416
- Steriade, D. (1995). Neutralization and the expression of contrast. Los Angeles: UCLA, Manuscript.
- Stewart D., J. Schein, and B. Cartwright. (1998). *Sign Language Interpreting: Exploring its art and science*. Boston, MA : Allyn & Bacon

- Stokoe, W., D. Casterline, & C. Croneberg. (1965) A dictionary of ASL on linguistic principles. Silver Spring, Md.: Linstok Press.
- Sunderman, G. (1996). Code-switching and Universal Grammar: an RSVP experiment investigating the Functional Head Constraint. Master's thesis, The Pennsylvania State University, University Park, PA.
- Sutton-Spence, R. (1994) The role of the manual alphabet and fingerspelling in British Sign Language. Doctoral Dissertation, University of Bristol.
- Tang, Y. (2006). Beyond behaviour: goals of cultural learning in the second language classroom. *The Modern language journal*, 90 (1), 86-99.
- Thakerar, J.N., Giles, H. Cheshire, J.(1982). Psychological and linguistic parameters of speech. In Frazer, C. & Scherer, K, R. (Eds.), *Advances in the social psychology of language*, pp. 205-255. Cambridge: Cambridge University Press
- Toribio, A. J. (2001). On the emergence of bilingual code-switching competence. *Bilingualism: Language and Cognition* 4 (3), 2001, 203-231
- Toury, G. (1980): *In Search of a Theory of Translation*, Tel Aviv, The Porter Institute for Poetics and Semiotics, Tel Aviv University.
- Treffers-Daller, J. (1994). *Mixing two languages, French-Dutch contact in a comparative perspective*, Berlin: Mouton de Gruyter.
- Trudgill, P. (1972). Sex, Covert Prestige, and Linguistic Change in the Urban British English of Norwich. *Language in Society* 1:179-95
- Tseng, Y. (2002). A lesson in culture. *ELT Journal*, 56 (1), 11-21
- Valli, C. & Lucas, C.. (1995). *Linguistics of ASL (Second Edition)*, Washington D.C.: Gallaudet Press
- Van Hout, R. & Muysken. P. (1994). "Modeling lexical borrowability." *Language Variation and Change* 6: 39-62.
- Vanecek, E. & Dressler, W. (1975). Bericht uber psycholinguistische Experimente zur Sprechvariation. *Weiner Linguistische Gazette* 9: 17-38
- Vogt-Svendsen M. (1981). Mouth position and mouth movement in Norwegian Sign Language. *Sign Language Studies*, 33, pp 363-396
- Vogt-Svendsen, M. (2001). A comparison of mouthings and mouth gestures in Norwegian Sign Language (NSL). In Penny Boyes-Braem & Rachel

- Sutton-Spence (eds.), *The hands are the head of the mouth*, 9–40. Hamburg, Germany: Signum.
- Weinreich, U. (1953): *Languages in contact: findings and problems*. The Hague: Mouton.
- Weisenberg, J. (2002). Saliency in American Sign Language Loanwords. Unpublished qualifying paper. Stony Brook University..
- Weisenberg, J. (2003) Simultaneous codemixing in American Sign Language interpretation. Unpublished qualifying paper, Stony Brook University, New York.
- Weisenberg, J. & Garcia, E. (2007) From Telephone to Dialtone: A Look at Video-relay Interpreting. *Registry of Interpreters for the Deaf, Views*. Issue June. Alexandria: VA p. 10-39
- Wilbur, R. & Peterson, L. (1998). Modality interactions of speech and signing in simultaneous communication. *Journal of Speech, Language, and Hearing Research*. 41, pp. 200-212.
- Wilbur, R. (2000). Phonological and prosodic layering of nonmanuals in American Sign Language. In K. Emmorey & H. Lane (Eds.) *The Signs of Language Revisited: An anthology to honor Ursula Bellugi & Edward Klima*, pp. 215-244. Mahwah, NJ: Lawrence Erlbaum Associates.
- Wilcox, S. & Wilcox, P. (1985). Schema theory and language interpretation: A study of sign language interpreters. *Journal of Interpretation*, 2: 84-93
- Winston, E. & Monikowski, C. (2000). Discourse mapping: Developing textual coherence skills in interpreters. In Roy, C. (Ed.). *Innovative Practices for Teaching Sign Language Interpreters*. Washington, DC: Gallaudet University Press.
- Woodward, J. C. (1972). Implications for sociolinguistic research among the deaf. *Sign Language Studies* 1, pp. 1-7
- Woodward, J. 1978. Historical Bases of American Sign Language. In *Understanding Language through Sign Language Research*, ed. P. Siple, 333– 48. New York: Academic Press
- Zimmerman, D. & West, C. (1975). Sex roles, interruptions, and silences in conversation” in Thorne & Henley (Eds).
- Zuengler, J. (1987) “Effects of ‘Expertise’ in Interactions Between Native and Non-native Speakers” *Language and Communication* 7(2): 123-137.

Appendix

EXPERIMENTAL TASKS CARDS

Context A

Client name: Joseph Miller

Age: 18

Setting: Undergraduate Chemistry course at Columbia University. Day 10 of a fourteen-week session.

Topic: "Neither a Borrower Nor a Lender Be": Electron Affinity

The speaker is male, the instructor for this course. He is providing a brief overview of electron lending, borrowing, and sharing among the elements.

Background of

your client: Joseph refers to himself as 'hard-of-hearing' and is considering having implant surgery. He prefers to voice for himself in class. He is the only deaf person in his family. He was mainstreamed K-12, and is now in his first year at Columbia University in New York. He hopes to work as a chemist for a pharmaceutical company.

Context B

Client name: Alice Ronin

Age: 33

Setting: Computer Training Center in Garden City. Day 2 of a ten-week course called "Computer Basics".

Topic: "Why Computers Can't Write Jokes"

The speaker is male, the instructor for this course. He will be explaining the chemical differences between the makeup of a computer's central processing unit (CPU) and the human brain.

Background of

your client: Alice refers to herself as Deaf. Both her husband, daughter, and mother are deaf. This is her first class after taking a three year leave to be a full-time mother. She is a graduate of The American School for the Deaf, and has 12 undergraduate credits from Gallaudet University.

Context C

Client name: Bill Bartone

Age: 28

Setting: Undergraduate “Foundations of Education” course (required for teacher certification). Day 20 of a fourteen week session.

Topic: “Understanding the Grant Application Process”

The speaker is female, the instructor for this course. She is sharing with the class details of how she applied for a federal grant for her youth incarcerated literacy program .

Background of

your client: Bill refers to himself as ‘hard-of-hearing’, the son of hearing parents, both of whom are teachers in a public school system. Bill was mainstreamed K-12, graduated NTID, and is now enrolled at Queens College. Like his parents, he hopes to be a high school math teacher, and does not see his hearing impairment as an obstacle to that goal.

Context D

Client name: Carol Federman

Age: 50

Setting: Adult Continuing Education (CE) evening class at local high school.
Day one of the four week session

Topic: "Planning a Wedding"

The speaker is female, the instructor for this course. She is sharing with the class the details of planning her wedding, which took place in Rochester, NY.

Background of

your client: Carol is third generation Deaf. She lives in New York. She is the mother of two deaf children, and a grandmother of three. She was very active in the National Fraternal Society of the Deaf (NFSD), a former board member. She is a graduate of New York School for the Deaf, White Plains. She is taking this CE course to assist her daughter, who will be getting married next year.

SOURCE MATERIAL

LECTURE A: Technical, non-deaf

Okay, well, today's talk is on chemistry. And actually the title of the talk is "Neither A Borrower Nor A Lender Be," which is an old saying and really refers, in this case, to electrons that are really the main concern of all chemists. In fact chemistry is all about how atoms give, take, or share electrons, and as the title implies, it's better to share than to give or take, as it turns out. First of all, we know there are atoms because materials that have more than one kind of atom always have a specific ratio of each kind of atom rather than just any amount. For example, everybody knows that water is H₂O. No one ever thinks there's an H₃O or an H₄O and there isn't... isn't any such thing as H₃O or H₄O. That very fact that all water everywhere has the exact same amount of hydrogen in it, H, and the exact same amount of oxygen in it, tells us that there are atoms. And that, in fact, is called the Law of Definite Proportions. It's a famous cornerstone of chemistry: Law of Definite Proportions. What makes atoms combine with each other is that atoms form relationships and those relationships are called chemical bonds. Chemical bonds involve losing, gaining, or sharing electrons, as I said. Atoms that lose electrons are referred to as metals. Atoms that gain electrons are referred to as non-metals. To the average person a metal is something that shines but really, when you get down to the most elemental (forgive the pun) aspect of chemistry, a metal is something that loses electrons. A non-metal gains. And then there are those that can do both and they're gonna be important. They're very important, those... those few elements that can do both are called metalloids and one of them, silicon, is very important in computers. And then there are those few that don't do any of those things and they are sort of the loners of the atom world called noble gases. Nobel gases. They used to be called inert gases. The degree to which an atom can gain electrons is called electronegativity. Electronegativity. It's also called electron affinity. They mean the same thing. And as you would guess, if you remember, the nonmetals tend to gain electrons and so the nonmetals would have high electronegativities, meaning they gain electrons. The metals have very low electronegativities and the noble gases, you remember, they are kind of the loners of the atom world, they don't gain or lose or do anything, they have no electronegativity as you might expect. And so atoms tend to come together, if you want to use the analogy of human relationships, they come together either as a loser and a gainer, a giver and a taker if you will. The giver being the metal and the taker being the nonmetal. Or they come together to share, in which case you couldn't have two loser atoms sharing, which is the case: two metals cannot form a relationship in which they share electrons, but two nonmetals can. They both try to take electrons from each other, and if they're close in electronegativity then they are forced to share. And a good example of that is just about all the important molecules in the human body. Bonds in which atoms share electrons are called covalent bonds. Everybody's heard of those from high school chemistry. And covalent bonds are the only kind of bonds that you have in

molecules, really. In all the molecules, you've heard that word molecules even if you might be a little vague on its meaning, molecules contain atoms with covalent bonds. Now, you've also heard of a substance called Clorox which of course people use, they think, to clean their clothing. Clorox, as the name implies, contains chlorine and oxygen. And chlorine and oxygen are two nonmetals that have a very high electronegativity. In other words, they take electrons from other atoms. And when atoms get next to them, or near them, either one of these two elements, chlorine and oxygen, those atoms that are near the chlorine and oxygen will lose electrons. And the word for losing electrons is oxidation. Now, you may have heard the word oxidation. A lot of people use it when they see something rusting or paint deteriorating. In fact aging is a form of oxidation. And you can see that Clorox would do a good job of causing any material to lose its electrons and oxidize. It's called oxidize even though it doesn't... Oxidize does not mean combine with oxygen, it means lose electrons and the reason that they call it oxidation is because... because oxygen is very good at making elements lose electrons. So is chlorine though, so they could have called it chloridation as well as oxidation. And a famous example of oxidation is if you have a boat in the... in salt water. And what happens is the oxygen – actually, excuse me, not the oxygen, the chlorine in salt water, chlorine is in salt, in ordinary table salt and in the salt in salt water, and as you just heard a moment ago, it's in Clorox. And if you remember, I said that the chlorine makes other elements lose their electrons. Well, it makes your motor, which is sticking into the water, your propeller, lose electrons and the propeller eventually turns into a powder and you have no boat. What boaters do is they put another element next to the motor and it's called a sacrificial electrode and that other element is usually zinc, typically zinc, or magnesium and the boaters all say, "did you replace your zincs?" And they don't really exactly know what it means but they know that the zincs look pretty bad after a few weeks in the water and the motor looks good because what happens is that the chlorine in the water pulls the electrons away from the zinc instead of pulling it away from the motor. So basically they pick an element, zinc, that will lose electrons very easily. Electricity also uses this idea of losing and gaining and sharing electrons. Electricity is defined as the movement of electrons and actually, this process that I just told you about that goes on, in a boat corroding in the water, actually produces electricity. It is in fact a battery. If you got a little meter, you could measure the amount of electricity produced. All you need to produce electricity are two elements where one of them tends to be a losing element, that is it loses electrons, and one of them a gaining electron. So for example, I've forgotten there was an old show on television, MacGuyver, where he always used to make cool things like batteries. And in fact, if you took a potato and cut it in half and stuck a penny into the potato and a dime, say, into the potato, I assume the dime is made out of silver and the penny is made out of copper, at least the outside, you've got two different elements and since they're not the same element, one of them will lose electrons more readily than the other and you have a flow of electricity from the losing element to the gaining element. If you attach wires to each coin, you've got a little battery. And that battery is referred to by chemists

as an electrochemical cell. An electrochemical cell. And you can see why they would call it that: it's electro in that it produces electricity, chemical in that it uses chemicals. And then, there are the elements that are sort of neither losers nor gainers. I mentioned that there are some that are in the middle range of strength, that is to say they have a medium level electronegativity and the most famous is carbon. And what's interesting about carbon is that there are million and millions, tens of millions of compounds – a compound being a material that contains several different elements – and there are tens of millions of them. And the vast majority contain one single element in common and that element is carbon. There's something special about carbon that it's in so many different compounds. And that specialness is first of all, that it has an electronegativity of about two on a scale of zero to four and so since it's in the middle, it can have relationships with elements that are both a little bit stronger and a little bit weaker than it and still share. It can share with losers and it can share with gainers and so it forms many of those covalent bonds we referred to. And of course, carbon is the element that makes a compound qualify to be called organic. Organic does not mean it came from a worm, it means it contains carbon. And of course it also means that it's the basis of us.

LECTURE B, technical, deaf

Today's talk is about computers. And as you may remember from the chemistry talk if you were present, there are elements that are metals and there are elements that are nonmetals and s... but there are also elements that are called metalloids. And metalloids have unusual properties. You may remember that metals are electron losers, nonmetals are electron gainers. Well, metalloids can actually do something that is very strange. They can allow electrons to move through them in one direction but not the other. It would be like, as though you have a garden hose that allows water to go through one way but not the other. Of course a hose that's open completely, if you could see through it you could see through to the other side, should allow water to go both ways. But metalloids allow electricity to move through them one way, and as though there's some kind of trap door, prevent it from going backwards. And that little quality that metalloids have is why one of them, silicon, is so useful in computers. And of course you've heard of Silicon Valley, California. People wonder, first of course they wonder if this has anything to do with silicone, common in breast implants and the answer is no, silicone and silicon are not the same, although silicone is a compound that contains silicon. Silicon is an element, it is a metalloid, and not coincidentally it's right next to carbon, which you may remember from the other talk, is an element that has a middle-of-the-road electronegativity. Silicon dioxide is the chemical name for sand and it is the primary ingredient in the CPU of a computer. CPU stands for central processing unit. It is the computer itself that does the various processes that a computer needs to do. It does not store information, it only processes information. And of course Silicon Valley, California is the place where computers are designed. But that semiconductor property of metalloids, specifically silicon, is the critical property that makes a CPU possible. When CPUs first were being created way back, say, in the 1960s, the pathways of electricity through them were quite wide. Say, perhaps, 10,000 angstroms. An angstrom is a very small unit of length or width, actually it's defined as one ten-billionth of a meter. And nowadays, the pathways are much smaller. Recently the most modern computers in the year 2002 have CPUs with pathways only one hundred angstroms wide and, this'll... to give you an idea of what this is, the smallest atom is about one angstrom so a pathway equal to about a hundred atoms wide is actually almost as narrow as the pathways of electricity that occur in the human brain, which is sort of the model for the ultimate complexity. But the title of today's talk is "Why a computer can't get a joke, and why a computer can't write a joke." Computers are very impressive in that they process information very quickly and they store a huge amount of information that it seems that the human brain could never remember. But they have huge limitations by virtue of their architecture. Actually, the old architecture that's recently been replaced is called ISA. You may see ISA on some of your old computer equipment. It stands for industry standard architecture. But modern computers have exceeded that architecture hugely. A new computer that you might buy might say on it one gigahertz, which would be one billion cycles per second. So a billion times a second electricity will go through the

same point in the central processing unit. And there are even two gigahertz computers and, for all I know, three gigahertz computers. Those computers then, as they're processing the information, do need to store information while they're processing other information. And of course then if you have a little calculator you might know that there's an M-plus and an M-minus and an MR button for remembering a number here or there that you need to just hold aside for a moment. And that place in a computer is called RAM, which stands for random access memory. And random access memory in a typical modern computer, the processes that occur in it take nanoseconds, and a nanosecond is one-billionth of a second. So for example, the mem... the information can be stored in the random access memory when the CPU needs to store information, it can be stored in a few billionths of a second. Very, very fast. Actually, specifically the fastest memory that you normally buy is about ten-billionths of a second. Of course other information needs to be stored permanently, that is, it'll still be there when you turn the computer on. And that information is stored in storage devices that everyone has heard of called hard drives, or floppy disks, or perhaps tape, or zip drives. And all of them use an element that is actually a metal: iron. Its chemical symbol is Fe and iron has... it's really the only element that has significant magnetic properties. People often say that a magnet is a... attach... will attract a metal but actually will only attract iron for any significant amount. And iron oxide, commonly called rust, is the substance that all these devices, hard drives and tape and floppy disks, use. Iron oxide, actually you may re... if you notice tape generally, usually it's reddish brown in color, the color of rust. If you opened up a hard drive that's what color the disks inside would be. But those processes work differently because what they do, how they work is, they have little spots, millions of spots of the surface of the iron oxide that are either magnetized or are not magnetized. And if they are magnetized the computer looks at that as the number one, and if they are not magnetized, the computer looks at that as the number zero. And a system that uses ones and zeros is called a binary system. Binary system is based on two: there are two possibilities. And so for example, people will say a megabyte, and they may know that that's a million pieces of information, but actually it's not a million. It's a little bit more than a million. It is actually two to the tenth power. So for example, a kilobyte, which people will think is a thousand pieces of information, is actually one thousand and twenty four pieces of information because it's two to a specific power which will get you one thousand and twenty four. But the reason why adding memory, RAM, to a computer has such a powerful effect on its effectiveness is that hard drives work in milliseconds, thousandths of a second, and RAM memory works in billionths of a second, as I said. So anytime you're letting the computer use the RAM, it's working much faster than anytime you use the hard drive. Humans on the other hand, have no RAM or hard drives, but they do have a CPU of course, the human brain, and they do have to have a way of storing information. The human brain is really set up completely differently. And that is that the human brain produces proteins when it wants to remember something. It actually has to synthesize a protein. But the level of complexity of a human brain far exceeds even the most powerful supercomputer

and the reason for that is that the human brain can do something that even the world's greatest supercomputers cannot do, and that is change its physical structure as a result of the processes that it...that it...that it undergoes. For example, it's very common for a person to have a single brain cell connected to ten or twenty thousand other brain cells. If you can imagine billions of brain cells where each one, any specific one, is connected to ten or twenty thousand other ones and each of those ten or twenty thousand connected to another ten or twenty thousand, and those connections that occur, occur specific to the person and the person's experiences. And so of course in order for a computer to get a joke, let's say for example the joke was, "A horse goes into a bar and the bartender says 'why the long face?'" Well, a computer would simply look at that as information. If it even had a sentience or awareness, it might say, "Well of course horses have long faces. What's so funny?" But that's what's so funny. And how does a person know that that's funny? Because the level of complexity to recognize that kind of nuance of information is present in a human brain. Human brains are not electronic the way a computer is. They are electrochemical. They produce proteins, as I said, called neurotransmitters which ironically the body uses cholesterol to produce, a very important and essential and wonderful substance that everyone thinks is something akin to poison. And of course there's a lot more to be said on this subject but unfortunately I've already used eleven minutes.

Today I'm going to talk about the application process of grants at the federal level. I had a experience with this last year, and the process is a lot different than I thought from an outsider's standpoint. I was teaching fulltime for Eastern Suffolk Boces in the jail education program and one of the things that's happening right now is like with all other educational programs, we're losing money from certain funding sources that we used to have. So, we're always thinking of ways that we could bring in funding from other sources and keep the programs at the same level of functioning and at the same level of quality as we've always had them. So, one of the things... I started looking on the internet for what they call RFPs, which are requests for proposals. And first... that was my first educational experience. There are so many grant opportunities out there and every one of them has different criteria but for the most part you can find web sites devoted to telling you about proposals and funding opportunities. So I did some searching and the first thing I had to do was decide what would be appropriate inside a correctional facility. So, there are certain grants that are targeted to certain populations and that's... that's the first step: you have to filter out what would actually be appropriate. Then the second step is that you have to filter out what you think you could actually get funding for. So, there are logistics concerned, so for example I couldn't really have access to a lot of vocational grants because it would require students being at places other than the correctional facility and learning a vocation or a trade. So I had to limit myself into what I could realistically apply for. So I finally narrowed the search down to two grants, two funding opportunities. One was called an E L Civics grant and that was funded with what's called Title Two, or WIA funding, which is Workforce Investment Act. And the Title Two funds are geared toward adult learners. And then I found another grant called an Even Start program which is from Title One, which are geared towards... which is a federal... federal funds geared toward children. So the first one that we start... well, actually we started on both around the same time. They were two very different processes. So the first one that I will talk about is the Title Two, the adult education workforce investment funded E L civics program.

I downloaded the RFP, which is the request for proposals, like I said earlier, and I read through it. And I contacted a colleague of mine, her name is Terry Brady Mendez, and she is a consultant with V-Tech, which is the bilingual and ESL technical assistance program or center. So I spoke to her, she's a certified social studies teacher so I knew that from the civics standpoint she would have some input; she's also a bilingual educator. So I sat with her and I gave her a copy of the proposal, she read over it and then we met together. And I had never written a grant before so she walked me through piece by piece saying that, y'know, here are the directions, this is how you write it, they're telling you the points that they give for each section. We were limited to a ten-page narrative, which means that all the information that they wanted, which was the demonstration of need, program design, staff, types of assessment, and the curriculum all... all had to be in ten pages. And what we did was, she told me that if something says it's twenty-five points from a ten-page proposal, you would devote 2.5 pages of narrative to that section. So after I sat with her, I went back

to my administrator and I said to him, "I think that we could really do this. It's something that's well worthwhile for our population but I need help writing it. I don't think I could write it on my own." So we made a contract and we had this woman, Terry Brady Mendez, work with me and she actually put pen to paper on the writing of the grant. But I worked with her for several weeks on collecting data, on going over different program designs, etc. The fundamental purpose of the grant is to raise English literacy levels through the content area of civics education. And it has to be a supplemental program, not one that supplants anything, or not a new program. So we... we were able to meet that criteria. The one difficult thing was that we are an incarcerated population in the jail education program and one of the requirements for citizenship is that you have never been convicted of a felony. So we had to look at our student population at any given time and decide if we actually had an eligible pool to choose from, and we did because we found that on any given day, out of fifty students in the county correctional facility, forty – almost forty-five, I believe it was – were either awaiting trial, or were charged with misdemeanors, and the rest were convicted felons. So, that is our population. So we wrote the... we wrote the proposal, we worked on a budget, I...I put the budget together. The funding was up to three hundred thousand dollars per agency and you could apply for up to two grants per agency. So we only applied for the one and I brought it in for just under three hundred thousand dollars and that gave us a lot of money in the ESL program which had been impoverished up until that point. Gave us money for materials, it gave us money for computers, it gave us money for remodeling a classroom within the Yaphank correctional facility, which was very important because we are working in the hallway currently and we actually still are; the classroom has not been implemented yet. But there were a lot of nice... oh, and also hiring a new teacher and a teacher assistant, and a part-time secretary and pulling in speakers for what we call arts and education, which are supplemental enrichment speakers that you have in. So we put the application in and a couple of weeks later we found out -- well, actually it was a couple of months later – we found out that we obtained... we received funding for the program and now we are in the process of implementing it which is a lot harder than I thought it would be. My main... my only responsibility with Boces now has been on implementing these programs.

The second proposal that we... the second funding source that we looked at was an Even Start family literacy grant. And again, this is Title One funding. This targets children, and specifically for the Even Start purposes, children ages birth through seven. And what we did was, this is a... this is a program that targets the family and teaches intergenerational literacy with the goals of parents becoming more involved in their children's education and with children succeeding in school. This process took us a year and a half. We had to have advisory board meetings, we had tons of research to do, finding partners, getting letters from collaborators and supporters, and what resulted was a hundred and fifty page narrative with again, approximately three hundred thousand dollar a year budget, which we were able to obtain. And again, we're in the implementation process. So both of these programs are wonderful. They're both

very enriching for our incarcerated ESL population, but what I have found is that implementation is one of the most challenging experiences that I've ever been through in my life. Actually doing what you said you were going to do in the proposals, and you really cannot stray from that because that's what you were granted your funding on. So I like to think that I was very naïve and unaware when I wrote these, and it's kind of good that I was because if I wasn't I probably would have never undertaken the process. But it was a great learning experience and I think that ultimately the programs for the students will be wonderful and well worthwhile, as soon as we actually get them implemented.

LECTURE D, non-technical, deaf

My husband and I got engaged on January 14th of 1999. At the time he was a student at Kansas State University in geology and I was at Stony Brook. But I happened to be visiting him in Kansas when he proposed, and it was a sort of fun story. I'm really bad at cards but Robbie decided that he was gonna try and lose the ring to me in poker. So we made this agreement that we'd play poker and whoever lost at poker would have to buy the other person a gift for... that was worth about five dollars or less. And we were playing poker, and I'm not a very good card player but Robbie was determined to lose. So we kept on playing and playing and I always kept on losing, and then he started making up these different types of games like that the person who got the highest card five tries in a row would be the winner, or these games that was basically fifty-fifty chance and I still couldn't win. And he got really upset but I didn't know why. So he was upset because he was hoping to lose and could never lose. So he sort of got angry and upset that this really cute plan wasn't going to work. And so he didn't propose at that time. And the mail came and it just so happened that the ring was actually coming in the mail because he had picked it out in Syosset, where he's from, and had his parents' jeweler make up the ring, but he had to go to Kansas to go back to school so he had them ship it out to him. And at the time I just was hanging around with Robbie and really bored so I came with him to the mail even though he really didn't want me to and I kept on asking him what the package was but he wouldn't tell me. And so we got into this little fight. And finally he ended up giving me the ring and of course it was all better. But what we decided to do to celebrate was to go out to dinner and maybe a movie, because we were in Manhattan, Kansas but there wasn't really much to do to celebrate. But we weren't hungry when we actually got engaged so we decided to go to, like, a seven o'clock movie and we went to Class Action... no, Civil Action. It was a movie, actually it was really good for Robbie. It was about environmental spill in some New England town and John Travolta was a lawyer tryin' a fix it up, sort of along the lines of Erin Brokovich. My husband actually happens to be an environmental geologist so he was really interested in it, but I didn't happen to like the movie very much. So I sat in the movie theater looking at how the lights would sparkle in my ring. But anyway, it was funny because after we got out the only restaurant in town that we wanted to go to was closed because again, it was Kansas, it was a weeknight; they close pretty early and we didn't really feel like going to McDonald's or anything so what we ended up doing, I think, was getting shrimp cocktail at the local store and bringing it home. But we had a really nice night.

The interesting thing was what happened the next day when I got a phone call from his mom. We had called everyone to tell them the news. And then his mom asked me the next day, what was I planning on wearing, was I getting my dress, when was I gonna plan the engagement party? And so everything happened immediately that we started planning the wedding. It was a very stressful time for me. Robbie was getting his masters degree in Kansas, like I said, but he actually really didn't enjoy it that much because he had this advisor

who was a very famous geochemist and he was actually the only geochemist at Kansas State, which... and that's why Robbie went to study with him. But unfortunately he was also famous in Europe and he decided that rather than staying the whole time Robbie was in school that he was gonna go on a sabbatical in France and start working and studying there. What that meant was that left Robbie without close contact with his advisor for what would be the last year of his entire career at Kansas. In fact, the professor actually left during the first... second semester of Robbie's first year. And Robbie decided that life away from New York wasn't good enough in Kansas to actually spend the whole time there. So what happened was Robbie decided that he was gonna transfer to another university and he chose Rochester Institute of Technology. Now while Robbie's originally from Long Island, I'm from Rochester so I was pretty happy to see him go there. But what that meant was that he had a full two years left starting at scratch for his environmental health and safety management degree. So what that meant was even though we had just gotten engaged, we wouldn't be able to get married until he was more free to move around, so that meant a two and a half year engagement.

Now as I've already said, we started planning, or supposedly starting planning basically the day after we got engaged. And there was a lot of pressure to get things done. And as I've told everyone since then, it's the worst thing you can do either to... to get engaged with more than more than, say, a year till you get married or at least if you get engaged really early, just put it out of your head for a year. Because what happens is it's not that anything more gets done, and it's not like you actually need two years to plan a wedding, but what happens is that the stress that you could save for just a year of intense work gets stretched over two and a half years like it was for me, and you don't accomplish anymore, you just have more stress. So I've seen friends, subsequent to my marriage, who have gotten married after six months or nine months, had perfectly beautiful weddings. And so that's my advice for anyone who actually is planning on getting married.

But, we started planning; we had an engagement party within say, six months of getting married and that was really fun. We had a lot of friends from college. In fact, even one guy I haven't seen since the engagement party or since shortly after. But, we had a great time and I think one of the reasons that his parents wanted to have an engagement party was because we weren't gonna get married for so long and they wanted to have a party for us when we got engaged. And also they said it's more of a Long Island thing so I'm not so sure. But, I'm not really used to engagement parties up in Rochester but on Long Island I guess it's more common. We started planning the wedding, we picked out a place pretty early. My dad's a part of a country club in Rochester called Locust Hill and it's a really nice country club. They have the LPGA there every year. In fact, we wanted to have the wedding there because first of all, we couldn't have it in a church because my husband's Jewish and I'm not, so we wanted to have it at the country club and then have the reception there afterwards. It was just very convenient that way. And what we did was try to plan it for Memorial Day weekend, and that was because we thought it would be

the perfect day for everyone to travel. Since half the people would be coming from Long Island and half the people would be coming from Rochester, at least they'd have the Monday of Memorial Day to travel and come... and the Saturday to come up and the Monday to go back if they had to... if people had to travel. That was our ideal plan but we found out shortly thereafter that there were some people in the LPGA who were hoping to have the 2001 LPGA Rochester Wegmans championship Memorial Day weekend. It seemed that while the LPGA wanted to have it Memorial Day weekend, the sponsors Wegmans wanted to have it the weekend after. And Wegmans happens to be... it's a grocery store in Rochester, it's a wonderful grocery store and everything, but they're pretty powerful in Rochester and they really had their hands in a lot of pies; they have a lot of control. And it was really up for grabs for about a year after we picked the place whether we could actually have our wedding there. And the people at Locust Hill they would make all the plans for us if they had to switch it at the last minute but we still really wanted to be at Locust Hill even though they would switch us to Oak Hill, which is also a very nice country club. It held the Rider Cup in, I think, '95 or '97. But still, we really didn't wanna change and we were really worried about that right up until the end. But what happened was Wegmans won out because of the money that they were putting into this and the LPGA lost so basically we got to go to our Locust Hill country club.

The second thing that we ended up doing is picking a photographer. The photographer was recommended to us by a man who had actually taken my high school pictures and was supposed to be one of the best photographers in Pittsford. Everyone had used him when they were growing up; my older brothers used him, my younger brothers used... or, my step-sisters used him, all sorts... he's pretty popular. But unfortunately he's also very sick right now and was refusing to take any people who were asking him to do long-term things like weddings. Y'know, when you ask a photographer to do the wedding you're making a commitment for something that's far in the future and he felt that he wasn't healthy enough to actually make that commitment. So he suggested that we use this photographer who seemed very nice though he was a little smarmy. I don't know, he had this sense of humor, sort of sexist sense of humor but he had a... sometimes he made you laugh. And he was from Long Island and his... he, he was Jewish, his wife was Christian so it had the same sort of division that our family did. He knew where to take the pictures for the chuppah, he knew, y'know, that he should stay and watch us be lifted up on chairs. So we thought it would be a very good choice and we do think that the pictures are going to come out very well but it's been a year and a half and he still hasn't given us the pictures so we're a little afraid that he's not very reliable. But still, we're hoping to get the pictures. And that was just... this is all like only six months, maybe nine into the engagement. We had still had the flowers, the dress, the dresses to do.