

Language and Identity:  
A Quantitative Study of American Sign Language Grammatical  
Competency and Deaf Identity Through On-Line Technology

by

Patrick Boudreault

A Thesis submitted to the Faculty of Graduate Studies of

The University of Manitoba

in partial fulfilment of the requirements of the degree of

DOCTOR OF PHILOSOPHY

Faculty of Education

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**OF**

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## ABSTRACT

Although a clear sense of personal and cultural minority identity makes life easier for any individual, for Deaf people having a cultural identity is critical. When Deaf people are together, they each contribute to group formation, maintenance, and social ties within the Deaf community through the use of signed language as a pivotal tool, yet each Deaf person has his or her own individual personality and language variety. Deaf traditions, customs, values and behaviors are significant factors for effective socialization within this group. Deaf people, like other minority groups, constitute a cultural group, a group in which many Deaf people see themselves as members.

Although there has been a variety of research conducted on Deaf Identity as well as signed language acquisition, these studies have been carried out separately. Some initial work was conducted between the two areas of research to shed light on the importance of the connection of Deaf Identity and ASL. This study unites these areas, language acquisition and minority identity formation, to provide a greater understanding of the effects of language, social, and cognitive development in Deaf individuals during their lifetime.

In this study quantitative methods are used through the implementation of on-line data collection. The correlation patterns of signed language competency and Deaf identity, along with multiple background factors are analyzed and interpreted through multiple-regression analysis. The findings of this study reveal some statistical correlations between ASL competency and Deaf identity. Also some aspects of Deaf identity are probable predictors of the outcome of ASL competency, however, there are

no statistically significant factors that predict the determination of ASL competency.

These findings contribute not only to a better understanding of the Deaf community as a cultural entity but also add to the body of knowledge regarding the education of the Deaf, and to understanding the importance of the individual's identity along with their language, social, and cognitive development.



## CHAPTER 1 – INTRODUCTION

Developing one's identity is an ongoing process of attaining emotional support or relief from stress through the association with another person or group. My own experiences reflect the nature of this process. I am a native signer of Langue des Signes Québécoise (LSQ), born and raised in Quebec City. Born to Deaf LSQ parents and having several Deaf<sup>1</sup> family members on my mother's side, I had the chance to grow up in a Deaf-centric environment, with access and exposure to a natural language and the culture of the Deaf community in Quebec. Apart from the Quebec Deaf culture, my parents often traveled throughout their lives, in the USA and Europe, participating in many Deaf conventions and Deaf sports events. This interaction was truly unique since most Deaf Quebecers did not generally interact with other Deaf people outside of Quebec during the 1960s and 1970s. In this way, my parents acquired a greater understanding of the importance of Deaf culture and the preservation of signed language. This allowed me to have a greater appreciation of Deaf culture and signed language in my early formative years. The recognition of LSQ did not materialize until the early 1980s; therefore, I was fortunate to be raised in a Deaf-centric environment building my foundation in language and my self-identity as a Deaf person within the Deaf community.

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<sup>1</sup> **Deaf (uppercase "D"):** denotes individuals who, in addition to having a significant inability to hear, function by choice as members of the Deaf community, subscribing to the unique cultural norms, values, and traditions of that group whereas deaf (lowercase "d") denotes anyone who has a significant audiological loss regardless of their cultural or group identity (Padden, 1980; Woodward, 1972). Some work on Deaf identity presented in this document has labels with lowercase "d" which remain unaltered in respect to the author's original writing.

My second language is French. Within the Quebec hearing culture, I learned the importance of the French Quebec culture during the troubling moment in Canadian history with the referendums for the independence of Quebec. This also brought the French linguistics laws in the 1970's and 1980's. I experienced the social revolution and political activism of both my world and their world, and often they collided: the Deaf Quebec community and the hearing Quebec community. I experienced these struggles and changes within my heart and saw them with my own eyes, which has lead me to be a better observer of the social and cultural dynamic of linguistic minority groups, such as the French in English Canada and the Deaf in spoken language society.

My parents are proud Deaf people and also proud to be Quebecers, but they knew the utmost importance of expanding my knowledge of other languages and cultures. When I was 14 years old, my parents decided to send me to a Deaf summer camp at Camp Mark Seven in New York. I was immersed in American Sign Language (ASL) and Deaf American culture for three weeks. It was a revelation for me to see the similarities and differences between LSQ and ASL. This experience also helped me to see the similarities and differences between the Anglo-Canadian and American cultures. The more I started to interact with different languages and cultures, the more I was able to see the diversity within the language use in the Deaf community. While developing my first and subsequent languages (LSQ, ASL, French and English), and acquiring different cultural behaviors (Deaf and hearing), I also gained a greater appreciation of the complex interaction between language and culture.

Given my interest in this area, I studied Linguistics at the Université du Québec à Montreal (UQAM) and obtained a B.A. degree in 1995. Then eventually I was admitted

to McGill University in the School of Communication Sciences and Disorders to explore signed language acquisition. My M.Sc. thesis focused on the first signed language acquisition of ASL and testing the hypothesis of critical period effects (Boudreault, 1999). During the years at those universities, I gained a greater appreciation of the complexity between language dynamics and the person's background and experiences. I have always believed that the acquisition of signed language is not solely based on the age of acquisition, namely the critical period, but that there are other factors that interact with the processes of development in an individual as a whole. These include cognitive, linguistic and cultural aspects. This research study has given me the opportunity to critically explore the effects of ASL competency, along with other factors, in determining the importance of identity development in Deaf individuals. This information is significant because the education of the Deaf often ignores the positive impact of lifelong learning through incorporating the first and natural language of the Deaf, signed language, and the development of identity as a Deaf person.

A greater understanding of the correlated effect between language competency and minority identity is necessary for one to become a full-fledged member and to participate in his/her own community. Deaf identity means subscribing to a set of attitudes and beliefs held by the group, including recognition of membership in and shared interests with a specific group. Signed language is considered the most important factor of membership in the Deaf community (Padden & Humphries, 1988).

On the one hand, within this Deaf community, Deaf (capital "D") denotes individuals who function by choice as members of the Deaf community, subscribing to the unique cultural norms, values, and traditions of that group. On the other hand, deaf

(lowercase “d”) represents anyone who has a significant audiological loss and who may not be aware of, or chooses not to identify with, the Deaf community.

Although a clear sense of personal and cultural minority identity makes life easier for any individual, for Deaf people a cultural identity is critical. When Deaf people are together, they each contribute to group formation, maintenance, and social ties within the Deaf community through the use of signed language as a pivotal tool, yet each Deaf person has his/her own individual personality and language variety. Deaf traditions, customs, values and behaviors are significant factors for effective socialization within this group. Deaf people, like other minority groups, constitute a cultural group, a group in which many Deaf people see themselves as members (Padden & Humphries, 1988; Parasnis, 1996; Wrigley, 1996).

Although there has been a variety of research conducted on Deaf Identity (Bat-Chava, 2000; Carty, 1994; Erting, 1982; Fleischer, 1992; Gertz, 2003; Glickman, 1993, 1996; Grosjean, 1982; Holcomb, 1990, 1997; Jacobs, 1974; Johnson and Erting, 1989; Kannapell, 1993; Reagan, 2002) as well as signed language acquisition (Boudreault, 1999; Emmorey, 1991; Emmorey, Bellugi, Friederici and Horn, 1995; Lock, 1996; Mayberry, 1993; Mayberry and Eichen, 1991; Mayberry and Fischer, 1989; Newport, 1990; Overstreet, 1999; Stone and Stirling, 1994), these studies have been carried out separately. There has been no direct analysis between the two areas of research to shed light on the importance of the connection between both domains. The primary purpose of this study was to link language acquisition and socialization process to social identity development process. A study uniting these areas is critical in understanding the effects of language, social, and cognitive development in Deaf individuals during their lifetime.

In addition, this study will also help to understand the importance of a Bilingual and Bicultural approach to the education of Deaf children.

In many past studies, Deaf people have been categorically described as a marginalized group, subject to inquiry by hearing people who did not understand and discern Deaf people's meaning. A better understanding of Deaf individuals' cognitive, social, and language development while building Deaf identity can be discerned through quantitative methodology with its emphasis on interpreting various factors through multiple-regression analysis. The correlation patterns of signed language competency and Deaf identity, along with multiple background factors have been analyzed and interpreted quantitatively. These findings contribute not only to a better understanding of the Deaf community as a cultural entity but also to the importance of the individual's identity in conjunction with their language, social, and cognitive development.

The general questions I wish to examine further in this study are as follows:

- 1) Is competency in ASL related to Deaf Identity?
- 2) Are there predictor variables that influence the development of ASL competency?

The features that contribute to understanding the importance of the relationship between language and identity in Deaf individuals are an integral part of development throughout life. The use of signed language is not uniquely shaped by identity itself, but interacts with multiple factors. These factors will be explored by considering the following:

- Language attitudes towards ASL
- Language use
- Deaf cultural behaviors
- Deaf identity

- Cultural acceptance of Deaf community
- Family and educational background
- Socio-economic status

Deaf Studies is a relatively new phenomenon to be offered within university programs. Only a few universities in the United States offer such coursework today. The expansion of Deaf literature and awareness depends on the activities of research, teaching, and curriculum development in Deaf Studies. Presently, Deaf Studies is at the level of cultural reportage and is growing in significance to develop and maintain the Deaf community. This study gives me the opportunity for a thought-provoking analysis of relationships and patterns in the lives of Deaf people. At the same time, this kind of study is part of my effort to reveal a connection between the Language and Identity of the Deaf and to bring new insight into Deaf people and the field of Deaf education.

## CHAPTER 2 – LITERATURE REVIEW

Membership in the Deaf community<sup>2</sup> involves a complex interaction between American Sign Language (ASL) and Deaf identity. In order to understand the importance of the interrelationship between these two distinct, yet inseparable, features of membership in the Deaf community, several areas of research need to be reviewed and discussed. This includes a discussion of American Sign Language and the American Deaf Community to provide an understanding of the Deaf cultural context. The issues of minority identity in general, and how this relates to Deaf individuals' efforts to create a sense of identity within the Deaf and hearing worlds, will then be addressed. The literature also includes research describing identity labels, typology, and developmental stages and these are explored in terms of Deaf people and their process of identity development. The literature review will close with a comparison of paper-and-pencil versus on-line testing methods with a particular focus on the use of video clips on-line in ASL.

### American Sign Language and the North American Deaf Community

The American Deaf community is comprised of Deaf individuals who share a common language and culture. There are over two million people who are classified as deaf (as defined within audiological/medical perspective of 'severe' or 'profound hearing loss'), but the size of the American Deaf community is estimated to be between 400,00 and 500,000 members (Schein & Delk, 1974; Holt, Hotto & Cole, 1994). The most important criterion for this Deaf community membership is based on one's attitudes about Deaf consciousness. The degree of audiological variation does not play an

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<sup>2</sup> Deaf community defined here represent ASL users in Canada and United States.

important role in the identification of individuals for membership status in the American Deaf community. Attitudinal Deaf status which is comprised of four Deaf-related features - social, political, linguistic, and audiological components - must be considered in connection with individuals' identification of themselves as members of the community as well as acceptance by the other members (Baker and Cokely, 1980, Padden and Humphries, 2005). In this community, people are recognized as members if/when they exhibit proper and expected behaviors according to their socialization.

The most important element to participation in the American Deaf community is linguistic; Klima and Bellugi (1979) point out the significant relationship between a community, its culture, and its language. The primary language of the American Deaf community is American Sign Language (ASL), thus serving as the major identifying characteristic for those individuals who see themselves as members of the American Deaf community. In addition, ASL serves as an important commonality for the promotion of solidarity within the group. There are deaf individuals who do not use ASL but they are often viewed as outsiders by the American Deaf community (Padden, 1980).

In addition, ASL is the most essential linking factor for those Deaf people who were brought up in the American Deaf community. Deaf people tend to marry other Deaf people. Communication among Deaf people is free flowing, and they feel completely comfortable while interacting with each other at Deaf clubs, Deaf churches, Deaf sporting events, or any event geared to Deaf people. Outside of the American Deaf community, Deaf people too often experience discomfort. The existence of Deaf organizations - local, state, national and international within the American Deaf community - attests to the strong bond of socialization, for they have common topics to share based on their



common experiences. Moreover, many Deaf people build strong relationships during school years and continue their friendships throughout their lives. For a large number of the American Deaf community members over many years, the Deaf child starts the process of identification with a Deaf group within the residential school. That is where the transmission of Deaf culture and ASL takes place (Padden and Humphries, 1988). For many Deaf children, they acquire ASL not from their parents but from their own peers. Thus ASL links these individuals together, forming a bond and becoming each others' "ethnic-centered" family.

For the American Deaf community to keep its own cultural-linguistic boundaries, they must maintain autonomy and integrity themselves (Woodward, 1975/1982). Deaf people set the cultural boundaries not only to cultivate Deaf cultural identity but also to foster a possibility for becoming a full, whole human being. Through the positive social identities and satisfying in-group interaction among Deaf members, Deaf individuals gain a sense of Deaf heritage and tradition. This nurturing process, in forming a Deaf identity, encourages Deaf individuals to know "who they are" and to become productive members of that community. In sum, Deaf people not only desire to belong to a group with a common culture, but they also want to be recognized as a unique group that contributes to a multicultural society (Ladd, 2003; Lane, Hoffmeister and Bahan, 1996; Padden & Humphries, 1988; 2005).

American Sign Language is a natural language that arose within the Deaf community in North America, except where some different signed languages were used such as *Langue des Signes Québécoise* in francophone provinces. The historical origins of ASL were not directly observed, however there is a general understanding that it was

formed from various linguistics influences. Before the implementation of the first Deaf school in American in 1817 with the introduction of the *Langue des Signes Française* by Laurent Clerc (Van Cleve & Crouch, 1989), there were some signing communities, such as the island of Martha's Vineyard (Groce, 1985). Gestures and home signs were reportedly used by deaf individuals prior to 1817 (Armstrong, Stokoe & Wilcox, 1995), and these blended with other communicative systems that led to the formation of ASL. For a long time, ASL was considered as pantomime or a way of communicating with the hands that was not supported by linguistic convention. The first research studies, conducted by Stokoe (1960) and Stokoe, Casterline & Croneberg (1965), analyzed sign features and showed that ASL was a language. Stokoe and other linguists demonstrated that ASL was a fully grammatical language that displayed various grammatical characteristics found in spoken languages. ASL is based on the visual-gestural modality, unlike spoken language. Thus, ASL has a different linguistic typology from languages such as English, for example. ASL is a poly-morphemic language and often ASL phonological and morphological units are combined with one another simultaneously rather than sequentially as in the case of English (Newport & Meier, 1985). The study of ASL has only recently emerged, but already we have a better understanding of the complexity of ASL grammatical structures.

### Identity

The concept of individual identity is not static, but rather, it is a kaleidoscope that constantly changes because of how humans think and behave within modern society. The identity of minority groups has emerged in the past several decades as a result of the emancipation movement in regard to equality of human rights around the world. The

identity of minority groups has also been shaped because of their constant struggle to define or redefine their identity as a group. The majority group's perception of minority/ethnic groups is different in many aspects when compared with how minority groups perceive themselves. In North America, for example, both the civil rights movement and the women's movement enlightened the rest of the world with regard to the particular views of these groups and as a result, these minority group members experienced higher self-esteem and raised the consciousness of themselves and the majority population. The Deaf community is also viewed as a minority group, and faces the ongoing challenge of defining themselves within the hearing<sup>3</sup> world (Gertz, 2003; Ladd, 2003; Lane, 1992). The *Deaf President Now* (DPN) revolution at Gallaudet University, in March 1988, led to the appointment of a Deaf person as head of the university for the first time in 124 years (Gannon, 1989; Ramos, 2003). The DPN protest was the result of a long process of building self-awareness of Deaf people in the hearing world that was also fueled by civil rights movements in the 1960s and 1970s. As with the Deaf community or other minority groups, individual identity is intrinsically linked to the minority group, yet the minority group exists within the broader construct of the majority, which is also a factor in determining identity (e.g., the struggle for Deaf people between supporting the collective values of their own community against the pressure of the individualistic values of larger hearing society) (Wrigley, 1996)

Understanding the range of the potential spectrum of a person's identity will allow us to have a broader understanding of the general population. There are several tools for assessing Deaf identity that have been created or adapted from tests developed by

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<sup>3</sup> **Hearing:** A term used to refer to people who possess a normal level of audition.

numerous scholars that allow for a more accurate definition and interpretation of Deaf identity from a Deaf-center<sup>4</sup>. Approaching identity from a Deaf-center poses a tremendous challenge for researchers because most Deaf people (roughly 90%) are born to hearing parents (Holt, Otto and Cole, 1994; Moores, 2001), and often the parents are not familiar with the issues of the Deaf-World<sup>5</sup>. In addition to the unknown territory that hearing parents face, the medical and audist<sup>6</sup> establishments are often the first point of contact in the intervention process with a deaf<sup>7</sup> child. Furthermore, contact with the Deaf community is often the last step in the intervention process, with the exception of some countries such as Sweden (Mahshie, 1995).

The deaf child is viewed very differently by members of the hearing population as opposed to how he/she is viewed by members of the Deaf-World. The difference in perception contributes to a dispersion of erroneous definitions of Deaf identity that,

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<sup>4</sup> **Deaf-center:** Introduced by Padden and Humphries (1988) and discussed further in Overstreet (1999) as follows: "...being Deaf is considered the norm and hearing is a deviation from that Deaf-centered point of reference".

<sup>5</sup> **Deaf-World:** A term that can be written with all uppercase letters: "DEAF-WORLD" that represents a specific sign in ASL. Dawn Sign Press defines the term as follows: "The Deaf-World is what Deaf people call their culture with its unique language and institutions. Deaf-Worlds exist in many lands, wherever Deaf people communicate primarily in sign language and are connected by a culture that is recognizably their own, with common values, mores, and goals. Here in the U.S. and in Canada, most culturally Deaf people who are members of the Deaf-World use ASL as their primary language." (Dawn Sign Press, n.d.). This term is also used in the book *A Journey into the DEAF-WORLD* by Lane, Hoffmeister, and Bahan (1996).

<sup>6</sup> **Audist/Audism:** The term was first introduced by Tom Humphries (1975) where he defined audism as "The notion that one is superior based on one's ability to hear or behave in the manner of one who hears"(p.1). Harlan Lane (1992) redefined the term as "the corporate institution for dealing with deaf people, dealing with them by making statements about them, authorizing views of them, describing them, teaching about them, governing where they go to school and, in some cases, where they live; in short, audism is the hearing way of dominating, restructuring, and exercising authority over the deaf community" (p.43).

<sup>7</sup> **deaf child:** For the purpose of this document, deaf children (from Deaf and/or hearing parents) are labeled with a Greek letter "δ" to signify that they are in progress of acculturation, from "d" to "D".

during a person's lifetime, then lead to ongoing attempts on the part of Deaf people to define and identify themselves. A Deaf person's identity is impacted by the perceptions of others, however the primary process of acculturation is linked to the learning of sign language and the discovery of different layers of the Deaf-World. This discovery occurs throughout a Deaf person's experience within the Deaf community and ranges from the isolated stage to the ethnicity stage (Gertz, 2003; Fleischer, 1992).

A literature review of several works related to Deaf identity, with respect to a Deaf-center, which categorize, define, and delineate stages of identity development, will follow.

#### *General Theoretical Framework of Minority Identity*

The theories of minority identity development play an important role in understanding the psychological and social effects of the self-identification process of ethnic and minority individuals among the general population. First, *Social Identity Theory* will be discussed, which will be followed by a discussion of the theory of *nigrescence* that addresses the transformation of a person from being black to having a Black identity.

The field of social psychology suggests that individual identity and perceptions of others are shaped by attachment to a group. The *Social Identity Theory*, initially proposed by Tajfel and Turner (Tajfel and Turner, 1979; Tjafel, 1981), focuses on an individual's self-perception when becoming a member of a group. By belonging to a group, people appear to think of that group as being better for them than any alternative *outgroup* (outside of the individual as compared to the *ingroup* which refers to self) and they also choose one group over another because they are motivated by wanting to have a

positive self-image. This self-image has two components: *personal identity* and *social identity*. In theory, there is no limit to the number of social identities that one can have. The groups that individuals are associated with may be based on race, nationality, affiliation with a particular sport, and any other form of social grouping. To maintain a positive self-esteem and self-image, individuals will engage in intergroup comparisons that allow them to understand and analyze different groups. An individual might compare his/her own group to a superior one in which he/she does not belong. A group's relative status within a society may determine the extent to which that group's membership is positively evaluated. When people find themselves in a group that cannot be positively evaluated, they may choose to leave that group or to reduce their identification with that particular group. The understanding of self-esteem and self-image usually leads to an exploration of self-consciousness.

A person's identity formation process requires a thorough self-awareness of the community to which he or she belongs. Erikson (1964; 1968) states that people who do not have a strong and clear identity will face identity confusion and will become uncertain about their future. This means the formation of a strong consciousness and self-identity within a society is critical. The African-Americans, or Black people, develop their identity by experiencing an enculturation process known as the theory of *nigrescence*, which was introduced by Cross (1991) and allows us to see how the identity of Black people goes through a series of changes. The enculturation of Black identity, *nigrescence*, consists of the following five stages. 1) *Pre-encounter* stage - the preexisting identity or the identity to be changed. Prior to experiencing enculturation, a Black person may be deracinated, deculturalized or miseducated about his/her own

identity. 2) *Encounter* stage - the process of metamorphosis that occurs when an individual goes through an identity change from their existing identity. 3) *Immersion-emersion* stage - the person embraces the identity change process by moving toward the new identity, which they know less about, and overturning the identity that they are knowledgeable of. 4) *Internalization* stage - the Black person “converts” to their new identity to give himself/herself a high salience of Blackness. 5) *Internalization-commitment* stage - after developing a Black identity, the individual makes a long-term commitment to his or her new identity.

Many members of minority ethnic groups do not have the opportunity to analyze their own identity and they often possess negative beliefs toward their own ethnic group (Phinney, 1993). If people fail to embrace their own identity, they will face an identity confusion for the rest of their lives, as Erikson (1964; 1968) states: “... in order to experience wholeness, [the person] must feel a progressive continuity... between that which he conceives himself to be and that which he perceives others to see in him and to expect of him” (p.91). The result of an identity crisis or awakening will lead one toward commitment to their identity. Phinney (1993) proposed a three-stage model of ethnic identity development that differs from Cross’s model (1991) in that the process is reduced from five stages to three. The three stages are as follows: 1) *Unexamined ethnic identity*, 2) *Ethnic identity search/moratorium*, and 3) *Ethnic identity achievement*. Phinney’s (1993) definition of the three stages and Cross’ (1991) work on *nigrescence* is captured in a comparative table shown in Table 1. The theories of minority development presented here allow for a broader understanding of the theoretical framework of

minority and ethnic identity development, which can also be applied to Deaf identity development.

### Deaf Identity

Audists have defined and labeled Deaf people for centuries, which has often caused Deaf people to be misunderstood and incorrectly represented. The labels given to Deaf people have generally been based on the external observations by hearing people, who often do not understand signed language (Lane, 1992). ASL is the primary language of communication of the North American Deaf community and it is viewed as an identification factor of the Deaf community membership (Baker and Cokely, 1980; Klima and Bellugi, 1979; Lane, 1992; Lucas and Valli, 1992) Furthermore, Deaf people were labeled by hearing people who had colonial and audistic mentalities and the labels were based on negative perceptions, as hearing people believed themselves to be superior to minority ethnic groups (Lane, 1992). These labels had a long-term impact on Deaf people's self-identity because the information that hearing people had, regarding the Deaf-World, was often erroneous. ASL is one of several ways in which Deaf people identify themselves, yet audiologists and hearing professionals measure Deaf people by their degree of hearing loss (mild, moderate, severe or profound). The degree of hearing loss is not the way in which Deaf people view themselves (Lane, 1992, Hunt & Marshall, 2002). The pathological labels used by professionals do not exist within the Deaf community and are not used amongst its members. Padden and Humphries (1988) state: "Each label, however petty or harsh some might seem, in its own way helps us to understand the group's deep beliefs and fears" (p.43). The identification of Deaf



individuals among themselves, embraces a point of view that is opposite from an identification that is based on the measurement of hearing loss.

Identification within the Deaf community is based on an individual's beliefs, appropriate social behaviors, and attitudes toward Deaf issues, and these are highly valued. The presence of appropriate beliefs, behaviors and attitudes allows an individual to possess a profound connection to the community. The conflict between the social and individual construction of identity is discussed broadly by Reagan (2002) based on Foucault's concept of "archeological thinking" as the means of "making it possible to think differently" (p.1). According to Padden and Humphries (1988), one of the most powerful examples of this individual/social conflict is the conflicting definition when labeling people who are hard-of-hearing. This same conflicting concept is also discussed in Overstreet's (1999) dissertation in terms of Deaf-centered vs. hearing-centered perspectives. The concept of the word "hearing", from the Deaf-centered perspective, means "them", "other", or "not-us". Another example of conflict is evident in the labels of LITTLE-HARD-OF-HEARING<sup>8</sup> and VERY-HARD-OF-HEARING, which have different meanings from a Deaf-centered or a hearing-centered perspective. From the Deaf-centered perspective, the first label means that the person is more culturally Deaf and may be hearing in some ways, while the latter label means that the person acts more like a hearing person. From the hearing-centered perspective, these labels mean the exact opposite and are based on a pathological view of the degree of hearing (Padden and Humphries, 1988). As is evident from this example, it is very important that the definition of Deaf identity is essentially based from a Deaf-centered standpoint.

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<sup>8</sup> **ASL Gloss:** English words written in all uppercase letters to represent signs in ASL.

Several qualitative and quantitative studies have been conducted to understand the different types of Deaf identity and this research has established categories or stages of identity development. Selected works of Deaf identity assessments and observations from several researchers will be reviewed here along with the results and findings, where available. The following studies will be presented in more detail. A survey by Stone and Stirling (1994) was carried out with deaf children exploring their interpretation and understanding of basic terminology regarding Deaf identity. A study of the relationship between children's self-esteem and their parents signing abilities was conducted by Crowe (2002). An informal classification of different categories for Deaf identity was formulated from observations and discussions and was presented by Jacobs (1974) and Carty (1994). A more scientific approach in the designation of different categories of Deaf identity was introduced by Holcomb (1990, 1997) and Kannapell (1993). In numerous other works, results of research on Deaf identity have lead to the emergence of definitions of different stages of Deaf identity development rather than categorization systems (Bat-Chava, 2000; Fisher & McWhirter, 2001; Glickman, 1993,1996; Holcomb, 1990, 1997).

The processes of Deaf identity development are not solely focused on identification and categorization of patterns of behavior, but also involve an understanding of factors that affect enculturation and acculturation. The categorization of Deaf people into groups helps to differentiate different types of deaf/Deaf individuals who are part of the hearing and Deaf communities, as shown in Table 2 (Holcomb, 1990, 1997; Jacobs, 1974; Kannapell, 1993). The pattern of categorization demonstrates a comparative continuum from hearing to Deaf (culturally deprived individuals are considered to be outside of the

Deaf and hearing cultural framework, Jacobs, 1974). The *balanced bicultural* type defined by Holcomb (1990, 1997) is compared with the *other prelingually deaf adults* (Jacobs, 1974) and the *Type A /Type B* person (Kannapell, 1993). These categories are not placed at the end of the spectrum because they include both languages and both cultures. Conversely, other categories such as *Type C* (Kannapell, 1993), *culturally separated* (Holcomb, 1990, 1997), and *prelingually deaf adults of deaf families* (Jacobs, 1974), are placed at the end of the continuum because these groups are intentionally or voluntarily rejecting both the language and culture of hearing people. Therefore, these individuals are viewed as an extreme group that identifies themselves as “purists” in the Deaf-World, yet this does not necessarily translate into the best model for the Deaf community. Furthermore, these “purists” can also be considered to be on the opposite end of the spectrum as the *culturally captive* (Holcomb, 1990, 1997) or the *Type E* individuals (Kannapell, 1993).

The labeling of deaf/Deaf people with either lowercase “d” or uppercase “D” may be helpful in understanding which category a person belongs to, be it medically or culturally defined respectively. Every member of the Deaf community who grew up with other Deaf members, such as Deaf parents, Deaf relatives, Deaf friends, or attended the school for the Deaf, is considered to be uppercase “D” (Deaf) because they were raised within the context of Deaf culture. The opposite is true for individuals without hearing ability who grew up in the hearing world; they did not interact with Deaf people or experience various aspects of Deaf culture. These individuals are simply viewed as those who do not possess any Deaf cultural experiences and are labeled with a lowercase “d” (deaf). A problem arises when trying to understand the different categories of deaf/Deaf

individuals across the continuum between hearing and Deaf. Individuals who are experiencing the process of acculturation, as opposed to children who are already culturally Deaf, are labeled with the Greek letter “δ”(δeaf) as explained in a previous endnote. When discussing labels that define or identify deaf/δeaf/Deaf individuals, it is important to consider that the Deaf community in today’s society is experiencing many changes that impact upon their identity (Monghan, Schmaling, Nakamura and Turner, 2005; Padden and Humphries, 2005). These changes range from the field of Deaf education to advances in technology. Some of the changes are: an increase in the number of Deaf children attending mainstreamed settings in public schools and as a result, a decrease in the number of children attending schools for the Deaf; the closure of Deaf clubs which has resulted in decentralized points of rendezvous for Deaf people; the advent of cochlear implants as an alternative option of rehabilitative hearing; and the persistence of the audist establishment in eradicating Deaf culture and ASL. In addition to children, deaf individuals who are starting to experience facets of Deaf culture and who are beginning to gradually acculturate from culturally hearing to culturally Deaf may also be assigned the “δeaf” label. By labeling these people as such, it is a way to recognize the process of enculturation and acculturation. However, the identification of deaf, δeaf, and Deaf individuals is not, in and of itself, enough to understand the Deaf identity development.

There are several works which focus on understanding different stages of Deaf identity development and these studies are parallel to the theory of *nigrescence* proposed by Cross (1991) presented in Table 3 (Carty, 1994; Glickman, 1993, 1996; Holcomb, 1990, 1996). A comparative summary in Table 3 shows that there is commonality among

different authors in understanding the process of Deaf identity development, which may be applied to deaf/δeaf/Deaf individuals and translated to a deeper process of acculturation for deaf and δeaf people specifically. As for Deaf individuals, acculturation represents a process of awakening consciousness in regard to their own identity. A Deaf person may be part of the Deaf community all of his life, yet his Deaf identity may remain in “hibernation” until an event or traumatic experience triggers his self-consciousness of Deaf culture to a higher level. The Deaf President Now revolution was lead by four young Deaf activists, who all happen to be from Deaf families (Gannon, 1989; Ramos, 2003). These young men were confronted with an event that propelled them toward a higher level of Deaf consciousness, which then led them to commit themselves to the greater cause of the Deaf community. Other deaf/δeaf/Deaf individuals followed the lead of these four Deaf leaders, and as a result, deaf/δeaf/Deaf individuals experienced various levels of Deaf identity development during the revolution.

Understanding the different categorizations of Deaf identity is very important for future research as it applies to the self-identification of individuals who are members of a minority group. Furthermore, an understanding of Deaf identity has a broader application in regard to issues such as the learning of language and how that relates to self-esteem. This review has shown that there are reliable measurement tools to determine Deaf identity development, as is evident in the work of Glickman (1993, 1996) and Fisher & McWhirter (2001), and their work is supported by other work investigating different types of Deaf identities (Holcomb, 1990, 1997; Jacobs, 1974; Kannapell, 1993). The Deaf Identity Development Scale (DIDS) (Glickman, 1993, 1996) is one of the most strictly controlled assessment tools for measuring Deaf identity development and it has

tremendous potential to be applied to other research questions, such as bilingual and bicultural education for the Deaf. Given there is sufficient research and knowledge about Deaf culture that has been conducted in the last two decades and there have been attempts to categorize different types of Deaf identity prior to the development of DIDS, it is therefore concluded that there is a way to measure Deaf identity in order to determine which category or stage of development an individual fits within. Specifically, it is possible to categorize how a Deaf person fits within the hearing world.

#### *Identity Categorization – Jacobs*

*A Deaf Adult Speaks Out*, by Jacobs (1974), was one of the earliest works written by a Deaf person in observing different types of Deaf adults. The perspectives in this book are reflective of the thinking in the 1970s, as there was no formal recognition of Deaf culture during that time. Additionally, it is written based on the author's observations, is not empirical in nature and is based on the author's observations and experiences in the Deaf community. However, it is important that this work be included here in order to provide an overall picture of how the observation, analysis, and understanding of Deaf identity have evolved. Jacobs states there are three factors that affect the development of deaf children in becoming Deaf adults: 1) the degree of deafness, 2) the amount of native intelligence, and 3) the environmental components (education, family, and community). The third factor is a controllable factor that leads Deaf individuals to determine their Deaf identity throughout their lifetime. Jacobs observed nine different types of Deaf adults, which are listed here: 1) *Adventitiously deaf adults* -- lost their hearing after having acquired language and speech, 2) *Prelingually deaf adults from deaf families* -- have acquired language naturally from their deaf

parents (native signers), 3) Other prelingually deaf adults – the majority of the Deaf population, come from hearing families who do not master signed language, 4) Low-verbal deaf adults – Deaf adults that have missed educational opportunities and are often illiterate, however can express themselves with signs or gestures, 5) Products of oral programs – raised by using oral speech until they joined the Deaf community and learned signed language, 6) Products of public school – educated without interpreting services and often having an extraordinary ability, or moderately hard of hearing, or even deafened late in their life, 7) Uneducated deaf adults – individuals that possess only a few (or no) years of education, usually do not have a means of communication, 8) Deafened adults – individuals who lost their hearing during adulthood and often continue using speech or may become involved in the Deaf community and learn signed language, and 9) Hard-of-hearing adults – often viewed on the borderline between two worlds; Deaf and hearing, can use speech and signed language to various degrees.

#### *Identity Categorization – Carty*

Carty (1994) formulated six stages of Deaf identity based on work that was conducted with groups of Deaf adults in Australia. A summary of Carty's work is intended as a framework for discussion purposes as her six stages allow us to gain a general understanding of how Deaf people from another country perceive themselves. The six stages of Deaf identity are as follows: 1) Confusion – The realization stage that he or she is not the same as other members of the family (deaf or hearing), 2) Frustration / Anger / Blame – A natural emotional response towards the lack of understanding or acceptance from the people around them, 3) Exploration – A stage where one starts to explore the aspect of Deaf culture by associating with Deaf people, 4) Identification /

Rejection – A stage where the person accepts or is being accepted by the Deaf community, 5) Ambivalence – This stage occurs during the initial sense of identification, when awareness of some negative aspects of the group also occurs, and 6) Acceptance – This last stage determines one's personal and social identity where the person has a good understanding and awareness regarding the group to which he or she belongs.

The work of Jacobs (1974) and Carty (1994) serve as a foundation for the initial understanding of any theoretical framework regarding Deaf identity, and these beginnings have lead to more in-depth analysis in this field.

#### *Identity Categorization – Holcomb*

The work of Holcomb (1990; 1997) is based on Epstein's (1973) self-concept theory model. Epstein's theory of self-concept can be described as a person's identity awareness based on their interactive experience with other members of similar affiliation. Holcomb believes that Deaf people are experiencing awareness of their own identity during contact with other Deaf members based on Epstein's self-concept theory model. Holcomb developed seven categories of Deaf identity, followed by five stages of bicultural identity development. The seven categories are described below and the five stages will be described in the section "Stages of Deaf Identity Development".

The seven categories of Deaf identity are summarized here. 1) *Balanced bicultural identity* - a person who is comfortable in both Deaf and hearing cultures. 2) *Deaf-dominant bicultural identity* - a person who is predominantly involved with the Deaf-World but is still comfortable interacting within hearing culture. 3) *Hearing-dominant bicultural identity* - a person who has little contact with the Deaf community yet is comfortable with them. They are primarily involved with hearing culture for professional



or personal reasons, such as having a hearing spouse. 4) *Culturally isolated* identity - applies to a person who rejects all interactions with other Deaf people and usually does not use sign language. 5) *Culturally separate* identity - a person who interacts minimally with hearing people in their daily life and immerses him/herself in the Deaf-World. 6) *Culturally marginal* identity - a person who is not comfortable with either the Deaf or hearing communities. This person's profile usually applies to those who have recently become deafened and who possess a limited mastery of sign language. 7) *Culturally captive* identity - a person who does not have the opportunity to interact with other Deaf community members and has probably been sheltered by their parents or not exposed to the Deaf community due to other unfortunate circumstances.

#### *Identity Categorization – Kannapell*

Kannapell (1993) conducted a significant study on Deaf identity in relation to language attitudes, which include the use of English and American Sign Language. Her work was based on the general definition of Lambert's work on linguistic interdependence (as cited in Cummins, 1979), which focused on the learning of first and second languages in relation to children's participation in and identification with two cultures. Kannapell adapted Lambert's definition to apply to deaf children's attitudes towards Deaf and hearing people, and their learning of a first and second language (ASL and English). The four categories of identity suggested by Kannapell are listed here. 1) *Harmonious identification with both cultures* - a deaf child can identify with both Deaf and hearing cultures and master both languages. This category can also apply to hearing or hard-of-hearing children of Deaf parents. 2) *Identification with hearing culture, rejection of Deaf culture* - a deaf child identifies himself/herself with hearing culture and

does not feel an affinity to Deaf culture. These children do learn signed languages but do not completely involve themselves with Deaf culture; Kannapell views this as a “partial” acculturation of Deaf culture. 3) *Identification with Deaf culture, rejection of hearing culture* - deaf children identify themselves with Deaf culture, see themselves as members of the Deaf community, and use ASL. The majority of Deaf community members fit in this category. 4) *Failure to identify with either culture* - the deaf child is unable to identify with either cultural group (Deaf or hearing) and does not fully master either language (ASL or English). This category often applies to oral deaf children of hearing parents who do not have appropriate access to either culture.

Kannapell also classified six different types of deaf/deaf/Deaf people based on a study conducted with 202 deaf undergraduate students from Gallaudet University during the 1982-1983 academic year who responded to survey questionnaires. The study was carried out in three phases. Phase I was comprised of 202 respondents and addressed social variables and language attitudes, and included a list of 69 items divided into three major and three minor subscales. The three major subscales included attitudes toward language; ASL; and English or forms of English. The three minor subscales dealt with attitudes toward Deaf people, hearing people, and speech. Phase II was also comprised of 202 respondents and addressed self-evaluation of linguistic/communication skills. The data was gathered through self-reporting from six different groups and was compared with ratings by English professors and members of the Audiology Department. During Phase III, sixteen interviews were conducted with subjects who were selected based on their particular social variables. The interviews addressed various topics related to the use of communication methods and other relevant social issues.

A summary of Kannapell's typology is described in this section to provide an overview of the different attitudes and perceptions of Deaf people: *Type A - balanced bilinguals* who have harmonious identities in both cultures. *Type B* - people who are comfortable with both languages, thus *balanced bilinguals*, but have negative attitudes toward hearing culture and identify themselves more with Deaf culture. *Type C* - Deaf individuals who are *ASL monolinguals or ASL-dominant bilinguals*. They have positive attitudes toward ASL and Deaf culture but have negative responses toward English and hearing culture. *Type D* - people who are *English-dominant bilinguals* with harmonious identities in both cultures but, when compared with their views of English, they have negative views toward ASL. In the Deaf community, these people are labeled "hearies"<sup>9</sup>. *Type E - English-dominant bilinguals* who do not approve of ASL and do not identify with Deaf culture. These people are usually late deafened adults, oral individuals, or people who have attended public school in a mainstream setting. *Type F* - identify themselves as being part of Deaf culture, not hearing culture, but prefer English over ASL (Table 4).

#### *Stages of Deaf Identity Development - Glickman*

Glickman (1993, 1996) defined four stages in his theory of Deaf Identity Development. A summary of each stage is presented here. 1) Culturally hearing: This first stage applies to late deafened individuals whose hearing culture is already established prior to loss of hearing. The hearing loss is not the only factor that determines whether or not an individual belongs in this stage. Also of importance is an

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<sup>9</sup> **Heafies:** Bienvenu (n.d.) abbreviates "deaf people" to "deafies." She further stipulates that in between Deaf people (deafies) and hearing people (hearies) are the "heafies" – deafies who look and act like hearies. This can also be signed in ASL: THINK-HEARING.

individual's hearing attitude that is ingrained in their identity as this too, determines whether or not an individual belongs in this stage. When comparing hearing and Deaf people, this individual considers hearing people better in many aspects. They perceive Deaf people in stereotypical ways, assuming that Deaf people cannot succeed in the hearing world without support services and signed language interpreters. In addition to these stereotypical beliefs, this individual will align him/herself with oralist supporters and avoid interacting with Deaf people who use Sign Language. From a Deaf perspective, the concept of the sign THINK-HEARING is often applied to individuals who belong in this stage. An analogy can be made to the term "Oreo", which is applied to African-Americans who act like white people on the inside (attitudes, beliefs), yet are black and ethnic on the outside (Padden and Humphries, 1988).

2) *Culturally marginal*: This second stage is usually applied to deaf people born into hearing families whose identity is just beginning to develop. Communication skills are usually poor and individuals are unable to adapt to various communication behaviors; they usually prefer a communication system that includes both Deaf and hearing people, such as simultaneous-communication (speaking and signing at same time) or signed English. These individuals display social interaction behaviors that are usually inappropriate for both the Deaf and hearing communities. They also have a troubled sense of identity and are often isolated from Deaf and hearing people, and this causes difficulties in developing intimate relationships. There is an inconsistent self-belongingness, which shifts between the Deaf and hearing communities, and anger towards hearing or Deaf people respectively.

3) *Immersion in the Deaf-World*: The third stage is summarized as a 'separatist vision' of the world; people in this stage are involved in the Deaf World to the point where they feel as if they live in their own world to the exclusion of others. Individuals who embrace the Deaf World ultimately believe that everything in the Deaf-World is better than in the hearing world, which includes the superiority of ASL over English, being self-sufficient and usually being more anti-hearing than pro-Deaf (similar to *immersion* in Black Identity Theory). Individuals in this stage are angry at hearing people for the injustice they have had to endure. Eventually, these individuals become more affirmative regarding Deaf issues and focus on advocacy within their community (similar to *emersion* in Black Identity Theory).

4) *Bicultural*: In this fourth and last stage of Deaf identity, people are balanced and embrace both the Deaf and hearing worlds, with the exception of hearing people who are ethnocentric. They have pride in their own identity as a Deaf person and are at ease in both worlds. They also possess an appreciation of ASL and English and communicate in both languages willingly. They value the alliance between the two worlds while remaining opposed to the audistic and paternalistic values of some hearing people. A summary of the four stages is shown in Table 5.

The *Deaf Identity Development Scale* (DIDS) was designed with 60 items rated on a 5-point Likert scale. The 60 items were divided into four sets of 15 items each, one set for each stage of Deaf identity development. The reliability coefficient of the DIDS was reported at 0.86 for the *Hearing* scale, 0.76 for the *Marginal* scale, 0.83 for the *Immersion* scale, and 0.81 for the *Bicultural* scale. A total of 161 deaf individuals were tested with the DIDS (105 students from Gallaudet and 56 members of the Association of

Late-Deafened Adults of Boston, ALDA-B). The results show that the four distinct categories can be measured and that they do exist. However, the author suggested some changes and corrections within the 60 items, and these changes were implemented in a study by Fisher and McWhirter (2001).

The *Hearing* identity shows a moderate positive correlation with the *Marginal* scale ( $r=.57, p>.000$ ) and negative correlation with the *Immersion* scale ( $r=-.30, p>.000$ ) and the *Bicultural* scale ( $r=-.47, p>.000$ ). The *Marginal* identity correlates negatively with the *Bicultural* scale ( $r=-.45, p>.000$ ). There is no correlation between the *Immersion* and *Bicultural* scales ( $r=-.05, p=.274$  ns) yet in theory, the correlation was supposed to be distinct, however the results show a slight overlap. Gallaudet students who participated in this study were found to be more culturally Deaf when compared with the members of ALDA-B. Deaf students who attended public schools with Deaf classmates scored higher on the *Bicultural* scale and those who attended residential schools for the Deaf generally scored lower on the *Hearing* and *Marginal* scales and higher on the *Immersion* scale.

#### *Stages of Deaf Identity Development – Holcomb*

As previously introduced in the section of Identity Categorization, Holcomb (1990, 1997) proposed definitions for five stages of bicultural identity development. The achievement of a bicultural identity is made through a complex and sometimes painful process. The five stages are summarized here: 1) *Conformity* is the first stage when the deaf person is generally conforming to hearing values and functions in the hearing world. The use of sign language and interaction with members of the Deaf community is nonexistent. 2) *Dissonance* is the next stage where the deaf person encounters other Deaf

individuals, and discovers that his/her preconceived ideas about Deaf people are incorrect. The person starts to question other people's judgments toward the Deaf community. 3) *Resistance and immersion* is the third stage where the Deaf person starts to explore and discover the facts pertaining to the Deaf-World and begins to seek membership in the community. At this stage, the Deaf person starts to fully immerse himself/herself in the Deaf-World and also rejects hearing people. 4) *Introspection* is a stage where the Deaf person starts to accept the fact that hearing perceptions toward Deaf people are based on a lack of knowledge and accepts hearing people as part of his/her life. 5) *Awareness* is the fifth and final stage of bicultural identity development where the person becomes more comfortable in both Deaf and hearing cultures.

#### *Stages of Deaf Identity Development – Bat Chava*

Bat-Chava (2000) conducted a study with 267 deaf adults that explored identity and was based on the Social Identity Theory described previously (Tajfel, 1981). Minority members are motivated to keep a positive self-image regarding their community. This self-image has two components: personal identity and social identity. Any action or cognition that elevates the social identity will therefore tend to also elevate the self-image. The author suggests that strong Deaf identities are associated with high self-esteem. She also stated that culturally Deaf and bicultural people have higher self-esteem (Bat-Chava, 2000). The author used three types of Deaf identities based on the work of Glickman (1993, 1996) and Leigh et al. (1998): culturally Deaf, culturally hearing, and bicultural. Bat-Chava's study focused on two aspects: 1) association with other Deaf people and the affiliation with Deaf institutions or organizations, and 2) positive attitude toward deafness and Deaf people.

Based on a study sample of 267 subjects, the results showed that 33% (n=81) of the subjects were *Culturally Deaf*, 24% (n=58) were *Culturally hearing*, 34% (n=82) were *Bicultural*, and 9% (n=22) were categorized as having “negative identity” because they scored below-average levels on group identity. The results also indicated that the *Culturally Deaf* subjects who attended schools for the Deaf had a stronger Deaf identity than other groups. The *Culturally Deaf* and *Bicultural* groups had a higher level of self-esteem than the *Culturally hearing* group who were generally late deafened. Bat-Chava noticed that a shift from one group identity to another can occur during a person’s lifetime and this applies more often to women than men, indicating that contextual factors can also have an effect on identity change.

#### *Stages of Deaf Identity Development – Fisher and McWhirter*

Fisher and McWhirter (2001) conducted a study of 323 deaf participants in the southwestern part of the United States with a revised version of DIDS (Glickman, 1993), as previously discussed in this proposal. After applying the changes to particular items, a reliability analysis was conducted with Cronbach’s coefficient alpha for each scale to ensure a consistency coefficient. The revised version had a slightly improved internal consistency for the *Marginal* and *Immersion* scales (.76 to .84 and .83 to .87 respectively) and a slight decrease for the *Hearing* and *Bicultural* scales (.86 to .81 and .81 to .78 respectively). The new version provided a new interscale correlation between scales, the negative correlation between the *Marginal* and *Immersion* identity ( $r=.09$ ,  $p=ns$ ) became a positive correlation which is significant in this version ( $r=.33$ ,  $p>.01$ ) (see Table 5). Altogether, the new version strengthens the correlation of the *Marginal* scale with the *Immersion* and *Bicultural* scales. However, it weakens the correlation between the



*Hearing* and *Immersion* scales and between the *Marginal* and *Bicultural* scales. By revising the DIDS, Fisher and McWhirter (2001) have improved and strengthened the original study overall, and have created a test that will allow researchers or counseling professionals to obtain more accurate identification of an individual's stage of Deaf identity, refer to table 6.

The previous exploration of Deaf identity development as summarized in the studies mentioned above, is essential in comprehending Deaf people's identity. The purpose of the review of these studies is to provide a theoretical framework of Deaf identity development that can be applied to this study. However, these studies do not investigate or formally assess the aspect of language acquisition or language competence, specifically grammatical competence in ASL and the role this plays within the process of Deaf identity development. This will be discussed further in the following section.

#### Language and Identity

"There is no separating language from personal and group identity"

Freire, 1989

Deaf schools are the core of sociolinguistic interaction in the Deaf community and ensure the continuity of American Sign Language and Deaf culture (Lane, Hoffmeister and Bahan, 1996; Padden and Humphries, 1988). This section discusses the relationship between the language competency and identity of ethnic groups including the Deaf community. The complex relationship between language competency and minority identity will be explored. This will provide us with broader insight on the importance of an ASL competency in the development of Deaf identity.

### *Minority Identity and Languages*

The modern scientific study of language was initiated by Saussure with the posthumous publication of *Course in General Linguistics*, and it was an important initial work in the field of linguistics. Agar (1994) viewed Saussure's work as *inside-the-circle* linguistics. This means that the study of language was mainly focused on the internal structures of the language and ignored the other factors surrounding the language. Saussure did not incorporate cultural aspects with language and treated it separately. But the anthropologist Whorf believed that studying language and culture was equally necessary and comparable. The study of the language with *outside-the-circle* linguistics refers to the study of other parameters such as culture. Agar (1994) invented the term *languaculture* to summarize Whorf's idea that language and cultural values are interrelated to each others to define who we are and how we identify to one another. This summarizes how one's identity is irrevocably bound to language, since the language contains the sublime characteristics of the culture deeply incorporated within every discourse. The interpretation of the message between languages is often concealed within the cultural meaning that is intrinsically linked with the identity of the individual who uses the language.

Gudykunst and Schmith (1988) stated that language and ethnic identity are reciprocally related. The ethnolinguistic identity studies show that the choice of the language falls into the realm of social identity (Bond, 1983), and the use of language and its rules are shared by a certain group of users (Bourhis, 1979). From the sociolinguistics' point of view, the dominant language group does not embrace the cherished value of ethnicity in minority groups. It is the majority's ethnocentric attitude

that is influenced by the linguistic and cultural “melting pot” in American society. The survival of a minority ethnic and linguistic group is dependent on the ability to maintain their language because this is what defines the minority individuals’ membership in the community (Woolard, 1990).

The survival of the minority group depends on language protection. In some instances, politics have played an important role in wiping out minority linguistic groups, which is called *linguicism*<sup>10</sup> by Skutnabb-Kangas and Cummins (1988). In other ways, language planning has also helped to maintain a linguistic minority, such as Catalan in the northeastern part of Spain (Woolard, 1990) or French in Quebec, Canada (Porter, 1996; Schmid, 2001).

The phenomenon of *linguicism* continues to exist around the world. One of the most recent examples, widely covered by the media, happened in California in 1998 with *Proposition 227*<sup>11</sup>, under Unz’ initiative regarding bilingual education. California overwhelmingly rejected bilingual education and this meant that all California public school children must be taught using English as the primary language of instruction, with few exceptions. An interesting element in this initiative was that the area of San Francisco, where there are a large number of minority linguistic and ethnic groups, rejected *Proposition 227*, while other counties of the State of California accepted it (Schmid, 2001). This experience illustrates how minority groups struggle to preserve

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<sup>10</sup> **Linguicism:** Ideologies, structures, and practices which are used to legitimate, effectuate, regulate, and reproduce an unequal division of power and resources (both material and immaterial) between groups which are defined on the basis of language.

<sup>11</sup> **Proposition 227:** Visit the link for full text of the proposition at: <http://primary98.ss.ca.gov/VoterGuide/Propositions/227text.htm>

their minority cultural identity, which is directly connected to their language. The connection goes beyond the circle of their community, as the community members were concerned about the education of their minority children. While the majority linguistic group made the decision to abolish bilingual education in favor of English as the only language to be taught in California, the minority groups viewed this as a form of *linguicism* that would lead to the loss or confusion of identity in future generations of minority ethnic children. *Proposition 227* also had an indirect impact on Deaf education and the use of ASL in the classroom, since deaf children were subjected to the same treatment as other minority language hearing children (Zapfen, 1998).

The increasing interest in multiculturalism in education and sociocultural and linguistic issues in conjunction with the minority groups has attracted the attention of several researchers (Grosjean, 1982; Skutnabb-Kangas and Cummins, 1988). The Deaf community has been no exception. The issues with this group can be more complex since the ethnicity of the Deaf community is not only linked with paternity<sup>12</sup> but also linked directly with social interaction for the majority of the members.

#### *American Sign Language and Deaf Identity*

This section covers several issues such as defining Deaf ethnicity and how the term *ethnicity* can apply to the Deaf community. The relationship between Deaf identity and language competency is also investigated.

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<sup>12</sup> **Paternity/Patrimony:** Deaf individuals who have involuntary biological condition of deafness are referred to as *paternity*. The term *patrimony* indicates that the Deaf individuals conform to the Deaf values and attitudes, and have shared cultural knowledge of the Deaf community. In addition, the *patrimony* group is evaluated by other members of the Deaf community if they meet the attitudinal and behavioral criteria of the Deaf community. *Paternity* and *patrimony* groups form the Deaf ethnicity that ensures its continuity. (Fishman, 1977; Johnson and Erting, 1989; Royce, 1982).

The term ethnicity in the Deaf community is applied to the children of Deaf parents, whether they are Deaf or hearing, who internalize Deaf traditions and values. They are part of the core group of the Deaf community and are influential within the group. This core group is on a continuum with deaf individuals in isolation who are usually not exposed to signed language or have a strong Deaf identity, as shown in Figure 1 (Gertz, 2003; Fleischer, 1992).

Ethnicity in the Deaf community involves voluntary transmission, and usually the link is carried by the core members of the Deaf community or the *Deaf Ethnic* group (Fleischer, 1992; Johnson and Erting, 1989; Fishman, 1977). Those members of the Deaf community, who share the same Deaf values and knowledge, ensure the voluntary continuity of group identity. Johnson and Erting (1989) state: "...sign language variety and socialization into the norms of bilingual language use are two of the phenomena that most strongly contribute to the formation and maintenance of the Deaf ethnic group" (p.45). Language is a trait typically aligned closely with ethnicity. This also applies to the Deaf community and the to values that they hold connected with ASL, even though the majority do not come from Deaf parents or Deaf relatives. The formation of Deaf ethnicity requires the development of Deaf identity.

In most instances, Deaf individuals from Deaf families who are members of the Deaf community are considered native signers in their first Sign Language. Other members of the Deaf community, who acquired signed language at the Deaf school or through other members of the Deaf community by social interaction, consider signed language their primary and natural means of communication. These are not native signers, but are considered to be first language users. The native signers are usually the

ones who carry the ethnicity of the Deaf community and influence first/primary language users by exposing them to signed language (Chamberlain, Morford and Mayberry, 2000). The concept of the *mother-tongue* as defined by Skutnabb-Kangas (1994) allows for a broader perspective of this concept regarding Deaf people. Deaf children may not use the same language of origin as their primary caretakers, as it may not be accessible to them. Deaf children have the right to become bilingual and signed language is their natural language. Skutnabb-Kangas (1994) defined bilingualism as follows: "...a goal for the education of the deaf minority children must combine the highest degree of competency and function with a positive identification with two languages, but not necessarily an early learning of other languages except Sign Language" (p.143). Deaf people who identify themselves with the use of signed language tend to discover Deaf culture and their self-identity as a Deaf person as well.

An observation made by Bragg (1992) in the Deaf American Monograph regarding the language use by an actress Marlee Matlin in the NBC's TV series "Reasonable Doubts" in the early 1990s:

"What Marlee Matlin actually uses is Englished ASL; she consistently follows English word order when she signs in front of the jury... A number of deaf advocates of Traditional ASL are highly critical of Marlee Matlin's signing style. They consider her character, Tess Kaufman, a member of the hearing world – not of Deaf culture. Their argument in support of this judgment is that Marlee Matlin occasionally vocalizes words, and that her attitude, rather her character's attitude, portrays that of a hearing person – not that of a Deaf person." (p.31-32)

The observations made by Bragg suggest clearly that the ethnic Deaf community measures identity through the attitudinal behaviors and the use of ASL variations or other means of communication. American Sign Language is the center of the Deaf community and the values and beliefs of the Deaf community are interlinked with this language in

the formation and maintenance of the Deaf ethnicity (Johnson and Erting, 1989). Erting (1982) states that language is closely linked with ethnicity and that language is viewed as a biological inheritance and a central factor of individual identification with a group.

“ASL remains largely in the hands of the Deaf people and the few hearing people who have obtained the ability to remain unnoticed in an otherwise all-Deaf group. This largely exclusive ownership of ASL is undoubtedly an additional factor in its symbolic attachment to Deaf ethnicity” (p.53) (Johnson & Erting, 1989).

The Deaf ethnic group is crystallized by the use of ASL as a linguistic symbol. The children who are less proficient in ASL tend to construct their own identification along with the group by imitating from other more proficient ASL users or being corrected by them (Johnson and Erting, 1989). Gumperz (1974) states: “Language is simultaneously a store or a repository of cultural knowledge, a symbol of social identity, and a medium of interaction” (p.786). This represents well how the members of the Deaf community view language use or choice as a way to identify the individual’s identity within the community.

#### *ASL Competency and Deaf Identity*

Linguistic competence is defined as an internalized knowledge of a language, and linguistic performance is external evidence of language competence. Factors other than linguistic competence may affect language use and form. These factors include the level of consciousness of the individual’s Deaf identity and the age of language acquisition.

A different point of view, as compared to research on second language critical period effects, is required regarding the critical period effects on signed language acquisition. Language acquisition is mostly delayed in the deaf population because the majority of

hearing parents do not use signed language with their deaf children. Since the majority of the deaf population, approximately 90%, has hearing parents (Holt, Hotto and Cole, 1994; Moores, 2001) many deaf children are not exposed to an accessible language during the preschool years. Deaf children of Deaf parents, however, have full access to mature, fluent and interactive communication with the adult language models. These culturally Deaf individuals can be compared to hearing children who have normal language stimulation. These Deaf children are often the language models for their peers at the Deaf schools where the others tend to look up to and learn from this Deaf ethnic group (Johnson and Erting, 1989). Several studies have examined the long-term outcome of signed language performance and competency on various grammatical structures in ASL by comparing the individuals whose signed language acquisition was delayed with other groups whose signed language was acquired on a normal schedule (Boudreault, 1999; Emmorey, 1991; Emmorey, Bellugi, Friederici, & Horn, 1995; Lock, 1996; Mayberry, 1993; Mayberry & Eichen, 1991; Mayberry & Fischer, 1989; Newport, 1990). This research on the age of signed language acquisition has found significant effects on several types of grammatical structures by using different processing tasks and measures.

In a study on ASL grammatical judgment conducted by Boudreault (1999), the ASL competency of Deaf participants with different ages of acquisition was investigated. The results indicated that ASL competency decreases with increased age of language acquisition. The Deaf ethnic group (native signers) outperformed other groups who acquired signed language at a later age or were from hearing families. Therefore, this suggests that language competency is not only linked with the grammatical knowledge of a language but may also be linked with the identity of the Deaf person.



Language competency and Deaf identity are undoubtedly interrelated and inseparable. For the successful development of these two spheres in Deaf education, both must be present in bilingual educational settings. The understanding of Deaf culture and the appreciation of ASL usage as a natural language of deaf students are essential for the development of Deaf identity in Deaf students. This is logical since the continuity of Deaf ethnicity revolves around the Deaf schools for deaf children as it revolves around the Deaf community for Deaf adults. ASL is the nucleus of Deaf education along with Deaf Studies being incorporated into the bilingual education curriculum that uses both languages (ASL as a first language and English as a second language) and both cultures (Deaf and hearing).

As previously discussed, the term *languaculture* (Agar, 1994) clearly defines the concept of the fusion between language and culture, and this often applies to minority groups. The consciousness of Deaf culture starts with a strong self-identity within the Deaf community that allows an individual to build a better awareness of the importance of ASL. ASL is viewed as a critical indicator for association with the Deaf community. Bilingual education will allow the deaf child of hearing parents to have the opportunity to acquire a strong foundation in a first language that is natural and accessible like ASL. The acquisition of the second language, such as English, will follow in order for them to be proficient bilinguals. The exposure to Deaf culture in bilingual settings leads to the development of Deaf identity in deaf children incorporating two cultures, Deaf and hearing. The bilingual environment has the presence of the Deaf ethnic members and they act as role models, linguistically and culturally, for deaf children who are from hearing families. The interaction with other Deaf ethnic members ensures a stable

development of social skills and self-identity in deaf children, where it is blended with the process of language development. The deaf children from bilingual educational settings will eventually become Deaf adults with stronger Deaf identities and increased ASL competency.

Considering Deaf people as part of a bilingual minority within the general theoretical framework of cultural diversity allows Deaf community members to understand more about their own self and group identity (Parasnis, 1996). The linguistic competency of ASL requires an in-depth understanding of the Deaf experience and visual concepts through the eyes of Deaf people. ASL performance is external and observable by other users, and it can also identify the cultural and linguistic background of the users. Deaf people with lesser linguistic competence may control the grammatical and lexical use of ASL. This linguistic maneuvering allows individuals to be selective about how they use certain complex grammatical constructions, such as not taking advantage of the use of space or classifier predicate structures. When these signers determine which grammatical structures they will produce they may eliminate possible errors. It may be difficult to distinguish or measure their ASL performance simply from sampling their natural language use. Measuring their language competency based on a specific psychometric tool can shed light on what Deaf signers know about the grammatical rules of ASL (Boudreault, 1999).

The findings presented by Glickman (1993, 1996) and Kannapell (1993) show that there is a need for further study regarding Deaf identity and ASL competency.

Glickman (1993, 1996) found a significant effect on communication preference related to cultural identity ( $p > 0.001$ ). Deaf people who were more comfortable with ASL

scored higher on the *immersion* and *bicultural* scales, see Figure 2. Ethnicity played a role in Deaf identity since the individuals who scored higher on the *immersion* scale were more often from Deaf families rather than hearing families and vice versa for the *hearing* scale ( $p > 0.001$ ). However there was no significant effect for ethnicity on the *marginal* and *bicultural* scales, see Figure 3.

Figure 4 shows there were significant effects on the Deaf individuals who had Deaf or hearing parents who signed, as they scored higher on the *immersion* and *bicultural* scales ( $p > 0.001$ ). This showed that the use of signed language in the family contributed to the internalization of Deaf culture and increased self-identity as a Deaf person.

Becoming deaf earlier in life did play a role in the development of the cultural Deaf identity as shown in Figure 5. Apart from the age of becoming deaf, the acquisition of a signed language during the critical period did not have a significant effect on the development of Deaf identity ( $p = ns$ ) (see Figure 6.), which was surprising. The most plausible explanation for that result was that the analyzed sample was only conducted with Gallaudet students who may have already developed, to some degree, their own Deaf identity while being enrolled at this university. Further study is needed on this aspect of Deaf identity in relation to the age of language acquisition.

Kannapell (1993) also felt that further research was needed to clarify the relationship between language and identity based on her findings, including the measurement of fluency in ASL and English among deaf children, deaf people's subjective reactions to languages and language users in relation to their Deaf identity, and comparisons of self and professional evaluations of linguistic skills.

In summary, the current study explores new questions regarding the relationship between grammatical competency in ASL and Deaf identity. Clearly there are good reasons and evidence to suggest that Deaf identity is strongly related to language competency. This research examines factors such as age of language acquisition, use of sign in the family, ethnicity, and psychometric testing of ASL competency rather than self-reporting methods, to determine more clearly how they influence Deaf identity development.

### Research Questions

The purpose of the current study was to understand the interrelationship between people's grammatical competency in ASL and their development of a Deaf Identity. This was based on the body of knowledge regarding the importance of the individual's identity within the sphere of language competence. The analysis of these two main factors were included within the context of other factors related to language skills, level of deafness, educational experiences, and community involvement. The experiment was aimed to understand the importance of the Deaf or Hard-of-Hearing individual through his/her language and identity development.

The research questions that guided my study were:

- 1) Is competency in ASL related to Deaf Identity?
- 2) Are there predictor variables that influence the development of ASL competence?

In order to answer these questions a quantitative study was developed implementing on-line data collection procedures as outlined in the following chapter.

## CHAPTER 3 – METHOD

The methodology of this study involves collecting data through on-line testing procedures and then using quantitative methods to analyze the collected data. This chapter will discuss the methods used for this study. The official website for this study was linked to the following URL: <http://www.deafnexus.com/deafstudies>

The implementation of this study involved novel methodology related to on-line testing with video playback. A thorough literature review of previous work in this area was required to ensure that all variables were scrutinized and carefully considered prior to implementation. A summary of this review follows to provide a better understanding of how the methodology regarding the technical aspects of this study was determined.

### Internet Testing

In the field of traditional psychometric research, the paper-and-pencil format is widely used, and has shifted progressively to computerized testing in the past forty years. For example, the Wechsler Adult Intelligence Scale (WAIS) was first automated in 1969 and was reintroduced in 1980 with a revised version (Byers, 1981; Schatz & Brownhyke, 2002). In the mid 1980s and early 1990s, internet access from home became a reality, which lead to the development of internet-based testing and assessment. The number of internet users has grown exponentially in the past few years to almost 39 million users in the United States and 3.6 million users in Canada as in 2003 (DeArgaez, n.d., Nielsen//NetRating, 2003). Broadband<sup>13</sup> usage has grown to replace lower internet

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<sup>13</sup> **Broadband:** Internet connection with larger bandwidth speed, which includes cable modem, DSL, LAN (Local Area Network), and Wireless connection (Wi-Fi).

connection speeds (dial-up modems), which has resulted in a 49% increase of high-speed internet users from 2002 to 2003 alone. Given this rapid increase, the result is a projected 41 million broadband users in the United States in 2005 (DeArgaez, n.d, Nielsen//NetRating, 2003). As overall usage has increased, access to the internet has also increased for individuals with disabilities (Newburger, 2002). Therefore, it is reasonable to assume that Deaf people are gaining access exponentially to the internet as it allows them to access a mode of communication that was previously unavailable to them. Communication tools such as e-mail, chat programs<sup>14</sup>, video-conferencing, interactive pagers, and seeking information on-line have empowered Deaf people to communicate amongst themselves and with the non-deaf population as they never have before. Given the rapid growth of high-speed internet access in the general population, and following the logical progression of testing thus far, it is reasonable to assume that communication tools available to Deaf people will be extended to various forms of on-line testing.

Many researchers have adopted computer-based technology within their testing and assessment tools for reasons of practicality and cost-effectiveness. The application of test validity and reliability remains a major factor in ensuring the results properly reflect the general population and prevent bias. A number of studies have been conducted to ensure that paper-and-pencil testing and internet testing are equally valid and reliable and these studies are discussed and comparatively analyzed in the literature review that follows.

#### *Internet vs. Paper-and-Pencil*

The most challenging aspect for the researcher when implementing a test on-line is to ensure that reliability and validity are equivalent to traditional testing with paper-and-

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<sup>14</sup> **Chat** (also known as instant messaging): A conversation between two or more people conducted via networked computer systems by typing messages and seeing immediate responses; takes place in real time.

pencil (PP) and this challenge has specifically been addressed in various areas of psychological testing. In general, researchers are attracted to using on-line testing because it allows them to reach a large pool of subjects, at a lower cost, and in a shorter time period. The literature reveals several studies that analyze the difference between the two formats (Internet and PP) and conclude there is a general positive favor toward the use of internet testing with some specific considerations.

Andersson, Kaldo-Sandstrom, Strom and Stromgren (2003) used the Hospital Anxiety and Depression Scale (HADS) in relation to patients with tinnitus and then used the Klockhoff & Lindblom grading system to compare the results with those obtained from patients tested via the internet. The results from the internet provided meaningful and valid data in terms of psychometric properties when compared with the PP format. The PP group's results revealed a lower score on the depression scale when compared with the internet group. Andersson et al. (2003) suspect that the internet group scored higher because the respondents were "self-recruited" and motivated to seek help from a psychologist. Yet even though the scores of the PP group were lower, the results do not show a significant effect ( $p = .09$ ). The data sample was small in this study (Internet:  $n=157$  and PP:  $n=86$ ) and Andersson et al. (2003) suggest future studies should be conducted with a larger sample for a factor analysis.

Buchanan (2002) explored the issue of the potential risk of self-diagnosis by the participants when undertaking on-line psychological assessment. He concludes that internet testing can be a valid and useful instrument, however, he cautions that psychometric properties should not be taken for granted.

Bressani and Downs (2002) conducted a comparative test with on-line and PP formats by using the Ansell-Casey Life Skills Assessment tool with three different grade levels (Grade 5:  $n=28$ , Grade 7:  $n=32$  and Grade 12:  $n=37$ ) by using repeated measures and a counterbalanced design. The results show there are no significant effects between the internet and PP testing formats.

Giuseppe, Teruzzi and Anolli (2003) conducted an experiment with both formats (on-line and off-line versions) that investigated participants' attitudes toward computer and internet use. A total of 203 participants were recruited for the on-line test and 202 undergraduate students were recruited from a large Italian university for the PP format test. The findings show that Web-based data collection neither statistically enhances nor diminishes the consistency of response even though the on-line sample was not controlled. The internet-based test can be a suitable alternative to more traditional PP based measures with careful considerations in developing a reliable and valid test on-line.

Kiesler and Sproull (1986) show that e-mail test administration produces lower error rates (0%) than does PP test administration (5.3%). The lower error rates are realized because the electronic format does not allow for illegible responses that are inherent with PP testing. When testing in a PP format, the Scranton answer sheets can be incorrectly marked resulting in higher error rates.

Miller et al. (2002) conducted a survey with several alcohol dependency tests (AUDIT: risk assessment of developing alcohol use disorders, ADS: assessment of severity of physical dependence symptoms, RAP: the occurrence of alcohol consumption toward social and health functioning, URICA: adapted test to monitor the readiness to behavior change for alcohol use, and drinking rate tests) using three different formats:



PP:  $n=88$ , Web:  $n=83$  and Web-I:  $n=84$  (Web-I, the participants were allowed to take a break from testing for between 1 to 48 hours). The results of these findings show no psychometric property differences between on-line and PP formats. Miller et al. (2002) suggest the Web-based method is a suitable alternative to more traditional methods. In addition, allowing breaks during lengthy Web-based assessment (group Web-I) from 1 to 48 hours did not compromise the reliability or validity of the measure. When asked about test preference, 80% of students preferred Web-based testing to paper-and-pencil assessment and only 8% preferred the traditional PP format.

Petit (1999) conducted exploratory research of internet testing with the Computer Anxiety Scale along with other factors such as demographic items. A total of 839 volunteers responded to the survey in 21 days. Petit concluded that using the internet is a viable method of data collection. Another study by the same author (Petit, 2002) was conducted by undertaking comparative research with internet and PP formats using three different tests: 1) Marlowe-Crowne Social Desirability Scale, 2) Perfectionist Self-Presentation Scale, and 3) Computer Anxiety Scale. The internet sample consisted of 2,649 self-selected adults and the PP sample included 459 adults. Petit found no difference between the internet and PP formats in the three tests and she concludes that internet testing may be comparable to the PP version. This study confirms the results of a previous study also conducted by Petit (1999) that found internet-based testing is a potentially useful and valid data collection tool.

Salgado and Moscoso (2003) conducted two different studies: 1) personality testing with the Personality Inventory of Five Factor (PI/5F) on the internet and with PP, and 2) perceptions and reactions with regard to the internet-based test compared to the PP

version of the same test. The first study was based on 162 undergraduate students' responses, and the second study included 123 undergraduate students and 42 managers who previously took the PI/5F internet test. Salgado and Moscoso (2003) conclude that results obtained from both the PI/5F on the internet and from the PP format are equivalent in psychometric properties and the norms are generalizable from one format to the other. The participants in the second study preferred the internet-based test to the PP version due to the ease of use and the ability to correct their answers quickly.

Based on comparative studies between internet-based and PP test formats summarized above, it is apparent that psychometric testing on-line is a feasible option for researchers to conduct large-scale studies. The next two sections will discuss the advantages and disadvantages of conducting psychometric tests on-line.

When compared to traditional PP testing, the development of testing on-line requires additional skills, such as computer knowledge and the ability to work with Web developers in setting up an on-line test. Although additional skills are needed, this is counterbalanced by the cost-savings that are realized when using internet-based testing. After completion of the test development, the costs related to data collection are considerably reduced. The cost reduction is due to several factors which include but are not limited to: disposable materials are not used; no need to reimburse the subjects for voluntary participation (if applicable); and a research assistant or test proctor may be used very little or not at all (Arnau, Thompson & Cook, 2001; Barak & English, 2002; Giuseppe et al., 2003; Miller et al., 2002; Sampson, 2000). Naglieri et al. (2004) state that internet testing is more scalable than the PP testing format. The term *scalable*, in the

language of the internet, means that a change in volume or the number of tests administered would result in very little additional cost.

In addition to being cost-effective, internet testing is also time-saving and allows for large-scale testing. The duration of the data collection decreases since on-line testing is available at all times and multiple tests can be conducted simultaneously across cyberspace from unique Web hosting servers. The time saving factor of internet testing is clearly illustrated by Petit (1999) where she collected data from 839 subjects in 21 days. Apart from the length of time for data collection, the number of participants is also a contributing factor due to greater access to a wide range of subject applicants, including those who live in remote locations (Arnau et al., 2001; Buchanan, 2002; Giuseppe et al., 2003; Naglieri et al., 2004; Petit, 1999; 2002; Sampson, 2000).

A further advantage is the quality of data entry is enhanced, since it is computerized, thus minimizing the data entry errors from subjects and researchers alike (Petit, 1999, 2002; Stanton, 1998). Barak and English (2002) state that data entry is rigorously monitored as the computer ensures that subjects complete mandatory fields before jumping to another page or question. The scores can be calculated accurately, without human mistakes, and can be easily transferred to other databases for norming procedures. Furthermore, test instructions are fully automated and more standardized for all subjects.

Another advantage is the features available on HTML<sup>15</sup> that allow researchers to incorporate additional tools within the test (which are unavailable in PP format), such as multi-media interface, video, graphics, confirmation buttons, etc. (Arnau et al., 2001; Barak & English, 2002). The accessibility of e-mail communication allows the subjects

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<sup>15</sup> **HTML (Hypertext Markup Language):** The page description language used to describe documents that are to be published over the World Wide Web (Zack, 2004).

to communicate with the researcher to address their concerns or questions related to the test on-line. Conversely, the researcher can contact the subject by e-mail after the completion of the test to ascertain whether or not the subject is willing to participate in other experimental tests simply by selecting a permission button (Barak & English, 2002).

Human nature is such that people are prone to changes in behavior while interacting with others, especially when it comes to confidentiality or revealing “unacceptable” behavior. Subjects tested on the internet are less intimidated and therefore more comfortable revealing sensitive data about themselves, which allows for increased test validity when comparable tests are conducted in the presence of a proctor or a researcher. Subjects tested on the internet are more candid when it comes to revealing personal information on-line, more so than in a traditional testing situation (Andersson et al. 2003; Barak & English, 2002; Buchanan, 2002; Bressanni & Downs, 2002; Budman, 2000; Giuseppe et al., 2003; Mead, 2001; Naglieri et al., 2004; Reynolds, Sinar & McClough, 2001; Salgado & Moscoso, 2003).

Miller (2000) conducted a test on-line regarding the prevention of alcohol abuse and noticed that participants who had never taken a Web-based assessment study and had no previous internet experience were willing and able to successfully complete a Web-based assessment.

Although there are many advantages to internet-based testing, there are also limitations that are specific to this format, just as there are limitations to traditional PP testing. There are several academic literature references that suggest careful consideration of the limitations in order to improve upon future testing tools on-line.

The technical aspect of hardware and software compatibility is important to ensure that everyone will be able to complete the test on-line without technical problems. The JavaScript<sup>16</sup> programming may not work for some older browsers and some do not have the plug-in required for the Java feature function. To function properly, the programming must be based on HTML and also must be compatible with older versions of the browser. Individuals who are not very computer-literate tend to use e-mail and internet browsers only; they will not typically go into the preferences setting to make changes or install/upgrade new software, such as installing a plug-in for enabling the JavaScript (Barak & English, 2002; Petit, 2002; Miller et al., 2002). Another technical consideration is that researchers may not be familiar with HTML language programming and may need to hire a Web developer to design the test on-line (Barak & English, 2002). The test development on-line may require at least 6 months to complete (Petit, 2002). Another concern is the modem connection speed to enable the user to connect to the test (Miller et al., 2002). Further to these limitations outlined above, the issue of accessibility with regard to the Deaf population will be discussed in the methodology chapter.

Subject selection within the general population may be biased, since the internet user tends to be younger, economically privileged, educated and female. Respondents are self-selected, rather than randomly selected, creating a further bias (Barak & English, 2002; Miller et al., 2002; Naglieri et al., 2004; Petit, 1999, 2002). The internet is borderless, i.e. global, and there is no way to monitor or identify the user who is logged

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<sup>16</sup> **JavaScript:** Designed by Sun Microsystems and Netscape as an easy-to-use adjunct to the Java programming language. JavaScript code can be added to standard HTML pages to create interactive documents (Big Bug, n.d.)

in. Demographics, such as age of the test taker or language and culture differences, cannot be monitored and multiple submissions from the same individual may occur (Barak & English, 2002; Buchanan, 2002; Miller et al., 2002; Naglieri et al., 2004; Petit, 1999, 2002). In addition, there is no control over whether or not the respondent is cheating, nor is there control over extraneous factors, such as distraction, environmental cues, fatigue or intoxication (Barak & English, 2002; Buchanan, 2002; Bressani & Downs, 2002; Petit, 2002).

### *Security Issues*

Security regarding sensitive data and information submitted on-line should be taken into consideration (Barak & English, 2002). There is an increasing trend of e-mail spamming and infiltration of privacy on the World Wide Web, which is also a security consideration. Often a spam e-mail address list is obtained from a database server who sells their information to other people for marketing purposes. When people are well informed about the security characteristics of the internet, they tend to be less reluctant to submit sensitive information on-line (Harris, Van Hove & Lievens, 2003; Horrigan & Rainie, 2002). The data server should be maintained behind a secure firewall<sup>17</sup> as it will reduce unauthorized intrusion to the data module from the outside. A traffic counter of the testing site should be added to monitor for undesirable intrusion into the data server (Fox et al., 2000; Naglieri et al., 2004).

The intellectual property of the test content on-line should be protected as well. Within the browser, it is possible to retrieve graphic or video images by using the access menu with Hot keys and the right mouse content menu selection command. In order to

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<sup>17</sup> **Firewall:** A special type of gateway server that monitors all traffic passing between a local network and the outside world to prevent security breaches (Zack, 2004).

prevent this, the Web developer can disable access menu selections, such as cut, copy, paste, export, save, save as, print, print screen, etc. (Naligeri et al., 2004). Part of the researcher's responsibility is to give consideration to all of the privacy and security issues mentioned above in addition to ensuring that all participants must be treated in accordance with the ethical principles and code of conduct of psychologists (American Psychological Association, 2002).

### *Visual Modality of ASL and Video Testing*

ASL is a visual language that incorporates space and time enabling the signer to communicate visually. Given the modality, testing in ASL is different than traditional testing tools using spoken languages either in a written form or with the medium of sound. Testing with ASL as the primary language of communication on-line requires Web developers to use video or movie technology to convey the message. When testing in ASL, many researchers have been faced with creatively overcoming challenges and dealing with their own limitations when administering tests in a way other than traditional spoken/written language test tools. Implementing a valid and reliable testing tool in ASL requires an understanding of the basic principles and limitations of the digital video playback with regard to the World Wide Web.

The study of the feasibility of implementing a new psychometric tool in ASL with video playback requires additional attention in regard to video quality, particularly issues such as image size, image clarity, and stability of video playback. The early experimental tools conducted in ASL used the traditional TV and VHS player to proceed with the experimental testing (Hoffmeister, 1999; Prinz, Strong & Kuntze, 1994; Supalla et al., 1995). The VHS player provides a real life equivalent of the video playback

smoothness at 29.97 FPS<sup>18</sup>. During the 1990s, the use of the VHS player was superior when compared to the computerized digital video, which was usually grainy or blurry, presented in a very small screen size, and generally played at 15 FPS (half the rate of the VHS). The VHS version represented the best choice for the ASL researcher in terms of quality video playback until early 2000 when video compression technology made its most advanced leap, made possible with Sorenson Video Codec (Rorder, n.d.; Segal, 2002). The limitation of the VHS player is that it does not allow the experimenter to measure the response accuracy automatically and it requires counting the data scores manually, which increases the possibility of error in data entry. Using VHS players for testing also requires having the participants physically come to the research laboratory or having the researcher carry all the equipment on site to conduct the experimental testing. The time and the cost involved for ASL testing with a TV and VHS player is greater than the cost of computerized testing.

An experimental tool for testing ASL competence based on grammatical judgment was designed and conducted myself in my previous work for Master's thesis research (Boudreault, 1999). The medium used for the test was digitally compressed video playback on a portable computer with PowerLaboratory software 1.0.2 (Chute & Daniel, 1996). The compression software used was Movie Cleaner Pro 1.2, which is the software of a previous generation to the new compression technology introduced by Sorenson Video Codec (Segal, 2002). The Media Cleaner Pro 1.2 allows the video to be rendered into an acceptable quality format: 30 FPS, Cinepak (format of video codec compression), millions of colors, 340 X 280 pixels, the computer LCD screen is set at 1024 X 768, and

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<sup>18</sup> **Frames per seconds (FPS):** In the industry standard, 29.97 FPS is used for video or TV, 24 FPS for movie (16mm, 8mm), 48 FPS for IMAX HD and Webstreaming usually uses 10 to 15 FPS.



an average of 300 Kbps data rate transfer. The testing was carried out with a portable computer, was not connected on-line and the results were recorded for accuracy and latency locally with PowerLaboratory software 1.0.2. (Chute & Daniel, 1996). This testing was successful in many aspects, and in particular, the ability to record the results automatically for accuracy response and latency response in milliseconds. The portability of the testing tool was an important factor in accessibility to testing outside of the laboratory environment that allowed the researchers to reach the participants within the Deaf community with ease. Apart from the advantages stated here, the test had its own limitations with video playback size as compression technology had not fully reached its potential to be conducted on-line. The participants commented that they would like to have a larger viewing area of the video, as the percentage of the video area within the screen was only 12%<sup>19</sup>. This testing tool was not available for on-line testing, as the bandwidth<sup>20</sup> for the internet user back in 1999 was predominantly a dial-up modem connection of 56 Kbps<sup>21</sup> (average of 10 times slower than DSL or a cable modem connection). The data rate average of 300Kbps required to play a video is far too demanding for a dial-up connection, where the maximal capability is to handle an

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<sup>19</sup> **Pixels:** Image quality calculated by the ratio of the video area divided by the screen area:  $(340 \times 280) / (1024 \times 768) = 0.12$

<sup>20</sup> **Bandwidth:** The amount of information that can be transmitted through a communication channel (Zack, 2004).

<sup>21</sup> **Kbps:** Speed that measures how much data can be transferred in one second to your computer and is rated in KiloBits per second (Kbps). This can cause some confusion since the size of files is measured in Kilo Bytes (KB) and when you download a Web page or a file, your browser will indicate Kbps and not KB. Mathematical conversion: 1 Byte = 8 Bits. (Bug Club, n.d.)

Example:

1) 1 MB = 1024 KB, 2) 6 MB = 6144 KB (6 X 1024), 3) 6144 KB = 49152 Kilo Bits (6144 X 8),  
4) 49152 KiloBits (File Size) / 256 Kbps (Speed) = 192 sec or 3min 12 sec to transfer 6MB file.

average of 50Kbps. Based on the experience acquired from the development of a testing tool and the knowledge others have gained from developing psychometric tests on-line, the recommendations for future versions of testing in ASL on the World Wide Web are enumerated below.

### *Considerations for On-line Testing in ASL*

The psychometric testing in ASL should be done only in comprehension (receptive mode) and the use of face-to-face video conferencing is not suggested for reliability purposes. With a broadband connection, such as DSL or cable modem the data rate for downloading Webpage contents is generally much faster than uploading<sup>22</sup>, see Table 7 for a more detailed comparison chart. Since the download and upload speeds are not always equal, it is very important that the quality of the video playback is optimized for testing in ASL, given that grammatical sensitivity is based primarily on the visual reception of the participants.

Yoshino et al. (2001) conducted an experimental psychiatric interview with non-deaf chronic schizophrenia respondents using televideo and concluded that the reliability of the test is insufficient with narrowband infrastructure. Since the speed of upload with DSL or cable modem is similar to the narrowband speed, this supports the idea that face-to-face interactive testing is not possible in ASL.

Hardware and software are not the only factors in preventing the use the video conferencing; the contact language effect is also present on-line when the connection speed is not optimized. The signer will probably modify their ASL register and signing

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<sup>22</sup> **Download/Upload:** 1) Download refers to the action of transferring data from a remote computer to your local machine. 2) Upload refers to the act of transferring data from your computer to a remote system .

style toward English ordered grammar due to the lack of clarity in the transmission of images and the limited use of space when using a webcam (Keating & Mirus, 2003). The contact language effect is also described in literature that refers to language use in the Deaf community. When Deaf individuals are faced with new communication situations or situations that are more formal, they tend to modify their language use from ASL to English-based signing (Lucas & Valli, 1992). Given the sensitivity to test reliability and validity, testing with video conferencing is not an option at the moment because of the contact language effect and the influence of technical features, such as lighting, distance, texture (clothing and background) that can also determine the level of clarity in signal transmission.

The major concern when implementing an on-line test in ASL is the quality of video playback. However, new developments in video compression software allow researchers to materialize a much larger video size. By increasing video size, the quality of the image is increased as well, and the memory requirement is decreased with Sorenson Squeeze 3.1 Software that generates its own encoding technology called, "Sorenson Video Codec" (Segal, 2002). With these new developments, the video size will be 480X360 with a data transfer rate averaging from 90 to 100Kbps, three times faster than the transfer rate in my earlier experiment (Boudreault, 1999). The target bit rate of the video playback per second should be at least 5% to 10% below the current maximum internet speed. If the video target bit rate is 100Kbps, then the minimum download speed connection for the user would be a narrowband of 128Kbps<sup>23</sup>. This is a breakthrough in

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<sup>23</sup> **Minimum Download Speed:** "...the target bit rate is set lower than the ideal bit rate for the connection (e.g. 56Kbps modems can only achieve 53Kbps). Many encoding technicians will target a bit rate at 42

the area of digital video compression technology, which allows the video file to be sent through the internet with less bandwidth, however not with a dial-up connection (see Table 8). To ensure maximum quality, the percentage of the video window and the browser window should be twofold or even threefold that which was used in Boudreault (1999). Standard set-up of a browser window size of 800 X 600 results in a viewing area of 36%<sup>24</sup>. The current digital video compression technology meets the needs required for on-line testing and the visual modality needs of Deaf participants.

Apart from the video playback size, the screen resolution is an important factor to consider when ensuring the display screen is set-up properly. Individual preferences vary with regard to screen resolution set up, some prefer 640 X 480 and others prefer 1024 X 768 or higher. A study conducted in 2001 by WebSideStory and Browser News states approximately 5% of internet users use 640 X 480 screen resolution. The most popular screen resolution size is 800 X 600, preferred by 50% of users, and some users prefer even higher screen resolution (Thomason, 2001). Screen resolutions of 800 X 600 and 1024 X 768 are acceptable for video playback. In order to control the uniformity of the screen size, researchers should provide instructions to Deaf participants advising them to set up their computer screen resolution at 800 X 600. These instructions can be given step-by-step with JPG pictures in both operating systems: PC Windows and Mac OS.

The internet connection speed is a factor that will determine how the test format will be presented. Testing in ASL requires the use of a much larger video screen to enable Deaf participants to view test items clearly and without restrictions. To determine test

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kbps or even 36 Kbps. For full blown, two-channel ISDN connections that have a maximum bandwidth of 128Kbps, set your target at 100Kbps or even 80Kbps." (Roeder, n.d.)

<sup>24</sup> **Viewing Area Calculation:** Pixels of the video area divided by the screen area:  $(380 \times 360) / (800 \times 600) = 0.36$ .

accessibility among the general Deaf population, a literature review was conducted regarding computer access and type of bandwidth used within the Deaf community. There is no strong statistical evidence pertaining to computer access, however there is a general assumption that 20,000 Deaf people use a computer at home and 100,000 Deaf people have high-speed internet access at home or public computer access in the United States (A.J. Lange, President of the National Association of the Deaf, personal communication, August 1, 2004). Zazove et al. (2004) conducted a study of Deaf people and computer use, and based on a sample of 227 participants, only 63% reported computer use, which occurred mostly at home. However, this study does not mention general high-speed internet access among the Deaf population at locations other than a person's home. The increasing use of Video Relay Service<sup>25</sup> (VRS) in the past number of years has lead to an astronomical increase in the number of minutes that are logged on VRS calls by Deaf people who use ASL. NECA (2004), who administers the VRS funding from the Federal Communications Commission of the United States, reported an increase of VRS use during the period from June 2003-June 2004 of 196% compared to an underestimated initial assumption of a 30% increase for the same period. This critical information leads to the assumption that the number of Deaf users with high-speed connections has also increased exponentially for the same period. The assumption is based on the fact that using VRS requires a high-speed internet connection and a computer.

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<sup>25</sup> **Video Relay Service:** VRS makes a phone call possible with a Video Interpreter (VI) who assists with the call on-line in ASL. The Deaf consumer signs to a Video Interpreter who speaks to the voice user and then in turn the VI signs the voice user's communication back to the Deaf consumer, similar to a phone relay service.

In conclusion, a comparison has been drawn between two testing formats, internet-based and pen-and-paper, showing there was no statistical difference between the outcomes, suggesting that on-line testing is a viable option. On-line testing has been shown to have more advantages than disadvantages, and some of the disadvantages can be overcome with additional security features within the test to strengthen the reliability and the validity of the test results. As for special considerations for testing in ASL, the use of video playback and implied technical issues were explored carefully in this review. Current technology allows researchers to develop a higher quality of video playback with a lower data rate transfer per second. Furthermore, on-line testing in ASL allows respondents to participate by using their native language. On-line testing in ASL will lead to infinite possibilities for the academic world to diminish the communication gap that currently exists between hearing people and ASL users.

The next section of this chapter explains the specific methodology used in the study, based on the previously reviewed work related to the use of technology in signed language research. This is discussed in three main sections: 1) participants' profile, 2) structure of the on-line testing, and 3) technical aspects of on-line testing.

### Participants

The participants who joined in this study were self-recruited on-line through various modes of recruitment; 1) Flyers were distributed and posted at various Deaf events at two university campuses that serve the Deaf and hard of hearing population (California State University, Northridge and Gallaudet University), 2) Email distribution from the researcher's personal email list, 3) Postings in various Deaf and hard of hearing related listserves, 4) Web link to the study website from the researcher's email signature,

and 5) A one month commercial announcement in <http://www.deafnewspaper.com> was used during the month of August 2005 (see Appendix A).

The anticipated length of time required for each participant to complete the on-line testing was one hour and the participants did not receive any compensation of any kind; this was a completely self-voluntary study. The participants could complete the study virtually anywhere but were asked to find a time and a place where they could complete the study in a quiet place without any interference.

In order for the video playback to be properly displayed with a large area of viewing and playing at full rates (30fps), it was required that the participant's computer be able to receive at least 256Kbps. An internet speed test was conducted. If the internet speed requirement was satisfied, the participant obtained a one-time identification code for the test and they were given the code by email. From the participant's email, they were given a direct link to enter the official website testing. This link also allowed them to return to the testing if they were suddenly cut off during the procedure for technical or human reasons. Following such interruptions, the database led the participant back to the last question responded to, and thus avoided having to redo the whole testing procedure.

The exclusion and inclusion of participants in this study was made at the completion of data collection by myself based on previously determined criteria as listed below. The reason for this was to allow for participation without restriction by all who were interested, in an attempt to diminish false declaration of background information. Although data was collected from hearing<sup>26</sup> and Deaf participants with first and second

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<sup>26</sup> **Hearing participants** were included since direct access to participants profile on-line was not available. Open access to all participants in this study allowed for gathering authentic and honest answers, and reduced the possibility of participants falsely identifying themselves as deaf.

signed language skills from a range of age groups and both genders, the following exclusion criteria determined the data that was not included in the analysis for the current study:

- 1) Hearing
- 2) Under 18 years old
- 3) Failed the high-speed internet test
- 4) Non completion of all test items

Asking respondents for detailed demographic information in the background questionnaire allowed the researcher to determine which population self-selected to be included in the analysis. Using the above criteria, 99 participants were included in the data analysis. More complete descriptions and profiles of the participants are provided in chapter 4 (Results).

A complete review of the research protocol for this study, including recruitment, obtaining consent, testing procedures, and data collection, storage, and analysis, was approved by the University of Manitoba Education/Nursing Research Ethics Board in January 2005. Following these guidelines ensured that the participants' confidentiality and informed consent was maintained.

#### Structure of the Test On-Line

The test was entirely developed and carried out on-line in two languages, American Sign Language and English (except for ASL testing sections which were available only in ASL). The test had four main sections; 1) Background Questionnaire, 2) Deaf Identity Development Scale – Revised (DIDS-R), 3) ASL Test, and 4) Test of Grammatical Judgment in ASL – Revised (TGJASL-R). The four testing sections were accompanied by three sections related to the testing protocol; 1) Home page for consent



form, 2) High-Speed internet test, and 3) Future research directions. For an overview of the website structure, please refer to Appendix D.

The general instructions of the study were presented in two languages, ASL and English. Refer to Appendix E for the entire web content script in English, and sample screenshots shown in Appendix F. The questionnaire and test items were presented in two languages, except for the ASL testing in sections 3 and 4, which were only available in ASL.

The home page, <http://www.deafnexus.com/deafstudies>, introduced the purpose of the study. If the participant was willing to continue to complete the study, they were asked to read the consent form and to provide an electronic signature (no ASL version was available for the consent form). The consent form sample is attached in Appendix B. Participants were asked for their email address to send them a unique password login by email for access to the official page of the study. If the participant refused or disagreed with the consent form, they were directed to exit the website and were asked whether or not they were interested in participating in future research. If they were interested, they would have to complete the consent form for future research participation as shown in Appendix C. This form applied to all participants who completed the test as well.

The High-Speed internet testing was performed on each participant's computer to ensure that the bandwidth met the minimal speed of 256 Kbps. If the speed test was successful, the participants were directed to the first section of the test, Background Questionnaire. Otherwise they were forwarded to the interest in future research participation page.

The first section of the four testing areas focused on participants' background information and it was divided into five subsections totaling 57 main questions and 26 sub questions. See Appendix G for a complete version of the questionnaire. When the participant completed or responded to all the questions, they were forwarded to the second section, DIDS-R.

The second section focused on determining the participant's Deaf identity development with the DIDS-R self-rating scale, totaling 60 items. Please refer to Appendix H for the English version and Appendix I for the ASL translated version of the DIDS-R. When the participant completed or answered all these questions, they were forwarded to the third section, the ASL test.

The third section focused on testing the participant's comprehension of ASL using two stimuli. The participant was required to answer both items correctly in order to proceed to the fourth and last section, the TGJASL-R. Please see Appendix J for a description of the two stimuli. In this way, the two stimuli served as an initial screening test to prevent people without ASL skills from randomly responding to items in the TGJASL-R and skewing results. If participants did not respond to both stimuli correctly they were forwarded to the interest in future research participation page.

The last of the four sections focused on testing the participant's grammatical knowledge of ASL with a total of 78 stimuli and 4 practice items. For a complete list of items, see Appendix K. Participants were required to complete a series of four practice items before proceeding to the TGJASL-R test. When the participants completed all four testing sections, they were forwarded to the interest in future research participation page.

### *Background Questionnaire*

The background questionnaire was developed and expanded by the principal researcher based on previous studies (Boudreault, 1999, Chamberlain, 2002) and provided information about the participants' education, work, hearing status, and communication experiences. There were five parts for a total of 57 questions and 26 sub-questions; 1) Part I: General Personal Information totaling 17 questions, 2) Part II: Hearing Status totaling 11 questions (with 6 sub-questions), 3) Part II: Communication totaling 5 questions (with 20 sub-questions), 4) Part IV: Language Mastery totaling 10 questions, and 5) Part V: Community Involvement totaling 14 questions.

There were three different answer formats used in this questionnaire; 1) by radio buttons, 2) by filling the blank box with text, and 3) a drop list with possible answers. For Part IV (Communication), a 10-point Likert scale was used with a radio button format; 1 = None, to 10 = Excellent. For Part V (Community Involvement), a 5-point Likert scale was used with a radio button format; 1 = Never, 3 = Once in awhile, 5 = Regularly, for questions #44 - #50 and #53 - #56; 1 = Inactive, 3 = Moderately Active, and 5 = Very Active, for questions #51, #52 and #57 inclusively.

Each question was generally in a small group of questions per page (2 or 3 questions at a time). Along with each question, there was a video clip making the ASL version available to the participant for viewing (see appendix G). For a complete description of the video production process, see below under technical aspects of on-line testing.

### *DIDS-R*

The Deaf Identity Development Scale Revised (DIDS-R) was used with the authors' permission (Glickman, 1993; Fisher, 2000; Fischer & McWhirter, 2001).

The DIDS is a self-reporting scale designed to measure the different stages of Deaf identity development. All the questions were presented in two languages, written English and ASL through video playback. The participants answered 60 questions with a 5-point Likert scale; SA - strongly agree, A - agree, DK - don't know, D - disagree, and SD - strongly disagree, from left to right respectively.

The DIDS-R was divided into four scales: 1) Hearing, 2) Marginal, 3) Immersion, and 4) Bicultural. 15 items for each scale were presented in random order in this study.

The DIDS-R items were translated into ASL by the researcher with the collaboration of two other Deaf translation experts, Dr. Lawrence Fleischer and Dr. Genie Gertz of California State University, Northridge. The translation of the items in glosses was available from Glickman's dissertation (1993), however the signed version was not available. A revision of the translated items was performed and filmed for this study. For a complete list of the items in English, see Appendix H and for the ASL version in English glosses, see Appendix I.

### *ASL Test*

The ASL test was presented in the third section of the on-line testing instrument. Two ASL sentences were used to determine the participants' knowledge of ASL grammar. The ASL test had two purposes; 1) to determine whether or not the participant could comprehend ASL stimuli, regardless of hearing status (hearing, hard of hearing, or deaf) the final section of the on-line testing was to be completed only by participants who

use ASL to avoid random responses, 2) to ensure that the participant was able to view the video clips on-line, which is a requirement to complete the following section of this study. The participant may have completed the previous sections without using the video clips and platform or software incompatibility would not have been detected.

Both sentences were presented in ASL accompanied by a choice of five representative drawings in color, where the participant selected the correct picture for each stimulus. The first sentence had a lower level of complexity compared to the second sentence, but both involved basic vocabulary and grammar structures. The participants were required to correctly answer both ASL stimuli to continue to the next section of the study.

The first ASL stimulus included the relationship between Agent (Subject): FRIEND and Patient (Object): BOY, the verb used was: PUSHING. The Agent performed the verb toward the Patient, the participant must understand ‘what’ or ‘who’ the Agent is pushing. The translated sentence of the stimulus is: *The boy pushed his friend on the swing*. See Appendix J, Stimulus 1 to view the item.

The second ASL stimulus included the relationship between Agent (Subject): GIRL and Theme (Object): HOUSE/CANVAS. A series of two distracters was used with minimal pairs of signs where the difference was situated within the handshape marker. The first distracter used was the classifier predicates CL:/B/ and CL:/U/ to represent “brush”, wide for wall painting vs. narrow for portrait painting respectively. The handshape CL:/U/ was the correct one. The second distracter used was the color signs GREEN vs. YELLOW. Both share similar features except for handshape (/G/ vs. /Y/ respectively). The handshape /Y/ was the correct one. In addition to this, the Non-

Dominant Hand was used in this sentence to sign the CANVAS while the Dominant Hand was used to indicate the process of PAINTING toward the canvas. The translated sentence of the stimulus is: *The girl is painting a yellow house on a canvas.* See Appendix J, Stimulus 2 to view the item.

### *TGJASL-R*

The TGJASL was first used in the principal researcher's Masters thesis (Boudreault, 1999). It covers six different grammatical categories with a total of 164 items. The subjects had to determine whether the sentence they viewed was grammatical or not, and they responded with 'yes' or 'no' answers. This method of grammaticality judgment is frequently used to assess language skills and this instrument has proved to be a reliable and valid measurement tool of ASL competency. The sentences in all grammatical categories were reviewed by an ASL linguist, Dr. Terry Janzen, and a Deaf native signer, Rick Zimmer, to ensure that stimuli reflected appropriate structures. The final revised version was downsized to 78 sentences; 6 grammatical sentences and 6 ungrammatical sentences for each of the five categories, including simple sentences, negatives, verb agreement, relative clauses, and questions. As for the classifier predicate category, there were 9 sentences of each grammatical category, with two different levels of complexity: simple (6) and complex (3). There were four practice sentences prior the test. See Appendix K for a complete listing of the ASL items in English glossing. All the sentences were presented individually with a QuickTime video playback.

### Technical Aspects of On-Line Testing

This study established a milestone in the field of the academic research through on-line data collection with video playback in American Sign Language. The new

medium of data gathering was the most challenging part of the research process. The development, engineering, programming and implementation of software to integrate 222 video clips along with written English throughout the website was a critical feature of the data collection process. The project was made possible through constant collaboration with Chad W. Taylor of MöSDeux ([www.mosdeux.com](http://www.mosdeux.com)), a deaf software engineer and programmer. He was an important independent contractor in the success of this research project. The following section describes the technical aspects of the on-line testing, including video production, website development, and data storage and analysis.

### *Video Production*

The video used in this project was entirely produced by the researcher. It was shot with a 3CCD Panasonic AG-DVC80 camcorder with 4:3 aspect ratio, and filmed with a professional 3-point lighting system, 500W each with softboxes against a blue background. The background did not have any shadow effect due to the lighting coming from both sides of and above the signer. The videotaping was of professional quality and it was completed during the month of the January 2005. The video was recorded digitally with professional quality miniDV tapes and transferred to desktop computer. The video was edited with Final Cut Pro 4.5 software on an Apple G5 dual 2.0Ghz computer. The edited video was compressed with Sorenson Video Squeeze 4.1 software in QuickTime version. The compression settings were made as follows: Sorenson Video 3 Pro Codec, 2-pass VBR, the average data rate was 450 Kbps (i.e., 8 second video clips averaged 482 K), the frame size was at 320 X 240, the frame rate was at 29.97 fps (no dropped frames from the original format filmed in the studio), and it was set to force for playback scalability in order to play the video without interruption due to the data downloading.

The video was played in a progressive mode instead of using the streaming mode. The choice of the video playback was based on previous testing of various connection speeds and operating systems. The researcher concluded that it was more dependable for the study that all video be downloaded to the participant's computer memory cache instead of streaming the video. This would avoid a significant loss of the data packet during video playback, which could stop or freeze the video due to several factors, such as, participant's operating system efficiency and the fluctuation of the internet connection speed. A data packet loss would compromise the ASL testing section, which relied on a seamless flow of the video playback. The QuickTime progressive video playback was the best choice at the time of the website development in terms of video quality and data size. The video controller was removed throughout the study, but each video began and ended with a black fade in/out. Throughout the components of the website, with the exception of the ASL testing section, the video could be played repeatedly by the participant by double-clicking the command on the video window.

#### *Website Development*

The website development was made possible by Chad W. Taylor of MöSDeux and the graphic design interface was made by Chad W. Taylor' subcontractor, Adam Betts. The website was entirely developed based on open source software CocoaMySQL (<http://cocoamysql.sourceforge.net/index.html>) for video, questionnaire, and content structure management. The web hosting was with Crazy Web Hosting Inc. (<http://www.crazywebhosting.com>), a deaf owned company based in Texas. The direct and friendly customer support provided by this company was an important factor in the completion of the website development and in providing flexibility for data storage. An



unexpected problem was encountered with the cross platform and cross browser for this study. The video playback posed a tremendous challenge for cross platforms for both operating systems, Window XP and OS X. The problem was resolved by imposing that participants use a specific browser for each Operating System; Safari web browser for Mac OS X and Internet Explorer for Window XP. If the participant used a different web browser, the study website asked them to switch to either of the two specified browsers. This was due to the time and financial restrictions to develop and test multiple browsers for this study.

### *Data Storage & Analysis*

All the data collection in this study was performed automatically on-line and the data was submitted with a secure 128-bit Secure Socket Layer (SSL)<sup>27</sup> through an encrypted<sup>28</sup> 128-bit channel to the server. The participant received a unique and one-time access user code for unlocking the test website. To increase the data reliability, the database retained a list of email addresses of participants who had completed the test in order to reduce the multiple test effects. The data was stored in a secure server with an open source software MySQL database (<http://www.mysql.com>). The test results were sent to the server one at a time and were also encrypted. The electronic data storage was saved in a file that required an encrypted password to unlock it for analysis by the researcher. Added security features ensured that the participants' personal information and data results were protected against unauthorized access. The researcher of this study downloaded all the

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<sup>27</sup> **SSL:** "A secure communications protocol designed by Netscape that enables encrypted connections to be made over the Internet" (Zack, 2004).

<sup>28</sup> **Encryption:** The encoding of data so that it may be read only by authorized persons (Zack, 2004).

collected data at the end of the study. The identity of each subject was replaced with a generic code before proceeding to statistical analysis. All the data were transferred to Excel software to perform data organization and management prior to transferring to other software for statistical analysis within the SPSS 13.0 program. The results of this analysis are presented in the next chapter.

## CHAPTER 4 – RESULTS

Ninety-nine individuals were included in this study from the original pool of 219. Participants were recruited from various forms of information dissemination as outlined in chapter 3. Once participants volunteered to participate, the process of exclusion and inclusion was made in three steps: 1) preliminary screening, 2) secondary screening, and 3) final screening.

The preliminary screening was made to determine whether or not participants had access to an Internet broadband speed connection to ensure the ability to view the video clips online. Fifty-four participants (24.7%) failed this initial requirement. The secondary screening excluded individuals who did not meet the study criteria such as: 1) hearing participants, 2) under 18 years old, and 3) did not formally log in after completing the agreement. Four hearing participants (1.8%) completed the test but were excluded from the data analysis. Four participants (1.8%) were under the legal age of 18 years old. Twelve participants (5.5%) did not complete a sufficient number of questions, or did not formally log into the test. A total of 20 participants (9.1%) were excluded at this stage.

The final screening was related to the ASL testing section. Thirty participants (18.3%) were unable to complete the ASL test or failed to answer correctly. There were two possible explanations for this. First, participants may have been unable to play the video clips since viewing videos in the first two sections of the test (background and DIDS-R) was not necessary. The participants may have proceeded through the test without viewing the clips, depending on the written English text to complete the first two sections. A second possibility is that participants were not able to correctly answer either one or two of the sentences in the ASL comprehension task. Sixteen participants (7.3%)

did not complete the TGJASL-R section for unknown reasons. Forty-six participants (21%) were excluded at this final stage of the exclusion process. This research project was based on the remaining 99 participants (45.2%) as shown in Figure 7.

### General Information About the Participants

The detailed background questionnaire provided general data about the participants in this study. There were five main subcategories of the questionnaire: 1) general personal information, 2) hearing status, 3) communication, 4) language mastery, and 5) community involvement.

#### *General Personal Information*

As shown in Table 9, there was a larger percentage of women (62.3%) than men (37.4%) in the sample. Table 10 describes the age distribution of the participants. The participants' age ranged from 19 years old to 71 years old. Participants were grouped by age in increments of 10 years except for the last increment, which was from 59 to 80 years old. This showed that there were a balanced number of participants in each age group.

Table 11 describes the ethnic diversity of the sample. There was a greater proportion of Caucasian people in the sample (90.9%), in comparison to minority groups (9.1%). All participants originated from North America where ASL is commonly used (Canada and United States). Canadians accounted for 19.2% of the sample and Americans accounted for 81.8% of the sample, as shown in Table 12.

For a more detailed description of the distribution of participants by regions of each country, please refer to Tables 13 and 14. In Canada, the majority of the participants originated from Ontario (36.8% for Canada only) and Manitoba (36.8% for Canada only).

As for United States, the largest portion of the sample came from the West Coast (38.75% for US only), followed by two other regions, Middle Atlantic (16.25% for US only) and South (16.25% for US only).

Regarding the household income of the participants, please refer to table 15. The median incomes of the sample were within the range of \$40K and \$59.9K. The household income distribution seemed to be normal and representative of the general population of North America.

There was a large range in education levels achieved by the participants in the sample as shown in Table 16. Approximately 20% of the sample was educated at the high school level or below. Fifty-four percent of the sample were either currently college or undergraduate students, or had completed an undergraduate degree. Approximately 20% of the sample were currently graduate students or already held a graduate degree.

As shown in Table 17, the distribution of majors among the participants was as follows: Liberal Arts 35.6%, Business 21.2%, Computer Science 11.1%, Science 6.1%, Social Science 5.1%, Engineering 2%, Medicine 1%, and 13.1% responded "N/A" for non-applicable. The largest portion of the participants studied in Liberal Arts, which suggested that fluent communication in spoken and written English, or in written English and ASL (bilingual) would be necessary to succeed in higher education endeavors.

Of the respondents who were pursuing or had completed a college or university education, most of them attended more than one academic establishment during their higher-education endeavors. From a total of 133 responses recorded, where multiple responses were possible, 62.3% of the participants stated that they went to one of three different renowned institution that serve and support Deaf/hard of hearing students

(Gallaudet University 41.1%, California State University, Northridge 12.1%, and National Technological Institute for the Deaf at Rochester Institute of Technology 10.1%). Forty-eight (48.5%) participants went to a hearing college/university where interpreting services and/or other support services were provided. The remaining 10.1% of the participants went to a hearing college/university where interpreting services and/or other support services were not used or were not provided as shown in table 18. This demonstrates almost all participants went to colleges and universities where direct communication or support services were available.

Information regarding the employment status of participants is provided in Tables 19 and 20. The results showed a general tendency of under employment among the participants in this study.

### *Hearing Status*

The hearing status of the sample denotes a greater number of participants who self-labeled themselves as Deaf (87.9%) in comparison to those who labeled themselves as hard of hearing (12.1%). The results were based on their own assessment, thus do not include a formal audiometric test of hearing level as shown in Table 21. Generally, the sample represents a greater portion of culturally Deaf individuals.

There was also a greater number of the sample who were born deaf at 70.7%, and the early onset of deafness, before four (4) years of age, accounted for 19.2% of the participants. The onset of deafness between five (5) and 10 years of age accounted for 3% of the participants; the onset of deafness between 11 and 20 years of age accounted for 1% of the participants; and there was only 1% of the participants who had a late onset

of deafness of after 21 years of age. 5.1% of the participants stated that the age of onset of this condition was unknown, as shown in Table 22.

The hereditary factor of deafness among the participants indicated that 28.3% were born either from both or one deaf parent(s) (one parent 8.1% and both parents 20.2%). The remaining participants (71.7%) had hearing parents as shown in Table 23. The sample of this study had a greater proportion of deaf participants born of deaf parents than is reflected in the general population, which is generally assumed to be 10%.

The participants who were using hearing aids during the study accounted for 36.4% of the sample, and the rest (63.6%) were not using amplification devices. In another note, there were only 6.1% of the participants who were using a cochlear implant at the time of this study as shown in Table 24. The use of assistive hearing devices among the participants appeared to be representative of the culturally Deaf population.

### *Communication*

Various modes of communication were used among the participants in this study during various stages of their lives, including ASL, SEE (Signing Exact English), PSE (Pidgin Signed English), oral and written English, and gestures. A clear trend in participants' preferred means of communication from childhood to adulthood was demonstrated, with a significant increase towards the use of ASL and a similar decline in the use of speech/oral methods. See Figure 8 for details.

The communication of the participants in this study among family members indicated that approximately one-third opted for ASL as the language of communication with their immediate family members (mother, father and siblings). However the oral/speech method accounted for approximately half of the participants' means of family

interaction, and this proportion generally remained constant for all members of the family. The distribution and use of communication methods with family members is shown in Figure 9.

The communication used by participants at school from pre-school to high school showed a significant shift from speech/oral methods to ASL as the language of choice. The communication used by participants in mainstream settings reflected an inverse trend from regular classes with a signed language interpreter to classes with other deaf children as the schooling years increased, as shown in Figure 10.

The general preference of communication among the participants varied depending on how the individuals interacted with other people. Interacting with hearing individuals generally resulted in equal use of speech/oral (48.5%) and written (43.4%) English. However the use of ASL increased with hearing individuals who were closer to the participant's everyday life (workplace and friends). The use of speech/oral and written English remain other alternative means of communication with hearing individuals. While the communication preference with deaf friends or deaf colleagues in the workplace was ASL (Figure 11).

### *Language*

Participants' age of signed language acquisition was categorized into four different AOA (age of acquisition) groups: Native<sup>29</sup> (0 to 4 years old), Early (5 to 7 years old), Delayed (8 to 13 years old), and Post-Puberty (14 years old and older). The Native group accounted for 35.6% of participants, the Early group accounted for 14.1%, the Delayed group accounted for 16.2%, and the Post-Puberty group accounted for 34.3%, as

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<sup>29</sup> Native is used here, this include individuals who are born from Deaf parents and those who are considered their ASL as primary language even if they are born from hearing parents



shown in Figure 12. The participants' AOA among these categories was not equally divided, however the distribution was reasonably representative of the deaf population.

The self-measurement of language skills was based on a Likert scale from 0 ('Not at all') to 10 ('Excellent') for both comprehension and production of five different areas of communication: ASL, SEE, PSE, Speech/Oral, and Fingerspelling. The overall results showed that ASL and Fingerspelling received the highest level of mastery. The comprehension levels of SEE and PSE were ranked higher than the production levels of these communication methods. The speech/oral skills were considered the least mastered of all the various means of communication, as shown in Figure 13.

A comparison of self-evaluated language skills and AOA of ASL revealed several significant relationships. The level of ASL comprehension decreased significantly within the post-puberty AOA group. Speech comprehension increased significantly with increasing AOA, whereas fingerspelling comprehension showed the opposite trend and increased as AOA decreased, as shown in Figure 14. Levels of language production also showed a connection with AOA of ASL. There was a significant decline of ASL and fingerspelling production within the post-puberty group; however, speech production increased significantly with increasing AOA as shown in Figure 15.

#### *Community Involvement*

Participants provided a self-measurement of their degree of involvement with hearing and Deaf communities. Most participants demonstrated a higher degree of involvement with the Deaf community than with the hearing community. There were a few participants who were highly active within the hearing community as shown in

Figure 16. This involvement may have been due to their communicative preference for oral/spoken language.

### Results of DIDS-R

In this section, a summary of the results from the DIDS-R (Fischer, 2001) is presented. First, Cronbach's Coefficient Alpha for internal consistency was performed to ensure that the replication of the DIDS-R in this study was consistent with previous findings. Second, interscale correlation reliability was performed to ensure that the reliability between studies was consistent. Third, an overall summary of the DIDS-R results will be discussed.

#### *Cronbach's Coefficient Alpha for internal consistency of DIDS-R*

Cronbach's Coefficient Alpha for internal consistency was performed for comparison with previous studies (Glickman, 1993; Fischer, 2001). In this study, the DIDS-R was used with 60 items (15 items for each of the 4 scales) based on Fisher's (2001) test before it was reduced to 47 items in accordance with meeting a minimal score of the coefficient factor of 0.8. The 47 items of DIDS-R as follows: Hearing Scale – 10 items, Marginal and Immersion Scales – 12 items each, and Bicultural Scale – 13 items. For the purposes of this study, all 60 items were used and the results showed that three scales demonstrated reliability above .8 (Hearing - .88, Marginal - .88, and Immersion - .79). However, the Bicultural scale showed a coefficient factor of .66, which was the least reliable of all four scales as shown in Table 25. For a specific list of deleted items in 47 item test, refer to Appendices H and I. where the deleted items are marked with an asterisk.

Data analysis of the DIDS-R was performed with 47 selected items, based on Fisher (2001), to verify whether the deletion of the least reliable items would increase the coefficient factor. The results showed that there was no significant difference between the 60 item and 47 item scale, therefore, the 60 item scale was used for this study. Refer to Table 25 for comparative scores between the 60 item and 47 item results from this study.

#### *Interscale Correlations Reliability of DIDS-R*

The interscale correlation reliability was performed on the DIDS-R in this study and generated an acceptable level of reliability across items. The current study used all 60 items of the DIDS-R instead of the revised version with 47 items as suggested by Fisher (2001). As shown in Table 26, the significant correlations were as follows: 1) Hearing and Marginal .78 at  $p < .01$ , two-tailed; 2) Hearing and Bicultural -.39 at  $p < .01$ , two-tailed; 3) Marginal and Bicultural -.39 at  $p < .01$ , two-tailed; 4) Immersion and Bicultural -.17 at  $p < .05$ . The following correlations were non-significant: 1) Hearing and Immersion, and 2) Marginal and Immersion.

In comparison to results from Glickman (1993) and Fischer (2001), this study seemed to closely replicate Glickman's findings, and the reliability factor was lower for this study than with the study conducted by Fischer & McWhirter (2001).

#### *DIDS-R: Comparison of means with other factors*

A split-plot ANOVA between DIDS-R and AOA was made (4 X 4 – four DIDS-R scales and four AOA groups). There were several significant differences between the AOA groups and two of the DIDS-R scales (Hearing and Marginal). There was a significant difference on the Hearing scale,  $F(3, 95) = 4.09, p < .009$ . A Tukey posthoc

showed that the Native group, Mean: 6.26, SD: 6.16, had a lower score than the Post-Puberty group, Mean: 12.65, SD: 10.79, which signify that Native group had a lower sense of Hearing identity compared with Post-Puberty group. There was also a significant difference between groups on the Marginal scale,  $F(3, 95) = 6.030, p < .001$ . A Tukey posthoc analysis showed a significant difference between the Native, Mean: 8.71, SD: 7.19 and Early group, Mean: 18.0, SD: 11.8, whereas the Native group had a lower score on this scale. And between the Native, Mean: 8.71, SD: 7.19 and Post-Puberty group, Mean: 17.26, SD: 9.82, demonstrate that the Native has a lower score on this scale as shown in Figure 17. This indicated that the Native participants had a different way to process their Hearing and Marginal Identity Scales compared with other groups. In sum, the Native group had lower scores on Hearing and Marginal scales compared with other AOA groups, which means that Native group has less ambiguous interpretation of their Deaf identity.

There were also significant differences within the analysis of comparison of means between DIDS-R scales and the degree of Deaf community involvement. There were three degrees of community involvement: “Low”, “Mid”, and “High”. Two DIDS-R scales showed a significant difference within groups of degree of involvement: 1) Hearing scale at  $F(2, 96) = 7.099, p < .001$ . A Tukey posthoc analysis was performed and it showed that there were differences between two degrees of deaf community involvement, Low and Mid, at this scale,  $p < .001$ . 2) Marginal scale at  $F(2, 96) = 6.289, p < .01$ . A Tukey posthoc analysis was performed and it showed that there were differences between two degrees of Deaf community involvement, Low and High, at this

scale,  $p < .001$  as shown in Figure 18. Meanwhile, there was no significant difference with DIDS-R scales and the degree of hearing community involvement as shown in Figure 19.

### Results of TGJASL-R

This section is focused on the analysis of the results of TGJASL-R along with other factors. The ASL grammatical judgment is the Independent Variable in this study and was the most important instrumental tool to determine the research question. The results of TGJASL-R was measured with A' analysis, the main goal of this measurement is to examine the percentage of hits and false alarms the subjects made. A' is an index of grammatical sensitivity which allows us to take into account the subject's guessing behavior. The formula used for A' analysis was:  $0.5 + [(y-x)(1+y-x)]/4y(1-x)$ , taken from Linebarger, Schwartz, and Saffran (1983) and it was used in previous study for TGJASL (Boudreault, 1999). The x is the proportion of false alarms (ungrammatical incorrect answers) and y is the proportion of hits (grammatical correct answers). A' data were computed separately for each subject.

The overall mean of A' of the study participants' responses on TGJASL-R was 0.84. The mean of A' is whether the chance of hits of correct response was above the 50 – 50 chance, the A' mean of this study indicate that the sample has a high grammatical sensitivity. The mean of A' from my previous study on TGJASL was 0.80 (Boudreault, 1999), and this study showed similar results. There were 63 participants (63.6%) who scored above the mean, which meant that their grammatical sensitivity was greater. While there were 36 participants (36.4%) who averaged below the mean, which indicated that their grammatical sensitivity was less. The overall mean score on this test was much higher in comparison with a previous study using an earlier version of TGJASL.

A paired t-test analysis of each grammatical category between grammatical and ungrammatical categories was performed. The paired sample t-test was performed for grammaticality comparison, and there was a significant difference between grammaticality response, grammatical vs. ungrammatical for all six grammatical categories:  $t = 6.791$ ,  $df = 98$ ,  $p < 0.000$  (2-tailed). A separate analysis of t-test for each grammatical category was performed, and there was a significant difference for grammaticality for the four grammatical categories: 1) Simple:  $t = -4.960$ ,  $df = 98$ ,  $p < 0.000$  (2-tailed), 2) Verbs:  $t = -6.532$ ,  $df = 98$ ,  $p < 0.000$  (2-tailed), 3) Questions (Wh.):  $t = -5.787$ ,  $df = 98$ ,  $p < 0.000$  (2-tailed), and 4) Classifiers:  $t = -14.332$ ,  $df = 98$ ,  $p < 0.000$  (2-tailed) as shown in Figure 20. Generally, the participant responses were different between grammaticality categories except the Negative and Relative Clause sentences, probably due to the use of non-manual signals that make these grammatical structures more easily recognizable.

A Pearson Correlation analysis between A' and AOA was performed, it showed that there was a small negative, but significant, correlation between these factors (A' and all four groups of AOA):  $r = -.211$ ,  $p < 0.05$  (2-tailed). The mean and SD of A' for each AOA group are as follows: 1) Native Group ( $n=35$ ); Mean: 0.852, SD: 0.101, 2) Early Group ( $n=14$ ); Mean: 0.872, SD: 0.075, 3) Delayed Group ( $n=16$ ); Mean: 0.812, SD: 0.120, and 4) Post-Puberty Group ( $n=34$ ); Mean: 0.812, SD: 0.111.

An one-way ANOVA analysis between groups with A' as Dependent Variable and the AOA as Independent Variable (1 x 4: A' score and four AOA groups) resulted in a non-significant difference between groups,  $F(3, 95) = 1.424$ ,  $p = .240$  as shown in Figure 21. This signified that there were no factors that affected the grammatical

judgment of ASL related to the age of acquisition.

A Comparison of means between A' and the degree of community involvement resulted in a non-significant difference for both communities: Deaf,  $F(2, 96) = 1.977, p = .144$ , and hearing,  $F(2, 96) = 2.114, p = .126$ . This finding meant that the degree of involvement with either community did not affect the results of TGJASL-R.

#### Correlation between DIDS-R and TGJASL-R

A Pearson Correlation analysis between A' results of TGJASL-R and the four scales of DIDS-R was performed. There was only one scale that had a significant correlation with A', the scale in question was the Hearing scale,  $r = .254, p < 0.05$  (2-tailed). There were some inter-correlations between the scales of DIDS-R as follows: 1) Hearing and Marginal scales:  $r = .779, p < 0.01$  (2-tailed), 2) Hearing and Bicultural scales:  $r = -.391, p < 0.01$  (2-tailed), and 3) Marginal and Bicultural scales:  $r = -.389, p < 0.01$  (2-tailed) as shown in Table 27. This demonstrated that the competency of ASL grammatical judgment was related to the Hearing scale, where the other scales were not.

#### Multiple-Regression Analysis

In order to answer the critical part of the research questions, a multiple-regression analysis was performed to determine the predictability of the factors that affect the results of the grammatical judgment of ASL. A linear multiple regression analysis was performed between A' as Dependent Variable and other Independent Variables as follows: 1) DIDS-R scales (Hearing, Marginal, Immersion and Bicultural), 2) Age of Acquisition, Degree of Deaf Involvement, 3) Degree of Hearing Involvement, 4) Self-measurement of ASL comprehension, and 5) Self-measurement of ASL production. The linear regression analysis showed that the only significant predictor factor of A' for the

grammatical judgment task in ASL was the Hearing scale of DIDS-R with  $t = -2.589$ ,  $p < .011$ . The second most probable predictor factor of this analysis was the self-measurement of ASL comprehension, but this was not significant at  $t = 1.483$ ,  $p = .141$  as shown in Table 28. The predictor factor showed that the Hearing scale was a way to predict the competency of ASL grammatical judgment. The other factors did not show any significant outcome for predictability of the grammatical judgment score. A complete table of correlation between the all factors of this study is displayed in Table 29.



## CHAPTER 5 – DISCUSSION

The underlying purpose of this study was to shed light on the relationship between ASL competency and Deaf Identity. The two main factors of this study, ASL competency and Deaf Identity have generally been examined separately in previous studies. Although a connection between these factors was noticed in earlier studies, it was not fully investigated. As Agar (1993) explains, language and culture are not two separate entities; instead they are closely embedded together, and he referred to this concept as “Languaculture”. A review of the literature suggests there is a connection between language and identity in the Deaf community (Bat-Chava, 2000; Erting, 1982/1994; Fisher & McWhirter, 2001; Glickman, 1993,1996; Holcomb, 1990, 1997; Johnson and Erting, 1989; Kannapell, 1993;). The Deaf community perspective considers an individual’s knowledge and use of ASL as the barometer for their Deaf identity. To understand the various degrees of ASL grammatical competency among individuals, these skills were related to various factors such as Deaf identity and age of signed language acquisition. In addition to the main inquiry, this study also investigated factors, other than Deaf identity itself, that predict the variable of ASL competency. Few quantitative studies have been conducted in this field and the research that does exist is generally qualitative in nature. The present study was a novelty in two ways: 1) the use of on-line data collection with video playback in two languages (English and ASL), and 2) the use of a quantitative approach to determine the interrelation between ASL competency and other factors among the Deaf participants. The study facilitated an increased understanding of several aspects of the relationship between ASL competency and Deaf Identity.

This study was carried out through two major stages: 1) the design and implementation of on-line data collection procedures, and 2) the development of the questionnaire and test tools.

#### On-line and Technology Aspects

This study was entirely implemented on-line with the use of MySQL database and QuickTime video playback. This unique approach allowed for the collection of participants' responses electronically and facilitated the process of data analysis. The website was fully accessible in two languages, written English and ASL, except for the ASL testing section which only used ASL through video playback. The ability to collect data with video playback through a high-speed internet connection put this study on the cutting edge of technological advances in research methods. The project website was designed and developed by Chad W. Taylor under my direction, and I was entirely responsible for the creation of the video clips. The most challenging aspect of this study was developing a stable platform to carry out data collection with the presence of the video clips. The cross-platform of video playback was an issue during the development stage and a compromise solution was found by directing the participants to use a specific web browser in order to play the videos properly. The on-line testing approach was adequate and effective in this kind of study, however a further exploration of various techniques is required to provide more flexibility in cross-platform usage (Window XP and Mac OS X).

The structure of designing and developing the test on-line with the use of ASL and English, along with the automatic data collection seemed ideal at the beginning of the study development. It was and is still considered ideal at the end of the research project in

terms of the technological possibilities. At the same time, it has been a rough road to travel in order to implement such a novel approach from the ground up all the way to being fully functional. It took me and my web designer much more time than anticipated due to various incompatibilities regarding the server hosting support, cross platforms of different Operating Systems, and the use of video playback. Multiple attempts to resolve the technical difficulties were necessary in order to make the study website operational. In addition to the compatibility issues, it was important for me to use and present ASL, a visual language, as equal to written English. As a result, I spent unexpected additional amounts of time translating and filming the questionnaires and the test items. This effort added significant time and energy to the process of completing the website, in comparison to only using a written English format as in previous studies involving internet testing. However, I believe this was worthwhile since it was essential to make the study completely accessible for users of ASL in order to study the connection between ASL and Deaf identity. Otherwise, more time consuming individual testing through a traditional approach, i.e. using DVD or VHS and scoring the results manually, would have been necessary.

### Procedures

The study was designed to collect data through four measures: 1) Background questionnaire (57 questions and 26 sub-questions), 2) DIDS-R (60 questions), 3) ASL Test (2 stimuli), and 4) TGJASL-R (4 practice stimuli and 78 test stimuli), that were administered in the order listed. These measures were preceded by three sections related to testing protocol: 1) Home page for consent form, 2) High-speed internet verification, and 3) future research involvement. To observe the overall structure of the test on-line,

refer to Appendix D. A total of 222 video clips were used in this study, 84 were related to ASL testing and were not accompanied with English text. The data was stored within the study web server and was analyzed using SPSS. Prior to making the final analyses, a process of exclusion and inclusion was followed based on the following exclusion criteria: 1) hearing participants, 2) under 18 years of age, 3) no formal log in to the study after accepting the agreement, and 4) non-completion of the study (e.g. various degrees of non completion included: 1) quit at the beginning of the study, 2) completed the background questionnaire and the DIDS-R test however not the ASL test and TGJASL-R sections possibly due to the video not playing properly, and 3) the TGJASL-R section completed only half-way due to the possibility of fatigue, distraction, or disinterest.)

Recruitment occurred through various means of advertisement, including posting flyers at California State University, Northridge and Gallaudet University, personal email distribution, Deaf and Hard of Hearing list serves, web links and a commercial advertisement in <http://www.deafnewspaper.com>. The recruitment was not as successful as anticipated due to the nature of self-recruitment, lack of monetary compensation for participants' time, and the lengthy process to complete the study, which was on average 60 minutes. For those participants who did complete the study most stated that the procedure was efficient and simple to follow throughout the on-line information.

Some challenges were faced with the issue of the log in authentication being sent by email to participants' accounts. Some email servers considered the study's email address to be spam. A compromise solution was established by posting a warning message to all participants that they might not receive the authentication message in their

current email inbox but rather in their spam folder. Further investigation to resolve this issue is needed.

This new approach to research has proven to be feasible and it is recommended that future research applications be developed to continue to improve and pursue the use of ASL video playback in studies related to signed language and Deaf cultural issues.

### Participants of the Study

An initial database of 219 participants was compiled; however, this was reduced to 99 participants for the study following the application of exclusion and inclusion criteria. It was anticipated that a sample of approximately 300 participants would be obtained; however, the final number was sufficient to proceed with data analysis. As stated previously factors such as no compensation for participation and on-line, self-recruitment without any personal contact may have contributed to the smaller number of participants. Overall, the participant profile was as expected from the general Deaf population except for two key characteristics. There was a much greater occurrence of Caucasian individuals within the study sample (90.9%), and a high percentage of the sample (20%) had a graduate degree or were in the process of obtaining a graduate degree (master's or doctorate). These two factors may have been related since primary recruitment occurred through post-secondary institutions and because these are people who tend to volunteer for research. However, Deaf/hard of hearing students within these programs do not reflect the racial and ethnic diversity within the general Deaf population. Future research will need to incorporate strategies to ensure more diversified recruitment and sampling. 87.9% of the sample self-labeled themselves as Deaf and this suggests that

the majority of study participants were culturally Deaf individuals. The hereditary factor among the participants was relatively high, at 28.3%, in comparison to the general Deaf population, which is approximately 10% of Deaf people being born into families with other Deaf members.

Communication use and preference among participants generally favored the use of ASL despite the fact that most of them were exposed to other means of communication during their lives. The age of signed language acquisition among the participants was divided into four age groups, and the largest groups were the Native group (35.5%) and Post-Puberty group (34.3%). The participants' self-evaluation of their communicative skills demonstrated an association between later age of acquisition of signed language and greater speech production and comprehension. Participants generally rated their mastery of ASL and Fingerspelling as high, and rated their comprehension of SEE and PSE as higher than their production level, which is typical.

The sample analyzed in this study showed a higher proportion of Caucasian, well educated, culturally and genetically Deaf individuals. This disproportionate sampling is a factor of on-line testing and self-recruitment, as the researcher has less control of these factors and socio economic status and access to computers will contribute to determining participation. A larger sample, and the inclusion of control groups, would be beneficial in understanding more about the outcomes of such a study in the future.

### Research Questions

Two main research questions were proposed pertaining to how ASL competency and Deaf identity are related to each other and what other factors determine ASL skills.

The findings of this study will be compared with previous studies conducted by Glickman (1993,1996) and Kannapell (1993) that raised some questions regarding the connection between ASL and Deaf identity. A discussion of previous work related to the critical period hypothesis for language acquisition will also be reviewed in light of the current findings.

*Question #1:*

Is competency in ASL related to Deaf Identity?

Grammatical competency in ASL was measured with the TGJASL-R and the results indicated that in terms of a grammaticality judgment task the sample of this study scored higher than previous sampling of Deaf people. The TGJASL-R scores also showed some correlation with the results of DIDS-R as a measurement of Deaf identity in this study. There was only one scale of the DIDS-R that correlated significantly with the competency of ASL. This was the Hearing scale, whereas the other scales; Marginal, Immersion and Bicultural were not significantly correlated with the TGJASL-R results. However, among the three non-significant scales, the Marginal and Bicultural scales were factors that arose as probable, although not significant, correlations in this study. An examination of those two scales in the future would help to understand the effect of ASL competency since they showed some kind of pattern in participants' responses. Future studies would require using better control among groups. As for the Immersion scale, this is a scale where the participants' responses were varied and did not show any strong patterns. This study indicated that there is a relationship between the Hearing Scale of the DIDS-R and TGJASL-R since the participants' responses on the Hearing scale were lower and more concentrated compared with the other DIDS-R scales. This concentrated

pattern of responses indicated an attribute of Deaf identity as identified by the participants. The participants strongly disagreed with the negative statements about Deaf people that were part of the items in the Hearing scale. According to these findings, Deaf people's identity is partly defined by what they "are not", as well as what they are. The more the participants possessed a clear understanding of their own Deaf identity, by disagreeing with the negative perceptions towards them as measured on the Hearing scale, the greater their ASL competency as related to the results of their TGJASL-R scores. In this sense, the study partially answered the first research question.

*Question #2:*

Are there predictor variables that influence the development of ASL competency?

The answer to the previous research question confirmed that there is a connection between TGJASL-R and the Hearing scale, but not the other scales of the DIDS-R. As for this second research question, a multiple-regression analysis was performed involving ASL competency and five other parameters (AOA, self-measurement of ASL production and comprehension, degree of Deaf and hearing community involvement). The only predictor factor of ASL competency that arose in this study was the result of the Hearing scale measurement from the DIDS-R, whereas the other factors did not predict the outcome of ASL competency. This study reveals that the way to predict participants' ASL competency is by knowing their perceptions of self, specifically regarding how much they disagreed with the Hearing scale items.

It is important to note that among the other non-significant factors in this study, there were two probable predictors that may have been significant if the study had been conducted with more strict control among groups. These two factors are: 1) the AOA of



signed language, and 2) the self-measurement of ASL comprehension. Both of these are possible factors in predicting the outcome of ASL competency based on participants' knowing about their own language mastery and understanding its grammar functions. The remaining factors, including the degree of Deaf and hearing community involvement, and the Immersion and Bicultural scales of DIDS-R were the least predictable factors in determining ASL competency as determined in this study.

### Conclusions

The findings of this study suggest that the relationship between ASL competency and Deaf identity can be predicted by one's attitude and understanding of self. Specifically, one's responses to negative statements about Deaf people and positive statements about hearing people reflect a correlation with ASL competency. The Hearing scale of the DIDS-R focused Deaf people to define their own identity by acknowledging what they are not, or their disagreement. The participants' responses were more varied and less consistent when responding to the positive aspect of their own Deaf community as outlined within the Bicultural scale of the DIDS-R. A possible interpretation of this outcome is that the level of consciousness of participants' Deaf identities were not fully or widely understood due to the linguisticism and audism within the Deaf community. Deaf identity is often not deeply explored by members of the Deaf community at large. This study does, however, support the general theory of identity development in which language plays an important part as discussed by various researchers: Agar (1994), Bond (1983), Gudykunst and Schmith (1988) and Woolard (1990).

Glickman (1993) explored various aspects of the relationship between Deaf identity and language use without any formal measurement of ASL. Various factors were raised by this research regarding communication preference, hearing status of

participants' parents, the choice of participants' parental communication, and the participants' age of becoming deaf. Although the study did not directly answer these questions, the Glickman (1993) study led me to raise new research questions in the current study, particularly related to various communicative circumstances. These factors were incorporated in my background questionnaire and analyzed within the multiple regression analysis. These factors did not show any significance in predicting ASL competency, probably because the focus was on the development of Deaf identity and that was not the main research question here.

Kannapell (1993) suggested that a measurement of ASL fluency in relation to Deaf identity was required, rather than a subjective measure of language use. The current study was carried out based on her suggestions for future research directions. She developed an understanding of various types of deaf people and this classification system was essential in developing the fundamental question of this study. This study confirms that there are various types of deaf people within the study sample, although careful exploration of these types did not occur since the study was not designed to argue directly her findings.

The question pertaining to the critical period hypothesis for language acquisition as supported in previous studies carried by several researchers (Boudreault, 1999; Emmorey, 1991; Emmorey, Bellugi, Friederici, & Horn, 1995; Lock, 1996; Mayberry, 1993; Mayberry & Eichen, 1991; Mayberry & Fischer, 1989; Newport, 1990) was not supported in this study. The interaction between the two factors of AOA groups and the A' of TGJASL-R did not result in a significant effect. Despite the fact that this study does not support the evidence of the critical period hypothesis, there are some differences

noted by AOA groups within the DIDS-R results. This shows that delayed first signed language acquisition among the participants has an effect on Deaf identity as supported in previous study by Glickman (1993) in relation to age first learned to sign. In the current study the results of the TGJASL-R indicated that there was a significant difference between grammaticality responses (grammatical vs. ungrammatical). These results suggest more careful consideration in future studies related to the AOA and Deaf Identity is needed.

### Limitations of the Study

This study was a breakthrough in terms of the technology in on-line data collection with ASL video playback. However there were some limitations to this study that need to be discussed. The three main aspects of the study's limitations include: 1) technology, 2) sampling, and 3) test tools.

First, the novel approach of on-line testing looks appealing to researchers due to its ease of use and precise data collection, particularly in order to reach a larger number of participants in cyberspace in a short time. However this was not the case here, the data collection was lengthy and was not carried out in a speedy manner. A factor that entered into this equation was that access to the website for various Operating Systems and Browsers was not universally accessible. The use of QuickTime video player was another factor because some participant's computers did not have the specific software. The restricted access to a high-speed internet connection was another factor that limited participant's participation in this study. Consideration of these various factors extended the process of study website development significantly.

Second, the sample obtained for this study was much smaller than needed for an effective multiple-regression analysis. The sample obtained was sufficient for an initial study involving a novel application of on-line data collection, however, greater numbers could have resulted in more significant results. The sample size was restricted by limited access to high-speed internet for some of the interested individual who wanted to participate. As well as being a smaller than anticipated sample, the sample did not represent a diverse group. The sample was not controlled among different groups and this resulted in a more skewed representation of Caucasian, well educated, culturally Deaf individuals. The socio-economic status was an important factor that needed to be addressed in order to have a more representative sample. The self-recruitment and no compensatory approach used here may be factors that prevented the collection of a larger, more balanced sample. In addition, the length of time to complete the study averaged 60 minutes, and this may have been an important obstacle for participants who were unable to commit to the completion of the testing.

Finally, the testing material used here was generally appropriate however it was lengthy and complicated which required the participants' full attention. The DIDS-R test may have been substituted with another testing tool since there were a higher proportion of culturally Deaf individuals in this sample. The possible explanation here is that the Hearing scale has some negative framing in their questioning that made the culturally Deaf individuals disagree more consistently (i.e. lower score overall), which resulted in a greater correlation factor. The DIDS-R may be appropriate if the sample had included other segments of the deaf population, such as late deafened and hard of hearing individuals.

The TGJASL-R is a test tool that requires a high level of concentration in order to determine the grammaticality of the ASL sentence presented. Even though the A' score was high overall in this study, the use of this test on-line does not allow me, as the researcher, to monitor extraneous factors that may distract the participants and affect their responses in TGJASL-R.

The limitations of the study were a result of implementing a new and relatively untested approach to data collection. In this sense, they were not surprising and they do provide opportunities for continued learning and development. However addressing these issues in the future will be essential.

#### Future Directions

My experience in implementing this study has led me to consider several improvements and recommendations in the areas of technology, sampling, testing materials, and additional research questions.

The technology aspect of this on-line study was a tremendous technological breakthrough in using ASL digital video playback on two levels: 1) the use of MySQL data collection directly linked to the video stimuli, and 2) the use of on-line testing. I would recommend that the video playback should be offered in various players instead of just one, i.e. QuickTime, Window Player and Flash. The cross-platform interoperability needs to be resolved in order to allow everyone to use it properly, i.e. Windows XP and Mac OS X. In addition to this, the browser interoperability should be addressed in order to be able to test with various browsers, i.e. Netscape, Internet Explorer, Safari and

Firefox. The video playback window size may be increased in the future where the speed of the internet connection is increased in general.

The study sample obtained needs to be increased to a larger number, such as 300 to 500 participants, to allow for displaying a better understanding of the results from a statistical perspective. In order to do this, the following suggestions should be considered:

1) provide monetary compensation to the participants for their time, 2) collect the data with more control among groups of the sample, i.e. measuring level of ASL competency, identifying the AOA of first and subsequent languages, broadening ethnic groups, identifying level of education, controlling the socio-economic status, 3) Provide access to testing materials in different settings, including on-line testing, off-site testing with a portable laptop with the researcher present, and implementing a specific on-site workstation for interested participants to complete the study. The sample needs to be diversified and broader to reflect more accurately the Deaf and hard of hearing population in North America. This will allow future studies to better understand how various groups distinguish themselves from the culturally Deaf population that was dominant in this study.

The testing material used in this study was generally appropriate, but due to length could have been divided into different sections and administered at different times. The number of questions in the background questionnaire should be reduced if possible. Explore the possibility of substituting the DIDS-R test for another test that measures Deaf identity without negatively framed questions as present on the Hearing scale.

Since this is the first study that quantitatively measured the areas of ASL competency and Deaf identity through the use of novel technology, this experience will provide a foundation for my future research plans. I would like to move in the following directions:

- 1) Conduct a reduplication or an expanded version of this study with a larger sample to satisfy the statistical robustness.
- 2) Design an additional measurement tool for Deaf identity based on the concept of *nigrescence* as discussed by Cross (1991). This will allow for a better overview of Deaf identity and will also help to shed light on how ASL competency is formed.
- 3) Control and balance the groups within the samples obtained for future studies to better answer some of the unanswered questions that the current study has raised regarding ASL competency and Deaf identity.
- 4) Analyze and sub-analyze each factor carefully along with ASL competency to determine any relationships or correlations that exist.
- 5) Administer the study with an off-line control group to determine the validity and reliability of this technology for data collection in research settings.

## REFERENCES

- Agar, M., (1994) *Language shock: Understanding the culture of conversation*. New York, NY: William Morrow and Co.
- American Psychological Association (2002). Ethical principles of psychologists and code of conduct. *American Psychologist*, 47, 1597-1611. Available from APA Web site: <http://www.apa.org/ethics/code1992/html>
- Andersson, G., Kaldo-Sandstrom, V., Strom, L., & Stromgren, T. (2003). Internet administration of the Hospital Anxiety and Depression Scale in a sample of tinnitus patients. *Journal of Psychosomatic Research*, 55, 259-262.
- Armstrong, D.F., Stokoe, W.C. & Wilcox, S.E., (1995). *Gesture and the Nature of Language*. Cambridge; New York, NY: Cambridge University Press. 270.
- Arnau, R. C., Thompson, R. L., & Cook, C. (2001). Do different response formats change the latent structure of responses? An empirical investigation using taxometric analysis. *Educational and Psychological Measurement*, 61, 23-44.
- Baker, C. & Cokely, D. (1980). *American sign language: A teacher's resource text on grammar and culture*. Silver Spring: TJ Publishers, Inc.
- Barak, A., & English, N. (2002). Prospects and limitations of psychological testing on the Internet. *Journal of Technology in Human Services*, 19 (2/3), 65-89.
- Bat-Chava, Y. (2000). Diversity of deaf identities. *American Annals of the Deaf*, 145(5).
- Bienvenu, M.J. (n.d.) *Can Deaf people survive 'deafness'?*. Retrieved June 25, 2004, from <http://gradschool.gallaudet.edu/clc2002/Readings/DeafSurvivedeafness.PDF>
- Bond, M.H., (1983). How language variation affects inter-cultural differentiation of values by Hong Kong bilinguals. *Journal of Language and Social Psychology*, 2, 57-66.
- Boudreault, P. (1999). *Grammatical processing in American Sign Language: Age of acquisition and syntactic complexity*. Unpublished master's thesis, McGill University.
- Bourhis, R. Y., (1979). Language and ethnic interaction. In Giles, H. & St-Jacques, B. (eds.), *Language and Ethnic Relations* (pp.117-142). Oxford: Pergamon Press.



- Bragg, B., (1992). In defense of English-like signing on NBC-TV's reasonable doubts. In: Garretson, M., (ed.). Viewpoints on deafness, *A Deaf American Monograph*; 42 (pp.31-33). Silver Spring, MD: National Association of the Deaf.
- Bressani, R. V., & Downs, A. C. (2002). Youth independent living assessment: Testing the equivalence of Web and paper/pencil versions of the Ansell-Casey Life Skills Assessment. *Computers in Human Behavior*, 18, 453-464.
- Buchanan, T. (2002). On-line assessment: Desirable or dangerous? *Professional Psychology: Research & Practice*, 33, 148-154.
- Budman, S. H. (2000). Behavioral health care dot-com and beyond: Computer-mediated communications in mental health and substance abuse treatment. *American Psychologist*, 55, 1290-1300.
- Bug Club, (n.d.). *What is data transfer?* Bug Club.org, retrieved June 22, 2004 from <http://bugclub.org/beginners/software/DataX-fer.html>
- Byers, A.P. (1981). Psychological evaluation by means of an on-line computer. *Behavior Research Methods & Instrumentation*, 13, 585-587.
- Carty, B. (1994). The development of deaf identity. In C. J. Erting et al. (Eds.), *The deaf way: Perspectives from the international conference on Deaf culture* (pp. 40-43). Washington, DC: Gallaudet University Press.
- Chamberlain, C., (2002). *Reading Skills of Deaf Adults who Sign: Good and Poor Readers Compared*. McGill University, Doctoral Dissertation, 306 pages.
- Chamberlain, C., Morford, J. & Mayberry, R. I., (Eds.), (2000). *Language Acquisition by Eye*. Mahwah, NJ: Lawrence Erlbaum and Associates.
- Chute, D.L., & Daniel, R.S. (1996). *B/C PowerLaboratory*, Pacific Grove, CA: Brooks/Cole Publishing Company.
- Cross, W.E., Jr. (1991). *Shades of black: Diversity in African-American identity*. Philadelphia, PA: Temple University Press.
- Crowe, T.V. (2002). Self-esteem scores among deaf college students: An examination of gender and parents' hearing status and signing ability. *Journal of Deaf Studies and Deaf Education*, 8(2), 199-206.
- Cummins, J. (1979). Linguistic interdependence and the educational development of bilingual children. *Review of Educational Research* 49, 222-251.

- Dawn Sign Press, (n.d.). *The DEAF-WORLD*. Retrieved July 19, 2004, <http://www.dawnsign.com/journey>
- De Argaez, E. (n.d.). *Broadband usage keeps growing*. On-line. Retrieved June 10, 2004, from <http://www.Internetworldstats.com/articles/art030.htm>
- Emmorey, K., (1991). Repetition Priming with Aspect and Agreement Morphology in American Sign Language. *Journal of Psycholinguistics Reserarch*, 20(5), 365-388
- Emmorey, K., Bellugi, U., Friederici, A., & Horn, P., (1995). Effects of age of acquisition on grammatical sensitivity: Evidence from on-line and off-line tasks. *Applied Psycholinguistics*, 16, 1-23
- Epstein, S. (1973). The self-concept revisited: Or a theory of a theory. *American Psychologist*, 28, 404-416.
- Erting, C., (1982/1994). *Deafness, communication, and social identity: an anthropological analysis of interaction among parents, teachers, and deaf children in a preschool*. American University, Doctoral Dissertation, 591 pages.
- Erikson, E. (1964). *Insight and responsibility*. New York, NY: Norton.
- Erikson, E. (1968). *Identity: Youth and crisis*. New York: NY, Norton.
- Fischer, L.C. (2000). *Cultural Identity Development and Self Concept of Adults who are Deaf: A Comparative Analysis*. Arizona State University, Doctoral dissertation, 100 pages.
- Fischer, L.C., & McWhirter, J.J. (2001). The Deaf identity development scale: A revision and validation. *Journal of Counseling Psychology*. 48(3), 355-358.
- Fishman, J., (1977). *Language and ethnicity*. In Giles, H., (Ed.) *Language, Ethnicity, and Intergroup Interaction* (pp. 15-59). New York: Academic Press.
- Fleischer, L. (1992). Communication issues: ASL and English. In conference proceedings, *Deaf studies: What's up?* Washington, DC: Gallaudet University Press.
- Fox, S., Rainie, L., Horrigan, J.B., Lenhart, A., Spooner, T., & Carter, C. (2000, August). *Trust and privacy on-line: Why Americans want to re-write the rules*. PWE Internet Project. Retrieved June 22, 2004, from <http://www.pewInternet.org/reports/toc.asp?Report=19>

- Freire, P., (1989). *Paulo Freire and John Vasconcellos: A dialogue*. [videotape] CSUN, May 15.
- FTPplanet, (n.d.). *Web connections – How fast is fast?* FTPplanet.com: FTP new user guide. Retrieved June 22, 2004, from [http://www.ftplanet.com/ftpresources/int\\_con.htm](http://www.ftplanet.com/ftpresources/int_con.htm)
- Gannon, J. (1989). *The week the world heard Gallaudet*. Silver Spring, MD: National Association of the Deaf.
- Gertz, G. (2003). *Dysconscious audism and critical deaf studies: Deaf crit's analysis of unconscious internalization of hegemony within the deaf community*. Dissertation Abstract International, 64(08), 534B. (UMI No. 3100674).
- Giuseppe, T., Teruzzi, T., & Anolli, L. (2003). The use of the Internet in psychological research: Comparison of on-line and off-line questionnaires. *CyberPsychology & Behavior*, 6, 1, 73-80.
- Glickman, N.S. (1993). *Deaf identity development: Construction and validation of a theoretical model*. Dissertation Abstracts International, 54(06), 2344A. (UMI No. 9329612).
- Glickman, N.S. (1996). The development of culturally deaf identities. In N.S. Glickman & M.A. Harvey (Eds.), *Culturally affirmative psychotherapy with deaf persons* (pp. 115-153). Mahwah, NJ: Erlbaum.
- Groce, N.E. (1985). *Everyone Here Spoke Sign Language: Hereditary Deafness on Martha's Vineyard*. Cambridge, Mass.: Harvard University Press.
- Grosjean, F., (1982). *Life with two languages : an introduction to bilingualism*. Cambridge, Mass.: Harvard University Press.
- Gudykunst, W.B., & Schmidt, K.L., (1988). Language and ethnic identity: An overview and prologue. In Gudykunst, W.B. (ed.) *Language and ethnic identity* (pp.1-14). Philadelphia, PA: Multilingual Matters.
- Gumperz, J.J., (1974). Linguistic anthropology in society. *American Anthropologist*, 76(4), 785-798.
- Harris, M. M., & Van Hove, G., & Lievens, F. (2003). Privacy and attitudes towards Internet-based selection system: A cross-cultural comparison. *International Journal of Selection and Assessment*, 11, 230-236.

- Hoffmeister, R. J. (1999). *American Sign Language Assessment Instrument (ASLAI)*. Manuscript, Center for the Study of Communication & the Deaf, Boston University.
- Holcomb, T. K. (1990). *Deaf students in the mainstream: A study in social assimilation*. Dissertation Abstracts International, 51(06), 1984A. (UMI No. 20020702)
- Holcomb, T.K. (1997) Development of Deaf bicultural identity. *American Annals of the Deaf*, 142(2), 89-93.
- Holt, J., Hotto, S., & Cole, K. (1994) *Demographic aspects of hearing impairment: Questions and answers, Third Edition*. Gallaudet Research Institute, Gallaudet University. Washington, DC:. Retrieved June 5, 2006, from <http://gri.gallaudet.edu/Demographics/factsheet.html#Q3>
- Horrigan, J.B., & Rainie, L. (2002, March). *Getting serious on-line: As Americans gain experience, they use the web more at work, write emails with more significant content, and pursue more serious activities*. Pew Internet Project. Retrieved June 22, 2004, from <http://www.pewInternet.org/reports/toc.asp?Report=55>
- Humphries, T. (1975). *The making of a word: Audism*. Unpublished manuscript.
- Hunt, N. & Marshall, K. (2002). *Exceptional children and youth. (3rd ed)*. Boston, MA: Houghton Mifflin Company.
- Jacobs, L.M. (1974). *A deaf adult speaks out*. Washington, D.C.: Gallaudet College Press.
- Johnson, R., & Erting, C., (1989). Ethnicity and Socialization in a Classroom for Deaf Children. *The Sociolinguistics of the Deaf Community*, Ed. C. Lucas, San Diego: Academic Press, 41-83.
- Kannapell, B. (1993). *Language choice – identity choice*. Burtonsville, MD: Linstok Press, Inc.
- Keating, E., & Mirus, G. (2003). American Sign Language in virtual space: Interactions between deaf users of computer-mediated video communication and the Internet of technology on language practices. *Language in Society*, 32, 693-714.
- Kiesler, S., & Sproull, L.S. (1986). Response effects in the electronic survey. *Public Opinion Quarterly*, 50, 402-413.
- Kilma, E. & Bellugi, U. (1979). *The signs of language*. Cambridge: Harvard University Press.

- Ladd, P., (2003) *In Search of Deafhood*. Clevedon, UK: Multilingual Matters.
- Lane, H. (1992). *The mask of benevolence: Disabling the Deaf community*. New York: Alfred A. Knopf.
- Lane, H., Hoffmeister, R., & Bahan, B. (1996). *A journey into the DEAF-WORLD*. San Diego, CA; Dawn Sign Press.
- Leigh, I.W., Marcus, A.L., Dobosh, P.K. & Allen, T.E. (1998) Deaf/hearing cultural identity paradigms: Modification of the Deaf identity development scale. *Journal of Deaf Studies and Deaf Education*, 30, 329-338.
- Linebarger, M., Schwartz, M., and Saffran, E. (1983). Sensitivity to grammatical structure in so-called agrammatic aphasics. *Cognition*, 13, 361-392
- Lock, E., (1996). *Critical period effects on the acquisition of English syntax by deaf individuals*. Unpublished master's thesis, McGill University, Montreal, Quebec, Canada
- Lucas, C., & Valli, C. (1992). *Language contact in the American Deaf community*. San Diego, CA: Academic Press.
- Mahshie, S.N. (1995). *Educating deaf children bilingually: With insights and applications from Sweden and Denmark*. Washington, DC: Gallaudet University Press.
- Mayberry, R.I. (1993). First-language acquisition after childhood differs from second-language acquisition: The case of American Sign Language. *Journal of Speech and Hearing Research*, 36, 1258-1270, December
- Mayberry, R.I., & Eichen, E. B. (1991). The long-lasting advantage of learning sign language in childhood: Another look at the critical period for language acquisition. *Journal of Memory and Language*, 30, 486-512
- Mayberry, R.I., & Fischer, S.D. (1989). Looking through phonological shape to lexical meaning: The bottleneck of non-native Sign Language processing. *Memory & Cognition*, 17(6), 740-754.
- Mead, A.D. (2001). How well does Web-based testing work? Results of a survey of users of NetAssess. Paper presented at the 16th Annual Conference of the Society for Industrial and Organizational Psychology (SOP), San Diego, California.

- Miller, E.T. (2000). *Preventing alcohol abuse and alcohol-related negative consequences among freshmen college students: Using emerging computer technology to deliver and evaluate the effectiveness of brief intervention efforts*. (Doctoral dissertation, University of Washington, 2000). Dissertation Abstracts International, 61, 8.
- Miller, E. T., Neal, D. J., Roberts, L. J., Baer, J. S., Cressler, S. O., Metrik, J., & Marlatt, G. A. (2002). Test-retest reliability of alcohol measures: Is there a difference between Internet-based assessment and traditional methods? *Psychology of Addictive Behaviors*, 16, 56-63.
- Moore, D.F. (2001) *Educating the deaf; Psychology, principles and practices (5th ed.)*. Boston: Houghton Mifflin.
- Monaghan, L., Schmaling, C., Najamura, K., & Turner, G.H., (2005). *Many Ways to be Deaf: International Variation in Deaf Communities*. Washington: Gallaudet University Press.
- Naglieri, J. A., Drasgow, F., Schmit, M., Handler, L., Prifitera, A., Margolis, A., & Velasquez, R. (2004). Psychological testing on the Internet: New problems, old issues. *American Psychologist*, 59, 150-162.
- NECA (2004, January 16) *Letter to Marlene H. Dortch, Secretary, Federal Communications Commission*. Retrieved August 11, 2004, <http://www.neca.org/MEDIA/011604TRS.PDF>
- Newburger, E.C. (2002). *A nation on-line: How Americans are expanding their use of the Internet*. Washington DC: U.S. Department of Commerce, US Census Bureau. September.
- Newport, E. L. (1990). Maturation constraints on language learning. *Cognitive Science*, 14, 11-28
- Newport, E. L., & Meier, R. (1985). The Acquisition of American Sign Language. In D. I. Slobin (Ed.), *The crosslinguistic study of language acquisition, volume 1: the data*, (pp.881-939). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Nielsen//NetRatings (2003, June 17). *Nearly 40 million Internet users connect via broadband, growing 49 percent, according to Nielsen//NetRatings*. Retrieved June 10, 2004, from [http://www.nielsen-netratings.com/news.jsp?section=new\\_pr&thetype=date&theyear=2003&themonth=5#](http://www.nielsen-netratings.com/news.jsp?section=new_pr&thetype=date&theyear=2003&themonth=5#)
- Overstreet, S.V. (1999). *Deaf-centered or hearing-centered*. Dissertation Abstracts International, 60 (05), 1784A. (UMI No. 9931551).

- Padden, C. (1980). The deaf community and the culture of deaf people. In C. Baker & R. Battison (Eds.), *Sign language and the deaf community: Essays in honor of William C. Stokoe*. Silver Spring: National Association of the Deaf.
- Padden, C. & Humphries, T. (1988). *Deaf in America: Voices from a culture*. Cambridge: Harvard University Press.
- Padden, C. & Humphries, T. (2005). *Inside Deaf Culture*, Cambridge: Harvard University Press.
- Parasnis, I., (1996). On interpreting the Deaf experience within the context of cultural and language diversity. In Parasnis, I., (Ed.). *Cultural and Language Diversity and the Deaf Experience* (pp.3-19). Cambridge: Cambridge University Press.
- Pettit, F. A. (1999). Exploring the use of the World Wide Web as a psychology data collection tool. *Computers in Human Behavior*, 15, 67-71.
- Pettit, F. A. (2002). A comparison of World Wide Web and paper-and-pencil personality questionnaires. *Behavior Research Methods, Instruments & Computers*, 34, 50-54.
- Phinney, J. (1993). A three-stage model of ethnic identity development in adolescence. In M.E. Bernal & G. Knight (Eds.), *Ethnic identity: Formation and transmission among Hispanics and other minorities*. (pp.61-79). Albany, NY: State University of New York Press.
- Porter, R.P., (1996). *Forked tongue: The politics of bilingual education (2nd ed.)*. New Brunswick, NJ: Transaction Publishers.
- Prinz, P., Strong, M., & Kuntze, M. (1994). *The test of ASL*. Unpublished test. San Francisco: San Francisco State University, California Research Institute.
- Ramos, A. (2003). *The triumph of the spirit*. Beaumont, TX: R & R Publishers.
- Reagan, T. (2002). Toward an "archeology of deafness": Etic and emic constructions of identity in conflict. *Journal of Language, Identity, and Education*, 1(1), 41-66.
- Reynolds, D.H., Sinar, E.F. & McClough, A.C. (2001). *Evaluation of an Internet-based selection procedure*. Paper presented at the 15th Annual Conference of the Society for Industrial and Organizational Psychology (SOP), New Orleans, Louisiana.
- Rorder, B., (n.d.). *Compression parameters for Web codecs. StreamingMedia.com: Tutorials*. Retrieved June 22, 2004, from [http://www.streamingmedia.com/tutorials/view.asp?tutorial\\_id=41](http://www.streamingmedia.com/tutorials/view.asp?tutorial_id=41)

- Royce, A.P., (1982). *Strategies of diversity*. Bloomington: Indiana University Press.
- Salgado, J. F., & Moscoso, S. (2003). Internet-based personality testing: Equivalence of measures and assessees' perceptions and reactions. *International Journal of Selection and Assessment*, 11, 194-205.
- Sampson, J. P. (2000). Using the Internet to enhance testing in counseling. *Journal of Counseling and Development*, 78, 348-356.
- Schatz, P., & Browndyke, J. (2002). Applications of computer-based neuropsychological assessment. *Journal of Head Trauma Rehabilitation*, 17, 395-410.
- Schein, J. & Delk, M. (1974). *The deaf population of the United States*. Silver Spring: National Association of the Deaf.
- Schmid, C.L., (2001) *The politics of language: Conflict, identity, and cultural pluralism in comparative perspective*. New York, NY: Oxford University Press.
- Segal, N. (2002, March 18). *Sorenson media: Video compression software*. *Streaming Media World*. Retrieved June 20, 2004, <http://streamingmediaworld.com/video/docs/sorenson/>
- Skutnabb-Kangas, T. & Cummins, J., (Eds.). (1988). *Minority education: From shame to struggle*. Clevedon, UK: Multilingual Matters.
- Skutnabb-Kangas, T., (1994). Linguistic human rights. A prerequisite for bilingualism. In Ahlgren, I., & Hyltenstam, K., (Eds.). *International Studies on Sign Language and Communication of the Deaf, Vol. 27: Bilingualism in Deaf Education* (pp.139-160). Hamburg: Signum-Verl.
- Stanton, J. M. (1998). An empirical assessment of data collection using the Internet. *Personnel Psychology*, 51, 709-725.
- Stokoe, W.C. (1960). Sign language structure: an outline of the visual communication systems of the American Deaf. *Studies in Linguistics: Occasional papers*, 8.
- Stokoe, W.C., Casterline, D.C., & Croneberg, C.G. (1965). *A dictionary of American Sign Language on linguistic principles*. Washington, D.C.: Gallaudet College Press
- Stone, R., & Stirling, L.O. (1994). Developing and defining an identity: Deaf children of Deaf and Hearing parents. In C.J. Erting et al. (Eds.), *The deaf way: Perspectives from the international conference on Deaf Culture* (pp.49-50). Washington, DC: Gallaudet University Press.



- Supalla, T., Newport, E., Singleton, J., Supalla, S., Coulter, G. & Metlay, D. (1995). *An overview of the test battery for American Sign Language morphology and syntax*. Paper presented at the Annual Meeting of the American Educational Research Association (AERA), April 20, 1995, San Francisco, CA.
- Tajfel, H., & Turner, J.C. (1979). An integrative theory of intergroup conflict. In William G. Austin and Stephen Worchel (Eds.), *The social psychology of intergroup relations*. Monterey, CA: Brooks/Cole.
- Tajfel, H. (1981). *Human groups and social categories: Studies in social psychology*. Cambridge, UK: Cambridge University Press.
- Thomason, L. (2001, December part 2). *Accessibility tip: Screen resolution and page design*. Webmaster Tips Newsletter, Netmechanic. Retrieved June 19, 2004, [http://www.netmechanic.com/news/vol4/accessibility\\_no24.htm](http://www.netmechanic.com/news/vol4/accessibility_no24.htm)
- USByte (n.d.) *Web based storage solution: Introduction*. UsByte.com, retrieved June 22, 2004, from [http://www.usbyte.com/common/Web\\_storage.htm](http://www.usbyte.com/common/Web_storage.htm)
- Van Cleve, J.V. & Crouch, B.A. (1989). *A Place of Their Own: Creating the Deaf Community in America*. Washington, D.C.: Gallaudet University Press.
- Woodward, J. (1975/1982). *How you gonna get to heaven if you can't talk with Jesus: On depathologizing deafness*. Silver Spring, MD: T.J. Publishers.
- Woolard, K.A. (1990). Changing language policies and attitudes in autonomous Catalonia. *Language in Society*, 19(3), 311-330.
- Wrigley, O. (1996). *The politics of deafness*. Washington, DC: Gallaudet University Press.
- Yoshino, A., Shigemura, J., Kobayashi, Y., Nomura, S., Shishikura, K., Den, R., Wakisaka, H., Kamata, S., & Ashida, H. (2001). Telepsychiatry: Assessment of televideo psychiatric interview reliability with present- and next-generation Internet infrastructures. *Acta Psychiatrica Scandinavica*, 104, 223-226.
- Zack, J.S. (2004). Technology of on-line counseling. In R. Kraus, J. Zack & G. Stricker (Eds.), *On-line counseling: A handbook for mental health professionals* (pp. 93-121). San Diego, CA: Elsevier Academic Press.
- Zapfen, C., (1998). *Public Laws that Affect Deaf Education*. Retrieved August, 8, 2004 in <http://www.deafnix.com/IDEA.html>

Zazove, P., Meador, H.E., Derry, H.A., Gorenflo, D.W., Burdick, S.W. & Saunders, E.W. (2004). Deaf persons and computer use. *American Annals of the Deaf* 148(5), 376-384.

## TABLES

Table 1.

*Stages of Ethnic Identity Development and Ego Identity Statuses.*

Phinney, (1989)	Unexamined Ethnic Identity	Ethnic Identity Search		Achieved Ethnic Identity
	Lack of exploration of Ethnicity	Involvement in exploring and seeking to understand meaning of ethnicity for oneself		Clear, confident sense of own ethnicity
	Possible subtypes:			
	<div> <div>A. Diffuse: Lack of interest in or concern with ethnicity</div> <div>B. Foreclosed Views of ethnicity based on opinions of others</div> </div>			
Cross, (1978)	Pre-encounter	Encounter	Immersion/ Emerson	Internalization

From "A three-stage model of ethnic identity development in adolescence" by J. Phinney, 1993, In M.E. Bernal, & G. Knight, (Eds.), *Ethnic identity: Formation and transmission among Hispanics and other minorities* (pp.61-79). Albany, NY: State University of New York Press.

Table 2.

*Comparative Continuum of Types of Deaf Group Identities.*

Hearing			Deaf					Culturally Deprived*	
Jacobs, (1974)	Deafened adults	HoH adults	Adventitiously deaf adults	Products of oral programs	Products of public schools	Other preling. deaf adults	Preling. deaf adults/ deaf families	Uneducated deaf adults	Low-Verbal deaf adults
Holcomb, (1993, 1997)	Culturally isolated	Culturally captive	Culturally marginal		Hearing- dominant bicultural	Balanced- bicultural	Deaf dominant bicultural		
Kannapell, (1993)		Type E	Type D	Type F		Type A	Type B	Type C	

\*: Deaf individuals who are using ASL or other visual-gestural communication, they usually lack Deaf culture consciousness or awareness.

Table 3.

*Comparative Summary of Stages of Deaf Identity Development.*

Holcomb, (1990, 1997)	Conformity	Dissonance		Resistance and immersion		Introspection	Awareness
Glickman, (1993, 1997)	Culturally hearing	Culturally marginal		Immersion in the Deaf-World			Bicultural
Carty, (1994)		Confusion	Frustration/ anger/blame	Exploration	Identification/ rejection	Ambivalence	Acceptance

Table 4.

*Types of deaf persons & attitudes.*

TYPE	English	ASL	Hearing Person	Deaf Person
A	+	+	+	+
B	+	+	-	+
C	-	+	-	+
D	+	-	+	+
E	+	-	+	-
F	+	-	-	+

From "Language choice –identity choice" by B. Kannapell, 1994. Burtonsville, MD: Linstok Press, Inc.

Table 5.

*Theory of Deaf Identity Development.*

Stage	Reference Group	View of Deafness	View of Deaf Community	Emotional Theme
Hearing	Hearing	Pathology	Uninformed & Stereotyped	Despair, Depression
Marginal	Switches	Pathology	Shifts from good to bad	Confusion & Conflict
Immersion	Deaf	Cultural	Positive, Non-reflective	Anger/ "in love with deafness"
Bicultural	Deaf	Cultural	Positive, Personal, Integrated	Self-accepting & group pride

From "Deaf identity development: Construction and validation of a theoretical model" by N.S. Glickman, 1993. *Dissertation Abstracts International*, 54(06), 2344A. (UMI No. 9329612).

Table 6.

*Interscale correlation of the original and the revised DIDS.*

Scale	<i>Hearing</i>	<i>Marginal</i>	<i>Immersion</i>	<i>Bicultural</i>
<i>Hearing</i>	—	.57, $p > .001$	-.30, $p > .001$	-.47, $p > .001$
<i>Marginal</i>	.37, $p > .01$	—	.09, $p = ns$	-.45, $p > .001$
<i>Immersion</i>	-.06, $p > .05$	.33, $p > .001$	—	-.05, $p = ns$
<i>Bicultural</i>	-.31, $p > .01$	-.05, $p > .05$	.30, $p > .01$	—

From "The Deaf identity development scale: A revision and validation" by L.C. Fischer and J.J. McWhirter, 2001. *Journal of Counseling Psychology*. 48(3), 355-358.

Table 7.

*Comparative chart of Download and Upload speeds based on different Internet connection speeds (FTPplanet, n.d.).*

Connection	Speed	
	Download	Upload
Dial-up	56Kbps	56Kbps
ISDN (narrowband)	128Kbps	128Kbps
DSL (broadband)	6-8.5Mbps	128-256Kbps
Cable modem (broadband)	15-50Mbps	128-265Kbps
T1	1-10Mbps	1-10Mbps
T3	40-100Mbps	40-100Mbps

Table 8.

*Comparative chart of data transfer rates based on different connection speeds (USByte, n.d.)*

Maximum Connection Speed (Kbps)	Time Transfer		
	1 MB of data	10 MB of data	100 MB of data
28.8	4min 36 sec	46min	7hr 40min
56	2min 18 sec	23min	3hr 40min
128	1.15	11min 30sec	1hr 55min
144	54sec	9min	1hr 30 min
1,500	~6sec	~1min	~10min
8,000	~0.9sec	9.6 sec	1min 36 sec

Table 9.

*Gender Distribution*

	n	%
Male	37	37.4
Female	62	62.6



Table 10.

*Age by Group*

<i>Age</i>	<i>n</i>	<i>%</i>
19-28	22	22.2
29-38	26	26.3
39-48	31	31.3
49-58	13	13.1
59-80	7	7.1

Mean: 39, Min: 19, Max: 71, SD: 12.14

Table 11.

*Ethnicity by Group*

<i>Ethnicity</i>	<i>n</i>	<i>%</i>
African-American	1	1.0
Asian-American	3	3.0
Caucasian	90	90.9
Hispanic	1	1.0
Native-American	1	1.0
Other	3	3.0

Table 12.

*Origin of Participants by Country*

Country	n	%
Canada	19	19.2
United-States	80	81.8

Table 13.

*Distribution of Participants from Canada by Provinces (N=19)*

Provinces	n	%
British Columbia	1	5.3
Manitoba	7	36.8
Ontario	7	36.8
Quebec	1	5.3
Newfoundland	2	10.5
Nova Scotia	1	5.3

Table 14.

*Distribution of Participants from United-States by Regions (N=80)*

Regions	n	%
New England	7	8.75
Middle Atlantic	13	16.25
South	13	16.25
Midwest	10	12.5
Southwest	6	7.5
West	31	38.75

Table 15.

*Distribution of Participants Household Income*

Income	n	%
< \$20K	15	15.2
\$20K-\$39.9K	22	22.2
\$40K-\$59.9K	24	24.2
\$60K-\$79.9K	11	11.1
\$80K-\$99.9K	4	4.0
\$100K >	11	11.1
Don't Know	12	12.1

Table 16.

*Education Levels of Participants*

Education	n	%
High School		
Unfinished	3	3.0
High School Degree	17	17.2
College Student	21	21.2
College AA Degree	9	9.1
BA Degree	24	24.2
Graduate Student	5	5.1
Master Degree	11	11.1
Doctoral Degree	9	9.1

Table 17.

*Education Majors of Participants*

Major	n	%
Liberal Arts	35	35.6
Business	21	21.2
Social Science	5	5.1
Computer Science	11	11.1
Science	6	6.1
Medicine	1	1.0
Engineering	2	2.0
N/A	18	18.2

Table 18.

*Type of College/University Attended by Participants (N=99) \**

College/University	n	%
Hearing Without Support	10	10.1
Hearing With Support	48	48.5
NTID/RIT	10	10.1
Gallaudet	40	41.1
CSUN	12	12.1
N/A	13	13.1
TOTAL	133	134.3

\* More than one College/University per participant is possible.

Table 19.

*Employment Status of the Participants (non-students) (N=86)*

Employment	n	%
Disability (SSI, SDI)	8	9.3
Unemployment		
Insurance	1	1.2
Seeking Employment	10	11.6
Part-Time Employment	9	10.5
Full-Time Employment	45	52.3
Double Employment	7	8.1
Retired	6	7.0

Table 20.

*Employment Status of the Participants (students) (N=13)*

Employment	n	%
Full-Time Student Fellowship or VR	3	23.1
Full-Time Student No Employment	2	15.4
Full-Time Student Part-Time Employment	3	23.1
Full-Time Student Full-Time Employment	2	15.4
Part-Time Student Part-Time Employment	3	23.1
Part-Time Student Full-Time Employment	0	0.0

Table 21.

*Self-Label of Hearing Status by the Participants*

Label	n	%
Deaf	87	87.9
Hard of Hearing	12	12.1



Table 22.

*Age Onset of Deafness of the Participants*

Onset	n	%
Birth	70	70.7
< 4 YO	19	19.2
5-10 YO	3	3.0
11-20 YO	1	1.0
21 YO >	1	1.0
Don't Know	5	5.1

Table 23.

*Deaf Family Members by Participants*

Family Members	n	%
One of Two Parents Deaf:	8	8.1
Both Parents: Deaf	20	20.2
Hearing Parents	71	71.7

Table 24.

*Hearing Aid and Cochlear Implant User by Participants*

User	n	%
Hearing Aid(s)	36	36.4
Cochlear Implants	6	6.1

Table 25.

*Cronbach's Coefficient Alpha for Internal Consistency of DIDS*

Scale	Glickman (1993)	Fischer (2001)	Boudreault 60 Items	Boudreault 47 Items	Mean 60 I	Mean 47 I
Hearing	.86	.81	.88	.85	4.08	4.32
Marginal	.76	.84	.88	.86	4.30	4.07
Immersion	.83	.87	.79	.76	3.29	3.23
Bicultural	.81	.78	.66	.67	1.80	1.80

Table 26.

*Interscale Correlation of DIDS-R, Boudreault's*

Scale	Hearing	Marginal	Immersion	Bicultural
Hearing	--	.78**	-.01	-.39**
Marginal		--	.15	-.39**
Immersion			--	-.17*
Bicultural				--
* $p < .05$ ** $p < .01$ , two-tailed				

Table 27.

*Pearson's Correlation between TGJASL-R: A' and DIDS-R's four scales*

	A'	Hearing	Marginal	Immersion	Bicultural
A'	--	-.25*	-.14	-.06	.12
Hearing		--	.78**	-.01	-.39**
Marginal			--	.15	-.39**
Immersion				--	-.18
Bicultural					--
*: $p < .05$ (2-tailed)		**: $p < .01$ (2-tailed)			

Table 28.

*Linear Multiple Regression Analysis between A' as DV and Seven IV*

	Mean	SD	Beta	t	sig.
A'	0.83	0.11	--	--	--
Hearing	10.52	9.41	-.25	-2.59	.01
Marginal	13.85	9.98	.16	1.01	.32
Immersion	25.73	8.93	-.06	-.61	.55
Bicultural	48.06	5.92	.02	.22	.83
AOA	2.49	1.29	-.11	-1.11	.27
ASL Comprehension	9.11	1.60	.17	1.48	.14
ASL Production	8.69	1.73	.05	.46	.65
Deaf Involvement	2.18	0.65	.10	.96	.34
Hearing Involvement	1.48	0.56	-.08	-.77	.44

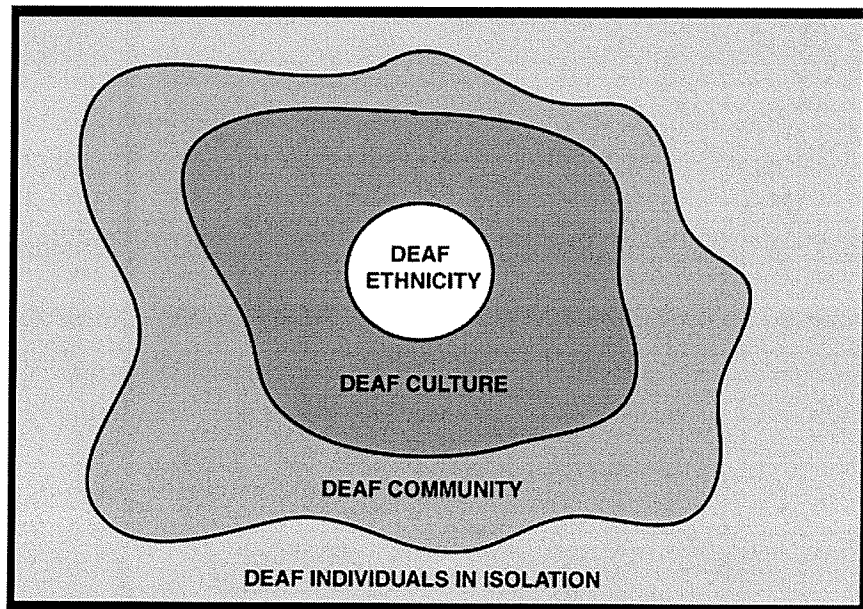
Table 29.

*Pearson's Correlation between TGJASL-R: A' and other IVs*

	A'	Hearing	Marginal	Immersion	Bicultural	AOA	ASL-C	ASL-P	D-I	H-I
A'	--	-.25*	-.14	-.06	.12	-.18	-.28**	.15	-.14	-.12
Hearing		--	.78**	-.01	-.39**	-.25*	-.40**	-.33**	.27**	.27**
Marginal			--	.15	-.39**	-.14	-.28**	-.29**	.11	-.34**
Immersion				--	-.18	-.06	.19	.19	-.27**	.06
Bicultural					--	.12	.34**	.29**	-.05	-.05
AOA						--	-.26*	-.38**	-.10	-.02
ASL-C							--	.69**	.42**	-.42**
ASL-P								--	.30**	-.33**
D-I									--	-.02
H-I										--

\*:  $p < .05$  (2-tailed)\*\*:  $p < .01$  (2-tailed)

## FIGURES



*Figure 1.: Map of Deaf Experience*

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From "Communication Issues: ASL and English" by Fleischer, L. (1992). In conference proceedings, *Deaf studies: What's up?* Washington, DC: Gallaudet University Press.

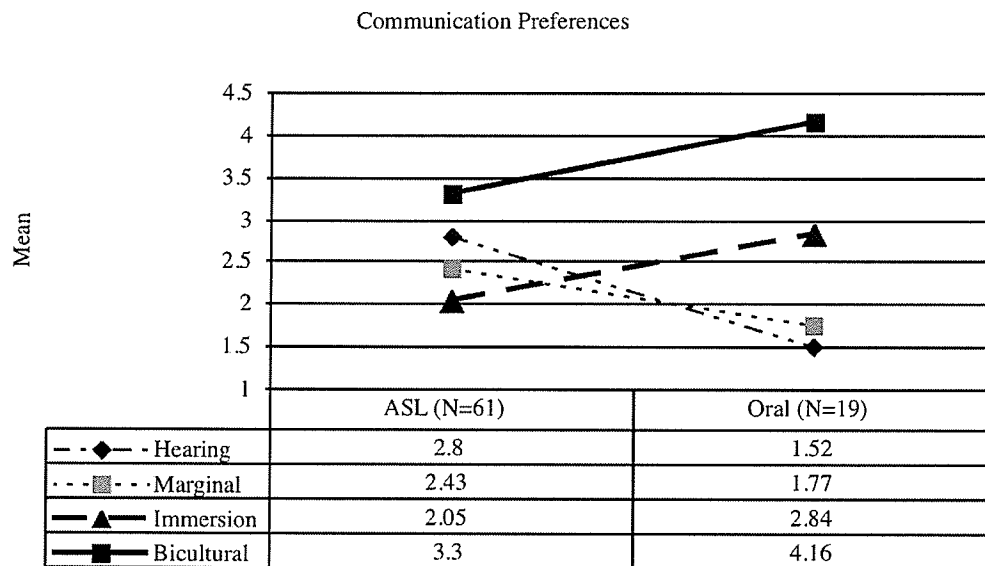


Figure 2.: DIDS – Communication Preferences

From “Deaf identity development: Construction and validation of a theoretical model” by Glickman, N.S., (1993). *Dissertation Abstracts International*, 54(06), 2344A. (UMI No. 9329612).

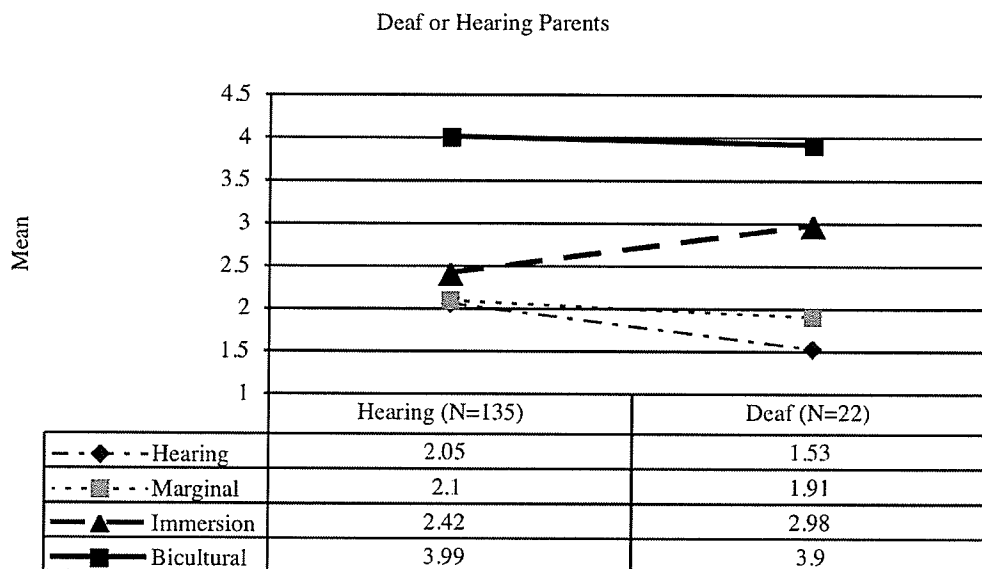


Figure 3.: DIDS – Deaf of Hearing Parents

From “Deaf identity development: Construction and validation of a theoretical model” by Glickman, N.S., (1993). *Dissertation Abstracts International*, 54(06), 2344A. (UMI No. 9329612).

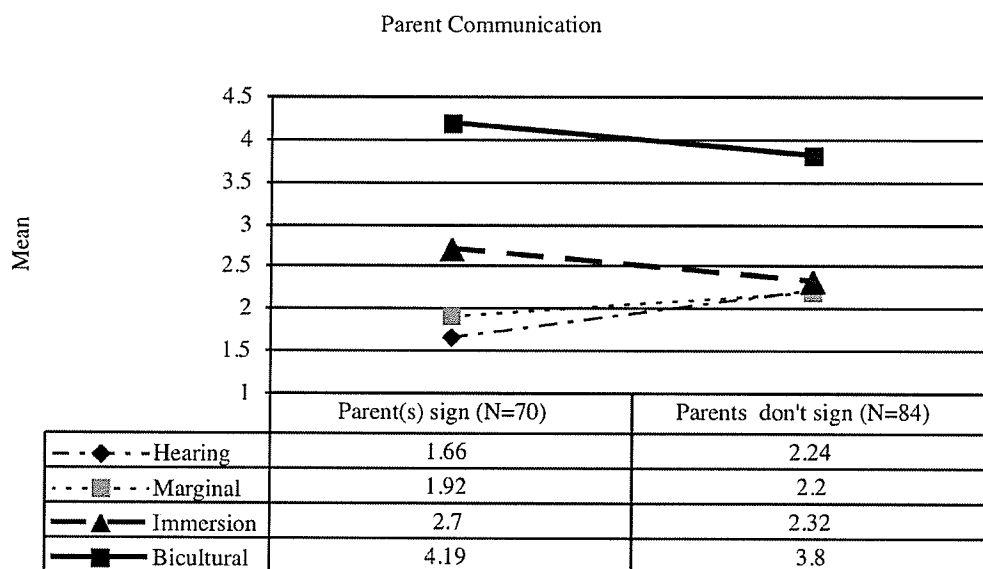


Figure 4.: DIDS – Parent Communication

From “Deaf identity development: Construction and validation of a theoretical model” by Glickman, N.S., (1993). *Dissertation Abstracts International*, 54(06), 2344A. (UMI No. 9329612).

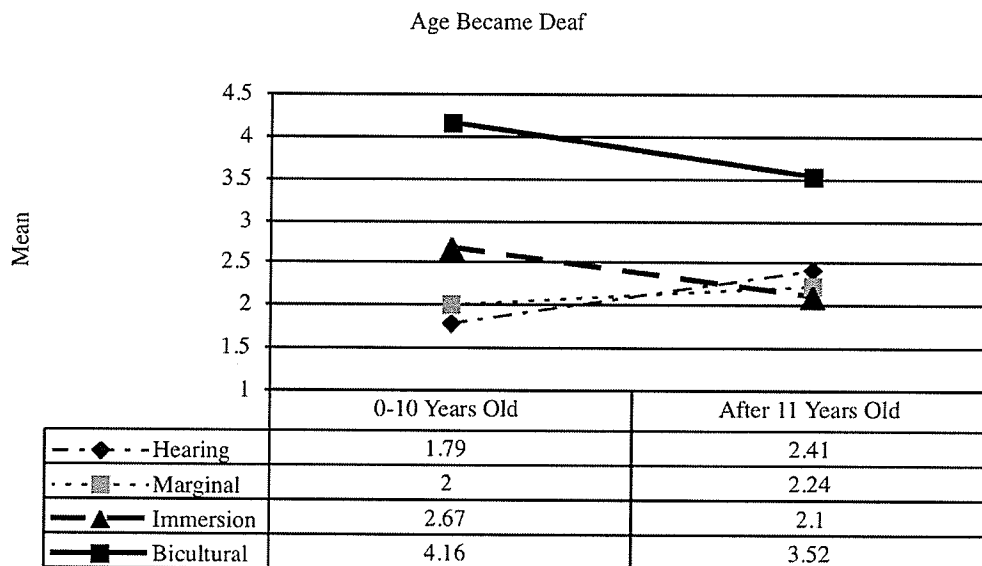


Figure 5.: DIDS – Age Became Deaf

From “Deaf identity development: Construction and validation of a theoretical model” by Glickman, N.S., (1993). *Dissertation Abstracts International*, 54(06), 2344A. (UMI No. 9329612).



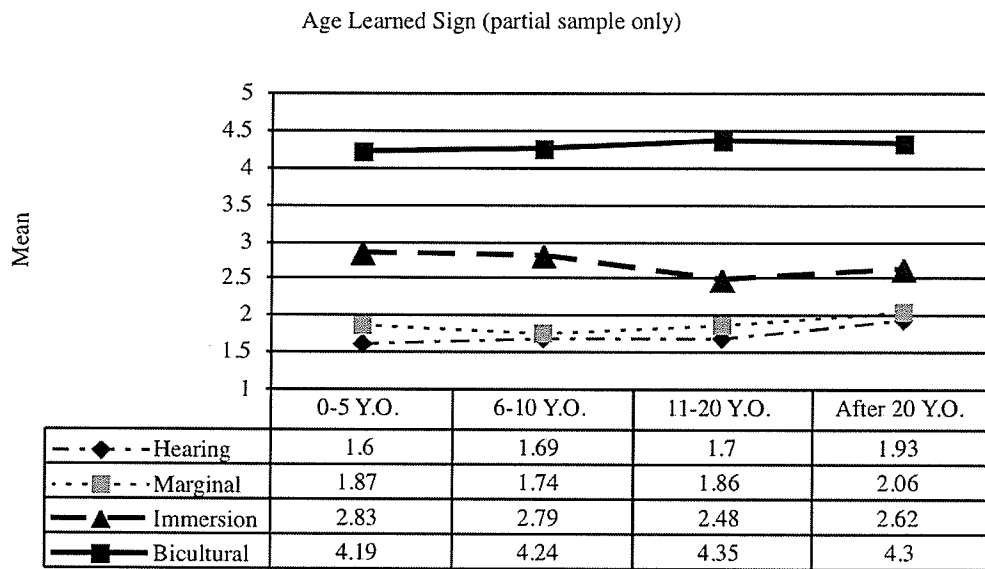


Figure 6.: DIDS – Age Learned Sign

From “Deaf identity development: Construction and validation of a theoretical model” by Glickman, N.S., (1993). *Dissertation Abstracts International*, 54(06), 2344A. (UMI No. 9329612).

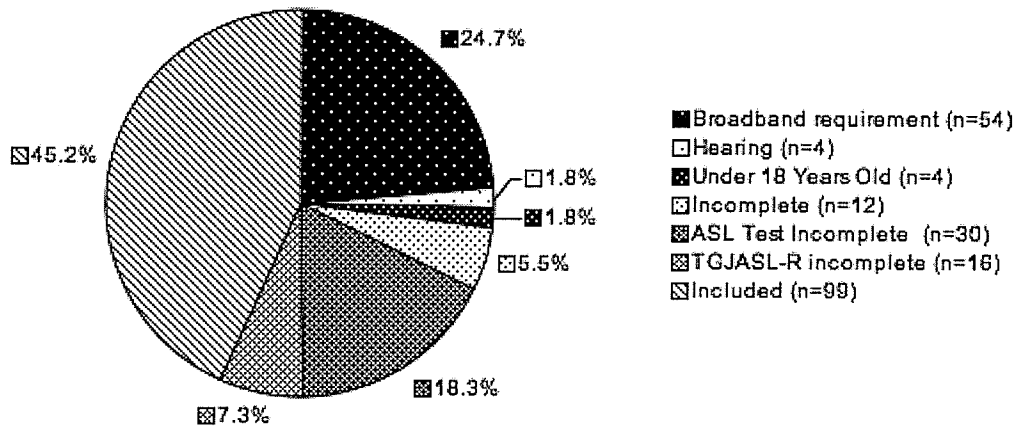


Figure 7.: Project’s Participant Inclusion and Exclusion Distribution (N=219).

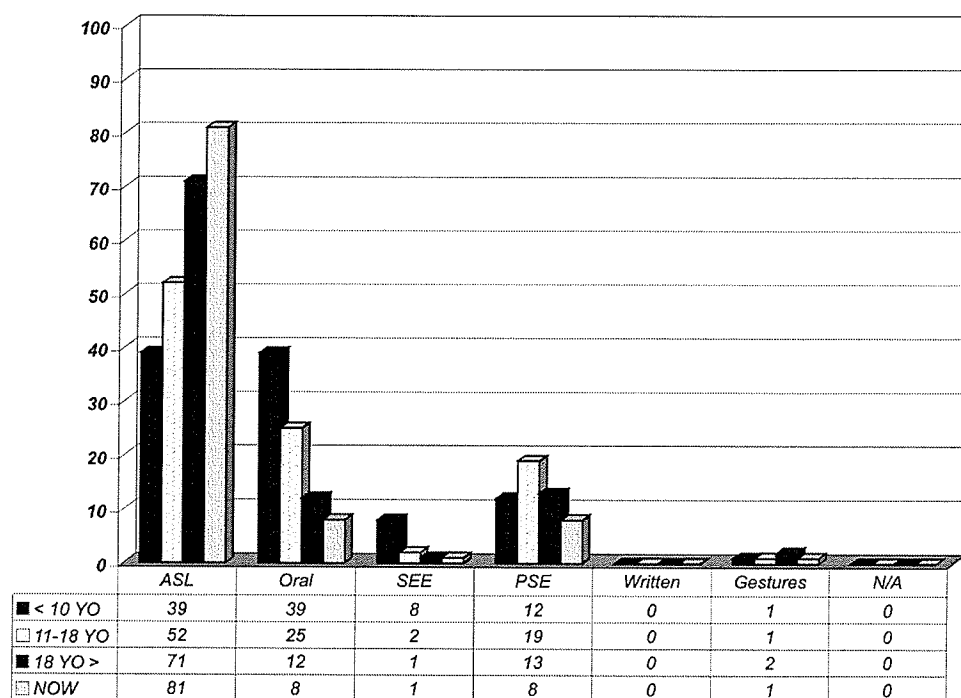


Figure 8.: Participant's communication preference during their lifetime

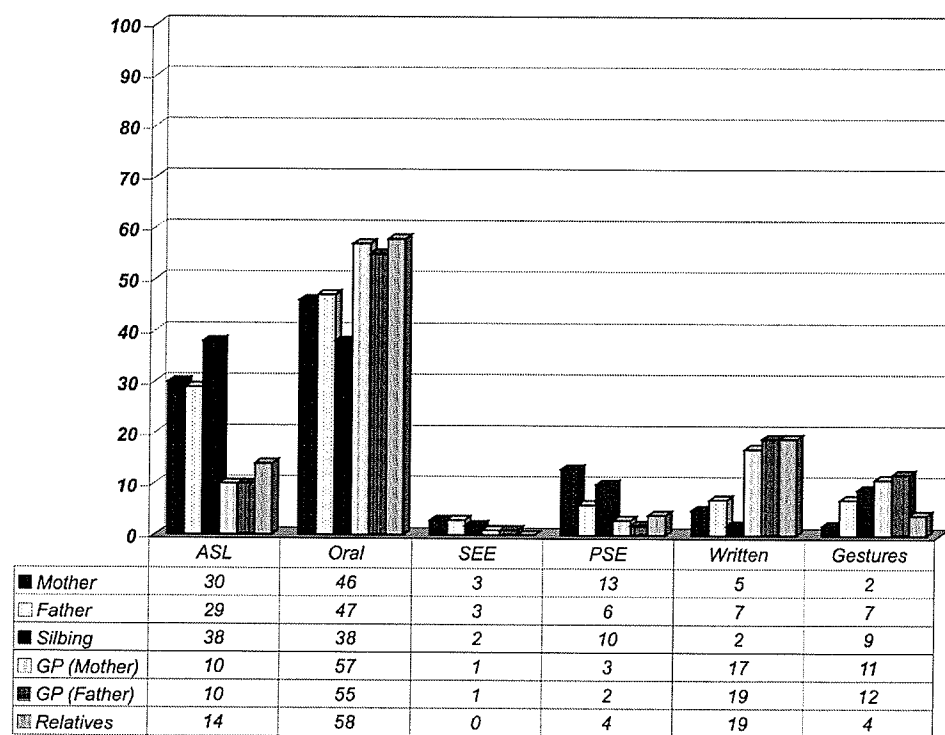


Figure 9.: Participant's communication with family members

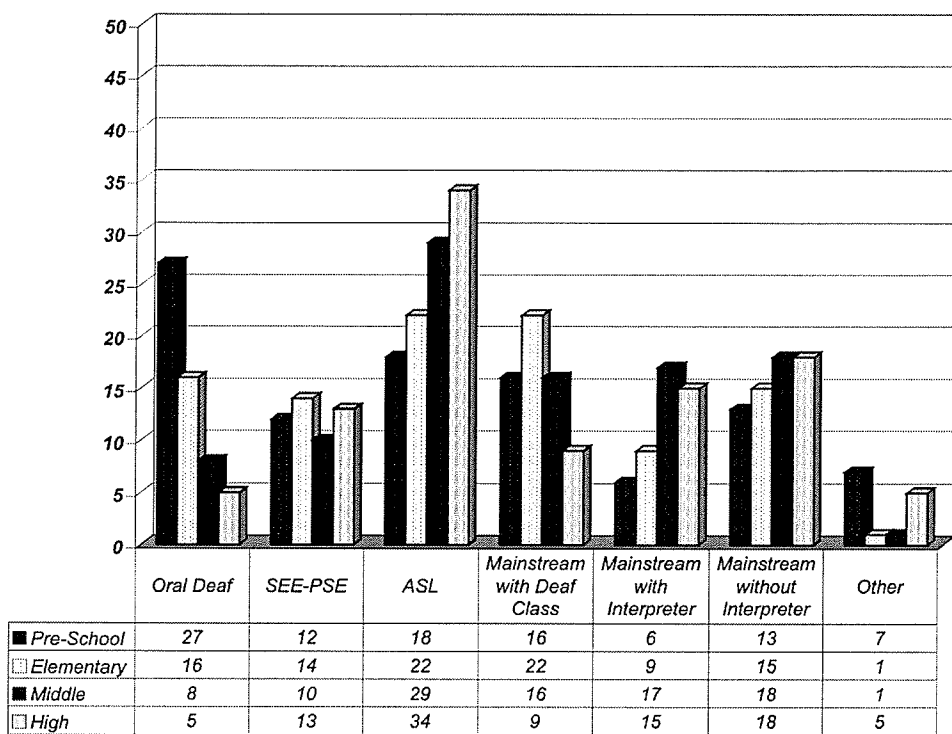


Figure 10.: Participant's mode of communication from kindergarten to Grade 12.

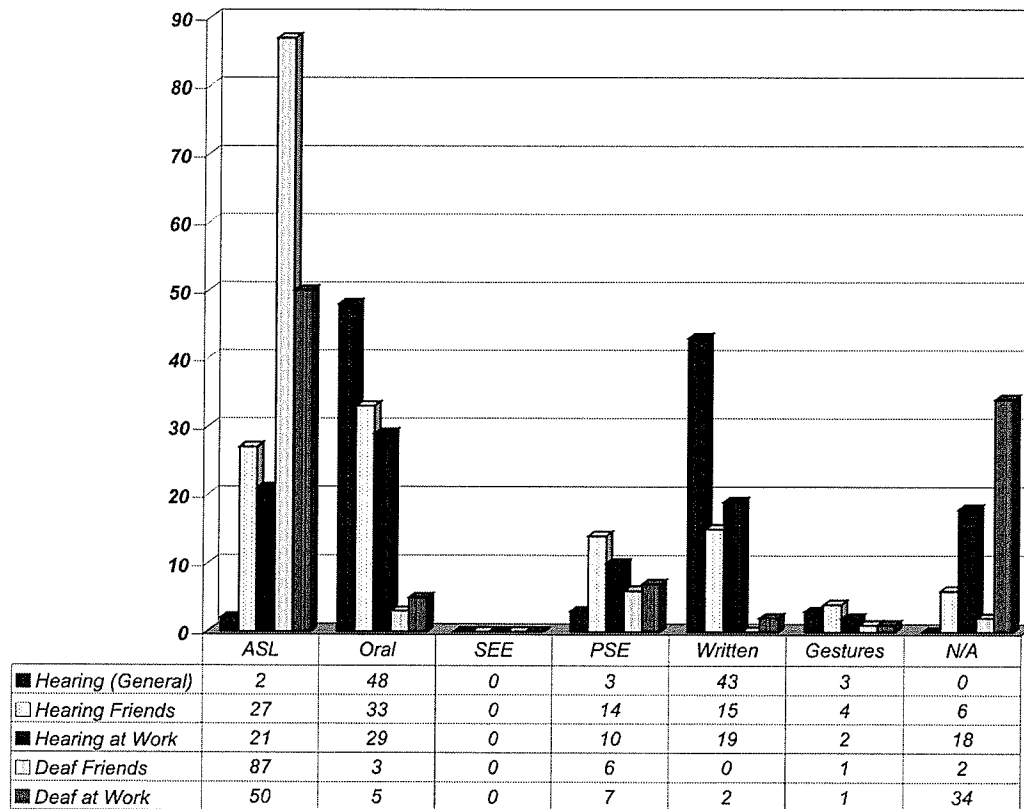


Figure 11.: Participant's mode of communication with hearing and Deaf individuals.

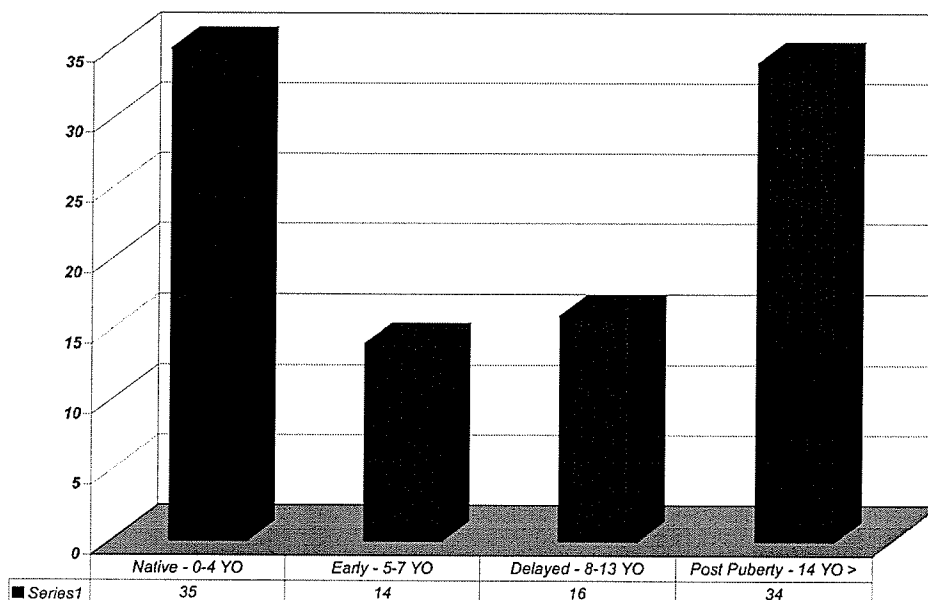


Figure 12.: Participant's Age of American Sign Language Acquisition in four groups.

Mean: 9.7, SD: 9.503

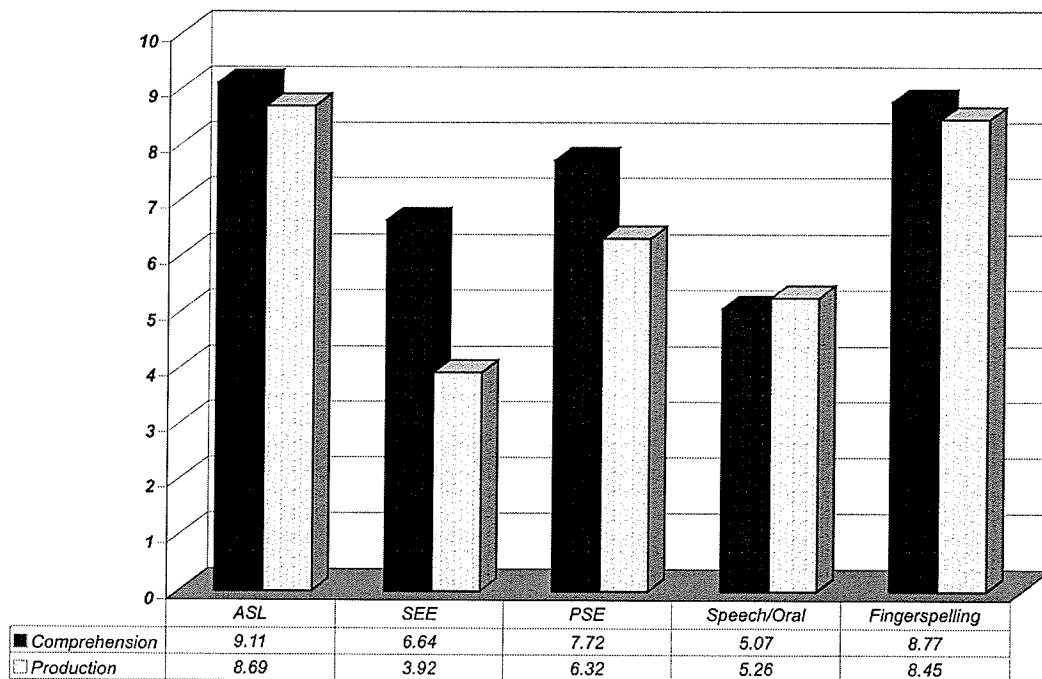


Figure 13.: Level of self-assessment of comprehension and production in five different areas of language & communication mastery.

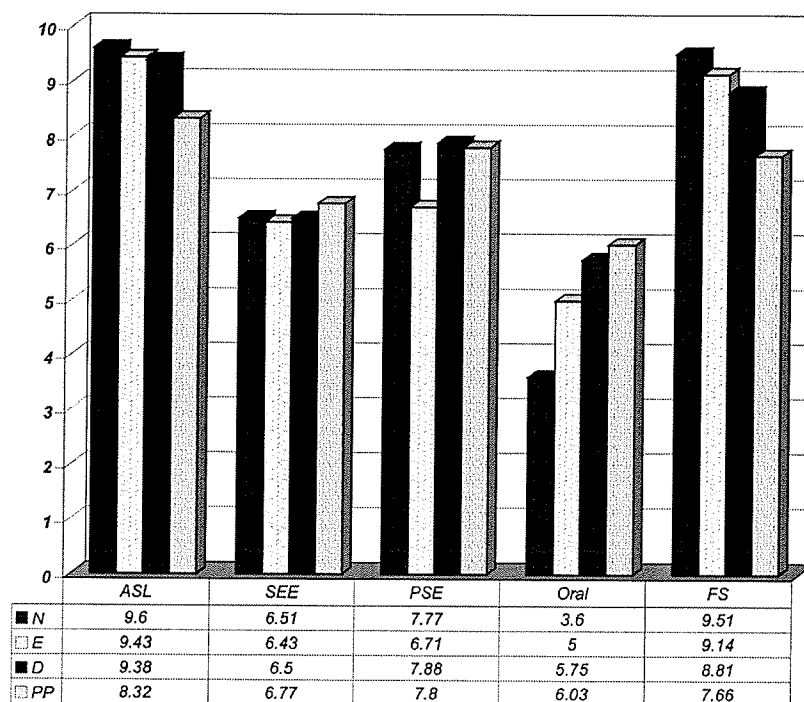


Figure 14.: Level of self-measurement of comprehension with AOA in five different areas of language & communication mastery.

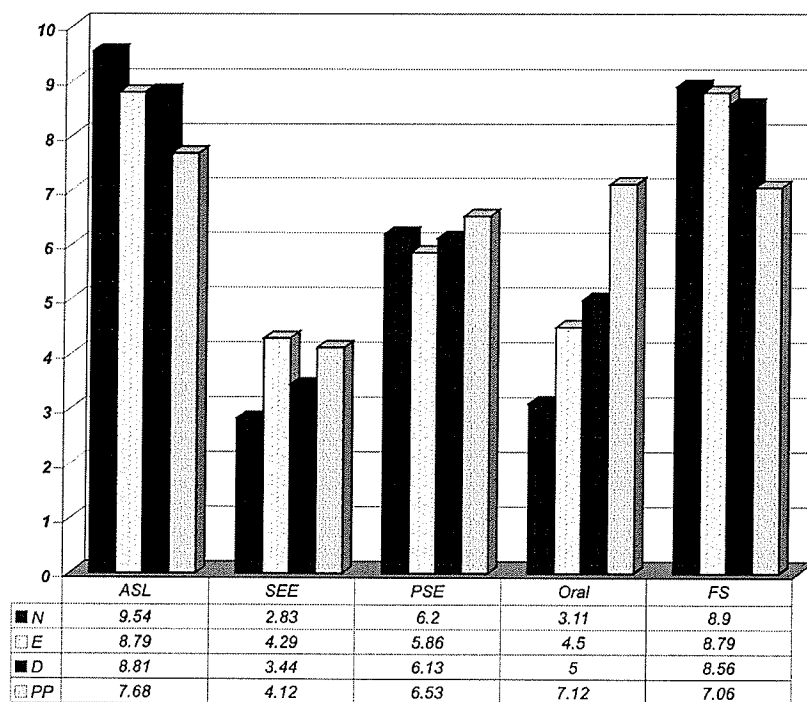


Figure 15.: Level of self-measurement of production with AOA in five different areas of language & communication mastery.

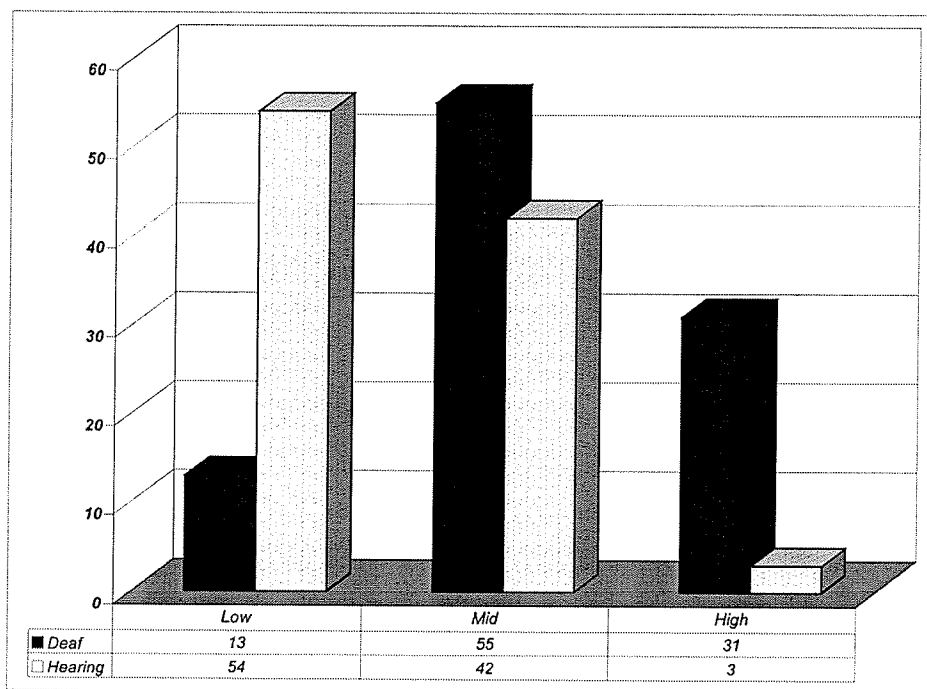


Figure 16.: Level of involvement with Deaf and hearing community.

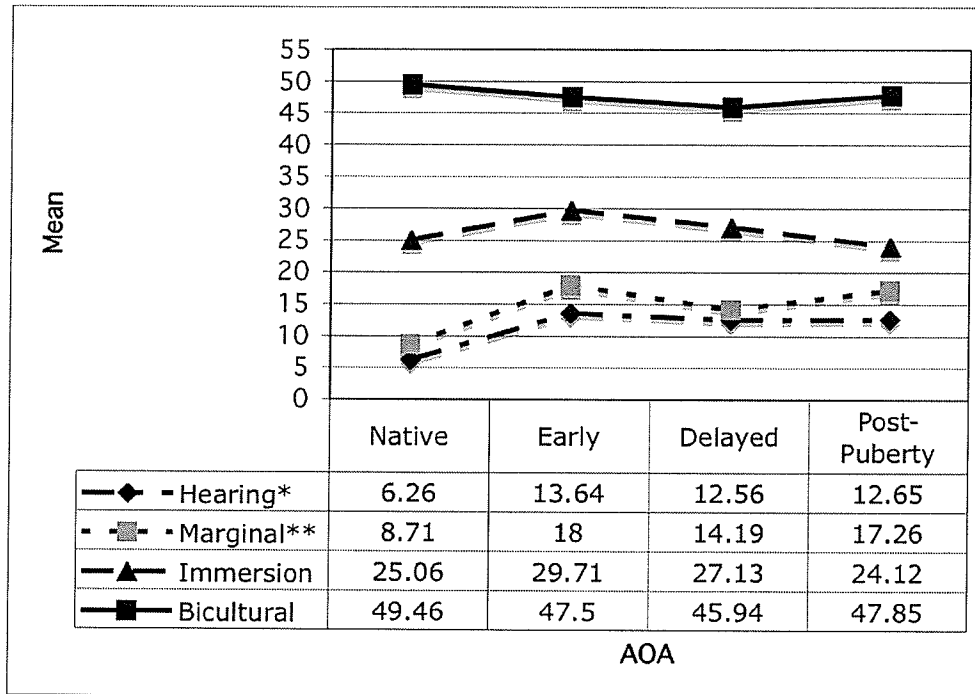


Figure 17.: Comparison of Means between DIDS-R scales and Age of Acquisition in ASL

- 
- Tukey posthoc Hearing Scale; Native/Post-Puberty  $p < .02$
  - Tukey posthoc Marginal Scale; Native/Early  $p < .01$
  - Tukey posthoc Marginal Scale; Native/Post-Puberty  $p < .001$

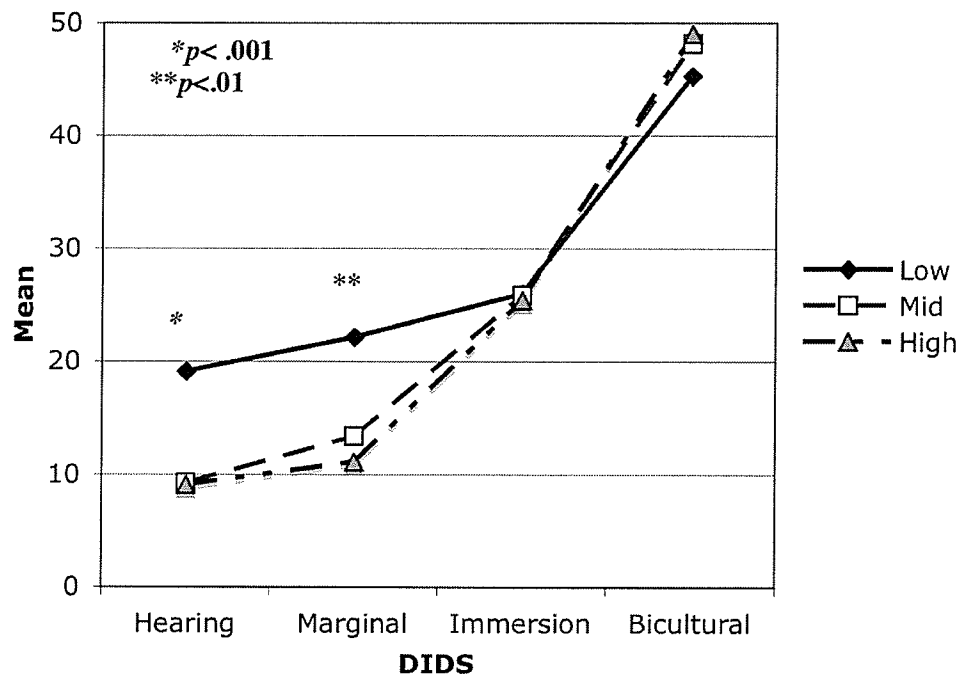


Figure 18.: Comparison of Means between DIDS-R scales and Degree of Involvement with Deaf community.

\* Tukey posthoc; Low/ Mid:  $p < .001$

\*\* Tukey posthoc; Low/High:  $p < .003$

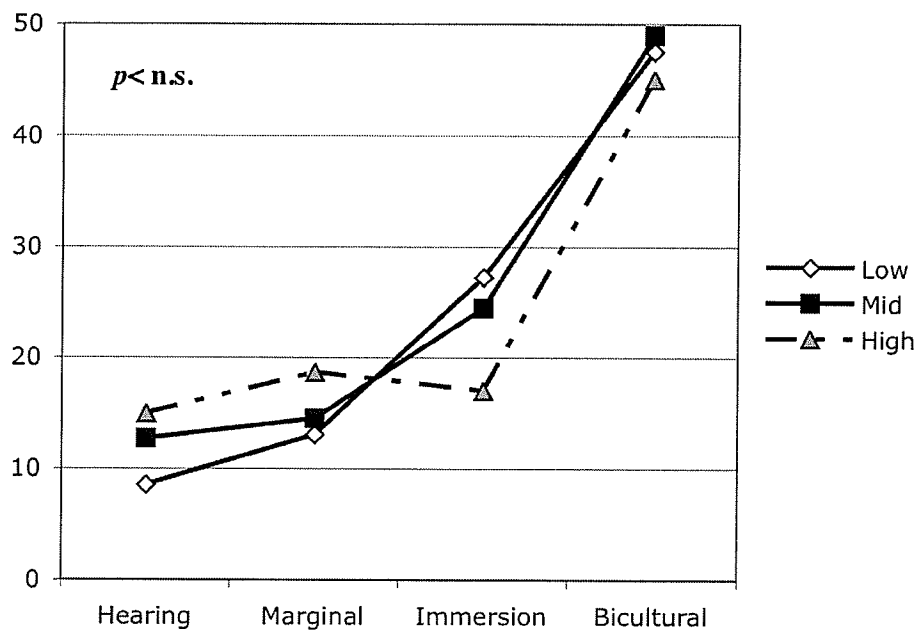


Figure 19.: Comparison of Means between DIDS scales and Degree of Involvement with hearing community.



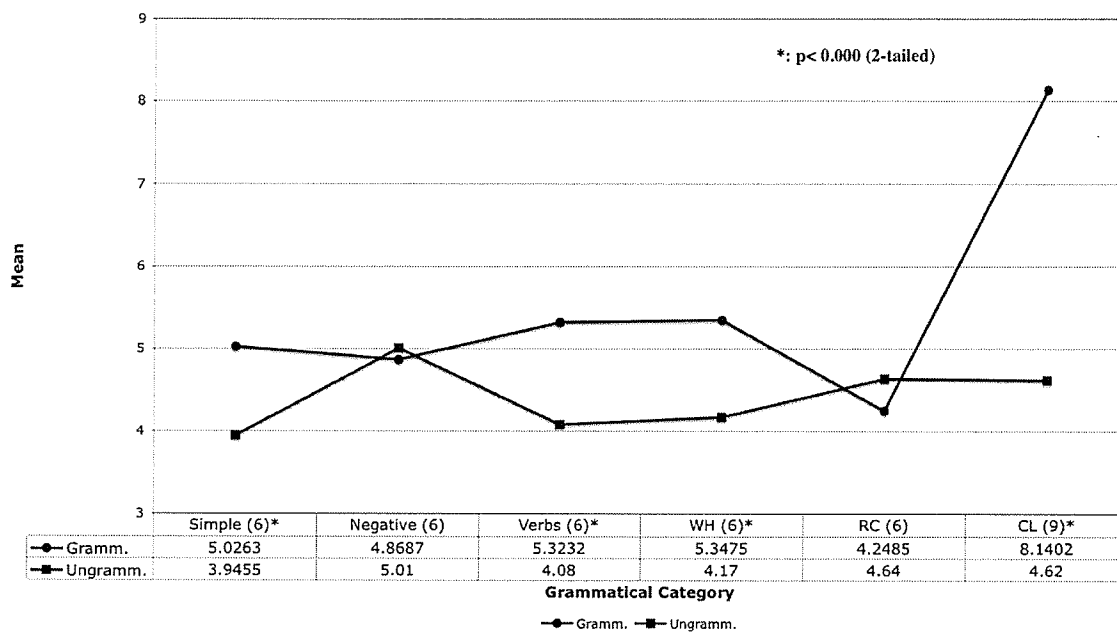


Figure 20.: Means of TGJASL-R by grammatical category and grammaticality.

Mean: 0.839, SD: 0.106, Min: .55, Max: .99

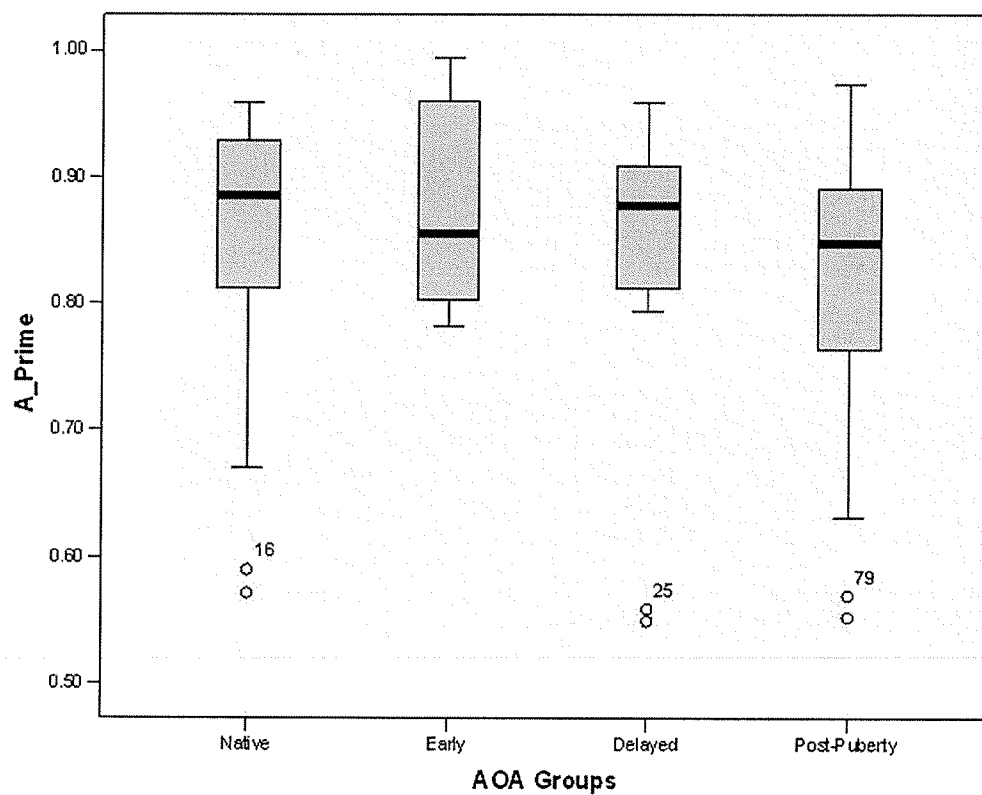


Figure 21.: A' of TGJASL-R by Age of Acquisition group.

APPENDIX A  
Advertisement Sample: Flyer & Email

## Deaf Studies Survey

### Deaf and Hard-of-Hearing Participants Wanted

My name is Patrick Boudreault and I am a Deaf doctoral student at the Faculty of Education, University of Manitoba in Winnipeg, Canada.

I am looking for Deaf – deaf – Hard-of-Hearing individuals to participate in an on-line survey. I hope you are willing to give your time to complete this survey, which you can do in either written English or American Sign Language through video playback. The survey will take you approximately 60 minutes to complete. You can respond to the survey from anywhere with a computer that has a high-speed Internet connection.

The purpose of my study is to understand the relationship between American Sign Language (ASL) and a Deaf - deaf - Hard-of-Hearing person's social development. Such findings may bring a better understanding of Deaf and Hard-of-Hearing individuals and their development of language and identity and influence educational and social services for Deaf children and adults.

To participate in this study on-line, please visit the URL's below:

**[www.deafnexus.com/deafstudies](http://www.deafnexus.com/deafstudies)**

Thank you in advance for your consideration of this request.

Patrick Boudreault, Principal Researcher

## Deaf Study Survey On-line

Date [here]

Hello!

My name is Patrick Boudreault and I am a Deaf doctoral student at the Faculty of Education, University of Manitoba in Winnipeg, Canada. I am looking for Deaf – deaf – Hard-of-Hearing individuals to participate in an on-line survey.

I hope you are willing to give your time to complete this survey, which you can do in either written English or American Sign Language through video playback. The survey will take you approximately 60 minutes to complete. You can respond to the survey from anywhere with a computer that has a high-speed Internet connection.

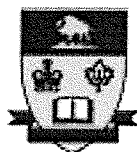
The purpose of my study is to understand the relationship between American Sign Language (ASL) and a Deaf - deaf - Hard-of-Hearing person's social development. Such findings may bring a better understanding of Deaf and Hard-of-Hearing individuals and their development of language and identity and influence educational and social services for Deaf children and adults.

To participate in this study on-line, please click the URL's below:  
<http://www.deafnexus.com/deafstudies>

Thank you in advance for your consideration of this request.

Patrick Boudreault, Principal Researcher

APPENDIX B  
Consent Form



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RESEARCH SUBJECT INFORMATION AND CONSENT FORM

**Research Project Title:** "Deaf Study Survey"

**Researcher:** Patrick Boudreault  
18111 Nordhoff St.  
Northridge, CA, 91330-8265

**Sponsor:** Dr. Charlotte Evans, University of Manitoba, Faculty of Education

This consent form, a copy of which will be left with you for your records and reference, which is available by downloading from this site directly, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

I am a doctoral student at the University of Manitoba, and this study is part of my thesis. The purpose of my study is to understand the interrelationship between American Sign Language (ASL) and the connection with self as a Deaf person and the Deaf community-at-large. This experiment is aimed to understand the importance of the Deaf and Hard-of-Hearing individual through their language and identity development and the role this can play within educational and social services for Deaf children and adults.

If you agree to participate in this study you will be asked to answer a variety of questions about yourself and your education, work, and communication experiences. You will also complete a test to measure your understanding of ASL. You will need to watch videos of signing and decide if they are good sentences or not. If you complete all parts of this study it will take approximately one hour and 15 minutes of your time.

Your participation in this study is a one-time occurrence and there is no risk related to you. The test will be conducted completely online and your answers will be recorded automatically, and then the data will be transferred to a secure database server with a 128-bits SSL encryption.

Your personal information will be kept confidential in a locked file that only the principal researcher will have access to. Your contact information will not be shared with anyone outside of this study. Your name will be replaced with a generic code for analysis purposes and in any documentation about this study.

The results of this experiment will be summarized with the whole group of participants and it will not provide you with your individual results. You can request a copy of this summary and it will be sent to you via email when the study is completed.

**COPYRIGHT: All images, text, programs, and other materials found in this Web Site are protected by Canadian and International copyright laws. Any use of the images, text, programs or other materials found in this web site is strictly prohibited, without the express written consent of principal researcher, Patrick Boudreault. Except as stated herein, none of the material may be copied, reproduced, distributed, republished, downloaded, displayed, posted or transmitted in any form or by any means, including, but not limited to, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of principal researcher, Patrick Boudreault.**

Your electronic signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

**Principal Researcher:** Patrick Boudreault, doctoral student

**Advisor:** Dr. Charlotte Evans,  
University of Manitoba, Faculty of Education

This research has been approved by the Education/Nursing Research Ethics Board at the University of Manitoba. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 204-474-7122. A copy of this consent form has been given to you to keep for your records and reference.

---

**\*\*Below this section: will be displayed outside of the consent form box on the website\*\***

- ☐ I agree with the consent agreement
- ☐ I disagree with the consent agreement
- ☐ I would like to receive a summary of the results of the study by email when it is completed.

Type in your name:

---

Date – Time will be electronically vouched by the computer automatically

APPENDIX C  
Consent Form for Future Research



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**Participant Information and Consent Form**  
**For permission to be contacted for future research by the principal researcher,**  
**Patrick Boudreault**

You are being asked for permission to be contacted in the future for participation in research studies. Please take your time to review this consent form and discuss any questions you may have. You are free to discuss this form with your friends, family and others before you make your decision.

If you agree to be contacted in the future for research purposes, information about you will be entered into an electronic database. The database will be maintained by Patrick Boudreault, Doctoral Student of the University of Manitoba and supervised by Dr. Charlotte Evans as advisor.

The Database will have the following information about you:

- *First and Last name*
- *Mailing address*
- *Phone number*
- *Fax number*
- *Email address*

Confidentiality of your information will be maintained in the following manner:

- *The database will be stored in a vaulted file and will be only accessible by the principal researcher, Patrick Boudreault.*
- *The information will not be shared with other researchers; however, the principal researcher may contact the subjects personally by email to request consideration for participation in other researcher's research projects.*
- *The contact information will be printed and preserved in a vaulted file up to 5 years, and after that time it will be destroyed.*

This consent form and the information in the database may be inspected by a University of Manitoba Research Ethics Board to ensure that your information is being collected and maintained in an ethical manner.

Your decision to allow your information to be in the database is completely voluntary. While there may be no benefit to you, your information will help researchers to quickly identify individuals who may be suitable for a particular research study. If you change your mind after agreeing to this, your information can be removed from the database. You will not be penalized in any way if you refuse to participate, or if change your mind and ask that your information be removed.

If you have any questions about this database, please contact:  
Patrick Boudreault

\_\_\_\_\_  
If you have questions about your rights as a research participant, you may contact the Human Ethics Secretariat of the University of Manitoba. Do not sign this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

#### Statement of Consent

I have read this consent form. I have had the opportunity to ask questions and discuss what is involved. I understand that my personal information will be kept confidential. By signing this consent form, I have not waived any of my legal rights.

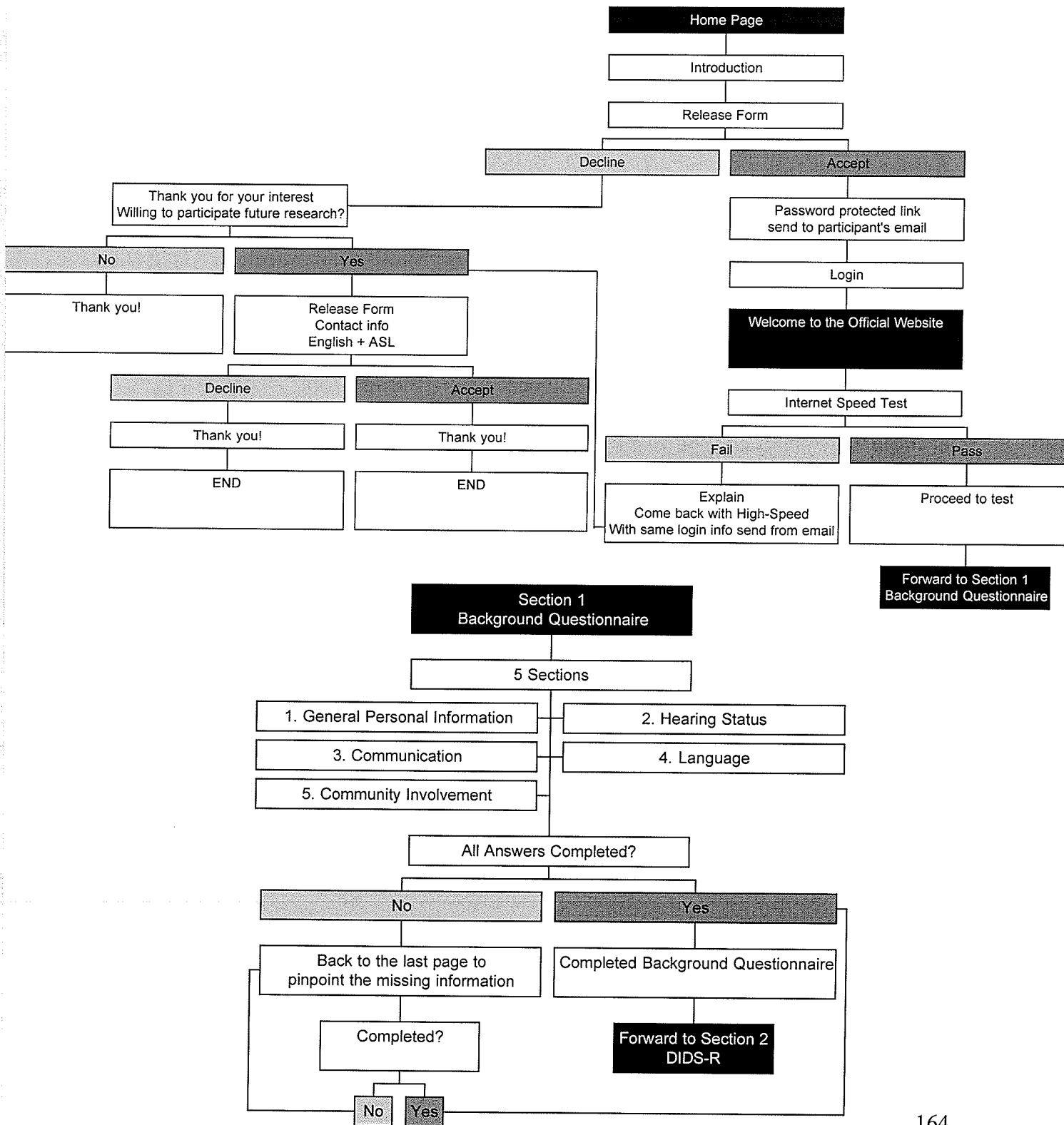
Participant electronic signature: \_\_\_\_\_ Accept \_\_\_\_\_ Decline      Date \_\_\_\_\_

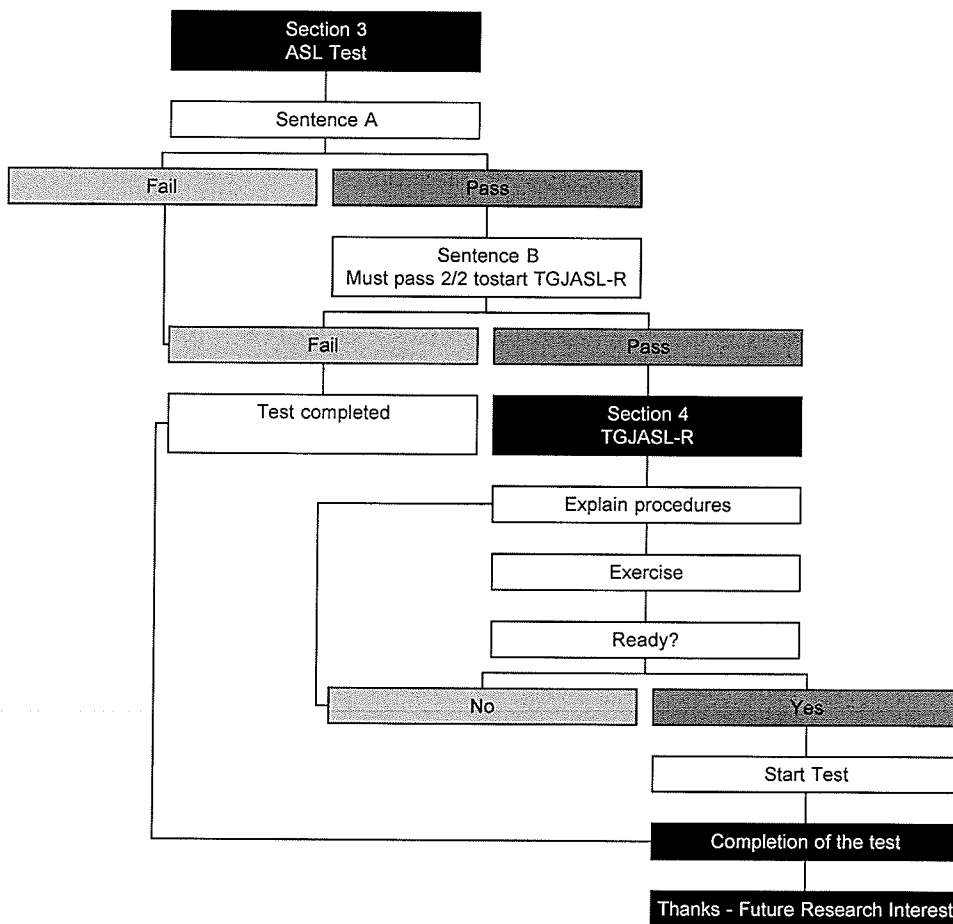
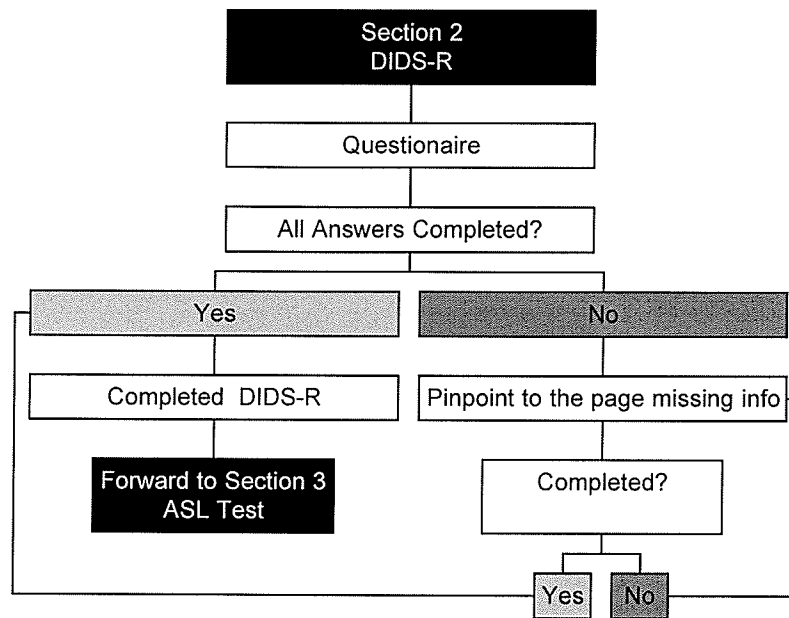
Participant typed name: \_\_\_\_\_



## APPENDIX D

### Website Schema





APPENDIX E  
Website Content Script: English

**{HOME PAGE}**

Hello!

I am a Deaf doctoral student at the Faculty of Education, University of Manitoba in Winnipeg, Canada. I am looking for Deaf – deaf – Hard-of-Hearing individuals to participate in an on-line survey.

I hope you are willing to give your time to complete this survey, which you can do in either written English or American Sign Language through video playback. The survey will take you approximately 60 minutes to complete. You can respond to the survey from anywhere with a computer that has a high-speed Internet connection.

The purpose of my study is to understand the relationship between American Sign Language (ASL) and a Deaf - deaf - Hard-of-Hearing person's social development. Such findings may bring a better understanding of Deaf and Hard-of-Hearing individuals and their development of language and identity, the influence on educational and social services for Deaf children and adults.

Patrick Boudreault  
818-677-4973 TTY  
818-742-0338 Voice  
[research@deafnexus.com](mailto:research@deafnexus.com)

**{Introduction}**

The Survey is divided into three main sections: 1) Background Questionnaire, 2) Deaf Identity, and 3) ASL Knowledge. The two first sections are accessible in two languages: English or ASL. You may read or view the video without limitation prior answering. However for the ASL section, you will only have access in ASL and the video viewing will be limited to one-time prior answering. You need to be not distracted in this section to provide your best knowledge of the ASL grammar.

Your participation during this survey must not be assisted by any other individual, this will ensure the accuracy of your own responses. Your results will be compared with other participants in this project, there is no right or wrong answers.

The consent form covers all the fundamental rights of the researcher/participant regarding this survey. You will be asked to accept or deny the agreement before going into the official site of this survey.

**{Consent Form}**:     See Appendix 4.B

### **{One-Time ID Link}**

You are registered for this survey, a unique and one-time identity code will be send to your registered email account. Please go to your email in a few minutes, you must click on the link in the body of your email message to get a full access to the Deaf Study.

If you your browser suddenly quit on you during the survey, do not worry, you can come back to this email message to continue your survey where you last answered without having to answer the questions all over again. Thank you.

### **{Welcome to Official Website}**

You are about to start your survey officially from here. Please take your time to answer you questions carefully, if you feel that the English is not your primary language, please click into the video window to start the ASL message/instruction/questions.

Before starting, you will be asked to start the internet speed test to ensure that your connection is suitable for this survey.

### **{Internet Speed Test}**

Your internet connection speed is insufficient to proceed this survey, you can come back later by user other computer with a faster connection speed.

### **{Internet Test Failed}**

Your internet connection speed is insufficient to proceed this survey, you can come back later by user other computer with a faster connection speed.

### **{Future Research}**

Would you like to be contacted for future research of this genre? If yes, you will be asked to provide some information that would allow us to contact you in the future. A consent form will be displayed in next page to cover all the fundamental rights of the researcher/participant regarding in disclosing the information. You will be asked to accept or deny the agreement before quitting this site.

**{Consent Form for Future Research}:**     See Appendix 4.C

---

### **{Section 1} Background Questionnaire**

This is the first section of three, the background questionnaire has five subsections: 1) personal information, 2) hearing status, 3) communication, 4) language mastery, and 5) community involvement. Once again, please take your time to answer you questions carefully, if you feel that the English is not your primary language, please click into the video window to start the ASL message/instruction/questions.

### **{Completed Section 1}**

You have completed the Background Questionnaire, you will about to enter the second section of this survey.

### **{Missing items}**

It seems that you have overlooked some of your questions, please verify all your answers to ensure that are properly filled or answered. Thank you!

---

### **{Section 2} DIDS-R**

This is the second section of three, this section has 60 questions. In each questions, you will be asked to answer from a range of 5 answers possible (SA= Strongly Agree, A= Agree, DK= Don't Know, D= Disagree, and SD= Strongly Disagree) related to your beliefs, values, perceptions related to the deaf and hearing world.

Once again, please take your time to answer you questions carefully, if you feel that the English is not your primary language, please click into the video window to start the ASL message/instruction/questions.

### **{Completed Section 2}**

You have completed this section, you will about to enter the third and last section of this survey.

### **{Missing items}**

It seems that you have overlooked some of your questions, please verify all your answers to ensure that are properly filled or answered. Thank you!

---

### **{Section 3 & 4} ASL Test & TGJASL-R**

This is the last section of three, this section will ask you to determine which answers are correct based on your ASL grammatical knowledge. In this section will include English and ASL for instruction part only, as for the ASL sentences will be presented in video only. Once again, please take your time to answer your questions carefully based on your knowledge of ASL grammar. Each presentation of ASL sentence will be presented only ONCE. Please be attentive.

#### **{Section3: ASL test}**

You will see two sentences in ASL, in each sentences, you will be asked which picture that fit the best with the described ASL sentence. You can click on the picture.

#### **{Section4: TGJASL-R}**

You are about to enter a second part of the ASL grammatical knowledge. What you are about to see is a list of different ASL sentences, you will be asked to determine whether or not the sentence is correct based on your ASL knowledge. Once again, please take your time to answer your questions carefully based on your knowledge of ASL grammar. Each presentation of ASL sentence will be presented only ONCE. Please be attentive.

#### **{Instruction}**

You will be asked to determine if the sentence is correct or not by pressing the button YES or NO. The sign variations and the semantics element of the sentence should not be taken consideration, all you need to focus on the correctness of the grammar use in ASL based on your knowledge of the ASL.

The next section will provide you a series of 4 sentences to get comfortable with this section. If you are comfortable with the procedure, you can select Yes to start the ASL part. If NO, you will be asked to redo the exercise section again until you are ready.

#### **{Ready?}**

Are you comfortable with this exercise instruction? If yes, please select Yes to start, otherwise you will repeat the exercise.

**{Completed the Survey}**

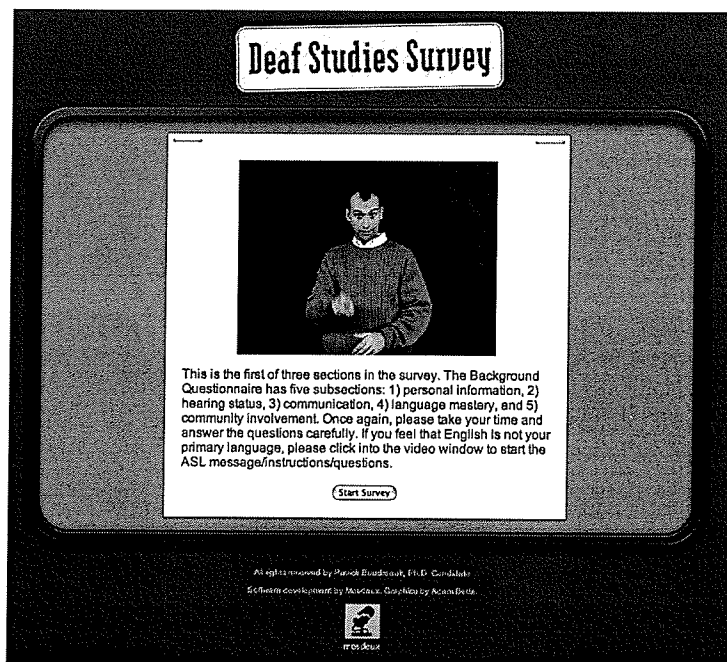
You have completed this survey. Your time is greatly appreciated and please take a few more moment to finalize this survey by asking you whether if you want to participate in future studies. If you have concerns of questions, please feel free to contact me at:

Patrick Boudreault  
818-677-4973 TTY  
818-742-0338 Voice  
[research@deafnexus.com](mailto:research@deafnexus.com)

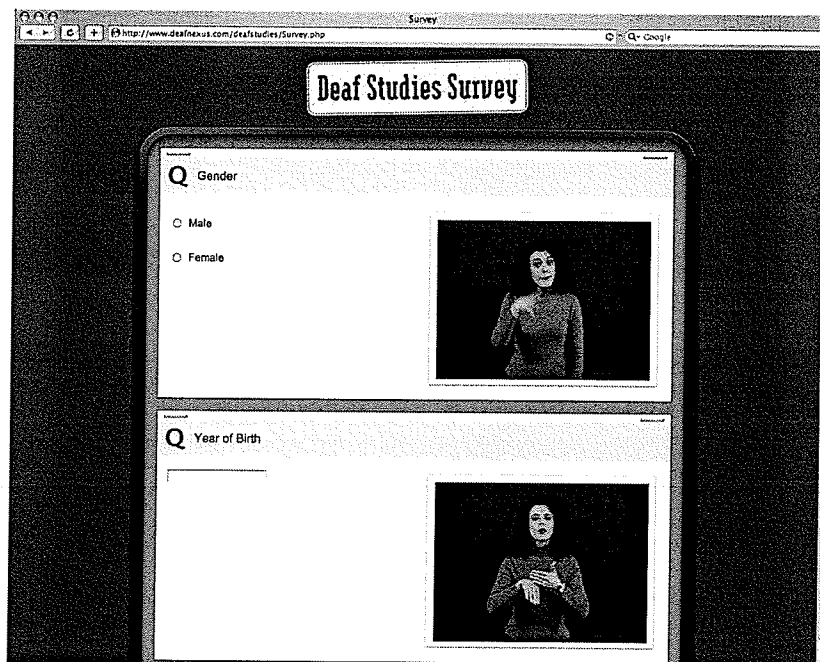
## APPENDIX F

### On-Line Test Screenshots

#### On-Line Test Screenshot; Instruction with ASL Video



#### On-Line Test Screenshot; Questionnaire sample with ASL Video





APPENDIX G  
Background Questionnaire

**Legend:** RDO: Radio buttons  
TXT: Answer by typing in a blank box  
DDL: Drop list with possible answers

PART I – GENERAL PERSONAL INFORMATION

1. Gender (RDO)
  - i. M
  - ii. F
2. Year of Birth (TXT)
3. Ethnicity (RDO)
  - i. African-American
  - ii. Asian American
  - iii. Caucasian (White)
  - iv. Hispanic
  - v. Native-American
  - vi. Other (TXT)
4. Where were you born? (DDL)
  - i. Canada
    - i. List of all provinces and territories
  - ii. USA
    - i. List of all States and territories
  - iii. Other: Type your country only (TXT)
5. Where did you growing up? (DDL)
  - i. Canada
    - i. List of all provinces and territories
  - ii. USA
    - i. List of all States and territories
  - iii. Other: Type your country only (TXT)
6. Where do you currently live? (DDL)
  - i. Canada
    - i. List of all provinces and territories
  - ii. USA
    - i. List of all States and territories
  - iii. Other: Type your country only (TXT)

7. What is your highest level of education? (DDL)
- i. High school level
    - i. Never finished high school
    - ii. Graduated from high school
    - iii. Student in a vocational school (did not graduate)
    - iv. Student in a vocational school (graduated)
  - ii. College / University level
    - i. Preparatory
    - ii. Freshmen
    - iii. Sophomore
    - iv. Junior
    - v. Senior
    - vi. Have two year college degree (associate degree)
    - vii. Have Bachelor's degree
  - iii. Graduate Student (Master or Doctoral)
  - iv. Have Master's degree
  - v. Have Doctoral degree
8. Answer all that applies. If you never went to College/University, please select "N/A" (RDO)
- i. Hearing College/University without interpreter/services support
  - ii. Hearing College/University with interpreter/services support
  - iii. NTID/RIT
  - iv. Gallaudet University
  - v. CSUN
  - vi. N/A
9. What is your program major? If you never went to College/University, please select "N/A" (RDO)
- i. Liberal Arts
  - ii. Business
  - iii. Social Science
  - iv. Computer Science
  - v. Science
  - vi. Medicine
  - vii. Law
  - viii. Engineering
  - ix. N/A

10. Employment (DDL)

- i. Disability (SSI, SDI, etc)
- ii. Unemployment Insurance (UI)
- iii. Full-time student
  - i. Fellowship, Scholarship, VR support, etc.
  - ii. No employment
  - iii. Part-time employment
  - iv. Full-time employment
- iv. Part-time student
  - i. Fellowship, Scholarship, VR support, etc.
  - ii. No employment
  - iii. Part-time employment
  - iv. Full-time employment
- v. Seeking employment
- vi. Part-time employment
- vii. Full-time employment
- viii. Two-jobs
- ix. Retired

11. Are you working in a signed environment? If you are currently not employed, please select "N/A" (RDO)

- i. Y
- ii. N
- iii. N/A

12. Workplace where there are other Deaf individual(s) who sign? If you are currently not employed, please select "N/A" (RDO)

- i. Y
- ii. N
- iii. N/A

13. Does your line of work involve with Deaf individuals as client, consumer, or student? If you are currently not employed, please select "N/A" (RDO)

- i. Y
- ii. N
- iii. N/A

14. Does your workplace provide ASL/English interpreting for meetings, professional development, etc? If you are currently not employed, please select "N/A" (RDO)

- i. Y
- ii. N
- iii. N/A

15. Is your workplace Deaf friendly (i.e. TTY, lighting system, ADA compliance etc.)  
If you are currently not employed, please select "N/A" (RDO)

- i. Y
- ii. N
- iii. N/A

16. Employment info (RDO) If you are currently not employed, please select "N/A"  
(RDO)

- i. Self-employed
- ii. Government employed
- iii. Private – large seized
- iv. Private – small seized
- v. Education
- vi. Business owner
- vii. N/A

17. Household income (RDO)

- i. Less than \$20,000
- ii. Between \$20,000 - \$40,000
- iii. Between \$40,000 - \$60,000
- iv. Between \$60,000 - \$80,000
- v. Between \$80,000 - \$100,000
- vi. Over \$100,000
- vii. Don't know

## PART II – INFORMATION RELATED TO THE HEARING STATUS

18. Hearing status (DDL)

- i. Deaf
- ii. Hard-of-hearing
- iii. Hearing
  - i. Hearing, does not know ASL
  - ii. Hearing CODA
  - iii. Hearing CODA interpreter
  - iv. Hearing ASL as second language
  - v. Hearing ASL as second language interpreter

19. Age became deaf (RDO)

- i. Born deaf
- ii. Born hearing, became deaf before age 4
- iii. Born hearing, became deaf between age 5 and 10
- iv. Born hearing, became deaf between age 11 and 20
- v. Born hearing, became deaf after age 21
- vi. Don't know
- vii. N/A

20. Do you use hearing aids? (RDO)

- i. Y
- ii. N

21. Hearing aids history (TXT)

- i. Start age (leave blank if never used hearing aids)
- ii. Stop age (leave blank if never used stopped using hearing aids)

22. Cochlear implant user? (RDO)

- i. Y
- ii. N

23. Cochlear implant history (TXT)

- i. Start age (leave blank if never had CI)
- ii. Stop age (leave blank if never stopped using CI)

24. Normal vision (RDO)

- i. Y
- ii. N

25. Wear glasses or contacts (RDO)

- a. Y
- b. N

26. Usher's Syndrome? (RDO)

- a. Y
- b. N

27. Family hearing status (RDO)

- i. Mom deaf or Hard-of-Hearing
  - i. Y
  - ii. N
- ii. Father deaf or Hard-of-Hearing
  - i. Y
  - ii. N
- iii. How many siblings are deaf or Hard-of-Hearing
  - i. 0-9 (RDO)
- iv. Grand-parents deaf or Hard-of-Hearing
  - i. Y
  - ii. N

28. Deaf Hereditary

- i. Number of deaf generation(s) ~~or HoH~~ from mother side
  - i. 0-6 (RDO)
- ii. Number of deaf generation(s) ~~or HoH~~ from father side
  - i. 0-6 (RDO)

PART III – COMMUNICATION

29. ASL: age began signing (leave blank if never used ASL) (TXT)

30. General use of mode of communication (RDO)

30a. Before age 10

- i. ASL
- ii. Oral
- iii. SEE
- iv. PSE/Signed English
- v. Gestures

30b. Between age 11 & 18

- i. ASL
- ii. Oral
- iii. SEE
- iv. PSE/Signed English
- v. Gestures

- 30c. After age 18
- i. ASL
  - ii. Oral
  - iii. SEE
  - iv. PSE/Signed English
  - v. Gestures

- 30d. Now
- i. ASL
  - ii. Oral
  - iii. SEE
  - iv. PSE/Signed English
  - v. Gestures

31. Family communication (RDO)

- 31a. Mother
- i. ASL
  - ii. Oral
  - iii. SEE
  - iv. PSE/Signed English
  - v. Gestures

- 31b. Father
- i. ASL
  - ii. Oral
  - iii. SEE
  - iv. PSE/Signed English
  - v. Gestures

- 31c. Sibling(s)
- i. ASL
  - ii. Oral
  - iii. SEE
  - iv. PSE/Signed English
  - v. Gestures
  - vi. N/A (no siblings)

- 31d. Grand-parents (mother side)
- i. ASL
  - ii. Oral
  - iii. SEE
  - iv. PSE/Signed English
  - v. Gestures

31e. Grand-parents (father side)

- i. ASL
- ii. Oral
- iii. SEE
- iv. PSE/Signed English
- v. Gestures

32. How do you communicate with? (RDO)

32a. Non-immediate members of the family (i.e.: uncle, aunt, cousins, nephew)

- i. ASL
- ii. Orally
- iii. SEE
- iv. PSE/Signed English<sup>19</sup>
- v. Written
- vi. Gestures

32b. Hearing people

- i. ASL
- ii. Orally
- iii. SEE
- iv. PSE/Signed English
- v. Written
- vi. Gestures

32c. Close friends (deaf or Hard-of-Hearing)

- i. ASL
- ii. Orally
- iii. SEE
- iv. PSE/Signed English
- v. Written
- vi. Gestures
- vii. N/A (no close deaf or Hard-of-Hearing friends)

32d. Close friends (hearing)

- i. ASL
- ii. Orally
- iii. SEE
- iv. PSE/Signed English
- v. Written
- vi. Gestures
- vii. N/A (no close hearing friends)



32e. People at work (deaf or hoh)

- i. ASL
- ii. Orally
- iii. SEE
- iv. PSE/Signed English
- v. Written
- vi. Gestures
- vii. N/A (no deaf or Hard-of-Hearing co-workers)

32f. People at work (hearing)

- i. ASL
- ii. Orally
- iii. SEE
- iv. PSE/Signed English
- v. Written
- vi. Gestures
- vii. N/A (no hearing co-workers)

33. Communication at school K-12 (RDO)

33a. Preschool

- i. Oral school of the deaf
- ii. Signing school for the deaf (Other means of communication than ASL, i.e.: PSE, MCE)
- iii. Signing school for the deaf (using ASL)
- iv. Classroom for deaf children in a hearing school
- v. Hearing school with no deaf program, with interpreter/support services
- vi. Hearing school with no deaf program, without interpreter/support services
- vii. Other

33b. Elementary (K to grade 6)

- i. Oral school of the deaf
- ii. Signing school for the deaf (Other means of communication than ASL, i.e.: PSE, MCE, TC)
- iii. Signing school for the deaf (using ASL)
- iv. Classroom for deaf children in a hearing school
- v. Hearing school with no deaf program, with interpreter/support services
- vi. Hearing school with no deaf program, without interpreter/support services
- vii. Other

33c. Middle school (grade 7 to grade 8 or 9)

- i. Oral school of the deaf
- ii. Signing school for the deaf (Other means of communication than ASL, i.e.: PSE, MCE, TC)
- iii. Signing school for the deaf (using ASL)
- iv. Classroom for deaf children in a hearing school
- v. Hearing school with no deaf program, with interpreter/support services
- vi. Hearing school with no deaf program, without interpreter/support services
- vii. Other

33d. High school (grade 8 or 9 to grade 11 or 12)

- i. Oral school of the deaf
- ii. Signing school for the deaf (Other means of communication than ASL, i.e.: PSE, MCE, TC)
- iii. Signing school for the deaf (using ASL)
- iv. Classroom for deaf children in a hearing school
- v. Hearing school with no deaf program, with interpreter/support services
- vi. Hearing school with no deaf program, without interpreter/support services
- vii. Other

PART IV – LANGUAGE MASTERY

Comprehension (RDO) 1 = None – 10 Excellent

34. How well do you understand ASL

35. How well do you understand SEE

36. How well do you understand PSE/Signed English

37. How well do you understand speech

38. How well do you understand fingerspelling

Production (RDO) 1 = None – 10 Excellent

- 39. How well do you express yourself in ASL
- 40. How well do you express yourself in SEE
- 41. How well do you express yourself in PSE/Signed English
- 42. How well do you express yourself in speech
- 43. How well do you express yourself in fingerspelling

PART V – COMMUNITY INVOLVEMENT

Deaf community (RDO) 1 =never, 3= once a while, 5 = regularly

- 44. Attend Informal Deaf gathering events (I.e. Coffee Night, Pizza Night)
- 45. Attend Deaf Club activities if any in your area
- 46. Attend captioned movies if any in your area
- 47. Attend interpreted performances if any in your area
- 48. Attend Deaf performances if any in your area
- 49. Attend Formal Deaf events (I.e. Festival, convention, etc)
- 50. Participate or follow Deaf National and International Conferences?
- 51. What is your level of involvement with your local community advocacy or deaf club?
  - i. 1= inactive, 3= moderately active, 5= very active
- 52. What is your level of involvement with your deaf sport organization?
  - i. 1= inactive, 3= moderately active, 5= very active

Hearing community (RDO) 1 =never, 3= once a while, 5 = regularly

53. Attend Informal hearing gathering events

54. Attend hearing organization in your neighbourhood

55. Attend to hearing performances without ASL interpreter

56. Attend formal hearing events (i.e. Festival, convention, etc.)

57. What is your level of involvement with your hearing local community advocacy organization?

i. 1= inactive, 3= moderately active, 5= very active

APPENDIX H  
Deaf Identity Development Scale-Revised  
*English version*

Table 31.1.: Hearing Scale:

<b>Item #</b>	<b>Stimuli</b>
*4	Deafness is a terrible disability
7	I feel sorry for deaf people who depend on sign language
12	I don't like it when deaf people use sign language
17	Deaf people should <u>not</u> marry other deaf people
19	When I see deaf people use sign language, I walk away
24	I don't understand why deaf people have their own culture
28	The focus of deaf education should be teaching deaf children to speak and lipread
33	It is best for deaf people to communicate with speech and lipreading
*34	Hearing people communicate better than deaf people
37	I only socialize with hearing people
*41	I would like to have an operation that would give me full hearing
43	Hearing counselors, teachers, and doctors who specialize in treating deaf people can give me the best advice
48	I call myself "hearing-impaired"
*53	It is important to find a cure for deafness
*55	Being deaf means feeling lonely and isolated
*: Deleted items in 47 items test	

Table 31.2.: Marginal Scale:

<b>Item #</b>	<b>Stimuli</b>
2	I don't know how I feel about deaf people
8	It's hard for me to make friends
*13	I don't know whether to respect or resent deaf people
15	I don't know whether to call myself "hearing-impaired" or "deaf"
21	Neither deaf nor hearing people accept me
23	I am always alone
*30	The best way to communicate is to speak and sign at the same time
31	I don't know whether to think of my deafness as something good or something bad
36	I don't know whether to respect or resent hearing people
*40	I want to socialize with deaf people, but often they embarrass me
50	I don't know what is the best way to communicate
52	I do not fit in with either hearing or deaf people
56	Sometimes I'm happy to be deaf, but most of the time I wish I could hear
58	I don't know whether I'd rather be with deaf or hearing people
60	Sometimes I wish I were more part of the Deaf community

---

\*: Deleted items in 47 items test

Table 31.3.: Immersion Scale:

Item #	Stimuli
3	Deaf people should only use ASL
6	Deaf people do not need hearing aids
10	There is no place for hearing people in the deaf world
16	Only deaf people should teach deaf children
*18	Hearing people don't help deaf people
22	Deaf people are satisfied with what the deaf world has to offer
*26	Hearing people do not understand or support deaf ways
*29	I feel angry with hearing people
35	Teaching deaf children to speak is a waste of time
38	It is wrong to speak while signing
45	Only deaf people should run deaf schools
47	I can't trust hearing people
49	Learning to lipread is a waste of time
51	Deaf people should only socialize with other deaf people
57	If an operation could make me hearing, I would not accept it
*: Deleted items in 47 items test	

Table 31.4.: Bicultural Scale:

<b>Item #</b>	<b>Stimuli</b>
1	I enjoy both deaf and hearing cultures
5	I support deaf culture without insulting hearing people
9	American Sign Language and English are different languages of equal value
*11	I call myself "deaf"
14	I want to help hearing people understand and respect deaf culture
20	I can change between ASL and Sign English
25	I have both deaf and hearing friends
27	When I am with hearing people, I remember my pride as a deaf person
32	I feel comfortable with my child being either deaf or hearing
39	I have thought a lot about what it means to be a proud, strong deaf person
42	I try to communicate well in <u>both</u> English and ASL
44	I feel comfortable with both deaf and hearing people
46	I feel good about being deaf, but I involve myself with hearing people also
54	My hearing friends will fight for deaf rights
*59	I seek out hearing friends who believe that deaf people should control their own lives

---

\*: Deleted items in 47 items test



APPENDIX I  
Deaf Identity Development Scale-Revised  
*Translated ASL version*

Table 32.1.: Hearing Scale:

Item #	Stimuli
*4	DEAF 1-SELF <sub>a</sub> PT <sub>a</sub> DISABILITY AWFUL
7	DEAF PEOPLE THEM-CIRCLE <sub>a</sub> DEPEND SIGN (slow) ASL PRO.1 PITY-2 <sub>a</sub>
12	DEAF PEOPLE SIGN PRO.1 CRINGE (palms up – push away)
17	DEAF <sub>a</sub> DEAF <sub>b</sub> MEET <sub>b</sub> MARRY SHOULD NOT
19	DEAF PEOPLE SIGN PRO.1 SEE (shake head) PRO.1 CL;/1/ [walk away]
24	DEAF PEOPLE GATHER/GROUP CULTURE THAT POSS.2 PRO.1 NOT UNDERSTAND
28	DEAF #ED SHOULD FOCUS TEACH DEAF CHILDREN SPEECH LIPREAD
33	DEAF PEOPLE SHOULD COMMUNICATE HOW? (rh) LIPREAD SPEECH
*34	HEARING PEOPLE PT <sub>a</sub> DEAF PEOPLE PT <sub>b</sub> COMMUNICATE BETTER WHO? (rh) PT <sub>a</sub> HEARING PEOPLE
37	PRO.1 INTERACT++ HEARING FOCUS THAT'S-ALL
*41	SUPPOSE SURGERY (locative: ear) HEAR PERFECT PRO.1 WANT
43	GROUP THEM (circle) PEOPLE FOCUS HELP DEAF PEOPLE LIKE HEARING COUNSELORS, DOCTORS, TEACHERS, THEM (circle) CAN 2-ADVISE-1 PRO.1 BEST
48	PRO.1 LABEL MYSELF #HI (hearing impaired)
*53	LOOK+ SOLVE DEAF IMPORTANT
*55	DEAF MEAN EQUAL LONELY ISOLATE

---

\*: Deleted items in 47 items test

Table 32.2.: Marginal Scale:

Item #	Stimuli
2	DEAF PEOPLE GROUP THEM (circle) HOW PRO.1 FEEL ABOUT THEM (circle) PRO.1 DON'T-KNOW
8	MEET++ CONNECT <sub>ab</sub> FRIENDS HARD FOR PRO.1
*13	DEAF PEOPLE GROUP PRO.1 DOUBT TWO <sub>ab</sub> PT <sub>ab</sub> (locative: one <sub>a</sub> two <sub>b</sub> ) SHOULD PRO.1 RESPECT, RESENT
15	LABEL MYSELF #HI <sub>a</sub> (hearing impaired) DEAF <sub>b</sub> PRO.1 DON'T-KNOW
21	DEAF <sub>a</sub> HEARING <sub>b</sub> ACCEPT PRO.1 NOT
23	PRO.1 TEND LONELEY ALONE
*30	COMMUNICATE BEST WHAT? (rh) SIMULTANEOUSLY SPEAK <sub>a</sub> SIGN <sub>b</sub>
31	DEAF PRO.B (entity) GOOD <sub>a</sub> BAD <sub>b</sub> PRO.1 DON'T-KNOW
36	HEARING PEOPLE GROUP PRO.1 DOUBT TWO <sub>ab</sub> PT <sub>ab</sub> (locative: one <sub>a</sub> two <sub>b</sub> ) SHOULD PRO.1 RESPECT, RESENT
*40	PRO.1 WANT++ INTERACT DEAF PEOPLE <sub>a</sub> , PROBLEM THEY <sub>a</sub> OFTEN 3-EMBARRASS-1 PRO.1
50	BEST WAY COMMUNICATE PRO.1 DON'T KNOW
52	GROUP DEAF <sub>a</sub> GROUP HEARING <sub>b</sub> PRO.1 FIT-NOT <sub>a</sub> , FIT-NOT <sub>b</sub>
56	PRO.1 DEAF SOMETIMES HAPPY <sub>a</sub> MOST TIME WISH HEAR CAN <sub>b</sub>
58	DEAF INTERACT <sub>a</sub> HEARING INTERACT <sub>b</sub> PREFER PT <sub>ab</sub> PRO.1 DON'T-KNOW
60	SOMETIMES PRO.1 WISH DEAF COMMUNITY PRO.1 MORE INVOLVE

\*: Deleted items in 47 items test

Table 32.3.: Immersion Scale:

Item #	Stimuli
3	DEAF PEOPLE SHOULD SIGN ASL ONE STRAIGHT (major) THAT'S-ALL
6	DEAF PEOPLE HEARING-AID (2 different signs) NOT NEED
10	DEAF WORLD <sub>a</sub> HEARING PEOPLE INVOLVE <sub>a++</sub> CAN'T
16	TEACH DEAF CHILDREN SHOULD WHO? (rh) DEAF PEOPLE
*18	HEARING PEOPLE <sub>a</sub> 3 <sub>a</sub> -HELP-3 <sub>b</sub> DEAF PEOPLE <sub>b</sub> NOT
22	DEAF WORLD <sub>a</sub> THAT POSS-2 <sub>a</sub> HAVE+ FIVE <sub>b</sub> PT <sub>b</sub> (locative enumerate all fingers <sub>b</sub> ) DEAF PEOPLE SATISFY
*26	DEAF PT-B <sub>a</sub> (circle) HEARING PEOPLE <sub>b</sub> UNDERSTAND 3 <sub>b</sub> -SUPPORT-3 <sub>a</sub> NOT
*29	HEARING PEOPLE THEM PRO.1 INFURIATED
35	DEAF CHILDREN TEACH SPEECH WASTE TIME
38	SIGN (mouthing – speak) SIMULTANEOUSLY WRONG
45	DEAF INSTITUTE CONTROL SHOULD WHO? (rh) DEAF PEOPLE ONLY
47	HEARING PEOPLE PRO.1 NOT TRUST
49	LIPREAD LEARN++ WASTE TIME
51	DEAF PEOPLE GROUP SHOULD INTERACT WHO? (rh) FOCUS DEAF PEOPLE THAT'S-IT
57	SUPPOSE SURGERY (locative: ear) BECOME HEARING PRO.1 REFUSE

---

\*: Deleted items in 47 items test

Table 32.4.: Bicultural Scale:

Item #	Stimuli
1	DEAF CULTURE <sub>a</sub> HEARING CULTURE <sub>b</sub> PRO.1 INVOLVE <sub>a</sub> INVOLVE <sub>b</sub> ENJOY
5	PRO.1 SUPPORT <sub>a</sub> DEAF CULTURE REDUCE <sub>b</sub> (scale down) INSULT <sub>b</sub> ++ HEARING PEOPLE <sub>b</sub> PRO.1 NOT
9	ASL <sub>a</sub> ENGLISH <sub>b</sub> LANGUAGES DIFFERENT UNDERSTAND EQUAL
*11	LABEL MYSELF DEAF
14	PRO.1 WANT 1-HELP-2 <sub>a</sub> HEARING PEOPLE UNDERSTAND <sub>a</sub> 2-RESPECT-1 DEAF CULTURE
20	ASL <sub>a</sub> SIGN ENGLISH <sub>b</sub> SHIFT-SHIFT PRO.1 CAN
25	FRIENDS PRO.1 INTERACT HEARING <sub>a</sub> DEAF <sub>b</sub> BOTH
27	PRO.1 INTERACT HEARING PEOPLE PRO.1 PROUD DEAF
32	POSS.1 CHILD DEAF <sub>a</sub> HEARING <sub>b</sub> DOESN'T-MATTER
39	PERSON DEAF PROUD STRONG MEANS WHAT? (rh) PRO.1 REFLECT+ LOT
42	ENGLISH <sub>a</sub> ASL <sub>b</sub> PRO.1 TRY COMMUNICATE <sub>a</sub> COMMUNICATE <sub>b</sub> BOTH
44	INTERACT DEAF <sub>a</sub> INTERACT HEARING <sub>b</sub> PRO.1 COMFORTABLE <sub>a</sub> COMFORTABLE <sub>b</sub>
46	DEAF PRO.B (entity) FEEL FINE <sub>a</sub> PLUS GROUP HEARING PEOPLE PRO.1 INVOLVE <sub>b</sub> ++
54	POSS.1 HEARING FRIEND <sub>a</sub> DEAF RIGHTS <sub>b</sub> 2 <sub>a</sub> -SUPPORT-3 <sub>b</sub>
*59	PRO.1 TEND CONNECT GROUP HEARING PEOPLE <sub>a</sub> THEM <sub>a</sub> (circle) 2 <sub>a</sub> -SUPPORT-3 <sub>b</sub> BELIEVE DEAF PEOPLE <sub>b</sub> CAN PROGRESS THEMSELVES

\*: Deleted items in 47 items test

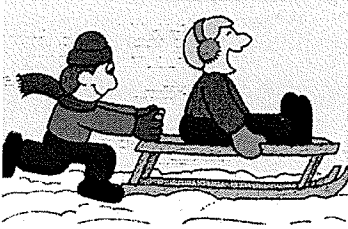
## APPENDIX J

### ASL Test

#### Stimuli 1. PUSHING: Answer – Drawing #3.

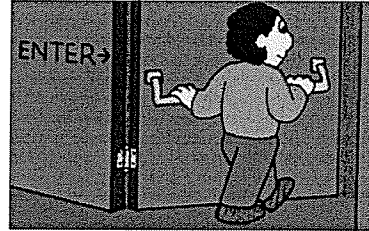
top  
BOY<sub>1</sub> CL:/U<sup>C</sup>/ [swinging], FRIEND PUSHING<sub>1</sub>  
English: The boy pushed his friend on a swing.

**Drawing 1.**



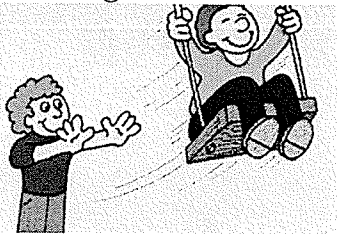
Subject: Man  
Object: Friend/Sleigh  
Verb: Pushing  
Location: Sleigh

**Drawing 2.**



Subject: Man  
Object: Door  
Verb: Pushing  
Location: Door

**Drawing 3.**



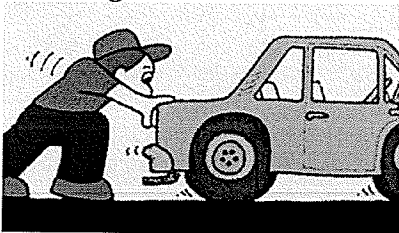
Subject: Friend  
Object: Boy  
Verb: Pushing  
Location: Swing

**Drawing 4.**



Subject: Man  
Object: House  
Verb: Pushing  
Location: N/A

**Drawing 5.**



**Picture #5.**

Subject: Man  
Object: Car  
Verb: Pushing  
Location: Car

**Stimuli 2. PAINTING: Answer – Picture #2.**

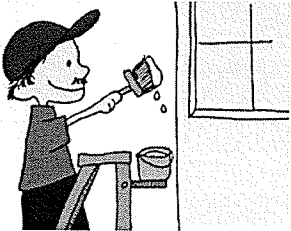
top

DH: GIRL CL:/U/ [painting on canvas] PRO. canvas, HOUSE YELLOW.

NDH: CL:/B/ [canvas]

English: The girl is painting a yellow house on a canvas.

**Drawing 1.**



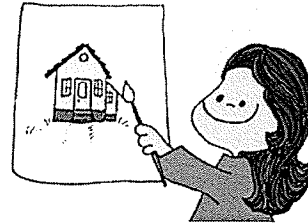
Subject: Man

Object: House

Verb: Painting CL:/B/

Color Object: Yellow

**Drawing 2.**



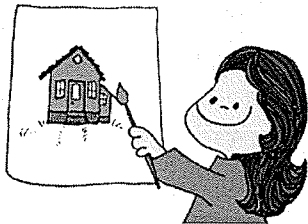
Subject: Girl

Object: House/Canvas

Verb: Painting CL:/U/

Color Object: Yellow

**Drawing 3.**



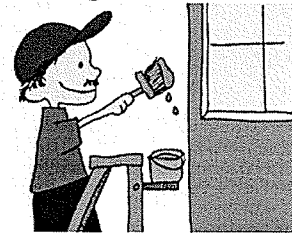
Subject: Girl

Object: House/Canvas

Verb: Painting CL:/U/

Color Object: Green

**Drawing 4.**



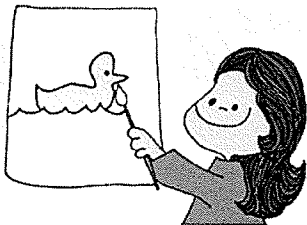
Subject: Man

Object: House

Verb: Painting CL:/B/

Color Object: Green

**Drawing 5.**



**Picture #5.**

Subject: Girl

Object: Duck/Canvas

Verb: Painting CL:/U/

Color Object: Yellow

APPENDIX K  
Test of Grammatical Judgment in ASL -Revised

Table 33.1.: Practice Sentence: [4 items]

<b>Stimuli</b>	
1.	MAN BUY BOOK
1b.	* <u>BOOK BUY</u> MAN
2a.	FRIEND SELL HOUSE COLOR YELLOW
2b.	* <u>COLOR YELLOW</u> FRIEND SELL HOUSE

Table 33.2.: Simple Sentence: [12 items]

<b>Stimuli</b>	
1a.	IN OFFICE OLD MAN WHITE-HAIR PONDER
1b.	*IN OFFICE <u>PONDER</u> OLD MAN WHITE-HAIR
2a.	4 BOYS FROM 'DEAF-INSTITUTE' CHAT
2b.	* <u>CHAT</u> 4 BOYS FROM 'DEAF-INSTITUTE'
3a.	SCHOOL FINISH BOY PLAY BASEBALL OUTSIDE
3b.	*SCHOOL FINISH <u>PLAY</u> BOY BASEBALL OUTSIDE
4a.	COLLEGE STUDENT TEND RUN EVERY-NIGHT
4b.	* <u>RUN</u> COLLEGE STUDENT TEND EVERY-NIGHT
5a.	BEFORE WW2 MANY WOMEN WORK FACTORY
5b.	*BEFORE WW2 <u>WORK</u> MANY WOMEN FACTORY
6a)	WINTER #ALL BEAR SLEEP UNTIL SPRING
6b*)	WINTER #ALL <u>SLEEP</u> BEAR UNTIL SPRING

Table 33.3.: Negative Sentence: [12 items]

---

**Stimuli**

---

Subsection A: Negative sign with positive Non-Manual Signal

- 7a. POSS-1 BROTHER HOUSE REMODEL <sup>neg.</sup>**DON'T-FINISH**  
 7b. \*POSS-1 BROTHER HOUSE REMODEL **DON'T-FINISH**
- 8a. TODAY #HS STUDENT MATH <sup>neg.</sup>**DON'T-KNOW**  
 8b. \*TODAY #HS STUDENT MATH **DON'T-KNOW**
- 9a. POSS-1 CHILDREN ICE-CREAM DIFFERENT <sup>neg.</sup>**DON'T-LIKE**  
 9b. \*POSS-1 CHILDREN ICE-CREAM DIFFERENT **DON'T-LIKE**

Subsection B: Negative Non-Manual Signal appeared in wrong clause

- 10a. POSS-1 GRANDMA BIKE NEW <sup>neg.</sup>**USE**  
 10b. \***POSS-1 GRANDMA** BIKE NEW **USE**
- 11a. SCHOOL PT-3 (Loc.) GIRL CHUBBY <sup>neg.</sup>**EXERCISE**  
 11b. \***SCHOOL PT-3 (Loc.)**GIRL CHUBBY **EXERCISE**
- 12a. BEFORE POSS-1 SON HURT <sup>neg.</sup>**CRY**  
 12b. \***BEFORE POSS-1 SON** HURT **CRY**
-



Table 33.4.: Verb Agreement Sentence: [12 items]

**Stimuli**

---

Subsection A: Subject 1st person and Object 3rd person

- 13a. PACKAGE HEAVY PT-1 **1-SEND-3** UNCLE  
13b. \*PACKAGE **1-SEND-3** HEAVY PT-1 UNCLE

Subsection B: Subject 3<sup>rd</sup> person and Object 1<sup>st</sup> person

- 14a. POSS-1 FRIEND **3-INFORM-1** PARTY TONIGHT  
14b. \*POSS-1 FRIEND PARTY **3-INFORM-1** TONIGHT  
  
15a. POSS-1 NEIGHBOR SMALL DOG **3-BITE-1**  
15b. \*POSS-1 NEIGHBOR **3-BITE-1** SMALL DOG  
  
16a. POSS-1 FAMILY DOCTOR **3-WARN-1** MUST LOSE-WEIGHT /U+U/  
16b. \*POSS-1 FAMILY DOCTOR MUST LOSE-WEIGHT /U+U/ **3-WARN-1**

Subsection C: Subject 1<sup>st</sup> person and Object 2nd person

- 17a. YESTERDAY SPANISH CLASS TEST PT-1 **1-ANSWER-2++**  
17b. \***1-ANSWER-2++** YESTERDAY SPANISH CLASS TEST PT-1

Subsection D: Subject 3<sup>rd</sup> person and Object 3<sup>rd</sup> person

- 18a. TEACHER<sub>i</sub> STUDENT<sub>j</sub> BOOK THICK **3<sub>i</sub>-GIVE-3<sub>j</sub>**  
18b. \***3<sub>i</sub>-GIVE-3<sub>i</sub>** TEACHER<sub>i</sub> STUDENT<sub>j</sub> BOOK THICK
-

Table 33.5.: Wh. Question Sentence: [12 items]

**Stimuli**

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Sub section A: Wh Question

- 19a. RECENTLY BOY TWO-OF-THEM FIGHT <sup>wh.</sup> **WHY?**
- 19b. \*RECENTLY <sup>wh.</sup> **WHY?** BOY TWO-OF-THEM FIGHT
- 20a. HOCKEY CANADA RUSSIA MATCH WIN <sup>wh.</sup> **WHO?**
- 20b. \*HOCKEY <sup>wh.</sup> **WHO?** CANADA RUSSIA MATCH WIN
- 21a. POSS-2 UNLCE B-O-B NEW #JOB <sup>wh.</sup> **WHAT?**
- 21b. \*POSS-2 UNLCE B-O-B NEW <sup>wh.</sup> **WHAT?** #JOB

Sub Section B: Wh. Question marker

- 22a. YESTERDAY POSS-2 MOTHER BUY GLASS <sup>wh.</sup> **COLOR?**
- 22b. \*<sup>wh.</sup> **YESTERDAY POSS-2 MOTHER** BUY GLASS **COLOR?**
- 23a. MOOSE MEAT, TASTE <sup>wh.</sup> **LIKE?**
- 23b. \*<sup>wh.</sup> **MOOSE MEAT**, TASTE **LIKE?**

Sub Section C: Y/N Question marker with Wh. Question wiggle

- 24a. MAN TALL MUSCULAR EXERCISE <sup>wh.</sup> **EVERYDAY ? Wh. Wiggle**
- 24b. \*MAN TALL MUSCULAR <sup>wh.</sup> **(Wh. Wiggle)** EXERCISE **EVERYDAY ?**
-

**Stimuli**

---

Sub section A: RC Marker

25a. BLACK CAT<sub>i</sub> EAT MOUSE<sub>j</sub><sup>rc</sup>, SLEEP

25b. \*SLEEP, \*SLEEP, BLACK CAT<sub>i</sub> EAT MOUSE<sub>i</sub><sup>rc</sup>

26a. BOY<sub>i</sub> SNOWBALL THROW GIRL<sub>j</sub><sup>rc</sup>, PUNISH

26b. \*PUNISH, \*PUNISH, BOY<sub>i</sub> SNOWBALL THROW GIRL<sub>i</sub><sup>rc</sup>

27a. GIRL<sub>i</sub> PUSH POSS-3 BROTHER<sub>j</sub><sup>rc</sup>, ESCAPE

27b. \*ESCAPE, \*ESCAPE, GIRL<sub>i</sub> PUSH POSS-3 BROTHER<sub>i</sub><sup>rc</sup>

Sub Section B: THAT marker

28a. CAT<sub>i</sub> STARE MOUSE<sub>j</sub> THAT<sub>j</sub><sup>top</sup>, TEND EAT BIRD.

28b. \*CAT<sub>i</sub> STARE THAT<sub>i</sub><sup>top</sup> MOUSE<sub>j</sub>, TEND EAT BIRD.

29a. WIFE<sub>i</sub> DISPUTE HUSBAND<sub>j</sub> THAT<sub>i</sub><sup>top</sup>, TEACH CHEMESTRY.

29b. \*WIFE<sub>i</sub> DISPUTE THAT<sub>i</sub><sup>top</sup> HUSBAND<sub>j</sub>, TEACH CHEMESTRY.

30a. TEACHER<sub>i</sub> DISPUTE STUDENT<sub>j</sub> THAT<sub>i</sub><sup>top</sup>, VERY-STRICT.

30b. \*TEACHER<sub>i</sub> DISPUTE THAT<sub>i</sub><sup>top</sup> STUDENT<sub>j</sub>, VERY-STRICT.

Table 33.7.: Classifiers Sentence: [18 items]

### Stimuli

Sub section A: Agent > verb of motion & Object > CL or SASS

- 31a. **GARBAGE CL:/C+C/ [can]** <sup>1</sup>, **MOUSE CL:/Vc/ [climb inside]** <sup>2</sup>  
 31b. \***MOUSE CL:/Vc/ [climb inside]**, **GARBAGE CL:/C+C/ [can]** <sup>3</sup>
- 32a. **WHITE HOUSE CL:/C/ [mouthing "CHA"-big]** <sup>1</sup>, **WOMAN CL:/V/ [pass by]** <sup>2</sup>  
 32b. \***WOMAN CL:/V/ [pass by]**, **WHITE HOUSE CL:/C/ [mouthing "CHA"-big]** <sup>3</sup>
- 33a. **CHAIR CL:/Vc/i** <sup>1</sup>, **RED BALL CL:/C/j [bouncing on chair]** <sup>2</sup>  
 33b. **RED BALL CL:/C/j [bouncing on chair]** **CHAIR CL:/Vc/i** <sup>3</sup>
- 34a. **TREE CL:/ARM/** <sup>1</sup>, **#CAR CL:/3/ [hit tree]** <sup>2</sup>  
 34b. \***#CAR CL:/3/ [hit tree]**, **TREE CL:/ARM/** <sup>3</sup>
- 35a. **STEEL CL:/F+F/**, **BOY CL:/1+Vc/ [climbing]**  
 35b. \***BOY CL:/1+Vc/ [climbing]**, **STEEL CL:/F+F/**
- 36a. **#HAY CL:/5/ [pile]** <sup>1</sup>, **COW CL:/Cs/ [eat hay]** <sup>2</sup>  
 36b. \***COW CL:/Cs/ [eat hay]**, **#HAY CL:/5/ [pile]** <sup>3</sup>

Sub section B: Agent > verb of motion 1 & Theme/Patient > verb of motion 2

- 37a. **THIEF CL:/1/ [running]** <sup>1</sup>, **POLICE CL:/1/ [pursuing thief]** <sup>2</sup>, **CL:/L-Lc/ [shoot at thief]** <sup>4</sup> **CL:/V/ [fall]** <sup>5</sup>  
 37b. \***THIEF CL:/1/ [running]** <sup>1</sup>, **POLICE CL:/1/ [pursuing thief]** <sup>2</sup> (**PO: Reversed**), **CL:/Lc-L/ [shoot at thief]** (**MVT: HMH Reversed on thumb level**) <sup>4</sup>, **CL:/V/ [fall]** <sup>5</sup>
- 38a. **#CAR CL:/3/x [car X]** <sup>1</sup> **GREEN LIGHT CL:/O-5/, [light up]** <sup>2</sup> **CL:/3/x [car X cross street]** <sup>1</sup> **CL:/3/y [car Y hit car X]** <sup>2</sup>  
 38b. \***#CAR CL:/3/x [car X]** <sup>1</sup> **GREEN LIGHT CL:/5-O/ [light up]** <sup>2</sup> (**MVT: HMH reversed**), **CL:/3/x [car X cross street]** <sup>1</sup> **CL:/B/v [car Y hit car X]** (**HS: incorrect**) <sup>2</sup>

- 39a. TABLE **CL:/B/**<sup>1</sup> CAT SLEEP CL:/Vc/ [cat's sleeping position on table]<sup>2</sup>, #DOG **CL:/B+B/ [barking at cat]**<sup>6</sup>, CL:/B+Vc > V+V/ [the cat awake from table]
- 39b. \*TABLE **CL:/B/ (PO: Reversed)**<sup>1</sup> CAT SLEEP CL:/Vc/ [cat's sleeping position on table]<sup>2</sup>, #DOG **CL:/1+1/ [barking at cat] (HS: incorrect)**<sup>6</sup>, CL:/B+Vc > V+V/ [the cat awake from table]
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<sup>1</sup>: Non Dominant Hand – Sign hold at the end of the movement as a reference point for Dominant Hand.

<sup>2</sup>: Dominant Hand joined the Non Dominant Hand on hold.

<sup>3</sup>: Dominant Hand executed without the reference point of Non Dominant Hand.

<sup>4</sup>: Dominant Hand – Sign hold at the end of the movement as a reference point for Non Dominant Hand.

<sup>5</sup>: Non Dominant Hand acted on the result of the Dominant Hand on hold.

<sup>6</sup>: Non Dominant Hand is temporarily absent while the CL sign use both hands.