

INTELLIGIBILITY OF AMERICAN SIGN LANGUAGE DIALOGUE
IN POPULAR MEDIA

by

CEDAR O'KONSKI

A THESIS

Presented to the Department of Communication Disorders and Sciences
and the Robert D. Clark Honors College
in partial fulfillment of the requirements for the degree of
Bachelor of Science

May 2023

An Abstract of the Thesis of

Cedar O’Konski for the degree of Bachelor of Science
in the Department of Communication Disorders and Sciences to be taken June 2023

Title: Intelligibility of American Sign Language Dialogue in Popular Media

Approved: *Melissa Baese-Berk, Ph.D.*
 Primary Thesis Advisor

This thesis examines the intelligibility of American Sign Language (ASL) dialogue in contemporary movies and TV shows. ASL and Deaf people have historically been represented inaccurately onscreen by hearing actors with poor signing skills. In recent decades, however, this has changed for the better, with directors hiring fluent Deaf actors and ASL dialogue coaches. Still, there has never been a study quantifying how intelligible the ASL dialogue in contemporary media is to actual signers.

Through an online survey for ASL signers, participants were shown 45 ASL dialogue clips from 9 different movies and TV shows. Participants rated how well they could understand the clips based on the actors’ ASL proficiency, and the way the dialogue was filmed. Analysis of this data found that even in films with fluent Deaf actors and ASL dialogue coaches, the dialogue was often highly unintelligible, due to culturally ignorant framing and editing of actors’ signing. The film *CODA* (2021) was a notable exception, with comparatively well-filmed ASL. Based on feedback from survey participants and additional research, this thesis recommends that directors hire ASL cinematographers to supervise and guide the filming and editing of ASL dialogue, to ensure that the final product is intelligible for a signing audience.

Acknowledgements

First and foremost, I would like to thank Professor Melissa Baese-Berk, Ph.D. for her invaluable guidance and support throughout my research and writing process.

I would also like to thank the University of Oregon's Speech Perception and Production Lab for being a wonderful and collaborative group of people. It is always a pleasure and an honor to brainstorm ideas, practice presentations, and cheer each other on as we tackle the great and wonderful beast that is research. I would especially like to thank Kurtis Foster, Carissa Diantoro, Cecelia Staggs, and Shiloh Drake, Ph.D. for their encouragement and assistance.

I would also like to thank Valentino Vasquez for his assistance with developing and recording the survey's screener questions, and for his presence as the second reader on my thesis committee.

I am very grateful to the University of Oregon's Office of the Vice President for Research and Innovation for awarding me with a generous UROP Mini-grant, which allowed me to compensate those involved with my survey. I am also very grateful to the Clark Honors College for awarding me Mentored Research Program funding during my time working on this thesis.

Lastly, I would like to thank my parents, Tim O'Konski and Susan Meade, my partner, Sky Croce, and my friend, Elise Grace, for all being infinitely patient, supportive, and kind as I tackled the aforementioned great and wonderful research beast. 🙌

Table of Contents

Introduction	8
American Sign Language	8
History	8
American Deaf Culture	11
ASL Linguistics	12
Name Signs	14
SimCom	14
Deafness in Hollywood	15
Filming and Editing Signed Dialogue	18
Actors' ASL Fluency	19
Literature Review	21
Intelligibility Studies	21
Intelligibility of ASL Onscreen	22
Positionality Statement	25
Methods	27
Choosing Media	27
Selecting Clips	28
Intelligibility Criteria	28
Disqualified Media	30
Editing Clips	32
Participant Recruitment	34
Survey Format	35
Survey Complications	37
Grading Translations	38
Results	40
Participants	40
Score Averages by Media	44
Proficiency Differences Among Participants	47
Ranked Data Split by Participant Experience	50
Rank Correlation	51
Data Split by Actor Background	52
Discussion	55

Notable Correlations	55
DHH Actors and Better Filming	58
Conclusion	64
References	67

List of Figures

Figure 1: Example of covering captions from the movie <i>CODA</i> .	34
Figure 2: Participant Identity Demographics	40
Figure 3: “How long have you been learning ASL?” Responses	41
Figure 4: “How did you learn ASL?” Responses	42
Figure 5: Participant Fluency Demographics	43
Figure 6: Media Watched by Participants Prior to Survey	44
Figure 7: Translation Accuracy, Comprehensibility, Actor Proficiency, and Filming Averages by Media	47
Figure 8: Comparing Translation Accuracy, Comprehensibility, Actor Proficiency, and Filming Averages by Participant Experience Level	50
Figure 9: <i>CODA</i> Screenshot	59
Figure 10: <i>Hawkeye</i> Screenshot	62

List of Tables

Table 1: Translation Grading Scale	39
Table 2: The Interagency Language Roundtable	42
Table 3: Ranked Media by Scoring Category, Subdivided by Participant Experience Level	51
Table 4: Overall Percentages for Four Scoring Categories, Subdivided by Actor Background	53
Table 5: Overall Percentages for Four Scoring Categories, Subdivided by Actor Background and Participant Experience Level	53

Introduction

American Sign Language

This section is intended to serve as a primer for readers who are unfamiliar with American Sign Language (ASL) by briefly describing its history, American Deaf culture, and some linguistic features of ASL that are relevant to this thesis.

History

Since at least the early eighteenth century, and likely for generations before that, the Indigenous people of North America used sign languages for various social and discourse functions. American Indian Sign Language (AISL) was used widely by many different communities, primarily as a lingua franca between tribes with different spoken languages (Davis, 2017). Due to various historical, sociocultural, and sociolinguistic pressures, American Indigenous signed languages are now considered highly endangered, and their use has mostly been replaced by dominant languages such as English, Spanish, and ASL (Davis, 2017).

In 1755, Abbe Charles-Michel de l'Epee of Paris founded the first public school in Paris for deaf students (*History of American Sign Language*, 2016). Following his example, many of his students went on to found schools for the deaf throughout Europe. At all these institutions, the language of instruction was Langue des Signes Francaise (LSF), or French Sign Language.

In the United States prior to the nineteenth century, there were small, scattered signing communities, but no deaf schools or standardized national sign language as in Europe. The languages in these isolated communities varied widely in size and sophistication, from unique systems of home signs used by individual families to Martha's Vineyard Sign Language, a sign

language known by the entire population of the village of Chilmark, since the isolated island community had a high incidence of genetic deafness (Bahan, 1996).

In 1815, Thomas Hopkins Gallaudet, an American man, traveled to Europe with the ambition of learning how to create schools for the deaf in America (*History of American Sign Language*, 2016). There, he met Laurent Clerc, a Deaf French man who was a graduate of l'Epee's Paris school. The two traveled back to America together, and, in 1817, established the first permanent school for the deaf in America—the American School for the Deaf—in Hartford, Connecticut (Bahan, 1996). For the first time, deaf children from all over the United States were brought together into a single community. This unification was the birth of the modern American Deaf community.

Following the curriculum of the European schools for the deaf, Gallaudet and Clerc taught the students at the American School for the Deaf in French Sign Language, or LSF (Bahan, 1996). The students, in turn, taught Gallaudet and Clerc the signs they had already invented and learned. American Indian Sign Language was recorded, published, and widely distributed to educators at schools for the deaf across the United States (Davis, 2017). American Indians also visited some residential deaf schools during the nineteenth century and taught students their signed languages, and some schools for the deaf were in close proximity to residential American Indian schools, increasing the amount of AISL language contact (Davis, 2017).

This confluence of linguistic contact between LSF, AISL, Martha's Vineyard Sign Language, and unique home sign systems led to the evolution of American Sign Language (ASL). As in Europe, graduates of the American School for the Deaf went on to found their own schools for the deaf throughout the United States, and thus ASL spread.

ASL has continued to evolve over time, though the influence of LSF is still notable today: 60% of modern ASL signs are historically related to signs from old LSF (Bahan, 1996). ASL is used primarily in the United States and Canada. Other countries have their own national sign languages, and not all English-speaking countries use ASL. In England and Australia, for example, the national sign languages are British Sign Language and Auslan, respectively, which have their own unique origins and are not intelligible to ASL signers.

There is currently no reputable data on how many people in the United States use ASL. The most recent survey of ASL signers is from Schein and Delk in 1972, who estimated that at the time, there were roughly 500,000 people who signed ASL at home, at least 250,000 of whom were pre-vocally deaf people who used ASL as their primary language (Mitchell et al., 2006). However, since that time, there has not been another survey of that nature. The U.S. Census Bureau codes ASL as English when it appears on its forms, so its data is not helpful, either (Mitchell et al., 2006).

There are more recent and accurate surveys of how many people in the United States are deaf or hard of hearing, but these do not provide an accurate estimate for how many people use ASL in their daily lives. Many deaf and hard of hearing people do not know or use sign language, and there is a non-insignificant population of hearing people who know and use ASL on a daily basis, such as ASL interpreters and hearing children of Deaf adults.

From 1970 to 2020, the US population increased by over 128 million people—a roughly 63% increase (United States Census Bureau, 2021). It is likely that since that time, the number of people who use ASL in their daily lives has increased at least somewhat proportionally.

At the same time, ASL has become a much more widely offered “foreign” language in schools, due to increasing awareness of and interest in the language by the mainstream hearing

population. Between 2003 and 2009, ASL course offerings at high schools and colleges increased by 437%, making ASL the third most-taught language in the United States (Brueggemann, 2009). This has likely increased the number of hearing people in the United States who are at least conversational in ASL.

While ASL is a minoritized language in the United States, it still has a significant population of speakers with a rich history, culture, and community.

American Deaf Culture

In this thesis, there is an important distinction to be made between *deaf* and *Deaf*.

With a lowercase d, *deaf* refers to an individual who has a profound hearing loss. In mainstream hearing culture, this reflects the dominant perspective on deafness: as a medical deficit, characterized by an inability to hear. This is also referred to as a “pathological” view of deafness, since it intrinsically implies that deafness is something to be cured—by teaching English lip-reading and literacy, and by using technology like hearing aids and cochlear implants to make deaf individuals as much like hearing people as possible (Reagan, 1995).

With an uppercase D, *Deaf* refers to an individual’s cultural identity as a member of the Deaf community—a linguistic and cultural minority group within the broader culture of anglophone North America. The Deaf community is characterized by the same kinds of elements that characterize other cultural minority communities: a common, shared language (ASL), a shared awareness of cultural identity, distinctive behavioral norms and patterns, shared historical knowledge and awareness, and a network of social organizations and communities—such as the communities fostered in schools for the deaf (Reagan, 1995). This alternate perspective on deafness is referred to as the “sociocultural” view.

From the sociocultural perspective, Deafness is not a handicap or deficit, but an essential cultural condition. Instead of comparing deafness to other physical disabilities, the sociocultural perspective compares the Deaf community to other nondominant linguistic and cultural groups (Reagan, 1995). This perspective does not focus on medical interventions to prevent or “cure” deafness, but instead on civil rights issues, with the goal of helping the Deaf community flourish in mainstream American culture.

The most significant element of Deaf cultural identity is, by far, competence in ASL (Reagan, 1995). Within the Deaf community, ASL serves multiple functions: not only is it the community’s vernacular language, but it is a marker of group solidarity, and a means for members of the Deaf community to identify each other. There are different regional and cultural dialects within ASL, such as Black American Sign Language (BASL). There is also “Pidgin Signed English,” (PSE), a dialect of ASL that uses more English-like grammar and signs.

There are also artificially constructed sign languages such as Signed Exact English (SEE) and Manually Coded English (MCE), which are typically created and used by educators to promote English fluency and literacy. These artificially constructed variations of ASL are generally met with a negative attitude in the Deaf community, which values ASL over English. PSE also tends to be viewed in a negative light for this same reason.

ASL Linguistics

ASL is not “signed English.” It is its own complete and separate language, with unique syntax and morphology. One of the most significant of these differences is the simultaneous grammar of ASL.

For example, the sign “to give” can be inflected to indicate different subjects and objects, different numbers of subjects and objects, and temporal information, all by changing the

orientation and movement of the sign within the signing space (Quinto-Pozos, 2011). Facial expression and body language can also simultaneously add further semantic information to the verb sign.

In English, all this grammatical information would need to be added sequentially with the addition of words before and after the verb phrase: *Give* becomes ***I give it to the two of them repeatedly in a haphazard manner***. In ASL, a signer could convey all that information simultaneously by modifying the way they sign “to give.” They could alter the movement of the sign to convey them giving something to two other people, add a cyclical motion to the sign to indicate they do so repeatedly, and use their facial expression and body language to convey clumsiness and disorganization. These inflections would all occur simultaneously with the verb, not sequentially as conjugations do in spoken languages (Quinto-Pozos, 2011).

In her TED Talk, “The enchanting music of sign language,” Deaf artist Christine Sun Kim describes the simultaneous grammar of ASL using the metaphor of a piano. English is a “linear language”: only one piano key may be pressed at a time. ASL, however, is played in chords: “all ten fingers need to come down simultaneously to express a clear concept or idea in ASL. If just one of those keys were to change the chord, it would create a completely different meaning” (Kim, 2015).

Writing is, inherently, a sequential form of communication: you can only write one symbol or character at a time. When faced with the simultaneous complexity of a single sentence in ASL, the task of translating all of the semantic information exactly into a concise written form is daunting. This is one of the main reasons why there is no standardized writing system for ASL, despite multiple attempts to create one (Quinto-Pozos, 2011). This, combined with the fact

that ASL is a minoritized language within the United States, means that the vast majority of ASL signers are, by necessity, also proficient in English.

ASL has a manual fingerspelling alphabet, in which a unique hand shape represents each letter of the English alphabet. The manual alphabet can be used to spell out English words that do not have a direct counterpart in ASL. People's names, for example, are often spelled out, unless they have been given a name sign.

Name Signs

In ASL, people with strong ties to the Deaf community will often have name signs, a specific sign to represent their name, created by others in the Deaf community. Name signs are unique for each individual—they can be arbitrary, combining the first letter of the person's name with the motions and/or location of a common sign, or descriptive, indicating a specific physical or personality trait (Stockdale, 2013).

Some name signs are universal or nearly so, such as the name signs for celebrities, presidents, and famous historical figures. However, most of them are tied to specific individuals in local communities, and are not common knowledge outside those specific contexts.

SimCom

Another example of contact between English and ASL is Simultaneous Communication, or SimCom. SimCom is a bimodal communication style in which a person speaks in English, while simultaneously signing the same message in ASL. SimCom has traditionally been used in educational settings, or when communicating in groups with mixed language needs.

Since ASL and English are two separate languages with vastly different grammar, it is very difficult to communicate effectively in both languages at once. Thus, SimCom typically consists of “grammatically correct spoken English, with signs used in varying degrees of visual

comprehensibility, and [Manually Coded English] with varying degrees of completeness” (Akamatsu & Stewart, 1998).

Despite being touted as a means of communicating in both languages at once, in practice, someone using SimCom will almost always speak full, fluent English sentences while signing occasional isolated ASL signs in an English grammatical order. Members of the Deaf community generally view SimCom as a communication method that devalues ASL and upholds an audist attitude, since it prioritizes spoken English over ASL (Lapiak, n.d.).

Deafness in Hollywood

The silent film era stretched from 1894 to 1929. During that time, movies were a bridge between the hearing and deaf worlds (Safran, 1998). Since every movie was silent and captioned, deaf and hearing people could equally enjoy films as theatergoers.

Movies were not only accessible for deaf audience members, but for deaf actors as well. There were at least five deaf movie actors during the silent film period, most notably Granville Redmond, a close friend of Charlie Chaplin who had cameos in seven of Chaplin’s films (Dudding, 2021; Safran, 1998). Chaplin saw Redmond as a natural silent film actor, because Redmond was so accustomed to expressing himself visually (Dudding, 2021). Redmond’s most prominent role was in the 1926 silent film *You’d Be Surprised*, in which he plays a major role and uses ASL onscreen (Smith, 2021). Redmond was fluent in ASL, and taught the language to Chaplin. Many believe that Chaplin’s friendship with Redmond, and Chaplin’s resulting knowledge of ASL, helped enrich Chaplin’s expressive acting and physical comedy in his films (Dudding, 2021).

But then came the “talkies”—suddenly, movies had sound, and movie studios stopped including captions. The year 1929 was the peak of the silent film era, but by 1930, no major

companies were producing silent films (Safran, 1998). In a single year, deaf people were entirely cut off from the film industry, both as actors and as audience members.

In the years that followed, ASL was still occasionally portrayed onscreen, though almost always by hearing actors with poor signing skills. In earlier years, sign language in movies was synonymous with secretive communication (Safran, 1998). Films that did portray deafness often oversimplified the issues of language and identity that d/Deaf individuals experience, and ignored the Deaf community entirely. It wasn't until 1968, in the film *The Heart is a Lonely Hunter*, that two deaf people were portrayed conversing together onscreen—they were both played by hearing actors with poor signing skills (Safran, 1998).

In 1986, everything changed. Marlee Matlin, a Deaf actress, starred in *Children of a Lesser God*, the first major motion picture since *You'd Be Surprised* in 1926 to cast a d/Deaf actor in a major role (Smith, 2021). In the film, Matlin's dialogue is entirely in ASL.

Directed by Randa Haines and adapted from a stage play by Mark Medoff, *Children of a Lesser God* follows hearing speech therapist James Leeds (played by William Hurt) and Deaf custodian Sarah Norman (Matlin), who both work at a school for the Deaf. The two have conflicting opinions on language—James thinks that Sarah should learn to speak, and she prefers to only communicate in ASL. This conflict forms the central tension in their tumultuous romantic relationship.

Not only was *Children of a Lesser God* the first film in 60 years, and the second film ever, to cast a d/Deaf actor in a major role, but it was the first major film to ever portray American Deaf culture and the American Deaf community onscreen. For the first time, mainstream hearing audiences saw fluent Deaf actors signing in ASL, and were exposed to some of the attitudes and conflicts surrounding ASL within the Deaf community.

Of course, the representation wasn't perfect. *Children* was criticized for being told entirely from a hearing perspective, for a hearing audience (Smith, 2021). There are no captions in the film, for either the spoken or signed dialogue. Instead, the signed dialogue is translated aloud by James, which only benefits hearing audience members, and filters all the Deaf characters' dialogue through James' biases. Furthermore, the signed dialogue in the film is often cut off or obscured by choices of framing and jump cuts (Smith, 2021).

Despite these issues, *Children* was still a massive improvement over the other existing films at the time: both for featuring Deaf actors as Deaf characters, and for accurately portraying ASL and the Deaf community. Marlee Matlin won the 1986 Academy Award for Best Actress for her performance in the film, becoming the first d/Deaf person to win an Academy Award.

Since *Children of a Lesser God*, there has been a slow but steady increase in the number of films and TV shows that feature d/Deaf characters, d/Deaf actors, and ASL. Thanks to strong advocacy efforts from Matlin and others, the quality of onscreen representation of Deaf individuals has improved. Still, d/Deaf characters are rarely the protagonists, and tend to serve as a source of context or character development for the hearing protagonists (Lerner & Sayers, 2016). Also, d/Deaf characters are rarely portrayed as connected to the Deaf community, or even other d/Deaf characters. Films tend to use d/Deaf characters as symbols of powerlessness, trauma, or isolation (Lerner & Sayers, 2016).

Much of the same is true for television. In a study of television shows featuring signing Deaf characters between 2007 and 2010, recurring Deaf characters in ongoing series were almost always the only Deaf character in the show, and were not shown as having any connections with the Deaf community (Rayman, 2010). Interestingly, one-off TV show episodes that featured

Deaf characters were much more likely to portray Deaf characters as culturally connected to each other through the Deaf community and ASL.

There also continue to be problems with the portrayal of ASL itself onscreen. These issues typically fall into one of two categories: the way the dialogue is filmed, and the actors' lack of Deaf cultural awareness and ASL competence.

Filming and Editing Signed Dialogue

Deaf viewers were frustrated by *Children of a Lesser God* in 1986, since they found that “the ASL dialogue had been pushed out of the frame by camera angles and editing” (Lerner & Sayers, 2016). This issue of inaccessible filming continues to be a major problem for ASL representation onscreen to this day. Filmmakers are often ignorant about sign language and Deaf culture, and thus inauthentic portrayals and tropes are unfortunately widespread. While more directors have started to cast Deaf actors who bring their knowledge of ASL and Deaf culture to the table, their performances are often hampered by the script, director, and editing process, which are still by and for the mainstream hearing population (Lerner & Sayers, 2016).

With spoken dialogue, filmmakers can cut away from a speaking character to show another character's reaction. Doing this with signed dialogue, however, cuts a character off mid-sentence. Filming a speaking actor in profile is not a problem, but filming a signing actor in profile can significantly impact the intelligibility of ASL dialogue, since the signing is now being viewed from an unconventional angle, and partially blocked by the actor's body.

Even changing the camera angle to a different shot of a signing character while they're mid-sentence can be very disruptive to the continuity of their signing. A close-up shot of an actor's face, common in films, can cut off part or all of the actor's hands, making their dialogue difficult or impossible to understand.

If an actor's face isn't properly lit, their hands and facial expressions can be difficult or impossible to make out. Even the actor's wardrobe can impact intelligibility: if they're wearing dark gloves and dark clothes, for example, their hands will blend into their body, and it will be very difficult to understand their signing.

Captions, ironically, often partially or entirely obscure the hands of signing characters. In many contemporary films, such as *A Quiet Place* (2018), there are embedded English captions for the ASL dialogue, while the spoken English dialogue is uncaptioned in the theatrical cut of the film. This creates a strange inverse of the accessibility of silent films, where the captions only aid hearing moviegoers.

Actors' ASL Fluency

If an actor learned their lines in ASL but has no other experience with the language or with Deaf culture, their signing will appear clumsy and stilted when compared to the signing of a fluent actor. The difference may not be noticeable for audience members with no knowledge of ASL, but for moviegoers who are proficient in the language, the contrast is obvious.

The slasher film *Hush* (2016), for example, stars hearing actress Kate Siegel as Maddie, a deaf woman. Siegel was the film's writer, and her husband, Mike Flanagan, was the film's director. They said that they chose to cast Siegel as Maddie due to "budget constraints" (Lopez, 2020).

While writing the movie, Siegel and Flanagan did online research about ASL and deafness, and hired a Deaf ASL consultant who taught Siegel her lines in ASL and vetted the script (Lopez, 2020). One of the changes the consultant made to the script was that, instead of being born deaf, Maddie became deaf later in life. This explained why Maddie was isolated from the Deaf community, and why her signing was not completely fluent.

The Deaf community was critical of the choice to cast Siegel as Maddie. Rebecca-Anne Withey, a Deaf actress and writer, said of Siegel's performance, "the signing fluctuated from ASL to PSE [Pidgin Signed English] [...] and her lip pattern changed from being non-existent to overly accentuating. It wasn't consistent. And therefore I didn't believe her" (Withey, 2016).

While Withey acknowledged that it was exciting and uncommon for a big-profile movie like *Hush* to feature a deaf character and ASL, she also expressed frustration at the fact that Siegel was cast at all.

Casting a hearing actor with no ASL experience to play a Deaf character makes about as much sense as casting an actor with no knowledge of Spanish to play a character who only speaks Spanish. No matter how much time they spend with a dialogue coach, their lack of fluency will be obvious to native speakers. Furthermore, since they don't have the appropriate cultural background, it's very likely that they will misrepresent the demographic they're attempting to portray. And most importantly, why go to all the trouble and expense of teaching someone their lines in another language when you can just hire an actor who's already fluent?

Deaf film actors have very limited options for auditions, due to the communication barriers present in the audition process, and the fact that many d/Deaf actors cannot "pass" as hearing, meaning that they are considered for a much more limited range of roles (Withey, 2016). Giving the few Deaf roles in media away to hearing actors, who then fail to portray the characters realistically, is deeply frustrating and upsetting for Deaf viewers.

Siegel did apologize after receiving backlash from viewers of the film, and acknowledged that anything she could say about the casting would just be an excuse (Lopez, 2020). Still, Siegel also expressed that she felt Maddie being deaf was important, given the lack of representation of deaf characters in film. Director Mike Flanagan said that "the conversation about inclusion and

representation is a vital one,” and that he hoped that future projects of his could support in that effort (Lopez, 2020).

Rebecca-Anne Withey said, “all of you directors out there, if you want authenticity and *real* deaf quirkiness and mannerisms in your movies – choose a deaf actor. Or at least give them the chance to audition...”

Literature Review

Intelligibility Studies

In linguistics, intelligibility studies have long been used in spoken language studies to assess a listener’s ability to understand speech. Someone who is fluent in a language can typically easily understand speech from familiar talkers with familiar accents in quiet listening locations. However, when listening to speech in noise, speech from unfamiliar talkers, or speech with unfamiliar accents, the intelligibility of the speech decreases for the listener (Bent & Bradlow, 2003; McDermott, 2009; Nygaard & Pisoni, 1998). People speaking a second language they learned later in life are generally less intelligible than people speaking their first language, though this may be in part due to listeners’ unfamiliarity with the speaker’s accent (Lane, 1963).

Classic intelligibility measures involve asking a listener to listen to a spoken message, and then either repeat or transcribe it. Intelligibility measures allow for easy comparison across groups and language stimuli (e.g. familiar accents versus unfamiliar accents, speech in quiet versus speech in noise), and directly measure the goal of communication: understanding the message you are receiving (Baese-Berk et al., 2023).

However, it is difficult to draw the line in intelligibility responses between where deviation from the desired answer represents natural variation and imperfection in understanding and repeating a message, and where it becomes indicative of an incorrect response. One of the

biggest drawbacks of intelligibility studies is that it is not always clear what they measure—while researchers can see if a listener successfully or unsuccessfully transcribes a word, only measuring intelligibility does not tell them why (Baese-Berk et al., 2023).

Intelligibility measures can be supplemented by comprehensibility measurements (Munro & Derwing, 1995). Intelligibility is typically measured through deviations between what listeners hear and what they transcribe. Comprehensibility, on the other hand, is a self-reflective judgement by the listener of how well they felt they could understand the message (Munro & Derwing, 1995). Additionally, asking listeners what factors impacted their ability to accurately transcribe the message can further clarify the causes behind intelligibility and comprehensibility measurements.

Intelligibility of ASL Onscreen

There have been many qualitative reviews of the quality of ASL dialogue in film and TV. Typically, these reviews are based on a single person's opinion, and are also usually a smaller part of a broader critical review of the media's portrayal of Deaf culture. The focus is less on the linguistic intelligibility of the ASL shown on screen, and more on the cultural awareness (or, typically, ignorance) of the filmmakers in portraying Deaf culture onscreen, of which ASL is a major component. To date, there has never been a study conducted to assess the intelligibility of the ASL shown onscreen in movies and TV shows.

It is vital to take the entire portrayal of Deafness into account when evaluating a movie or TV show's representation of ASL. Deaf culture and ASL are inextricably connected, and one cannot be evaluated without considering the other. However, I believe that quantitative data about the intelligibility of ASL in media is an important foundation on which to build these deeper analyses and arguments.

In my research, I could only find one study from 2010 that took a quantitative approach to ASL onscreen: “The Politics and Practice of Voice: Representing American Sign Language on the Screen in Two Recent Television Crime Dramas,” by Jennifer Rayman, an Associate Professor in American Sign Language and Deaf Studies at the California State University, Sacramento. In the study, Rayman conducted a case study of two episodes from different crime drama TV shows that feature ASL. She specifically focused on how often signing was visible onscreen.

The two episodes: “Silent Night” from *CSI: New York* and “Silencer” from *Law and Order: Criminal Intent*, feature a witness interview and a suspect interrogation scene, respectively, in which a hearing detective interviews a Deaf signing person about a crime.

In both scenes, Rayman observed that the ASL dialogue was filmed in an exoticized and objectifying way, with frequent close-ups on the hands of the signers and rapid changes in camera angle. To illustrate how dehumanizing this is, Rayman imagines how strange it would be to do this for a spoken language. What if, in a TV show, when a character spoke a foreign language, the filmmakers showed “close ups [sic] and quick cuts jumping from an image of the lips moving to the tongue tapping the teeth to a side close up of the mouth to an overhead image from the top of the head”? This visual framing would feel incredibly objectifying, and, as Rayman notes, would likely be labeled as racist. However, the filmmakers for these TV shows had no qualms about filming ASL in this jarring, exoticizing way. This choice frames ASL in the episodes as “something strange and unusual that separates Deaf signers from hearing speakers.”

The two scenes also featured frequent cutaways in the middle of a signer’s sentence to show the facial expressions and reactions of the other characters, or extreme close-ups on the signer’s face while they signed that cut their hands out of the shot. Filming ASL in this way

makes it completely unintelligible for viewers who know ASL. “The overall result from a signing perspective,” wrote Rayman, “is a disjointed jumble of signs leaving the impression of chaos and heightened emotion.”

Rayman transcribed each scene, noting every time the camera shot changed, and what the focus of each shot was. In each shot, Rayman noted if the shot contained any signing at all, and whether the signing was completely or only partially visible. Using this data, she calculated the percentage for how much of each signer’s communication was visible to the audience when they were delivering their lines.

In *Law & Order: CI*, the signing was visible roughly 50% of the time, though due to the rapid cuts, the linguistic message was not necessarily intelligible that frequently. In *CSI: NY*, the signing was only visible 18% of the time. Rayman concluded that, while her analysis was limited to only one scene per show, it indicated that “both episodes prioritize the spoken language stream of information over the sign language stream of information.”

In her conclusion, Rayman recommends several ways that media producers can better represent sign language onscreen. She asserts that hearing media producers should involve ASL experts and Deaf culture experts during all stages of production. She also recommends that hearing producers learn from the techniques of Deaf filmmakers, who are pioneering ways to show ASL onscreen.

Furthermore, Rayman recommends that SimCom be avoided in film, since “this method of communication only confirms in the minds of hearing signers that sign language is merely a code for spoken language and not a language in and of itself.” She instead suggests using subtitling and interpreters to translate signed dialogue into English for the audience.

While this study offers valuable insights into the impact that hearing filmmakers' cultural ignorance has on the filming and portrayal of ASL, it focuses solely on the visibility of the ASL onscreen, rather than the intelligibility of the language.

In my thesis, I will conduct an intelligibility survey to determine how quantitatively comprehensible the ASL dialogue in popular media is to ASL signers. I aim to discover which media has the best and worst intelligibility, and what factors contribute to the intelligibility of ASL dialogue in film. I will also, like Rayman, use my findings to identify specific ways that filmmakers can portray ASL in a more intelligible and respectful way onscreen.

Positionality Statement

Before I continue, I would like to clarify my positionality in conducting this research. I, Cedar O'Konski, am a hearing and able-bodied individual. I have had the privilege to study ASL throughout high school and college, via four years of in-person classes in high school, and one and a half years of online classes in college. I have been the president of the University of Oregon's ASL Club for the past three years. Through ASL Club, I have had the opportunity to regularly converse with others in ASL. I would consider myself conversationally proficient in ASL, but by no means fluent.

I am constantly learning new things about Deaf culture and ASL. While I have attended local Deaf community events, I would not consider myself to be more than very peripherally connected to the Deaf community. And, while I frequently converse with others in ASL, due to the demographics of ASL Club attendees, a sizeable amount of these conversations are with hearing people who have a roughly similar amount of ASL experience to me, or who are less experienced.

I am by no means an expert on ASL or Deaf culture. I take full responsibility for any errors or misunderstandings that may be present in the development and analysis of this research.

Methods

Choosing Media

In reviewing the available literature about onscreen ASL, I found that the common issues with its portrayal tend to fall into one of two categories: the way in which the dialogue is filmed (Rayman, 2010; Lerner & Sayers, 2016) and the actor's experience (or lack thereof) with ASL (Withey, 2016). I decided to focus my survey on how these two factors specifically impact intelligibility.

Rayman's 2010 study focused on TV shows that do not typically feature ASL onscreen. I chose to focus the scope of my survey on media with more substantial ASL representation—both to compare my findings with Rayman's, and to better expand the research in this area. I quantified “substantial” ASL representation as the following: for a TV show, there is at least one signing character who appears in more than one episode; for a movie, there is at least one signing character in more than one scene in the movie.

I also chose, at this point, to only focus on live-action media. In animated films and TV shows, the way in which the dialogue is animated would be an additional factor impacting intelligibility beyond the two I was focusing on. This eliminated media such as *The Dragon Prince* (2018-present), and *Unbound* (2019).

With these initial search parameters in place, I compiled the following list of seventeen potential pieces of media to include in my survey:

1. *A Quiet Place* (2018)
2. *A Quiet Place Part II* (2020)
3. *Baby Driver* (2017)
4. *CODA* (2021)

5. *Children of a Lesser God* (1986)
6. *Eternals* (2021)
7. *Hawkeye* (2021)
8. *Hush* (2016)
9. *Mr. Holland's Opus* (1995)
10. *Noelle* (2019)
11. *Only Murders in the Building* (2021)
12. *Sound of Metal* (2019)
13. *Switched at Birth* (2011-2017)
14. *The Family Stone* (2005)
15. *The Shape of Water* (2017)
16. *There Will Be Blood* (2007)
17. *Wonderstruck* (2017)

Selecting Clips

To get a representative sample of the ASL dialogue in a piece of media, I selected five clips of ASL dialogue from each movie and TV show. For efficiency and clarity, each clip consisted of a complete sentence by a single signer.

Intelligibility Criteria

The careful balance for intelligibility stimuli is using sentences that are somewhat predictable, but not too predictable. For example, a clip of a character bumping into someone else and saying, “Sorry, excuse me,” would be too predictable—someone could infer the gist of what is being said, regardless of the actual dialogue’s intelligibility. On the other hand, a clip of a character using highly technical terminology to describe a scientific concept would not be

predictable enough, since it would contain too much unusual vocabulary, which would negatively impact intelligibility independently of other factors.

For ASL specifically, the “not predictable enough” end of the scale has a few additional considerations. In a movie or TV show where characters use ASL, name signs are often created for the characters and used by the actors, to more authentically represent ASL onscreen. For example, in the science fiction movie *Eternals*, the superhero Makkari is played by Deaf actress Lauren Ridloff. Ridloff worked with her husband Doug Ridloff, the film’s ASL consultant, to create name signs for all the characters (Plainse, 2021). Makkari’s name sign, for example, is a descriptive name sign, combining a sign describing her distinctive earrings with the sign for “fast” or “speed,” since Makkari has the power of super-speed (Plainse, 2021).

This leads to lines in the movie that contain several name signs, like one towards the end of the film where Makkari says, “We became one...even Ikaris and Sprite, all because of Tiamut.” The signs Ridloff uses for “Ikaris,” “Sprite,” and “Tiamut” are all name signs invented by her and her husband for the film.

While that line in particular uses enough “non-predictable” vocabulary to disqualify it anyway, lines containing even a single name sign were disqualified from eligibility as representative clips. A viewer who knows ASL would be able to recognize name signs through context. However, they wouldn’t be able to tell from the name signs what the actual names of the characters are, since the name signs were created for the media and are not common knowledge in the Deaf community. Thus, name signs would be an additional factor impacting intelligibility.

Another impact on the intelligibility of ASL dialogue is the usage of SimCom. Due to both the linguistic considerations—SimCom is less intelligible to ASL signers because it prioritizes a clear message in English that is incompletely mirrored in ASL—and the overall

cultural attitude towards SimCom—namely, that it is not ASL and is disrespectful to the Deaf community—I also disqualified all instances of SimCom from the dialogue clips I gathered.

Disqualified Media

The SimCom consideration alone disqualified four films from my list. *Mr. Holland's Opus*, *Noelle*, *Sound of Metal*, and *The Family Stone* all contain Deaf characters and ASL dialogue. However, all or nearly all of the signing in these four films is SimCom, to the point where I was unable to find five clips from any of them that met my criteria.

Children of a Lesser God provided an interesting dilemma. Every character who signs in the film communicates using SimCom, except for Sarah, the female lead, played by Deaf actress Marlee Matlin. Sarah's lines in ASL are not captioned, or even directly translated through an interpreter. They are responded to via SimCom by the film's male lead, James, played by William Hurt. James typically, but not always, replies to Sarah in a way that conveys to the viewer the overall impression of what she has just said. However, her lines are never translated directly to the audience, indicating that the filmmakers did not intend for Sarah's dialogue to be intelligible, on its own, to a general audience.

In my intelligibility survey, one of the tasks I asked participants to complete was to translate the signed dialogue in each clip into written English, to get a finer sense of what parts of the dialogue were easier or harder to understand. For the other films on my list, a character's signing was always accompanied by either English captions or spoken English dialogue by an interpreter. I could use these lines to compare the experience of someone relying on English while watching the film to the experience of someone relying on ASL—or trying to, since, for most of the media, the English captions for the ASL dialogue were embedded and could not be turned off.

Thus, after much deliberation, I ended up disqualifying *Children of a Lesser God* from my list. Since the focus of my survey is on the intelligibility of ASL dialogue, I decided to only include clips in my survey of ASL dialogue that is intended, in the film, to be understood directly by the general audience, either via captions or via an interpreter. Otherwise, I could not assume that the dialogue was filmed with intelligibility in mind.

This decision came into play again for the film *There Will Be Blood*, in which ASL is shown onscreen several times, but it is never captioned or interpreted in any way, indicating it is not intended to be intelligible to a general audience. This also disqualified that film from my list.

The Shape of Water features ASL dialogue extensively from its lead, Sally Hawkins, who plays a mute woman. However, the ASL used in the film is period ASL from the 1960s, and contains several other unusual elements. In an interview, Hawkins said,

It [*The Shape of Water*] was a period piece, as well, so it was period ASL, and yet also with it being an amalgamation of things she [Hawkins' character, Elisa] cobbled together, because of where she'd probably have learnt it. We discussed briefly that she's probably learnt it from a book, and spliced it together from things she'd picked up. So she had her own language within that, which gave a bit of leeway. I still wanted to be as accurate as possible, for it to have that layer of richness, so that it could be understood on another level. (Utichi, 2017)

So the ASL Hawkins learned for the film was not only period ASL, but ASL choreographed to show that her character taught herself the language out of a book and then modified the signs based on her life experiences. These factors negatively impacted the dialogue's intelligibility outside of Hawkins' ASL proficiency, or the way in which the dialogue was filmed, and so I also disqualified *The Shape of Water*.

Lastly, despite including several Deaf actors in the cast, ASL did not appear enough onscreen in the film *Wonderstruck* for me to gather five clips, also disqualifying it.

In the end, this narrowed down my list of seventeen possible pieces of media to nine:

1. *A Quiet Place* (2018)
2. *A Quiet Place Part II* (2020)
3. *Baby Driver* (2017)
4. *CODA* (2021)
5. *Eternals* (2021)
6. *Hawkeye* (2021)
7. *Hush* (2016)
8. *Only Murders in the Building* (2021)
9. *Switched at Birth* (2011-2017)

Editing Clips

For a given movie or show, I tried to gather the five clips for the survey from as many different scenes and from as many different actors as possible, to cast as wide a net as possible for the overall intelligibility of the media, and to try to not favor any one particular actor or camera/lighting setup over the others.

I also tried to pick the most linguistically robust and complex lines I could, while still avoiding any overly unpredictable verbiage. For some media, like the TV show *Switched at Birth*, I was able to obtain very complex lines, such as, “Assuming that goes well, it looks like you’re on your way to being your dorm’s safety captain.” For others, like the films *Eternals* and *A Quiet Place*, the ASL dialogue throughout consisted of relatively brief and simple sentences, and so some of my five clips for those movies include comparatively simple lines such as “It’ll be dark soon” (*A Quiet Place*) and “Ready to go home?” (*Eternals*).

Once I had all five clips from a piece of media, I edited them to remove the audio. If there were embedded captions accompanying the ASL, I covered these with a black box, to completely obscure the captions while aiming to minimize visual distraction for survey-takers.

The censor boxes were formatted to be as small and minimally visually distracting as possible, while still covering the captions completely. Sometimes, the boxes blocked parts of a signer's hands, because in the original media, the captions did the same. In those cases, this editing choice may have mildly altered the intelligibility of the dialogue, since a little bit more of a signer's hands might be visible behind the captions but not through the censor box. However, if the captions were already covering a signer's hands, being able to see a small sliver more of the screen was typically a negligible difference.



Figure 1: Example of covering captions from the movie *CODA*.

Participant Recruitment

Since ASL is a minoritized language in the United States and Canada, I could not use traditional participant recruitment software to find survey-takers, since these platforms only organize participants by more commonly spoken languages, such as English and Spanish.

I also did not wish to conduct an entirely local survey, since there is not a large Deaf community in Eugene, so many of the people that method would recruit would be University of

Oregon ASL students, with two years or less of classroom ASL experience, and possibly little or no real-world conversational experience.

Thus, to reach as large and diverse a pool of survey participants as possible, I posted the link to my survey on social media. I made posts on the UO ASL Club's Instagram and Facebook pages, as well as my own personal social media accounts, and I shared the ASL Club's Facebook post with a local Eugene Deaf social Facebook group, of which I had met several of the members before. My lab also posted the link to the survey on our Twitter.

In advertising the survey, I said that fluency in ASL was encouraged, but not required to take the survey. "Fluent" can be a very loaded term, especially for second language learners. People who learn a second language later in life will rarely label themselves as fluent, even if they are quite proficient in the language. Since ASL is already a language with a relatively small population of speakers, I worried that even asking online, I would not get enough survey-takers if I only asked for "fluent" participants.

I was awarded a UROP mini-grant, so I advertised a \$15 Amazon gift card for every survey-taker who completed the entire survey. The maximum number of participants I had the resources to compensate was 60, so I planned to cap the survey at that number.

Survey Format

I created an online survey using the program Qualtrics. After giving their informed consent to participate, survey participants answered three screener questions. Because the survey was released online for anyone to take, I had no means of verifying participants' ASL fluency. And, since I said fluency was not required to take the survey, plus the fact that the survey had a monetary incentive for completing it, I wanted to have a security measure in place to try to weed out people who knew no or very little ASL.

Each screener question consisted of a video by University of Oregon ASL instructor Valentino Vasquez, who signed a single sentence that someone who is conversationally fluent in ASL could understand. Each video described something visually—a person’s physical appearance, a dog chasing a cat in the park, and the location of a beach house. Underneath each video were five similar images presented in a random order: five different people, five different pictures of dogs and cats, and five different houses. Participants were instructed to select the image that most closely matched Vasquez’s description. Each question had one correct image answer.

If participants answered all three questions correctly, they were deemed fluent enough in ASL to be able to participate in the survey. They were then shown 45 dialogue clips, five from each piece of media, presented in a randomized order. Participants could watch each clip as many times as they needed to, but they were encouraged in the instructions to only watch it once or twice and focus on their initial understanding of the dialogue.

After watching a clip, participants were asked to translate the signed dialogue into written English, to the best of their ability. They then answered three multiple choice questions:

1. How well did you understand the signed dialogue in the clip?
 - a. Scale of 1-5, 1 being “Impossible to understand” and 5 being “Very easy to understand.”
2. How did the actor’s ASL proficiency affect how well you understood the dialogue?
 - a. Scale of 1-5, 1 being “Very negatively” and 5 being “Very positively.”
3. How did the way this dialogue was filmed (e.g. lighting, camera angles, jump cuts) affect how well you understood the dialogue?
 - a. Scale of 1-5, 1 being “Very negatively” and 5 being “Very positively.”

After each video clip, there was an optional text box where participants could describe any additional factors that impacted how well they understood the dialogue, and add anything else they wanted to say about the clip.

The comprehensibility question and two clarifying questions focused on relevant factors were to hopefully compensate for the weaknesses of intelligibility studies, by trying to determine what specifically made the dialogue more or less intelligible for the participants.

After translating and rating the 45 media clips, participants were asked six demographic questions: their age, self-assessed level of ASL fluency, identity (hearing, hard of hearing, deaf, Deaf, etc), how long they had been learning ASL, how they learned ASL, and which of the media used in the survey they had watched prior to taking the survey.

Survey Complications

Unfortunately, a very large number of bots—over 1,000—tried to take the survey. The screener questions filtered most of them out, but through sheer force of numbers, a few randomly answered all three screeners correctly and were able to fill out the survey. Luckily, their responses were quite distinct from the responses of real people taking the survey—they were either gibberish, or completely unrelated to the signed dialogue—and I was able to manually weed them out of the data.

Still, there is a small possibility that a few of the responses flagged as bot responses were in fact real survey-takers who were not very proficient in ASL and greatly misunderstood the signed dialogue in every clip. Since these would be data outliers anyway, I deemed it acceptable to remove these responses from the data for the purposes of analysis.

Grading Translations

For every clip, I asked participants to translate the signed ASL dialogue into written English. By the nature of this task, they were not just transcribing what they understood, but translating from one language to another, giving rise to much more natural variation in the content of “correct” responses. To address this, I created a grading system for the translated responses that recognized this large degree of variation.

I hand-graded every translation on a scale from zero to three (see Table 1 for examples). A three indicated that the participant understood the dialogue completely and correctly, even if the actual wording of their translation differed slightly from how the captions translated the signing. In other words, their translation was scored as a three if they translated the gist of the dialogue correctly, with the correct details.

A two indicated that the participant correctly translated the gist of the dialogue, but that key details were incorrect, missing, or perceived as unintelligible. A one indicated that the gist of the dialogue was missing or incorrect in the participant’s translation, but some details may have been correct. A one was also used if a participant indicated that most of the dialogue was unintelligible to them. A zero was only used if a participant wrote “???” which they were instructed to do if they couldn’t understand any amount of the signed dialogue in the clip.

If the captions differed significantly from the signing, the signing was given precedent. For example, in *Baby Driver*, the caption for one of the clips was “I promised nothing would happen to you,” but in the film the actor signs, “I promised to protect you.” For grading the translations for that clip, I graded “I promised to protect you,” and variations thereof, as threes.

Movie Caption	We can't stay here. We need to go.
Responses graded as 3	<ul style="list-style-type: none"> • We can't stay here, we need to leave • The two of us can't stay here. We [the two of us] have to go [far direction]. • we can't stay here anymore, we need to leave
Responses graded as 2	<ul style="list-style-type: none"> • You can't stay here. You need to go • I can't stay here I have to go • Parents can't be here. Parents have to leave.
Responses graded as 1	<ul style="list-style-type: none"> • see ?? ?? what ?? ?? ??
Responses graded as 0	<ul style="list-style-type: none"> • ???

Table 1: Translation Grading Scale

A table with examples of each number on the translation grading scale, using actual survey responses. The caption is from *A Quiet Place*.

Results

Participants

Twenty participants completed the survey. The average age among participants was 32, with a mode of 21, a minimum of 18, a maximum of 68, and a standard deviation of roughly 15 years.

Sixteen participants identified as hearing. Of those sixteen, one identified as a CODA (child of Deaf adults) and three identified as ASL interpreters. Of the three ASL interpreters, one was also an ASL teacher, and another was an audiologist. Two participants identified as Deaf, and two identified as hard of hearing/Deaf.

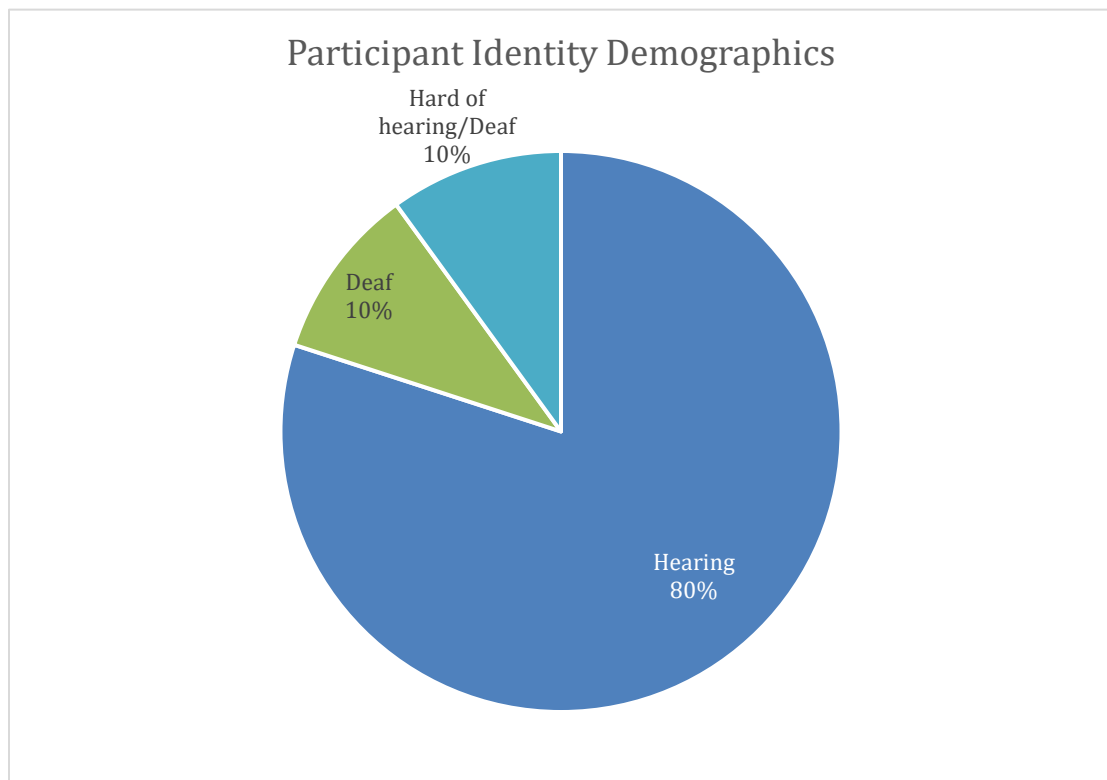


Figure 2: Participant Identity Demographics

A graph showing the self-reported identities of all 20 survey participants.

Ten participants reported having learned ASL for eight years or more, and the remaining 10 had been learning ASL for less than eight years.

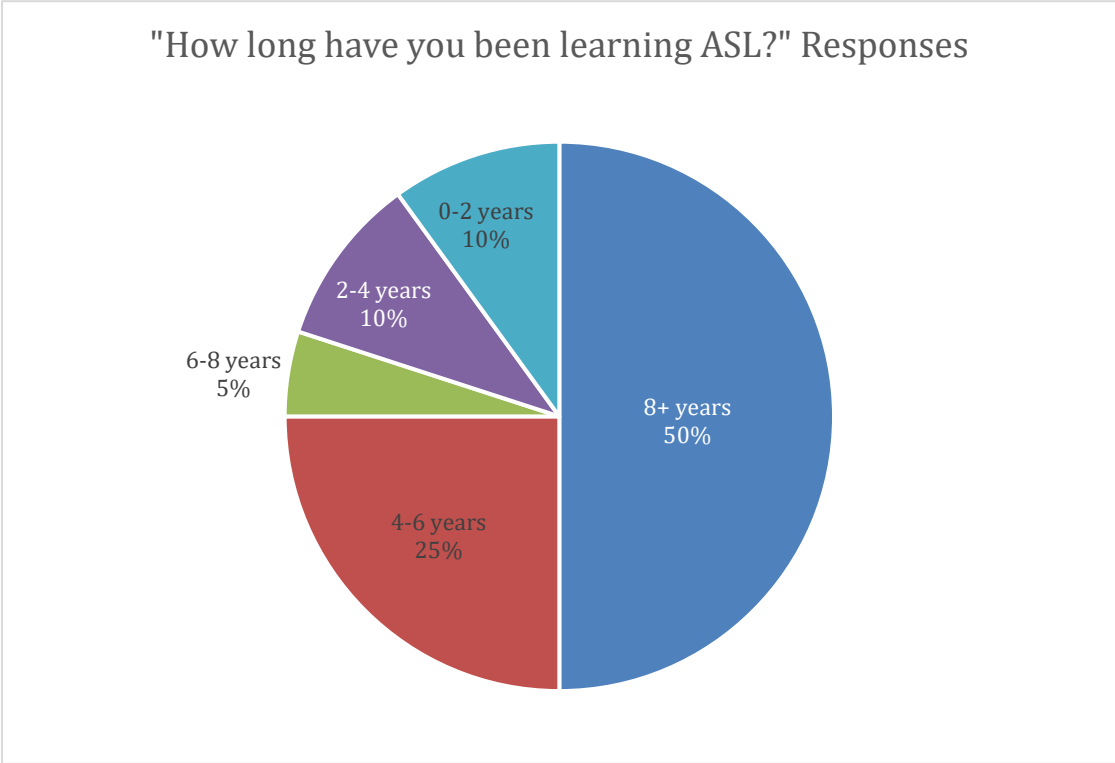


Figure 3: "How long have you been learning ASL?" Responses

A graph showing the length of time that all 20 participants reported they had been learning ASL.

Sixteen of the participants reported that they learned ASL from at least two different sources. The two most common sources were from in-person classes (14 participants) and from friends (10 participants).

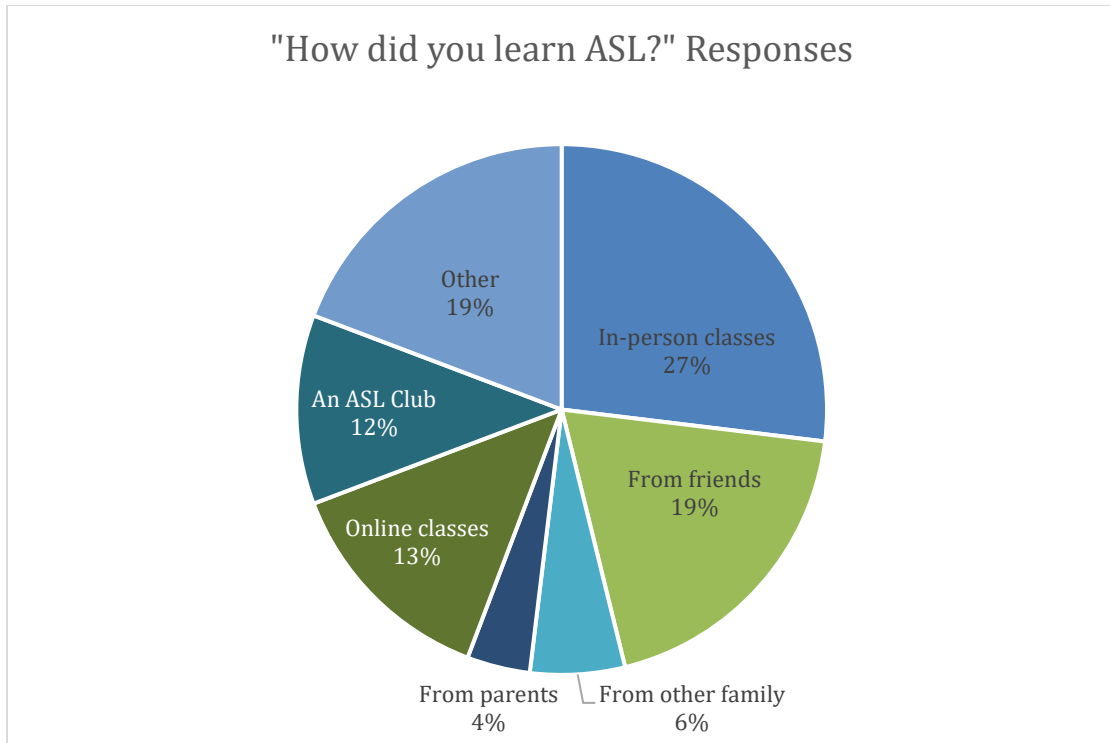


Figure 4: "How did you learn ASL?" Responses

A graph showing the different sources that participants reported learning ASL from. Participants could select more than one answer.

On the fluency scale (see Table 2), six participants rated themselves as Level 2, six rated themselves as Level 3, two rated themselves as Level 4, and six rated themselves as Level 5.

Level 1 – Elementary	Can fulfill the basic needs in a language such as ordering meals, asking time, and asking for directions.
Level 2 – Limited Working Proficiency	Can fulfill routine social demands such as small talk about one’s self, one’s family, and current events.
Level 3 – Professional Working Proficiency	Can discuss a variety of topics with ease and almost completely understand what others are saying.
Level 4 – Full Professional Proficiency	Can participate in all manners of conversations with ease and only rarely makes grammatical mistakes.
Level 5 – Native or Bilingual Proficiency	Can use the language the way an educated native speaker of the language would.

Table 2: The Interagency Language Roundtable

The levels of the Interagency Language Roundtable, the rating scale that participants used to self-assess their level of ASL fluency.

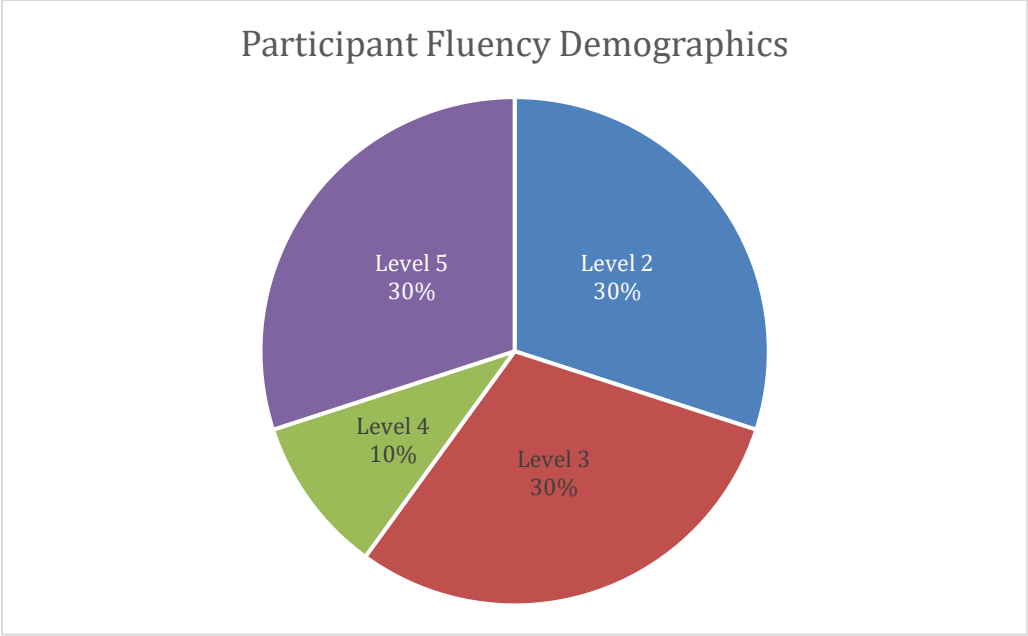


Figure 5: Participant Fluency Demographics

A graph showing the self-reported fluency of all 20 survey participants, using the Interagency Language Roundtable levels (see Table 2).

Participants also reported how many of the movies and shows used in the survey they had watched prior to taking the survey. The results were as follows:

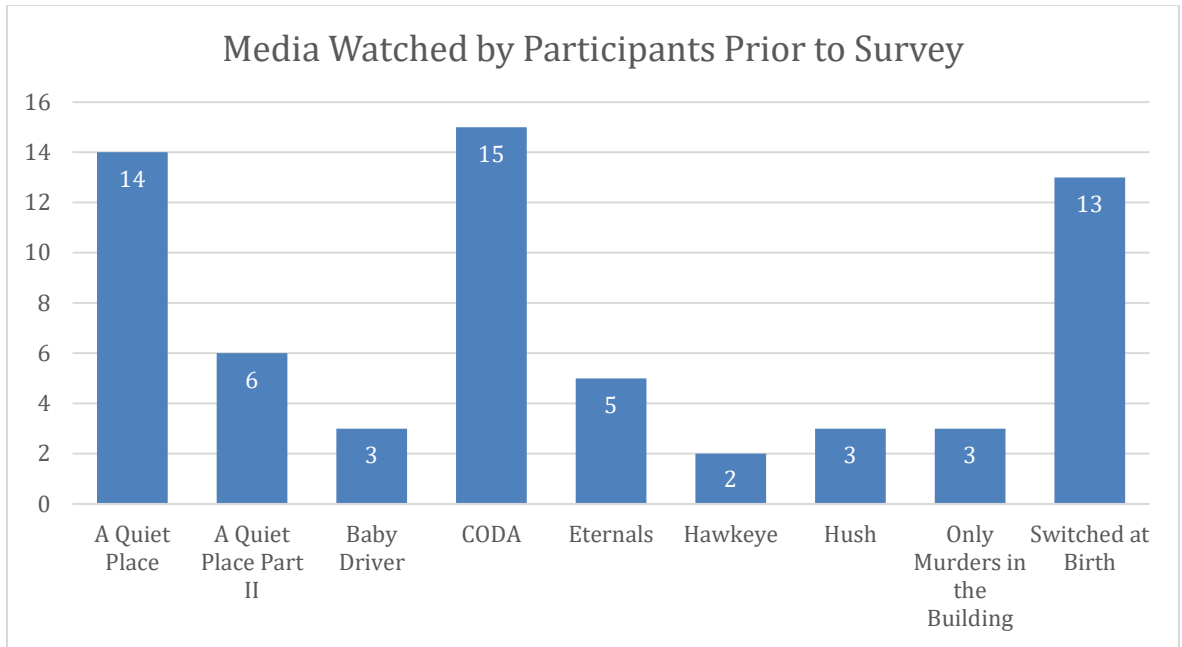


Figure 6: Media Watched by Participants Prior to Survey

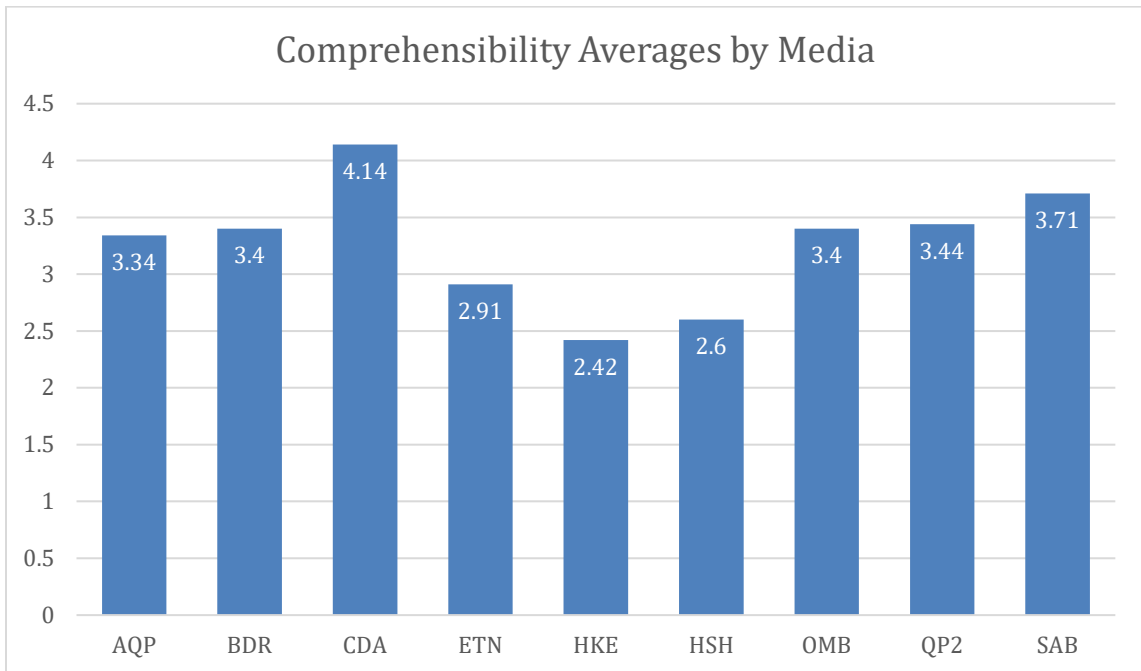
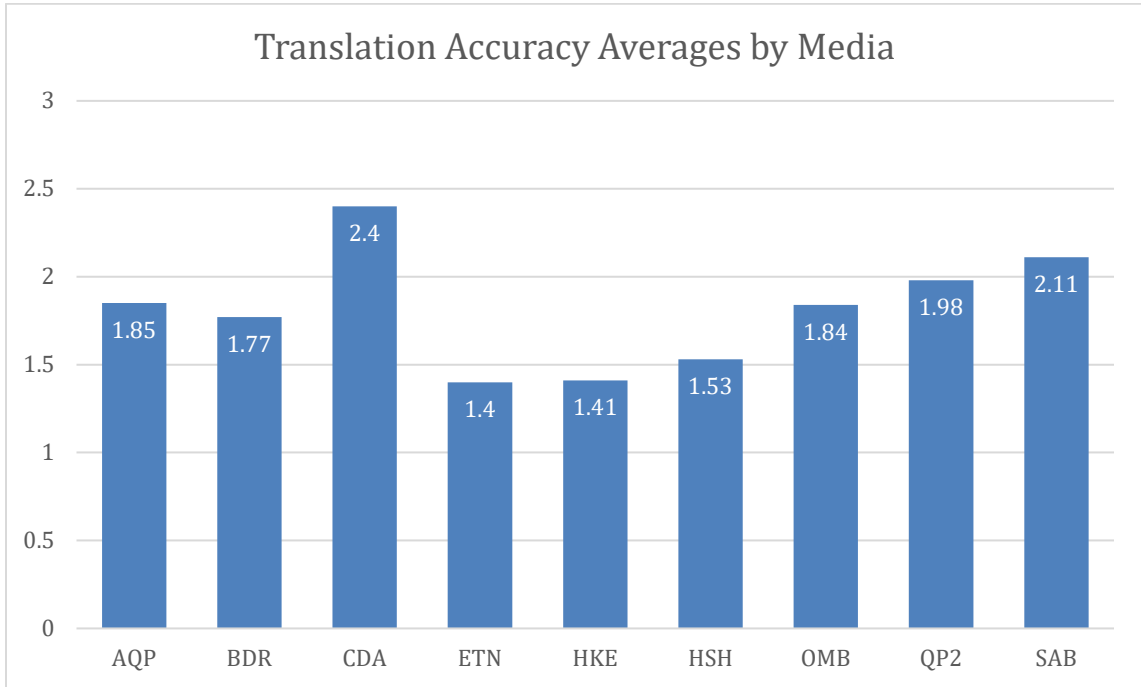
A graph illustrating how many of the participants (out of 20) had seen the media used in the survey prior to taking the survey.

When comparing the graphs in Figures 6 and 7, there is a visible correlation between some of the most-watched media and the highest-scored media. There are several possible explanations for this, which will be delved into in more detail in the discussion section.

Score Averages by Media

There were four scores for each piece of media. First, the accuracy of participants' translation of the signed ASL into written English, which was hand-graded on a scale of 0-3, as described in the Methods section. Second, the comprehensibility rating, which participants assigned to each clip on a scale from 1-5. Thirdly, the participants' rating of the actor's ASL proficiency, also on a scale from 1-5. And lastly, the participants' rating of how the dialogue was filmed, on a scale from 1-5.

For each piece of media, I averaged the scores given by all 20 participants for each clip. Then, I calculated the average of the five averaged clip scores for a piece of media to get that media's overall numbers for each of the four categories.



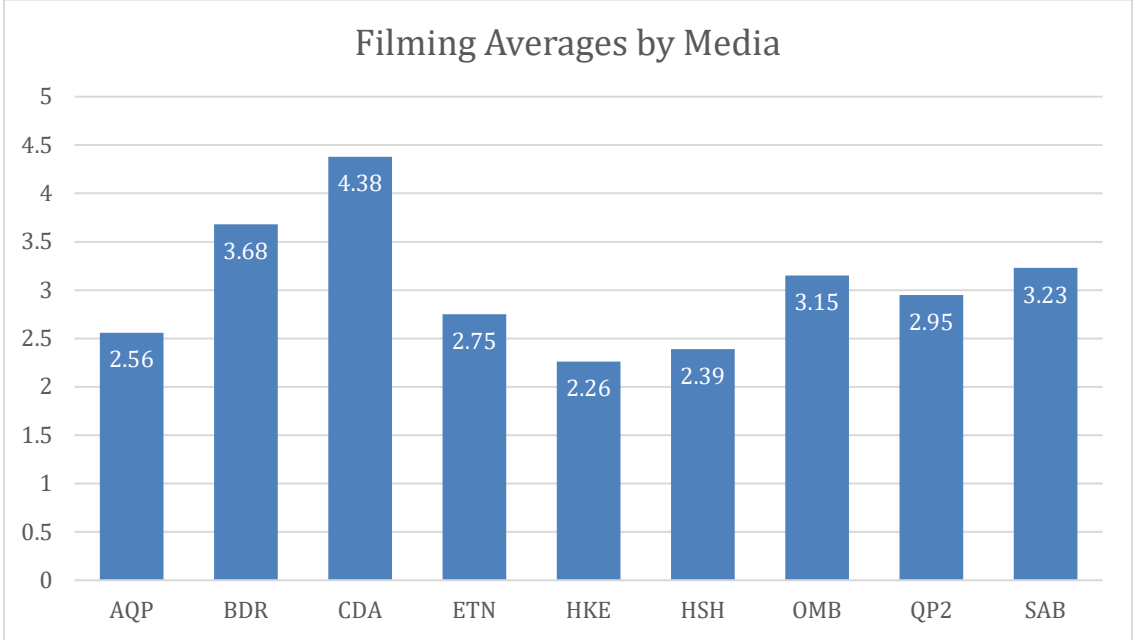
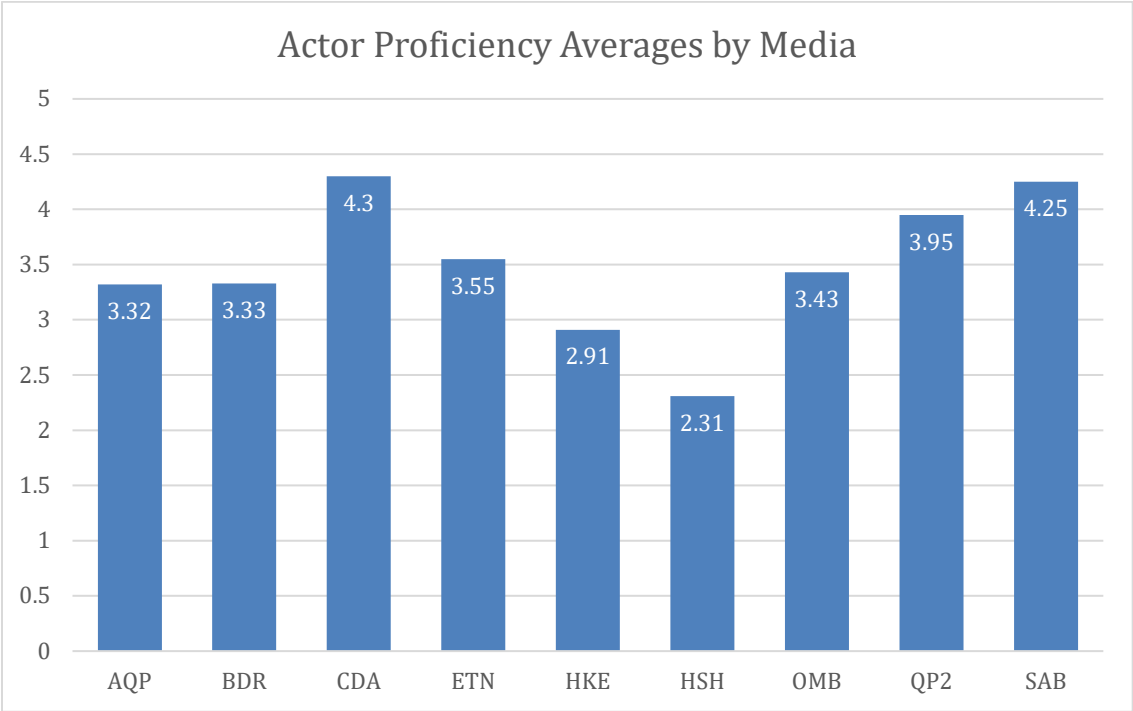


Figure 7: Translation Accuracy, Comprehensibility, Actor Proficiency, and Filming Averages by Media

Four graphs illustrating the average scores for translation accuracy, comprehensibility, actor proficiency, and filming for each of the nine media in the survey. Participants' translations were graded on a scale of 0-3, and the comprehensibility, actor proficiency, and filming were scored by participants on a scale of 1-5.

Across all four scores, *CODA* (CDA) and *Switched at Birth* (SAB) were consistently rated the highest, whereas *Hawkeye* (HKE) and *Hush* (HSH) were typically the two lowest-rated media.

The bar graph format makes it difficult to ascertain the differences between similarly rated media. Thus, I decided to reformat my data as rankings, to get a clearer picture of how the different media compared to each other within each score, and across scores. Before I did that, however, there was another factor to take into consideration.

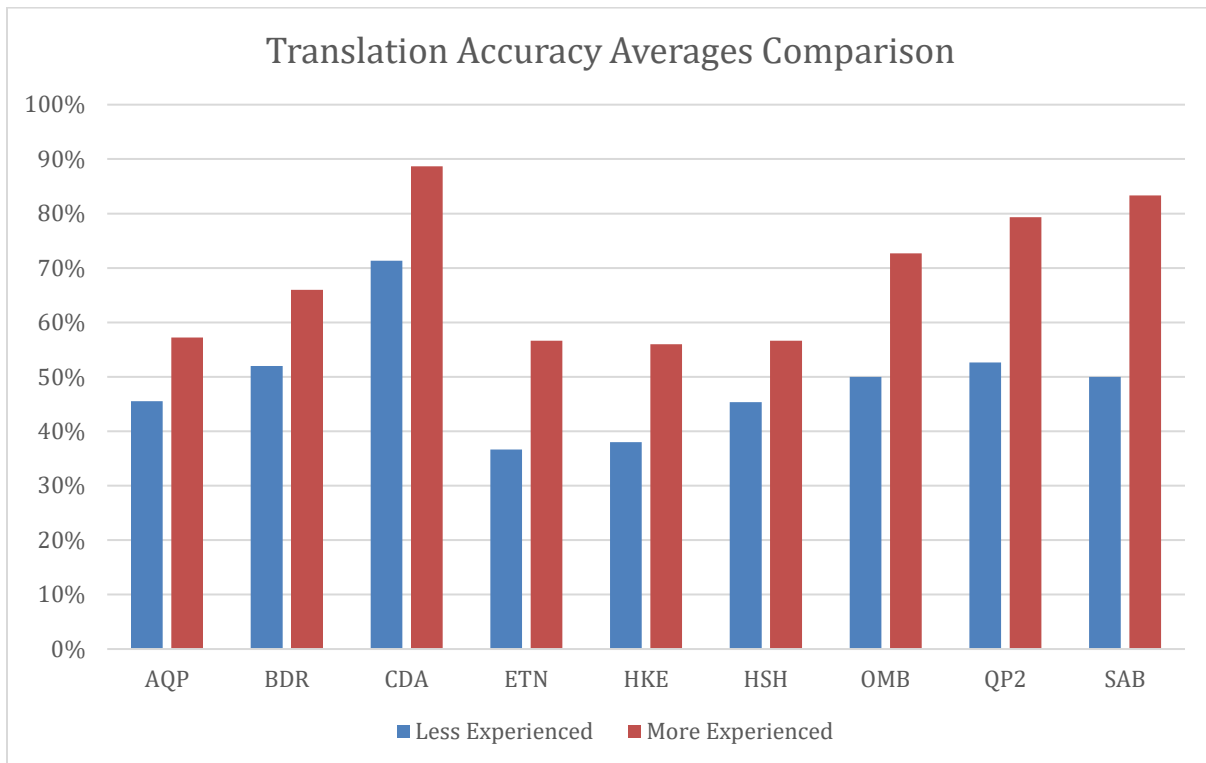
Proficiency Differences Among Participants

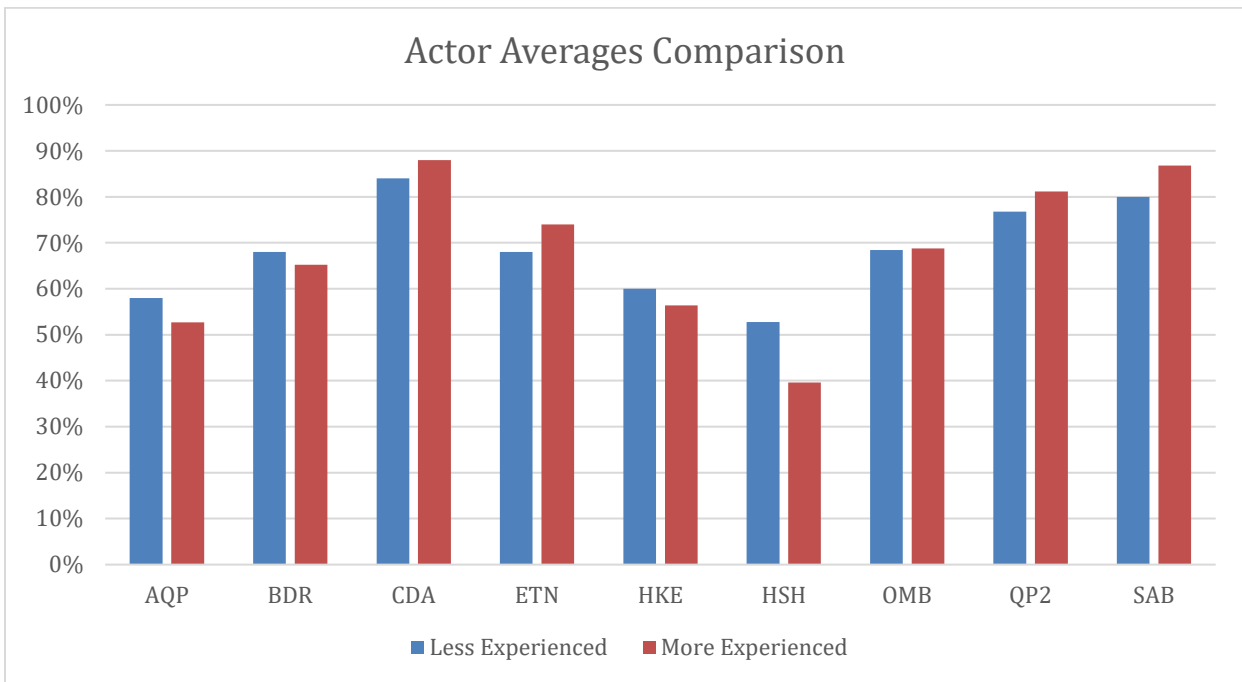
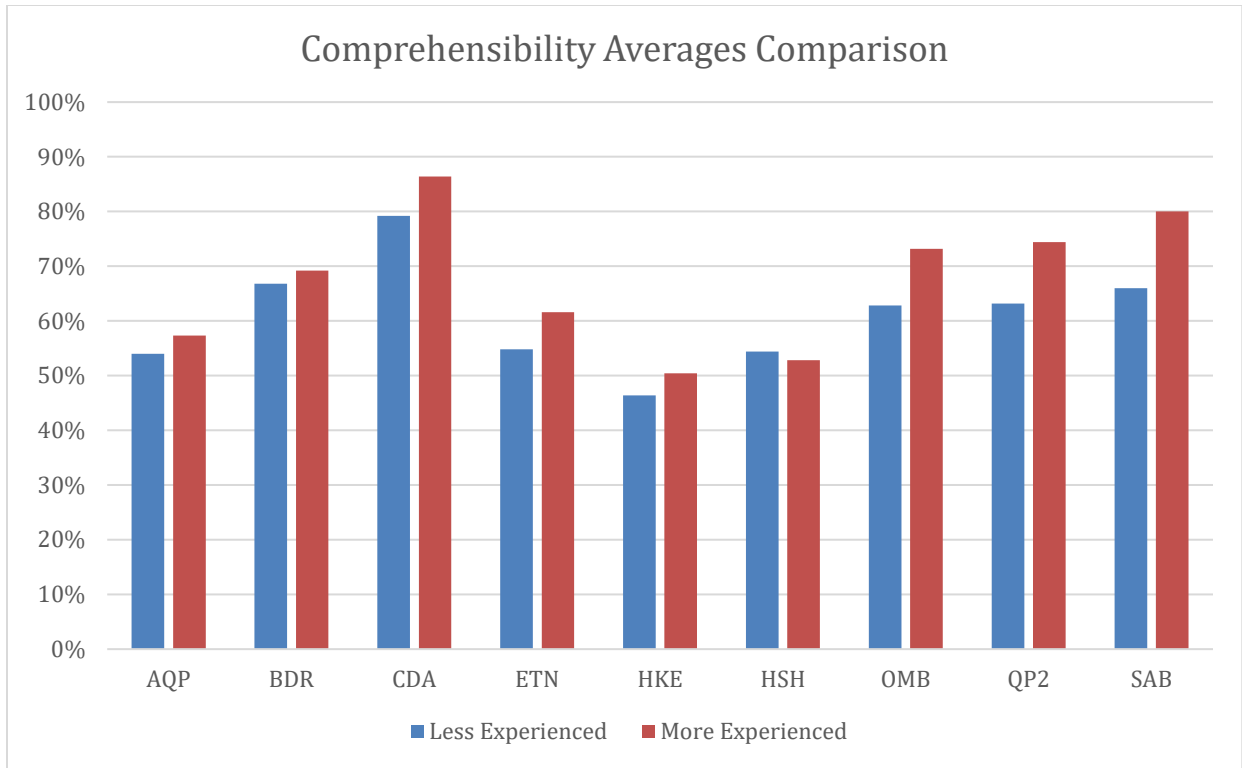
Due to the wide range of participant backgrounds and self-rated proficiency levels, not every participant's response could be given the same weight. A signer who has been learning ASL from online classes for one year is not at the same level of proficiency as a signer who has been involved in the Deaf community for their entire life, even if they both passed the screener questions. The first signer might rate a clip as completely unintelligible, whereas the second signer might be able to understand the dialogue in the clip perfectly. The first signer will also likely not be a very good judge of how proficient an actor is in ASL, since they are not yet at a high level of proficiency themselves.

The varying potential quality of participant responses led to my decision to split the participants into two groups for the purposes of data analysis. The *more experienced* group consisted of the 10 participants who said they had been learning ASL for eight years or more.

The *less experienced* group consisted of the other 10 participants, who said they'd been learning ASL for less than eight years.

First, I put the two groups' data side by side to see if there were any notable differences. Since the translation scoring was from zero to three and the other three scores were on scales from one to five, I divided the translation scores by three and the other scores by five, to make it easier to compare the four scores to one another out of 100.





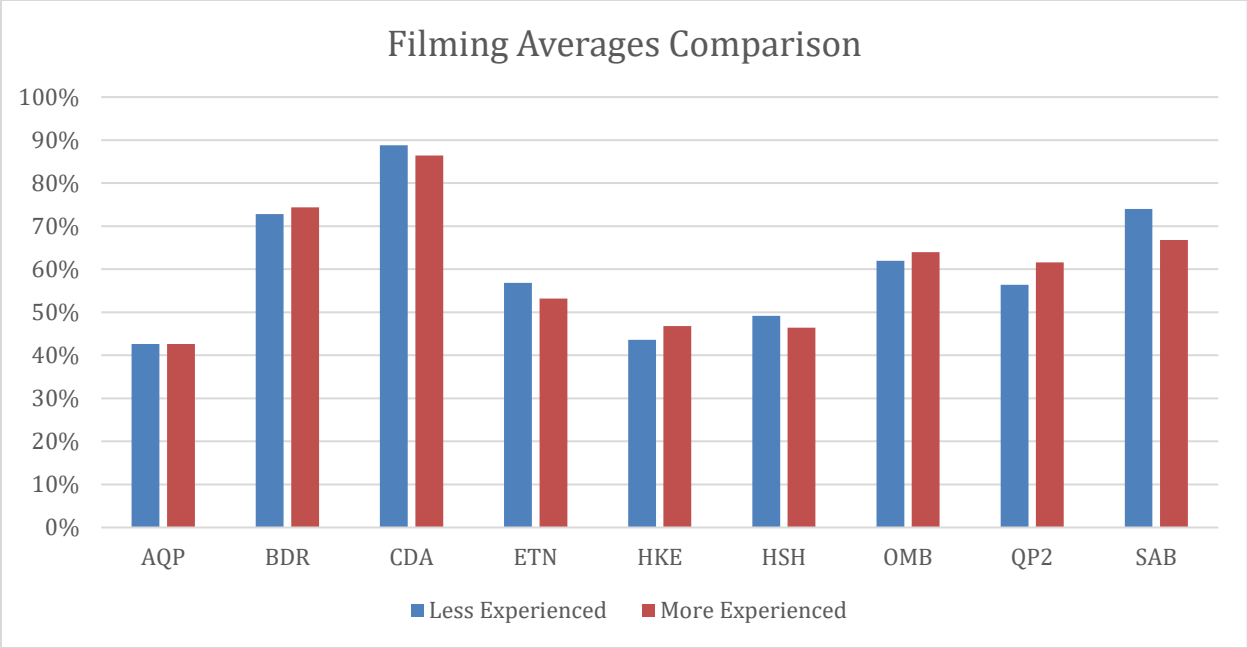


Figure 8: Comparing Translation Accuracy, Comprehensibility, Actor Proficiency, and Filming Averages by Participant Experience Level

Four graphs comparing the averages for the less experienced (<8 years of ASL experience) and more experienced (8+ years of ASL experience) participant groups across all four scores: accuracy of translations, rated comprehensibility of the signing, rating of the actors’ ASL proficiency, and rating of the quality of filming. Scores are percentages out of 100.

Overall, both groups rated the media relatively similarly. As is to be expected, the more experienced group translated the clips more accurately overall than the less experienced group, and, on average, rated clips as more comprehensible. For the ratings of actors’ ASL proficiency and the quality of filming, both groups gave generally similar scores. The only visible deviation is that the more experienced signers rated the actor’s ASL proficiency in *Hush* notably lower than the less experienced signers.

Ranked Data Split by Participant Experience

I reformatted the above data into a list format, to better compare the more similarly rated media.

Most Accurately Translated		Highest Comprehensibility		Highest Actor Proficiency		Highest Filming	
<i>Less</i>	<i>More</i>	<i>Less</i>	<i>More</i>	<i>Less</i>	<i>More</i>	<i>Less</i>	<i>More</i>
CDA	CDA	CDA	CDA	CDA	CDA	CDA	CDA
QP2	SAB	BDR	SAB	SAB	SAB	SAB	BDR
BDR	QP2	SAB	QP2	QP2	QP2	BDR	SAB
SAB	OMB	QP2	OMB	OMB	ETN	OMB	OMB
OMB	BDR	OMB	BDR	ETN	OMB	ETN	QP2
AQP	AQP	ETN	ETN	BDR	BDR	QP2	ETN
HSH	HSH	HSH	AQP	HKE	HKE	HSH	HKE
HKE	ETN	AQP	HKE	AQP	AQP	HKE	HSH
ETN	HKE	HKE	HSH	HSH	HSH	AQP	AQP

Table 3: Ranked Media by Scoring Category, Subdivided by Participant Experience Level

A table ranking the average scores by the more experienced signers (More) and the less experienced signers (Less), across all four categories.

CODA (CDA) was unanimously ranked the highest across all four scores, usually followed by *Switched at Birth* (SAB) in second place. Both groups rated the filming of *Baby Driver* (BDR) highly, and highly rated the actor proficiency in *A Quiet Place Part II* (QP2).

Hush (HSH) was unanimously ranked as the lowest-quality actor proficiency, and *A Quiet Place* (AQP) was unanimously ranked as the lowest-quality filming of ASL. For the lowest intelligibility and comprehensibility scores, there was more variation, with *Hawkeye* (HKE), *Hush* (HSH), and *Eternals* (ETN) ranked as the lowest in different categories by different groups.

Rank Correlation

Spearman’s rank correlation coefficient is a mathematical assessment of two ranked lists that compares how similar they are to one another. Two identical lists would have a Spearman correlation of $r_s = 1$. Two completely opposed lists (e.g., 1234 and 4321) would have a Spearman

correlation of $r_s = -1$. Generally, the closer to 1 a Spearman correlation is between two ranked lists, the more similar the two ranking orders are to one another.

The Spearman correlation between the translation accuracy and rated comprehensibility rankings from the less experienced signers is $r_s = 0.06667$, which is not a statistically significant correlation. The Spearman correlation between those same two rankings for the more experienced signers' rankings, on the other hand, is $r_s = 0.7$, a statistically significant correlation. This proves that there was a strong correlation between how accurately the more experienced signers could translate the dialogue in a clip and how intelligible they perceived the dialogue to be. In other words, the more experienced signers were able to very accurately assess how well they understood the dialogue.

Data Split by Actor Background

Of the 45 clips shown to survey participants, 29 featured d/Deaf or hard of hearing actors, and the other 16 featured hearing actors.

This is not necessarily a perfect metric for how proficient the actor was in ASL. As discussed in the introduction, *Hush* actress Kate Siegel only learned her lines in ASL, not other vocabulary, grammar, or cultural information (Withey, 2016). On the other hand, the star of *CODA*, actress Emilia Jones, went through an eight-month ASL and Deaf culture bootcamp, learning far more than the bare minimum required to deliver her lines in the film (Nast, 2021). In general, however, almost all the d/Deaf or hard of hearing actors in the clips were proficient in ASL before being cast, and the majority of the hearing actors were not.

Thus, I divided the four scores based on the actor's background: d/Deaf or hard of hearing (DHH) and hearing. I once again converted them to percentage scores by dividing the translation scores by three and the other scores by five.

	Translation	Comprehensibility	Actor	Filming
DHH Actor	64.94%	71.24%	78.93%	65.34%
Hearing Actor	52.00%	54.27%	52.67%	53.60%

Table 4: Overall Percentages for Four Scoring Categories, Subdivided by Actor Background

A table of the percentage scores across all media, divided by the actor’s background: d/Deaf or hard of hearing (DHH) or hearing.

Across all four scores—translation accuracy, comprehensibility, the actor’s perceived ASL proficiency, and the way in which the media was filmed—all participants scored the DHH clips as being higher quality on average.

I then calculated these same scores, this time dividing the participants into the less experienced and more experienced signers:

Less Experienced				
	Translation	Comprehensibility	Actor	Filming
DHH Actor	53.91%	66.48%	76.21%	64.41%
Hearing Actor	45.42%	54.75%	59.00%	53.00%

More Experienced				
	Translation	Comprehensibility	Actor	Filming
DHH Actor	75.98%	76.00%	81.66%	66.28%
Hearing Actor	58.54%	54.00%	46.75%	52.00%

Table 5: Overall Percentages for Four Scoring Categories, Subdivided by Actor Background and Participant Experience Level

A table of the percentage scores across all media, divided by the actor’s background: d/Deaf or hard of hearing (DHH) or hearing. The upper table shows the averaged ratings of the less experienced signers, and the lower table shows the averaged ratings of the more experienced signers.

As is to be expected, the less experienced signers had lower overall scores for translation accuracy and comprehensibility ratings. Both groups understood the DHH actors better than the hearing actors, and rated the DHH actors as more proficient in ASL than the hearing actors. Most notably, both groups rated the quality of filming more highly for clips that featured DHH actors.

Discussion

Notable Correlations

Looking at the graphs, there is a visible correlation between how many participants watched each piece of media prior to taking the survey (Figure 6) and each media's overall scores (Figure 7). Specifically, *CODA* and *Switched at Birth* were seen by the highest number of participants and consistently scored the highest across all categories, whereas *Hawkeye*, *Eternals*, and *Hush* were seen by the fewest participants and tended to score the lowest.

There are a few notable exceptions to this correlation. *A Quiet Place* was the second most-watched media among participants, with 70% reporting that they'd watched it. However, the film received low scores across all four categories, never placing higher than sixth in the rankings (see Table 3). On the other hand, only 15% of participants reported having watched *Baby Driver*, but it usually scored in the upper middle of the rankings. Lastly, 25% of participants said they'd seen *Eternals*, while only 15% said they'd seen *Only Murders in the Building*. However, *Only Murders in the Building* was ranked higher than *Eternals* across all scores, except for in the actor proficiency ranking by the more experienced signers.

There are a few possible explanations for this correlation. Firstly, there is the possibility that survey participants recalled specific lines of dialogue from the media that they'd already seen, which influenced the data.

In the case of *CODA*, two of the clips used in the survey happened to feature two of the more iconic, quotable lines from the film. The first is when Marlee Matlin's character asks her daughter, who wants to be a musician, "If I was blind, would you want to paint?" The second is during a heated argument, when Deaf actor Daniel Durant signs to his character's sister, "Our family was fine before you were born!" Since 75% of the survey-takers had seen *CODA* prior to

taking the survey, it is likely that at least a few of them may have remembered one or both lines from the film. This would mean that the *CODA* data is skewed to appear more intelligible than the other media in the survey, possibly explaining, at least in part, its unanimous first-place sweep across all scores.

However, for the other media in the survey, the dialogue clips were not particularly famous or quotable lines from the media. The TV show *Switched at Birth* ran from 2011-2017 and has 103 episodes. While 65% of survey-takers had seen some amount of the show prior to taking the survey, due to the sheer volume of episodes, it is unlikely that they were able to recall specific lines. And yet, *Switched at Birth* was scored very highly by participants across all categories.

The opposite is true for *A Quiet Place*: 70% of participants saw it prior to taking the survey, but it typically scored quite low across all four categories (see Table 3), indicating that, at least in that case, participants were not going off their memories of the film's dialogue.

A second explanation for *CODA* and *Switched at Birth*'s high scores is participants' familiarity with the actors. As with spoken language, if a viewer is familiar with a signer, it is easier for them to comprehend that signer, even if there are other factors impacting intelligibility.

Survey participants had the option to write additional thoughts about each clip. One of the *Switched at Birth* clips featured actress Katie Leclerc. Leclerc is hard of hearing and plays the Deaf character Daphne on the show. Daphne is one of the main protagonists and appears in most episodes of the show. One survey-taker, who rated the clip highly, wrote, "I have watched her [Leclerc] sign a lot."

Another participant elaborated on their scores for two clips from *CODA*, saying, of actors Troy Kotsur and Marlee Matlin, "I've seen him sign before"/"I've seen her sign before."

Yet another participant wrote about one of Matlin's clips from *CODA*, saying, "Marlee is proficient in sign. There is plenty of acting and appropriate facial expression here to convey the sarcastic nature of her question." Not only does this comment encapsulate how Matlin's fluency in ASL made her easier to understand, but the participant's use of Matlin's first name indicates that they have likely watched other media featuring her, and thus were very familiar with her signing.

Another factor that may be responsible for this correlation is the demographics of the survey participants. ASL is a minoritized language in the United States and Canada. Not many movies or TV shows feature the language, so, when one does, it can be a big deal for people with connections to the Deaf community, especially if the media features multiple Deaf actors.

CODA and *Switched at Birth* are the only two pieces of media from the survey which feature multiple Deaf characters. Not only that, but both feature Marlee Matlin, who is arguably the most famous Deaf actor ever, in prominent roles. Furthermore, *CODA* and *Switched at Birth* both represent aspects of Deaf culture onscreen. These three factors combined likely greatly boosted their popularity within the Deaf community. It's possible that a random sampling from a group of people who know ASL would show similar trends to Figure 6 in which media most of them had seen.

Lastly, the correlation between participants' familiarity with the media in the survey and the media's correspondingly high or low ranking could be at least partially unrelated. If media features multiple Deaf actors, and focuses on issues of Deafness and Deaf culture, it is likely that the filmmakers will be more knowledgeable and respectful of ASL and Deaf culture, and thus will better represent ASL onscreen: both by casting fluent Deaf actors, and by filming the ASL in a more intelligible way.

DHH Actors and Better Filming

In Tables 4 and 5, all four scoring categories are notably higher for clips featuring DHH actors when compared to clips featuring hearing actors. The higher translation, comprehensibility, and perceived actor proficiency scores are to be expected—all the DHH actors in the clips were proficient in ASL prior to being cast, so it makes sense that they would come across as more proficient to survey-takers and that their dialogue would be more intelligible. However, it is interesting that participants, on average, reported that the clips featuring DHH actors were filmed in a way that better showed their signing.

As with the previous correlation, this may be due to the subject matter of the more highly rated films. Since *CODA* and *Switched at Birth* celebrate and highlight Deaf culture in ways that the other media in the survey does not, the filmmakers and behind-the-scenes crews were more educated on ASL and Deaf culture than the average film crew.

In an interview about her experience working on *CODA*, Marlee Matlin said,

My experience on this set was really completely different than something I have been accustomed to. And the reason is, is because most of the people signed. The crew learned to sign. There were Deaf actors other than myself that I could involve myself in conversations with, whether it was at lunch or just talking between setups. There were interpreters everywhere. It was like one big family. (PBS NewsHour, 2022)

Matlin was at least partially responsible for creating this environment. Due to her fame, she had a large amount of influence over the casting and filming process. Early in the filming process, the studio filming *CODA* considered casting a famous hearing actor to play Matlin's character's husband. Matlin said she would leave the film if the studio hired a hearing actor to play a Deaf character (PBS NewsHour, 2022). The role ended up going to Deaf actor Troy Kotsur instead, who won the 2022 Academy Award for Best Supporting Actor for his performance in the film.

The respect for ASL and language access by the directors and crew of *CODA* not only made the actors feel welcome on set, it connected the crew to the language and culture they were representing onscreen, which resulted in well-filmed ASL dialogue.

Survey-takers only had positive things to say about *CODA*'s filming, regardless of which actor was featured in the clip: "Light, full shot of her [Matlin] signing, no camera changes, fluent signer, it's very easy to understand;" "The camera angle for this clip was perfect for portraying the actor's [Daniel Durant's] signing;" "The camera angle was wide enough to capture the actor's [Emilia Jones's] signing which helped comprehension."



Figure 9: *CODA* Screenshot

A screenshot from *CODA* of Daniel Durant, in one of the most highly-rated clips in the survey, before captions were covered.

While survey participants rated *Switched at Birth*'s filming highly compared to the other media in the survey, they also expressed frustration at unnecessary jump cuts in the middle of actors' sentences in two of the clips. One survey participant said of a *Switched at Birth* clip, "The

jump cut was inappropriate and completely disrupted the flow and focus of the visual language! I give this scene an F in editing.”

For a different *Switched at Birth* clip, the same participant wrote, “The actress [Marlee Matlin] is proficient in sign language, but the editors/writers are NOT proficient in allowing visual language to be visual in this clip. TWO cuts in this ONE sentence, and the middle of the sentence is far away and behind the actress. Maybe they didn't want the audience to understand? Mission accomplished.”

While *Switched at Birth* features many Deaf actors and portrays Deaf culture, it's clear from these comments that the filmmakers were not as well-versed in ASL as the crew for *CODA*.

The three lowest-ranked media in terms of filming were *Hawkeye*, *Hush*, and *A Quiet Place* (see Table 3). In the case of *Hush*, the entire cast and crew were hearing. While there was a Deaf ASL consultant for the script, it's unclear if they were involved in the filming process at all, or even present on set (Lopez, 2020). This could explain why the filming was rated so poorly: no one involved with the actual shooting and editing of the movie had any experience with ASL.

A Quiet Place and *Hawkeye* each feature a Deaf actress. However, in both cases, her character was a supporting role, and the rest of the cast and crew were hearing.

For *A Quiet Place*, Doug Ridloff served as an on-set ASL consultant for the actors, helping teach them their lines and coaching their signing, though it's unclear if he had any say in the filming and editing process (Deaf Niche, 2018). Deaf actress Millicent Simmonds taught her co-stars sign language, and helped alter the script to make her character's experiences and reactions more accurate to her own life experiences (Verhoeven, 2018). However, once again,

it's unclear if Simmonds' influence extended beyond tweaks to the script and actor performances.

Survey participants' comments about *A Quiet Place*'s filming tended to address the framing of the shots. One participant wrote, "The woman's [Emily Blunt's] signing space is not fully captured, making it difficult to see all of her signs." Another said, "If the camera angle was a little lower but still had the actor's [Noah Jupe's] facial expression/face in the frame the ASL would have been more clear. This scene was created for hearing people not for deaf people. The emphasis was not placed on understanding the ASL."

These comments make it clear that while *A Quiet Place* primarily features ASL dialogue, it was not filmed with sign language in mind. When actors are speaking, directors can focus closely on their faces. For a signing actor, however, this cuts their hands—and thus their lines—out of the shot.

In *Hawkeye*, Deaf actress Alaqua Cox plays Echo, an assassin and action hero based on a character from Marvel Comics. Doug Ridloff once again served as the show's ASL consultant, working with the actors to translate the script into ASL (Seoul-Oh, 2021). Ridloff also taught ASL to Cox's hearing costar Fra Free, who plays Echo's friend and ASL interpreter in the show. However, despite Ridloff's coaching and the interpreters present on set, survey participants once again were disappointed with the show's filming.

In one clip, the shot jumps to a different angle of Cox in the middle of her sentence. Participants commented, "It was hard interpreting with the camera moving in different angles;" "Too far away. Wrong camera angle. Jump cut in the middle of an utterance, but to a better angle;" "It is difficult to understand when the camera cuts in the middle of a phrase."

In another clip, Cox wears black gloves and a black jacket. This, combined with dark lighting on her face and hands, bright lighting behind her, a close camera angle that all but cuts her hands out of the shot, and large embedded captions that cover the barely visible remainder of her hands, makes her signing in the clip completely unintelligible.



Figure 10: *Hawkeye* Screenshot

A screenshot from *Hawkeye* of Alana Cox, in one of the lowest-rated clips in the survey, before captions were covered.

A small sampling of the many comments participants made about this clip: “Literally can't see any complete hand movements. Also very dark. Facial expressions and non-manual markers suggest the person is frustrated, but can't tell anything else;” “The signing is too low, can't see the signs;” “The dark gloves with the dark shirt made it essentially impossible to see what is being said;” “There is absolutely NO WAY to determine what this actress is signing in the dark, but she looks concerned about something. What a terrible injustice has been done here!;” “really? black gloves over a black shirt?????”; “I can't judge the actor's ASL proficiency due to the poor camera angle not showing the ASL dialogue. Who knows what was said because none of the sign language was in the frame.”

Of Alaqua's performance, one participant wrote, "I remember watching this show and thinking she's such a great actress if only they would of [sic] ever showed her signing :("

Conclusion

The representation of ASL and Deaf characters onscreen in media is improving, but there is still a long way to go.

Directors have gotten much better about hiring Deaf signing actors to play Deaf signing characters, in no small part thanks to Marlee Matlin's visibility and advocacy. This survey found that this is not only beneficial for accurately representing Deaf characters onscreen, but that the intelligibility and overall perceived quality of DHH actors' signing and performance is quantifiably better compared to the performances of hearing actors.

Filmmakers are also learning to hire ASL coaches and Deaf consultants, not only to teach actors their lines in ASL, but to work with the directors and writers to make sure the script is accurate and respectful. However, at least currently, this cultural awareness and respect does not extend past the script and casting process.

The media used in this study consisted of films and TV shows with "substantial" ASL representation: each had at least one signing character who appears in more than one episode or scene. While the filming of ASL in these clips wasn't as egregious as the "exoticized, objectifying" framing of *CSI: New York* (Rayman, 2010), directors still tended to film signed dialogue like spoken dialogue, with disastrous consequences for intelligibility.

The most frequent complaints from survey participants were that actors' hands were cut out of shots while they signed, that jump cuts to different camera angles in the middle of an actor's sentence made it hard to follow their signing, and that shots were too dark to clearly make out actors' signing and facial expressions. Sometimes, participants complained about the "black box" covering parts of actors' hands—but the censoring boxes used in the survey were placed precisely over embedded captions, which obscured the actors' signing in the original footage.

This study has provided quantifiable data showing that the ASL in contemporary movies and TV shows is largely unintelligible to actual signers. Even for clips from the unanimously highest-rated film in the survey, *CODA*, the 10 more experienced signers never all rated a single clip as 100% across all categories. Most of the media scored far lower, with an overall average of about 60% intelligibility across intelligibility and comprehensibility (see Figure 8).

This begs the question: if the ASL in contemporary movies and TV shows isn't intelligible to signers, then who is the media for? Disney's Marvel Studios can proudly proclaim that it's including Deaf superheroes in its films and TV shows. But if Deaf movie-goers can't understand the ASL in *Eternals* or *Hawkeye* without captions, what message does that representation actually send? Hiring Deaf actors and ASL coaches, only for the ASL in the movie to be all but unintelligible, makes the inclusion of Deaf characters onscreen feel hollow and tokenist; a well-meaning but ultimately empty gesture.

This study determined that a lack of cultural awareness anywhere in the filmmaking process leads to unintelligible ASL dialogue onscreen. Hiring Deaf actors and ASL directors to translate the script are good and necessary things for directors to do, but on their own, unfortunately, they simply aren't enough. ASL consultants need to be involved in the framing, filming, and editing of signed dialogue, or else it will still end up as largely unintelligible.

It would be very feasible to expand the role of ASL director/consultant to include these duties, or to add an ASL cinematographer position specifically focused on supervising the filming and editing processes.

The more experienced signers who took this survey were able to very accurately assess how well they understood the dialogue in each clip (see Table 3). All survey participants were also readily able to point out specific ways that the intelligibility of the signing could be

improved, as demonstrated by the comments quoted in the discussion section. In most cases, too, the adjustments to the filming would have been easy fixes.

These findings indicate that an ASL cinematography consultant would not need to have any specific training to be able to tell directors and editors when filmed signing is unintelligible, or to be able to suggest concrete ways to improve the intelligibility of the dialogue. They would just need to be present behind the camera and in the editing room, and listened to by the directors and editors.

If filmmakers involve ASL/Deaf culture consultants in every step of the movie-making process, the intelligibility of ASL onscreen will improve dramatically, making the representation of Deaf signing characters in films and TV far less tokenist, and far more genuine. If this change occurs in the industry, then, someday, DHH moviegoers will finally be able to enjoy comprehensible, well-filmed signing onscreen.

References

- Akamatsu, C. T., & Stewart, D. A. (1998). Constructing simultaneous communication: The contributions of natural sign language. *The Journal of Deaf Studies and Deaf Education*, 3(4), 302-319.
- Baese-Berk, M. M., Levi, S. V., & Van Engen, K. J. (2023). Intelligibility as a measure of speech perception: Current approaches, challenges, and recommendations. *The Journal of the Acoustical Society of America*, 153(1), 68–76. <https://doi.org/10.1121/10.0016806>
- Bahan, B. J. (1996). *Non-manual realization of agreement in American Sign Language*. Boston University.
- Bent, T., & Bradlow, A. R. (2003). The interlanguage speech intelligibility benefit. *The Journal of the Acoustical Society of America*, 114(3), 1600–1610. <https://doi.org/10.1121/1.1603234>
- Brueggemann, B. J. (2009). *Deaf subjects: between identities and places*. New York University Press.
- Davis, J. (2017). Native American Signed Languages. *Oxford Handbook Topics in Linguistics*. <https://doi.org/10.1093/oxfordhb/9780199935345.013.42>
- Deaf Niche. (2018, April 20). *10 Cool Things To Know About The Blockbuster “A Quiet Place.”* Deaf Niche. <https://deafniche.com/9-cool-things-to-know-about-the-blockbuster-a-quiet-place/>
- Dudding, W. (2021, April 8). Overlooked No More: Granville Redmond, Painter, Actor, Friend. *The New York Times*. <https://www.nytimes.com/2021/04/08/obituaries/granville-redmond-overlooked.html>
- History of American Sign Language*. (2016, August 17). Dawnsign.com; DawnSignPress. <https://www.dawnsign.com/news-detail/history-of-american-sign-language>
- Kim, C. S. (2015, October 28). *The enchanting music of sign language*. TED; TED Conferences. https://www.ted.com/talks/christine_sun_kim_the_enchanting_music_of_sign_language/transcript
- Lane, H. (1963). Foreign Accent and Speech Distortion. *The Journal of the Acoustical Society of America*, 35(4), 451–453. <https://doi.org/10.1121/1.1918501>
- Lapiak, J. (n.d.). *Simultaneous communication: the inequality of language*. Wwww.handspeak.com. Retrieved February 4, 2023, from <https://www.handspeak.com/learn/index.php?id=353>
- Lerner, M. N., & Sayers, E. E. (2016). *Film: Deaf Characters*. SAGE Knowledge; SAGE Publications, Inc. <http://sk.sagepub.com/reference/the-sage-deaf-studies-encyclopedia/i2282.xml>

- Lopez, K. (2020, October 20). *How Deafness in Horror Evolved Beyond Damsels in Distress*. IndieWire. <https://www.indiewire.com/features/general/mike-flanagan-hush-deafness-in-horror-1234593748/>
- McDermott, J. H. (2009). The cocktail party problem. *Current Biology*, *19*(22), R1024–R1027. <https://doi.org/10.1016/j.cub.2009.09.005>
- Mitchell, R. E., Young, T. A., Bachleda, B., & Karchmer, M. A. (2006). How Many People Use ASL in the United States? Why Estimates Need Updating. *Sign Language Studies*, *6*(3), 306–335. <https://doi.org/10.1353/sls.2006.0019>
- Munro, M. J., & Derwing, T. M. (1995). Foreign Accent, Comprehensibility, and Intelligibility in the Speech of Second Language Learners. *Language Learning*, *45*(1), 73–97. <https://doi.org/10.1111/j.1467-1770.1995.tb00963.x>
- Nast, C. (2021, July 16). *Meet Emilia Jones, Star of the Heartwarming Hit of the Summer*. Vogue. <https://www.vogue.com/article/emilia-jones-coda-interview>
- Nygaard, L. C., & Pisoni, D. B. (1998). Talker-specific learning in speech perception. *Perception & Psychophysics*, *60*(3), 355–376. <https://doi.org/10.3758/bf03206860>
- PBS NewsHour. (2022, March 24). *Marlee Matlin's Brief But spectacular take on deaf actors in Hollywood*. YouTube. <https://www.youtube.com/watch?v=Xk4Rua6LQxw>
- Plainse, J. (2021, November 8). *Eternals Actor Reveals How Makkari's Name Sign Ties Into Her Powers*. ScreenRant. <https://screenrant.com/eternals-lauren-ridloff-makkari-name-sign-powers-connection/>
- Quinto-Pozos, D. (2011). Teaching American Sign Language to Hearing Adult Learners. *Annual Review of Applied Linguistics*, *31*, 137–158. <https://doi.org/10.1017/s0267190511000195>
- Rayman, J. (2010). The Politics and Practice of Voice: Representing American Sign Language on the Screen in Two Recent Television Crime Dramas. *M/c Journal*, *13*(3). <https://doi.org/10.5204/mcj.273>
- Reagan, T. (1995). A sociocultural understanding of deafness: American sign language and the culture of deaf people. *International Journal of Intercultural Relations*, *19*(2), 239-251.
- Safran, S. P. (1998). The First Century of Disability Portrayal in Film: An Analysis of the Literature. *The Journal of Special Education*, *31*(4), 467–479. <https://doi.org/10.1177/002246699803100404>
- Seoul-Oh, R. (2021, December 14). *INTERVIEW - Marvel Studios' "Hawkeye" Star Fra Fee On Learning Sign Language, Working with Alaqua Cox and Marvel Posters*. POC Culture. <https://pocculture.com/interview-marvel-studios-hawkeye-star-fra-fee-on-learning-sign-language-working-with-alaqua-cox-and-posters/>

- Smith, M. T. (2021). Disability on Film: An Exploration of Film Codes' Obstructiveness in City Lights and Children of a Lesser God. *Canadian Journal of Disability Studies*, 10(3), 69-95.
- Stockdale, R. (2013, February 11). *Name Signs*. [Www.lifeprint.com](http://www.lifeprint.com).
<https://www.lifeprint.com/asl101/pages-layout/namesigns3.htm>
- United States Census Bureau. (2021, April 26). *Historical Population Change Data (1910-2020)*. United States Census Bureau. <https://www.census.gov/data/tables/time-series/dec/popchange-data-text.html>
- Utichi, J. (2017, December 1). *Sally Hawkins Found Strength And Soul In Guillermo Del Toro's "The Shape Of Water."* Deadline. <https://deadline.com/2017/12/the-shape-of-water-sally-hawkins-oscars-interview-1202217716/>
- Verhoeven, B. (2018, April 7). *"A Quiet Place": John Krasinski Says Cast Learned Sign Language for Silent Thriller*. The Wrap. <https://www.thewrap.com/quiet-place-star-john-krasinski-on-learning-sign-language-for-the-film-exclusive-video/>
- Withey, R.-A. (2016, May 16). *Rebecca-Anne Withey: What I thought of the Netflix movie "Hush," with a Deaf character (but not a Deaf actress)*. The Limping Chicken. <https://limpingchicken.com/2016/05/16/rebecca-anne-withey-what-i-thought-of-the-netflix-movie-hush-with-a-deaf-character-but-not-a-deaf-actress/>