
Dustin J. Hemsath
Brigham Young University

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Dustin J. Hemsath

A thesis submitted to the faculty of Brigham Young University in partial fulfillment of the requirements for the degree of Master of Arts

Michael William Child, Chair
   Blair Earl Bateman
   Rob Alan Martinsen
   Gregory L. Thompson

Department of Spanish and Portuguese
   Brigham Young University

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ABSTRACT


Dustin J. Hemsath
Department of Spanish and Portuguese, BYU
Master of Arts

Hand gestures during speech lighten the speaker’s cognitive load, provide lexical access, augment the precision of memory, and identify when a speaker is ready to learn a new skill (Abner, Cooperrider, Goldin-Meadow, 2015). Much of the research that has discovered these purposes of gesture have focused on gestures produced during speech in the speaker’s first language. Many researchers use these findings to argue for the same cognitive benefits of gesture in the second language, though only little research of gesture and second language speech has been done. The present study sought to fill the gap between first and second language research on gesture production by investigating the differences between the gesticulation produced by bilinguals in their first and second languages as well as discover their perceptions of those gestures. Native English speakers bilingual in Spanish and native Spanish speakers bilingual in English were interviewed in both languages and their gestures were counted and compared between their first and second languages. Results showed that even though native Spanish speaker’s gestured significantly more than native English speakers, all participants significantly increased their gesture production from their first to their second language. Task type also played an important part in this increase, wherein gestures increased only in descriptive and narrative tasks, but not in conversational role plays. Gestures also seemed to increase due to a heightened cognitive load within the tasks more so than due to increased anxiety levels, agreeing with previous research done in first language contexts. Participants also tended to base perceptions of gesture use on native cultural attitudes towards gesture, causing inconclusive results on speaker awareness of their co-speech gesture in either their native or second language. Some limitations suggest that this study be repeated with modifications, such as evaluating participant proficiency before interviewing and matching all participants to a specific range of time immersed in the foreign culture.

Keywords: awareness, cognitive load, cultural attitudes, gesture, L1, L2, lexical access, second language acquisition
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CHAPTER 1: Introduction

The first known recorded study of hand gestures occurred in the first century A.D. when Quintilian studied it as choreography for orators help persuade and clarify information (Gullberg, 1998, McNeill, 1992). In the seventeenth and eighteenth centuries, gesture was believed to be a universal language and a precursor to spoken languages (Kendon, 2004). Interest continued into the nineteenth century in sign languages, but gesture was not studied much at all after that until around the 1940s, when Efron ([1941] 1972) began to examine gestures as a phenomenon of language and pioneered the links between the two. Eventually, Kendon (1972, 2004) began to classify gestures and describe how they represent the thought process of the speaker. Later on, McNeill (1992) hypothesized the epicenter of gesture as being the same point as spoken language, identifying gesture as a sister to spoken language. However, research continues to identify why people gesture the way they do, when, and why.

Gesture production has recently grown into a field of study that has attracted interdisciplinary research. Psychologists have investigated questions such as who gestures, when they gesture, and how gesture develops (e.g., Kendon, 1972; McNeill, 1992; Nicoladis, Mayberry, & Genesee, 1999). Pedagogues have looked at gesture from several angles, such as effects on memory and moral reasoning, to discover its didactic potential in the classroom (e.g., Beaudoin-Ryan & Goldin-Meadow, 2014; Broaders, Cook, Mitchell, & Goldin-Meadow, 2007). Linguists have researched differences in gestures between cultures and the motivation for those differences as well as which gestures are produced in varying linguistic situations, including language learning contexts (e.g., Efron, 1972; Gullberg, 1998; Kita, 2000; McCafferty, 2002).

In the end, everybody gestures and the reasons for the varied hand and body movements that people do have merely been touched upon by the research that has been done. There are
countless scenarios that have not yet been investigated in order to understand the relationship between hand gestures and language. Yet there are plenty of scenarios that could potentially shed more light into the field of study and should be investigated.

**The Problem**

I first became aware of hand gestures in language learning contexts when a colleague commented that he noticed and was inspired by my use of hand gestures during a sample lesson. I knew I used a lot of hand movements for the benefit of my students, but I was not aware of the type of movements I was doing, or what they were even communicating to my students. As I began to research hand gestures in pedagogical contexts, I discovered the vast amounts of knowledge there was on the subject and the spectrum of categories with which the term gesture correlated. I soon learned that researchers were suggesting that co-speech gestures, or gesticulation, provided benefits for the speaker as well as the interlocutor (e.g., Frick-Horbury & Guttentag, 1998; Goldin-Meadow, Nusbuam, Kelly, & Wagner, 2001; Kita, 2000; McCafferty, 2002). I started observing my own students and the movements they were making while speaking in the target language (i.e., Spanish) and wondered why they were moving their hands the way they were and if those movements differed from when they speak in English.

Further research in second language learning contexts discussed the cognitive benefits of gesture produced by the learner, but many of the resources used to support their claims were written in first language (L1) contexts (e.g., Brillinger, 2007; Macedonia & Knösche, 2011; Macedonia & Von Kriegstein, 2012; Tellier, 2010). This is not to say that conclusions were false, but that there is a lack of research that shows if the same gestural phenomena that occurs during L1 speech also occurs equally in second language (L2) speech.
There are not many researchers who have conducted research in the field of second language gesture production that I have been able to find. The few who have published on the topic have identified both quantitative and qualitative differences between the gestures produced in the L1 and the L2 (Gullberg, 1998, 2008; McCafferty, 2002; Stam, 2006). It is my hope that through the current study, I can add to the gesture research in the field of second language acquisition and provide additional evidence of the relationship between L1 gesture and the L2 gesture production.

**Research Questions**

Given that little is known about gesture and its similarities and differences between the first and second languages of a speaker, this study was designed to explore any potential quantitative and qualitative differences between gesticulation in the first and second languages. Thus, I pose two research questions:

1. Do advanced-level second language learners gesticulate differently, either quantitatively or qualitatively, when speaking in the L2 compared to when speaking in the L1?

2. How aware are speakers of their gesticulation in the L1 and L2?

Two hypotheses governed the first research question and were influenced by the research of gestures in the L1 contexts. The first hypothesis is that speakers tend to produce more gestures in their L2 than in their L1. The second hypothesis is that speakers will produce different types of gestures in their L2 than in their L1. The second research question was not guided by a hypothesis, but rather was intended to be exploratory and interpretive in nature, in hopes to answer questions that arose during the course of the study.
Overview of the Study

Advanced-level L2 Spanish and L2 English speakers were recruited from the various third-year Spanish courses emphasizing reading, grammar, and culture and the English courses of various levels offered at the English Language Center at a large, private university in the Rocky Mountain region of the United States. All participants were given two language interviews in counterbalanced order (i.e., English then Spanish or Spanish then English). Within each interview, three tasks were presented for the participants to complete. The interviews were audio- and video-recorded and later transcribed and coded for gesture types per the number of clauses spoken within each task. The number of gesture types and gesture totals in the L1 interviews were analyzed in a mixed-model ANOVA and compared to the estimates analyzed through the same test for the L2 interviews.

After both language interviews, I conducted a debriefing interview with each participant. I asked questions regarding motivations and perceptions about individual gesture production during both language interviews. The questions were coded and categorized in order to form conclusions regarding both research questions.

Definition of Terms

Gesticulation: The hand and arm movements made by the speaker during discourse or during pauses throughout discourse.

Gesture: This study will use gesture and gesticulation synonymously.

Gesture type: Categorized movements according to the type of imagery presented. The four types of gesture considered in this study are metaphoric, iconic, beats, and deictic.
Language interview: Approximately a 10-minute period of time with a single interviewer in either English or Spanish, consisting of ice-breaker questions followed by the same three tasks in each language.

L1 group: One of two categories of speakers, those who were raised speaking English as a first language and those who were raised speaking Spanish as a first language.

Outline of Thesis

This chapter has introduced the motivations for which I have proposed this study and has described briefly what this study will entail. Chapter 2 will review the literature that has provided a strong foundation in the field of gesture studies in both L1 and L2 contexts. Chapter 3 will describe in more detail the methodology and data analysis that this study will undergo. Chapter 4 will present the outcomes of the data analysis and the participant responses from the debriefing interview. Chapter 5 will discuss the implications of the data detailed in Chapter 4 according to the research questions and hypotheses and describe the limitations found within the study design and implementation, including suggestions for further investigation in this area of research. Chapter 5 will end with explicit contributions to the field that this study has made.
CHAPTER 2: Review of Literature

Gesture, the movement of the hands and arms to communicate a message, has revealed much about human thought and communication. Efron (1972) and Kita (2009) have examined gesture variations as phenomena of culture. Other researchers have investigated the development (Kendon, 1972; Nicoladis, Mayberry, & Genesee, 1999) and the semantics (McNeill, 1992) of gesture as well as the connections gesture has with thought (Efron, 1972; McNeill, 1992; Stam, 2006). In this chapter, I will review the literature of gesture studies within thought and language contexts by first defining gesture and identifying the characteristics of gesture pertinent to this study. Then, I will survey the data on what gesture reveals about the thought process. I will then report on the research about speech-gesture development processes in a first language context. I will then conclude with a discussion of the studies that imply a need for further research on gesture within second language acquisition and educational contexts.

Defining, Identifying, and Classifying Gesture

Gestures have been defined in various ways. The term nonverbal behavior and body language find their way into general research on language production (Gullberg, 1998). In technical literature, non-vocal communicative behaviors, such as head movements, facial expressions, and posture, in addition to other body movements made during speech have been placed underneath gesture’s categorical umbrella (Neisser, 1976). McNeill (1992) provides a spectrum of gesture called Kendon’s continuum, named after Adam Kendon, in which gestures begin at one end as natural, speech-accompanied, and usually subconscious hand movements that McNeill refers to as gesticulation, also referred to as phonogènes (Cosnier, 1977), and progress along a continuum of more conscious, idiomatic gestures. For example, when a speaker is
mentioning a ball, his or her hands may be placed in front of the torso with palms facing inwards towards each other, the hands curved and fingers separated as if to be holding an actual ball.

Self-touching movements (e.g., fixing one’s hair, scratching, nervous fidgeting, etc.), also called self-adaptors (Ekman & Friesen, 1969), though similarly occurring during speech, are not grouped into gesticulations as they are widely considered non-communicative and are more directly tied with emotion and personality than with language (Neff et al., 2011). Next on the spectrum are speech-linked gestures. These gestures are not synchronous with speech, but intend to fill in the gaps of conversation with a lexicalized hand or body movement. To illustrate, a person may ask “Do you…” and stop his or her speech and point to the top of his wrist indicating the time, intending to complete the question “Do you have the time?” Gestures tend to become more lexicalized and depend less on speech, as the previous example implies, as the continuum advances. Emblems, which can occur with or without speech, carry their own semantic meaning and many times are culturally linked. A “thumbs up” carries with it a clear affirmation without the need for speech at all. Stam (2013) also points out that, in contrast with gesticulation, emblems are social behaviors and can be learned. Whereas emblems usually contain understood concepts within a community, pantomime is more like gesticulation in that it contains highly synthesized and spontaneous movements, but intends to relay a word, phrase, or even a story without verbal expression through socially lexicalized gesture forms (McNeill, 1992). However, Gullberg (1998) does not dismiss speech from pantomimes either. She explains that the point of view in which gestures are performed can be considered pantomime and be accompanied by speech when “all articulators represent the corresponding body parts in a character.” She calls this “true mime” (p. 98). Sign language ends Kendon’s continuum as it carries its own syntax and grammatical rules like any other spoken language. Although it may be used synchronously
with speech, it does not depend on the verbal linguistic system that may coexist within the same community but rather on its own linguistic conventions for the express purpose of communicating without speech.

From one end of the continuum to the other, a hierarchy of structure and grammaticalization builds towards a separate and accepted language (e.g., American Sign Language). McNeil (1992) posits that because this compositionality occurs on one end of the spectrum, the other end (i.e., gesticulation) is void of such grammar features. McNeill’s (e.g., 1992, 2000, 2007) extensive research on gesture has forged the way towards understanding gesture’s role in thought and speech and will be a framework for the current investigation. This study will specifically focus on gesticulation as a way to interpret the speech-thought process due to its inherent links to speech, as explained in the research above.

McNeill’s (1992) typology is currently the most widely used classification in gesture research, with many studies on gesture applying his typology to their research (e.g., Abner, Cooperrider, & Goldin-Meadow, 2015; Alibali, Kita, & Young, 2000; Beaudoin-Ryan & Goldin-Meadow, 2014; Gullberg, 2008; Hudson, 2011; Inceoglu, 2015; McCafferty, 2002; Stam, 2006; Yoshioka, 2005). Specifically, McNeill (1992) identified five classifications of gesticulation that speakers use to provide meaning, clarification, or direction to the interlocutor and placed those uses into the following taxonomy:

1. *Iconic gestures*: those which produce an image of a concrete object, such as the ball example given above.

2. *Metaphoric gestures*: those which represent abstract items (e.g., the index finger and thumb parallel to each other and extended from the closed hand to represent “a little”).
3. **Beats**: rhythmic movements with the hands and/or arms to emphasize part of an utterance (e.g., moving a flat, vertical hand towards the audience to the main point of a speech). These can also be manifest as simply as a quick flick of the wrist while still in a neutral or resting position (see Chapter 3 for a further explanation of “resting position”).

4. **Deictic gestures**: those that indicate the temporal or spatial location of an object (e.g., pointing to the clock when telling time or pointing forward to refer to tomorrow or the future).

Despite the wide range of nonverbal movements that are included in the term gesture (e.g., head movements, shoulder shrugs, posture, facial expressions, etc.), those movements that are limited to the hands and arms have been categorized into a spectrum that extends from speech-dependent to grammaticalized movements (i.e., Kendon’s continuum). Gesticulation, the most synthetic, or spontaneous and non-conventional, form on the continuum and the focus of this study, divides itself into four subcategories, namely: iconics, metaphorics, beats and deictics. Both Gullberg (1998) and McNeill (1992) continue to divide iconics and deictics into further subcategories, which will not be included in this work. Finally, self-adaptors are scratches and fidgety-type movements and are not counted as part of gesticulation because of their lack of direct association to the vocalized utterances with which they co-occur and, therefore, will not be investigated in this study.

John Napier (1980) once wrote, “If language was given to men to conceal their thoughts, then gesture’s purpose was to disclose them” (p. 166). The following sections will show just how possible Napier’s statement can be.
Thought and Gesture

In recent studies, gesture has been used as a tool to profoundly investigate Slobin’s (1996) “thinking for speaking” theory, which says that the linguistic structures people choose to say in order to communicate an idea reveals much about their thought process. Much of McNeill’s (2007) research has focused on linguistic thought processes, and he concluded that the growth point is “the initial unit of thinking for speaking out of which a dynamic process of organization emerges” (p. 4). From the growth point emerges a “dialectic” (p. 1), in which a synthetic, or non-conventionalized gesture and an analytic, or structured linguistic form, must resolve their dissonance through change and development to produce coherency. Neurological evidence affirms that linguistic structure and imagery originate from a “common neural system” when comparing symbolic gestures (emblems) and speech separately (Xu et al., 2008). This is to say that imagery and speech are two pieces to linguistic thought, and that the meaning of the output produced will reveal itself in appropriate speech accompanied by nonverbal language (e.g., gesture, facial expressions, body language, etc.) to complete the image originated in thought.

The use of different types of gesticulation could, thus, have different purposes for the speaker’s intentions, which begin at the growth point. Gesticulation is categorized by its synchronous representation of the speech it accompanies (McNeill, 1992). This is clearly seen in both iconic and deictic gestures; the hands may signify the vocalized word for “time” when a hand taps the wrist where a watch would typically be (iconic) or points to the tangible clock hanging on the wall (deictic). However, whether the gesture produced is iconic or deictic depends on the experience of the speaker, originating as thought, and that experience and personal relation to “time” is revealed through hand movements. Gestures also communicate...
additional implicit, or unspoken, information (Broaders et al, 2007; Goldin-Meadow & Singer, 2003; McNeill, 1992). As an example from McNeill’s work, the phrase “and he bends it way back” (in reference to a narrative about a comic book character bending a tree backwards toward the ground) was accompanied by a single hand in a gripping formation starting from a position near the head in a forward position and moving it back and downwards toward the shoulder. Not only does the gesture represent what is explicitly said, but it also tells the listener that the tree roots were affixed into the ground (i.e., not a fallen tree); otherwise, two hands representing the movement of both ends of the tree would have been used. It also tells us that the speaker is viewing the narrative from the perspective of the character; otherwise, a gripping formation would not have been present to represent the tree, but rather a bent arm and hand representing the bending tree.

Similarly, gestures can reveal implicit knowledge unbeknownst to the speaker. For example, children have also used deictic gestures that portrayed correct mathematical processes despite their previous erroneous verbal explanations of how to solve an equation (Broaders et al., 2007). The children in this study were asked to solve several math equations from the same mathematical concept, such as $5 + 3 + 4 = \_ + 4$, and then explain how they arrived at their answers. Only those children who answered all questions wrong in this phase were tested in the next phase. In the manipulation phase, the children solved six more equations of the same mathematical type. After solving the equations, the children were asked to explain once again. One group was asked to move their hands while explaining, another was asked not to use their hands, and the control group was not given instruction either way. For the most part, the children who increased their gesture production in all groups during the explanations showed with their hands the correct way to solve the equation despite their first explanations, which ultimately lead
to the wrong answer. These results reveal something intriguing about thought and gesture that cannot be ignored: gesture not only serves to relay embedded information from thought into our communications, but that speech is many times incapable of expressing that same information and results in intrapersonal miscommunications. This suggests that gestures provide underlying information of which speakers are unaware until their gestures reveal it to them.

To summarize, gestures portray the implicit information of speakers that they do not express verbally. Speakers do not generally recognize the information that gestures are providing most of the time (McNeill, 1992). However, inasmuch as gesture reveals implicit information, the detail it does communicate to an interlocutor suggests that the detail is cognitively possessed by the speaker.

**Gesticulation in the L1**

**Gesture development.** In accordance with the studies above, gesture develops alongside verbal language. In fact, gesture typically precedes verbal speech in infants. It is speculated, however, that the same gestures used by infants pre-linguistically do not continue developing with speech, but rather a new set of gestures is created to match meaning (Nicoladis, Mayberry, & Genesee, 1999). Nevertheless, this theory is rather controversial and requires more investigation to be considered for language development. In their longitudinal study, however, Nicoladis, Mayberry, and Genesee videotaped conversations with five bilingual children, between the ages of two and three and a half, every six months in order to compare gesticulation habits between children and adults. The similarities between the children’s gesture and that of adults suggest that on average, by the age of two, the speech-gesture system is already in place, despite the lack of complexity that will continue to develop in the children as they grow. It would seem, then, that gesticulation develops early on alongside speech from the same growth point.
Just as the complexity of language develops over time through interaction, gesticulations also assimilate according to the culture in which they are produced. Social consensus tends to identify gestural characteristic differences between cultures. From an American point of view, Italians are very open and liberal with their gesticulatory expression, whereas Asian cultures are seen as extremely conservative with their hand movements during speech. Though little is still understood about cultural differences in gesticulation, there are some studies that examine the relationship between culture and gesture. In his study of eastern Jews and southern Italians living in New York City, Efron (1972) compared gesture production from second generation members of these communities. He recognized that out of both ethnicities, members of the second generation who felt closer to the immigrant groups mimicked gestures from that group, and those who felt closer to American culture groups mimicked gestures used by their preferred associates. These findings suggest the development of gesture through social interaction. More recently, Kita (2009) has identified several cultural differences in gesticulation including hand shape, space, and the body part used to gesture (e.g., some cultures use their lips frequently when producing deictic gestures). Other socially learned gestures deal with pragmatics and the cultural differences seen due to cultural values. For example, some communities in Ghana find it rude and disrespectful to use the left hand to give, take, eat, or drink (Kita & Essegbey, 2001). This social taboo has converted into a gestural characteristic in which the use of the left hand is avoided in gesticulation or at least combined with the right hand to lessen the rudeness of its use.

These observations provide useful information. First, although gesticulation naturally develops alongside speech, it is motivated by the values of the community in which it is formed. Secondly, variations and forms of gesticulations can be learned.

**When do people gesture?** The phenomenon of gesticulation and its development and
production is intriguing to many psychologists who study thought, speech and language learning. The sheer amount of gesticulation that occurs during speech is astounding. In fact, it is estimated that 90 percent of descriptive discourse is accompanied by gesture (Nobe, 2000). In addition, when expressing logic and problem solving with a set of objects, children tend to gesture more than when simply describing those same objects (Alibali, Kita, & Young, 2000; Melinger & Kita, 2007). Even blind individuals gesture when they speak. Iverson and Goldin-Meadow (1998) investigated the amount of gesture twelve congenitally blind people used when speaking to sighted and unsighted individuals as compared to sighted individuals speaking to other seeing people. Interestingly enough, they found that their blind subjects did not gesture any less to other blind people than their seeing subjects gesticulated to other sighted individuals. In fact, the gestures used by the blind speakers were extremely similar to those used by the sighted speakers. Adding to their findings, blind subjects tended to use more gesture when speaking to seeing subjects than when speaking to blind subjects, knowing their interlocutors could see and benefit from their gestures in conversation. Their results suggest that gesticulation is not necessarily an observably learned action but is also a naturally implicit ability, or in other words, an action whose execution by the doer cannot always be explained and may vary according to situations and conditions in which speakers find themselves.

Similarly, gesture can occur over telephone communications. Evidence has shown that in telephone conversations or other media-assisted conversations in which there is no visual component, certain gestures are removed by the speaker, yet gesticulation still occurs, despite knowing the listener cannot see them (de Ruiter, 1998). Some reasons for gesture, then, could be explained by Stam’s (2014) observations. She found that gestures occur more frequently during moments of “high communicative dynamism” (p. 1). In other words, people are more likely to
use gesture when they are presenting new information, emphasizing information, or demonstrating a contrast of information. This suggests that spontaneous gesticulation occurs when the speaker desires to deliver purposeful messages to the interlocutor and not solely for the listeners benefit. Additionally, gesture occurs more frequently during spontaneous utterances than during memorized speech (Chawla & Krauss, 1994; Krauss, Chen, & Chawla, 1996), supporting the notion of high communicative dynamism.

The previous data, therefore, suggest that speakers, whether consciously or subconsciously, choose which gestures to use in certain situations, thus implying that gesture is not only used for the delivery of a message, but also closely linked to speech production and the value the speaker places on what is to be said, as supported by Stam (2014) and Krauss, Chen, and Chawla (1996).

**Why do people gesture?** Knowing the many situations in which gesture occurs leads to the question of why people produce gesture during these times. One theory on the subconscious use of gesticulation states that it lightens the cognitive load while speaking (Goldin-Meadow, Nusbaum, Kelly, Wagner, 2001; Gullberg, 2010; Kita, 2000; Yoshioka, 2005), or rather, it decreases the effort of working memory during thought and speech production. For example, the use of deictic gestures allows the speaker to project the image of thought onto a physical object that represents the image in thought so that cognition does not have to spend effort in maintaining that image in the mind. This has empirically been shown to relieve cognitive load for both present and non-present objects in the immediate space (Ballard, Hayhoe, Pook, & Rao, 1997; Ping & Goldin-Meadow, 2010).

The Lexical Access Hypothesis (Krauss, Chen, & Chawla, 1996) holds that spontaneous gesture aids in retrieving lexicon from memory and producing it in speech. Consequently, when
lexical access is more difficult, gesture tends to increase (Hostetter & Alibali, 2004; Stam, 2013),suggesting that spontaneous gesture serves as a search tool for lexicon not readily available in the mind to be uttered. Frick-Horbury and Guttentag (1998) and Alibali, Kita, and Young (2000) concurred that gesture facilitates the retrieval of lexicon stored in the brain. Further, Kita (2000) states that “gesturing helps the speaker organize information in a way suitable for linguistic expression” (p. 180), naming the process the Information Packaging Hypothesis. This process is hypothesized to occur when spatial information is not easily organized, or rather, when imagery is not easily conceptualized with words. Hostetter, Alibali, and Kita’s (2007) data supported both theories, and concluded that lexical access is merely a factor involved in gesture production due to the Information Packaging Hypothesis. In support of the prior theories, gestures made during these times of increased cognitive effort have never observably occurred after the information is expressed verbally, but only before or concurrently with the expression of the information (Krauss, Chen, & Chawla, 1996; Kita, 2000; McNeill, 1992). According to Kelly, Kravitz, and Hopkins (2004), gesture begins several hundred milliseconds prior to semantic processing. This timing reinforces both hypotheses that gesture has organizational and retrieval effects on cognition, which, in turn, influences speech output.

A connection between gesticulation and memory has also been empirically recorded. Stevanoni and Salmon (2005), after having provided a specific experience to children, observed that subjects who gestured more while recalling their experiences up to two weeks after the event reported more accurate and detailed information of the event than subjects who gestured less. Most of the children who gestured more did so on the encouragement of the researchers, whereas those who gestured less were not given any instruction on using their hands while speaking. Still, more gesture correlates with recalling more accurate information than does less gesture. A third
group that was instructed not to gesture yielded data showing that fewer gestures result in less accurate and detailed recollections. Goldin-Meadow, Nusbaum, Kelly, and Wagner (2001) confirmed through a dual-task study that an increase in gesticulation upon request has such an effect on working memory. Using mathematics as a basis, the researchers asked their adult and child subjects to explain a mathematical problem while remembering words unrelated to the task from a previously-presented word list. Subjects who gestured, as instructed, during their mathematical explanation recalled at the end of the task more words and letters from the word list than those subjects who were instructed not to move their hands. Again, this supports the notion that gesture provided some cognitive relief toward the effort it took to perform the mathematical explanation and spent that energy on the memory task. The results from both studies correlate with the previous research, in which a lighter cognitive load, permitted through gesture, allowed for more information to be mentally processed and verbally revealed.

Additionally, encouraging gesticulation from children has the potential to prepare them for learning and acquiring skills. Spontaneous gesture produced by the learner during a task can indicate implicit knowledge, predicting future success on that task. Broaders, Cook, Mitchell, and Goldin-Meadow (2007) observed that children implicitly knew how to solve mathematical equations even though they could not explicitly explain them or solve them correctly. All the children considered in their study did not arrive at the correct answer when solving the equations individually. When asked to explain how they arrived at their answers, again, the children gave an erroneous verbal explanation. While they verbally described their thought process, Broaders et al. observed their deictic and metaphoric gestures as they interacted with the equation on the whiteboard, which observations showed how to arrive at the correct answer despite their original answers and explanations. It appears that implicit knowledge was present and just needed to be
tapped into with the use of gesture. Consequently, after classroom instruction on how to properly solve the equation, a posttest was given to the children. Those subjects who were instructed to move their hands as they re-explained their problem-solving process arrived at the correct answer more often than did students who were not given any instruction on what to do with their hands and those who were prohibited from gesturing during the pre-lesson problem-solving and explanations. Thus, not only did gesticulation reveal implicit knowledge, but the speakers/gesticulators became more aware of that knowledge through their gestures and memory for further production was enhanced.

Encouraged gesticulation also seems to affect the awareness of multiple perspectives among youth. Beaudoin-Ryan and Goldin-Meadow (2014) investigated a similar process in a different subject area: moral reasoning. Forty-five fifth-graders were given a pretest, training, and posttest in which they were presented a moral dilemma and had to choose between a contractual obligation and obedience to a higher authority. In the pretest, they were given a story in which characters made poor moral choices according to their circumstances and then asked to choose which choice was worse (i.e. cheating or stealing to get money). The pretest then consisted of seven questions probing the participants to support their judgements. During the training, the children were split into three groups: Told-to-gesture, Told-not-to-gesture, and a control group that received no instruction regarding gesture. Two experimenters then displayed an example of debating between the two choices (cheating or stealing), without gesturing, but arguing each choice using multiple perspectives. In the posttest, the children were given a new dilemma and seven new questions to probe their reasoning during oral explanations. The results mirrored the findings of Broaders et al. (2007) but added to them as well, stating that “requiring gesture during spatial tasks has been shown to catalyze the production of more sophisticated
problem-solving strategies, allowing children to profit from instruction” (p. 1). In other words, not only may gesticulation prepare students for the lesson at hand, but it may also allow them to reveal and recognize multiple perspectives embedded in their implicit knowledge, increasing their problem-solving skills.

In sum, the evidence above strongly suggests that gesticulation is a natural method to aid in speech production and not only interlocutor comprehension. Gesticulation may lighten cognitive load, aid in lexical access, resolve image-speech dialectics, enhance memory, reveal implicit knowledge, and provide multiple perspectives in reasoning skills. Yet, speakers do not exhibit much control over these movements given that they first developed them as young children. These effects of gesture on cognition have been discovered in a first language context. Naturally the question arises, how does gesticulation and its effects transfer among bilinguals and second and foreign language learners? The next section will discuss possible answers to this question.

**Gesture and Speech in the L2**

Little experimental work with gesticulation has been conducted in the field of second language acquisition (SLA). Assuming the causes for and effects of gesticulation discussed previously are accurate, do they transfer to one’s foreign or second language as well? Some research points to the affirmative, but no one has formulated a direct hypothesis on the matter.

First language research finds that gesture helps with memory. Similar research exists in L2 gesture research. The underlying principles of total physical response (TPR) (Asher, 1966) are based on the increased memory of L2 words and phrases in regard to listening comprehension. Tellier (2010) used the principles of TPR and analyzed the effect of mimicked action of individualized vocabulary in an English as a Foreign Language (ESL) course for young
French speakers. New vocabulary lists of eight words were presented to twenty monolingual English learners between the ages of four and five. The lists were accompanied by pictures (to ten learners) or gestures (to the other ten learners) through video and the children were instructed to repeat the new words; the gesture group also had to reproduce the gestures while repeating the vocabulary, a difference in approach to the TPR strategy. Tellier reported that the students who gestured remembered more vocabulary on their tests than those who only saw the images while repeating the words.

A similar strategy was tested through another study which resulted in comparable findings (Macedonia and Knösche; 2011). A false corpus was presented to adult subjects in order to examine the acquisition of vocabulary and simple sentence structures. The vocabulary was taught with speech and gesture that were to be repeated when the word was introduced. No translation to the students’ L1 was made until the test at the end of each day, forcing the subjects to conceptualize the meaning of each word according to the movement it accompanied, including concrete nouns, abstract nouns, adjectives and verbs. Even though both of the above studies looked solely at embodiment, as opposed to gesticulation, of new vocabulary, both concluded that enactment, or the repeated action of an instructed motion with concurrent speech, did help students young and old remember more of the new vocabulary as compared to the control groups. The latter study added that it also allows for better conceptualization and recall of both words and phrases towards the production of logical sentences.

There is also further evidence that gesture in the L2 protects from the decay of lexical memory of less familiar words accessed in the process. Aligning their findings with those discussed in the previous paragraph, Macedonia and Von Kriegstein (2012) found that the more complex connections to lexicon through sensorimotor modalities, the stronger the recall, and that
perhaps “motor information could have hierarchical properties and affect memory more than other sensory components” (p. 406). It would seem, then, that gesture in the L2 acts similarly on lexical retrieval and enhanced memory as it does in the first language. However, again, each of the above studies examined enactment and embodiment, which are not gesticulation. And although Macedonia and Knösche (2011) incorporated sentence construction into their experiment, gesticulation was not a part of it. Therefore, these studies do not provide sufficient information about gesticulation and its role in L2 spontaneous speech, but they do suggest a basis for further investigation.

Other L2 investigations of gesture suggest that gestures communicate implicit information. Stam (2006) investigated gesticulation in bilingual children of Spanish and English, providing information that may have some correlation with the L1 studies mentioned earlier. The children in her study revealed mismatches between speech and gestures in their L2 during structures involving verbs of motion (i.e., linguistic structures involving a verb that explicitly refers to the movement of the subject or the object), which tend to differ syntactically between the two languages. English tends to place the manner of the action performed within the verb itself, leaving the trajectory, or path, to be explained in a preposition or prepositional phrase (Slobin, 1996; Stam, 2006). Due to this separation of movement and trajectory, Talmy (1985) described English as a satellite-framed language. In contrast, Spanish speakers tend to lead with a path-incorporated verb, leaving manner to be implied or included through satellite words or phrases. Stam’s (2006) research showed children’s “thinking for speaking” through the gestures of path they used during phrases that were structured like those described above. The children tended to produce path gestures during the moment in which the path was expressed linguistically in their L1 (i.e., during the verb for native Spanish speakers and during the satellite
for native English speakers). However, when speaking the L2, the gestures and speech became mismatched. For example, a native Spanish-speaking, advanced-level English-learner would utter the statement “and he goes to the . . . to a bowling place” and produce a gesture during the verb goes. The gesture, however, showed directionality of the event, a tendency for Spanish speakers, even though trajectory was not specifically expressed verbally, showing a mismatch of information. The student gestured as he would in Spanish when using English syntax verbally. This suggests that it is possible that intermediate and advanced L2 learners may be maintaining their “thinking for speaking” L1 patterns while speaking the L2. This example also raises the question of whether or not the Information Packaging Hypothesis transfers to the second language and to what degree gesticulation helps structure linguistic output. Due to the fact that Stam’s observations were based on the gesticulation of bilingual speakers, her findings do correlate with gesture effects in the L1 in which gestures reveal implicit knowledge and perspectives (Broaders et al., 2007) that are not revealed in speech output.

Another study of gesticulation during spontaneous conversation in the L2 indicated a relevant correlation between gesture and self-regulation (McCafferty, 2002). In video-recorded observations of an English-learner’s naturalistic conversations with a native English speaker, the researcher discovered that by placing the learner in an environment where he needed to negotiate meaning to progress in the conversation, he began to use compensatory gesture to make his limited language comprehensible to his interlocutor. As the learner became aware of the advantage his gestures had in making meaning, he became encouraged to utilize it to increase his own accuracy and proficiency. McCafferty even observed that when the subject used iconic gestures, his utterances were “well-formed” despite his low proficiency level, suggesting that gesticulation played a part in constructing appropriate language through the process of self-
regulation; the learner noticed his own potential mistakes and “found that his gestures helped him make meaning for himself” (p. 197). These data support the L1 research discussed previously in regard to the transfer of the Information Packaging Hypothesis, in which gesture aides in organization of language. Whereas the research by Hostetter, Alibali, and Kita (2007) is presented within an L1 framework, McCafferty’s discoveries are placed within the L2 context and provides a bit more insight into how gesticulation effects cognition. In this case, self-regulation appears to be valuable in organizing second language speech output.

In summary, the little research conducted on gesticulation and second language acquisition maintains that gesticulation affects cognition during L2 speech output. Though not directly observed through gesticulation, motor modality has affected second language lexicon recall in both children and adults. Gesticulation in L2 contexts can reveal implicit knowledge and information not expressed verbally. Lastly, gesticulation in conversation with native speakers may provide opportunities for L2 speakers to organize their speech in real time through self-regulation. However, each of these possibilities portray differences from the studies in the L1 contexts. Attention must be given to these differences in order to truly understand gesture’s role in L2 cognition and speech.

**L1 and L2 Gesture Differences**

The research presented here seems to support the potential transfer of cognitive benefits from the L1 to the L2 as a result of gesticulation, but not without its differences between languages. To add to this point, Gullberg (1998), in her study on gesture as a communicative strategy in L2 speech, recorded differences between French and Swedish participants’ gestures when narrating a story. She observed that, generally, the gesture types used by L2 speakers differed from those used by L1 speakers. Speakers, when recounting the story in the second
language, favored metaphorical and deictic gestures, whereas when speaking their L1 favored iconic and beat gestures, suggesting that there are other gestural differences that exist and that they may affect the transfer of cognitive benefits relating to gesticulation in the L1 to L2 cognition.

Although Gullberg’s (1998) study is suggestive of the effect gesture has on L2 speech, nothing else is known about gesticulation differences between the L1 and L2 in the same speaker. Careful investigation of these differences may provide insight into the role of gesticulation in second language acquisition. This study, therefore, will look at the differences in first and second language gesticulation and add to the little research already done with the field of gesture. It will observe successive bilinguals’ gesticulation in their L1 and L2, examining the frequency of their gesticulation within each language context, subdividing them into speaking tasks, and observing gesture types totals per interview and per task.
CHAPTER 3: Methodology and Procedure

Research Questions

The purpose of this study was to answer the following questions: (1) Do advanced-level second language learners gesticulate differently, either quantitatively or qualitatively, when speaking in the L2 compared to when speaking in the L1? Specifically, are there differences in the amount of gesticulation occurring both in general and in regard to gesture type, and does that change imply a differentiated experience when speaking in the L2? (2) How aware are speakers of their gesticulation in the L1 and L2?

In order to answer these questions, I designed a study that would allow participants to naturally and spontaneously gesticulate in a variety of speaking tasks. It was important that I not only test one L1 and L2, but also compare at least two first language groups and look for any similarities and differences. This way, any findings would not be attributable to a specific language. Consequently, I recruited both L1 English/L2 Spanish bilinguals and L1 Spanish/L2 English bilinguals to participate. In order to ensure natural gesture movements during the interviews, participants were not explicitly told that gesture was the focus of the study until after data were collected from each participant.

Video and audio recordings were made of each interview in order to analyze gesture production. I transcribed the audio for language and gesture and then coded the gestures and aligned the coding to the transcription, which will be explained further in the section on coding. As speaker awareness could only be analyzed through the expressed opinions from the participants about their own gesticulation, I conducted a debriefing interview. This provided further information to identify trends in gesturing that indicated participants’ awareness of
gesture types and their placement within speech in both the L1 and L2. This chapter will describe the details of my study design.

**L1 English Participants**

Twenty L1 English speakers (L1ESs) volunteered from three of the more than 30 sections of Spanish 321 courses (i.e. third-year Spanish courses) offered during the fall semester at a large private university in the intermountain region. Twelve male and seven female volunteers made up this series of participants and they were not paid for their time, but rather were encouraged to participate to practice for the required Oral Proficiency Interview (OPI) that all students majoring, minoring, or receiving a Language Certificate in Spanish must complete. Unfortunately, one participant had to be excluded from the study as the video recorder did not capture the participant’s full body and resulted in gestures that were not visible on camera. The median age of the remaining nineteen participants was 20.58 years with a range of 20 to 22 years.

All participants completed a Language Background Questionnaire (see Appendix D) before being interviewed, which showed that their language learning experience only varied in minor ways. Only four participants had taken an average of four years of Spanish instruction in elementary school whereas sixteen participants had taken an average of 4.1 years in middle and high school. One participant who was raised a simultaneous bilingual since the age of five spoke both Spanish and English at home and English at school. All of these participants spent between 18 and 24 months ($M = 21.68$ months) within either a Spanish-speaking community within the United States or in Spanish-speaking countries including Argentina, Chile, the Dominican Republic, El Salvador, Honduras, Mexico, Paraguay, Peru, and Spain. Most, however, spent that time in Mexico (see Figure 1). The average time that had passed since these participants had
returned from the immersive experience at the time of their interviews was 5.1 months with a range from two months to twelve months. Each one also had six weeks of intense language coursework immediately before entering the immersive experience with the exception of the simultaneous bilingual who only had two weeks.

![Figure 1. Number of L1ES participants who spent time within a Spanish-speaking community for a minimum of 18 months.](image)

The actual Spanish proficiency levels of the participants was not officially evaluated, although all were enrolled in a third-year Spanish course. The demands of this course suggest students have the ability to describe and narrate about familiar and some unfamiliar topics in multiple time frames using well organized discourse in Spanish. This suggests that the participants had capacity to complete the tasks of this study sufficiently to provide the necessary data. I reviewed the data from the Language Background Questionnaire and all participants rated themselves at a 3 (i.e. an advanced speaking level) or above in Spanish out of a five-point scale where 1 represented a beginning speaker and 5 represented a native speaker. The participant who was raised bilingual rated himself as a native speaker in both languages. Despite
these self-evaluations, in a debriefing interview fourteen participants did report that they considered themselves bilingual, with only three claiming not to be bilingual and two who were unsure (see Figure 2). These participants were not eliminated from the study due to their self-evaluation, however, because they were able to complete the tasks of the study sufficiently despite their self-evaluation on the Language Background Questionnaire.

![Figure 2. Participants’ responses to the question “Do you consider yourself bilingual?”](image)

The participants were interviewed twice, once in Spanish and once in English. They were randomly divided into two groups, one of which would be interviewed in their L1 first, the other in their L2 first. Group assignments were based on appointment time as well as interviewer and location availability. I, a native English speaker, conducted all English interviews, and four native Spanish speakers conducted the Spanish interviews. On occasion, the assigned Spanish-speaking interviewer was not able to arrive to the interview on time. In such cases, I, being the native English-speaking interviewer, began with the English interview. When this occurred, the
order of language interviews for future appointments was rearranged depending on what was needed to acquire an equal number of counterbalanced interviews.

**L1 Spanish Participants**

Twenty-one L1 Spanish speakers (L1SSs) were recruited from both the English Language Center (ELC) at the same university as the L1ES participants and through referrals from other participants. Six male and twelve female participants volunteered for the study.

Seven of the twenty-one total L1SS participants were not paid for their time. Instead, I encouraged them to participate for the practice it would simulate towards the Test of English as a Foreign Language (TOEFL), which all potential non-native English-speaking students must pass to enter University level courses in the United States, and was what students at the English Language Center (ELC) were preparing for. Two of those seven were not current students at the ELC, although they did attend previously. At the beginning of the recruitment phase, these seven participants volunteered, and despite the request for referrals from these participants as well as my own requests from associates and colleagues, no other L1SSs had volunteered. This may have to do with the time of year that recruitment was occurring, which was at the end of the fall semester leading up to Winter Break according to the university’s calendar.

After Winter Break, recruiting began again around mid-January. During this second phase of recruitment, fourteen additional L1SS participants volunteered with the incentive of receiving a $10 gift card to the university store. The incentive was used only for this group of participants because of the difficulty of encouraging volunteers and the existing time constraints for this study. All of these fourteen participants were also current students at the ELC.
Age differences and language learning experiences varied among L1SSs more than among the L1ESs. The mean age of all L1SS participants at the time of the study was 25.5 years with a range between eighteen and fifty-four years. Only one of the L1SSs began learning English before the age of six and only three before the age of eleven. All attended grade school (i.e., grades K–12) in their countries of origin and had at least one year of formal educational instruction of English in grade school with the longest educational experience in English lasting 13 years (M = 6.4 years). However, there were no data available to account for the quality of such English instruction in any of their experiences.

The English proficiencies of the L1SSs were not officially evaluated before beginning the study. Their enrollment in the ELC and/or time in the U.S., as well as their self-evaluations on the Language Background Questionnaire, attested to their approximate proficiency. Five participants rated themselves as lower than advanced in English. As it was desired that all participants would all be able to describe and narrate in multiple time-frames about both familiar and unfamiliar topics in an organized fashion with fair consistency, I reviewed the interviews of those five to see if I agreed with their assessments. I kept all L1SS samples that were comprehensible despite their errors and concluded that although three of the five were accurate in their self-assessments (and therefore eliminated from the study), two had marked themselves lower than their actual ability.

The three participants deemed to be speaking at a lower proficiency than desired, as explained previously, were removed from this study, making the total number of L1SS participants eighteen. The three who were removed from consideration in this study were also three of the five who rated themselves below an advanced level on the Language Background
Questionnaire (see Appendix D) and did not consider themselves bilingual according to the debriefing interview.

In the debriefing interview, each of eighteen L1SS participants also responded to the question “Do you consider yourself bilingual?” Just over half of the participants considered themselves bilingual, with only one unsure of her opinion (see Figure 2).

Similar to the L1ES group, the L1SSs were also randomly assigned to two separate groups in which one group received the English interview first and the other received the Spanish interview first. The counterbalance was achieved in the same manner as the L1ESs, consistently changing due to co-interviewer availability, resulting in ten participants receiving the L2 interview first and eight receiving the L1 interview first.

**Location**

Due to scheduling difficulties, I used four different rooms on campus at the university to record participant interviews. Two of the rooms were identical rectangular rooms extending from east to west (Figure 3). Twenty-four participants (twelve L1ESs and twelve L1SSs) were interviewed in these rooms. On the north side of the room, I set up two chairs at opposite east-west sides of the room facing each other. The interviewer sat on the west-side chair and the participant on the east. Both chairs swiveled and allowed for the armrests to be raised parallel to the backrest (i.e., not to be used) or lowered (i.e., to be used as intended). The chairs were set up with the armrests in the lowered position, except for one participant whose armrests were raised due to a lapse in observation of detail during room setup. None of the participants moved the armrests from their starting position. I placed the camera on a tripod at the northwest corner of the room, to the left of the interviewer. A laptop was placed to the left of the participant on the northwest corner of a long table that stood in the center of the room extending from east to west.
The laptop was used to record separate audio of the interview as well as video of the interviewer in order to compare interviewer gesture use as it may have influenced participant gesticulation. I closed the blinds on the windows and powered off the TV monitor on the east wall to prevent distraction during the interview.

Figure 3. Setup for Rooms 1 and 2.

The third room option (Figure 4) was significantly smaller than the first two rooms. The equipment was set up similarly except for the location of the laptop in relation to the participant; it was to the right of the participant. This choice was made due to the window in the door that the participant was facing. By placing the table and laptop to the right of the participant, the participant was far enough to the north side of the room where the window was not a distraction. The space between the interviewer and the participants was only slightly smaller than the first two rooms. Only one participant was filmed in this room and, therefore, no variables due to location raised any concerns.
The fourth room (Figure 5) was a small movie theater where only the open space in front of the screen was used and was set up to mimic the rooms described above. The camera was set up on a tripod to the left of the interviewer. The laptop for video-recording the interviewer and audio-recording the participant sat on a collapsible desk connected to a seat in the front row of seats. The space between the interviewer and the participant was a little longer than in the aforementioned rooms due to the preferred desk that would hold the laptop in a decent position to record the participants and the wall where the participants’ chair was located. However, I do not believe that the difference in distance had any effect on the gesticulation of any of the seven L1ES and five L1SS participants filmed in this room.

*Figure 4. Setup for Room 3.*
Figure 5. Setup for Room 4.

Time of day

It would have been ideal that all participants were interviewed and recorded at the same time of day during comparable days. Attempts were made to record each participant during weekday evening hours (i.e., Monday through Friday, 4:30 p.m. – 8:00 p.m.). Unfortunately, this could not occur due to scheduling conflicts between reserving rooms and having interviewers with opposing schedules. Although the majority of L1ESs (N = 12) completed their interviews on either Tuesday or Thursday within the expected timeframe, the other seven recorded their interviews on Saturday morning between 8 a.m. and 10:30 a.m.

The L1SS participants had a wider range of hours and days to choose from due to interviewer availability during the fall semester as compared to the winter semester. Seven participants in this group recorded their interviews on a Saturday, the earliest beginning at 8:00 a.m. and the latest one beginning at 12:00 p.m. The other fourteen L1SSs completed their interviews on a weekday between the hours of 2:30 p.m. and 8:00 p.m. Despite the varying times of day of the data collection, I will not consider time of day as a dependent variable in the
analysis. When too many variables interact, analyses tend to yield unclear data (there are already four other dependent variables).

**Equipment**

I used various pieces of recording equipment to record both audio and video of each interview. Due to scheduling and equipment availability, the same camcorder was not available for all interviews, and two different camcorders had to be used: a Canon Vixia R300 digital camcorder and a Samsung HMX-F90 digital camcorder. A Toshiba Satellite C875 laptop containing an Intel Pentium CPU B970 processor at 2.30 GigaHertz recorded video of the interviewers using the device’s hardware camera and the default Windows 10 Web Camera Application. On the same laptop, version 2.0.3 of the Audacity software recorded 32-bit audio-only files of the interviews at 44.1 kHz without video, which were converted to .mp3 files.

**The Interviews**

Each interview session followed the same process with the same questions. Each session contained an English interview, a Spanish interview, and a debriefing interview (see Appendix A-C). The language interviews consisted of three tasks given in the same order and conducted by a native speaker of the language. As previously explained, the language interviews were counterbalanced, alternating the order in which the language interviews were conducted to ensure that some participants were interviewed in their L1 first, and others were interviewed in their L2 first.

For the L1ESs, the average English (L1) interview lasted 10 min 0 sec, and the average Spanish (L2) interview lasted 8 min 4 sec, giving the L1ES participants a general language interview average time of 9 min 2 sec. For the L1SSs, the average Spanish (L1) interview lasted 9 min 0 sec, and the average English (L2) interview lasted 11 min 40 sec, giving the L1SS
participants a general language interview average time of about 10 min 20 sec. Amongst all
participants, the average length of the English interviews was 10 min 34 sec, whereas the
average Spanish interview lasted 8 min 31 sec. The average time of all language interviews was
9 min 32 sec.

The interviewers. Two language interviewers were required to collect the data. In order
to provide the participants with an authentic conversation in each language (i.e., Spanish and
English), a native speaker of each language conducted the respective interview. Due to the
interview format, in which the same question for each one of the tasks was used, it was also
necessary to have two interviewers so that the participant repeated the same or similar
information but delivered it as new information to a new interlocutor. Both language interviews
were conducted sequentially, one immediately after the other, and only one interviewer was in
the room with the participant at any one time.

I, a native speaker of English from the United States and a man in my mid-thirties,
conducted all English language interviews, including the debriefing interview at the end, for all
37 participants. The Spanish language interviews were given by four different interviewers due
to availability and scheduling conflicts. They all, however, consider themselves native Spanish
speakers, which was the most important characteristic for the language interviewers in order to
encourage more authentic speech from the participant.

The first Spanish interviewer, Jorge, was in his late twenties and is from Guatemala. He
learned English as a teenager, but considers Spanish his first language. He conducted Spanish
interviews for seventeen L1ESs and six L1SSs. I invited Jorge to help conduct the Spanish
interviews on account that he is male and had similar mannerisms as myself.
Stephanie, a woman in her late twenties, also conducted eleven L1SS interviews and two L1ES interviews. She is a native speaker, born in Mexico and raised in the United States since the age of five. She was first recruited as an interviewer due to a last minute cancellation from Jorge. However, she was also available for future interviews and at times when Jorge was not available. The two L1ES participants she interviewed were her students at the time. However, nothing in the data suggested that this relationship had any effect on gesture or language production.

Ana Victoria, a Cancun native and woman in her early twenties, conducted four L1SS interviews. I asked her to help with interviews when the previous two interviewers had scheduling conflicts.

The last interviewer, Yvette, only conducted one Spanish interview to an L1ES, graciously accepting to assist during an emergency situation due to a last minute cancellation when none of the other interviewers were available. Yvette is a woman in her thirties, born in the United States to Mexican immigrant parents and raised bilingual.

All interviewers were instructed to not move their hands and to limit other body movements like shoulder shrugs, head nods, etc. They were specifically instructed to hold the provided script with both hands during the entire interview to encourage limited hand movements and to eliminate the variable of interviewer influence on participant hand gestures. The interviewers were given no restrictions on verbal reactions such as laughter and backchannel feedback, such as “uh huh,” “okay,” and “mhm” (Eshghi et al., 2015), but were given specific instructions not to react with an anecdote of their own. A laptop with a webcam video recorded the interviewers’ movements during each interview to ensure the interviewers limited their movements similarly with each participant and in each language. A cursory analysis of
interviewers’ movements showed no unusual movements that would have affected participants’ gesticulations.

**The language interviews.** Once the audio and video recorders started recording, the interviewer began asking “small talk”-type questions. These questions were not scripted and were meant to simulate a sociolinguistic type interview, allowing the participant to become comfortable both in the environment and with the interviewer as well as to calm their nerves before continuing with the interview. These initial questions lasted 2–3 minutes per language interview.

After a few introductory questions, a semi-scripted interview followed. The interviewer presented three different scenarios throughout the interview that would elicit specific types of responses from the participant: a role play about losing an umbrella, an explanation/description of a game, and a personal narrative. These different tasks were based on Advanced-level tasks from Stanford University (2017) and a Spanish Speaking Test from the Center for Applied Linguistics (1995). Three different tasks were used to observe the possible differences in gesture production as affected by speaking task. Throughout the interview and during participant responses, the interviewers reacted in natural ways, asking for clarification if something was not understood, giving affirmation for understanding, and asking for more information if they were interested in the content. The semi-scripted nature of the interviews allowed the participants to feel they were participating in a conversation rather than in a structured interview, encouraging more naturalized gesticulation patterns.

After the first language interview, the interviewer left the room and the next interviewer entered to conduct the next language interview, either in English or Spanish according to the counterbalanced order to which the participant was randomly assigned, as explained above. The
second interview continued in the same manner as the first, including the ice-breaker questions at the beginning and leading the participant into the same three tasks.

Despite the same role play about losing an umbrella being presented in both language interviews, each of the interviewers may have led it in a different direction. For example, in one of the Spanish interviews, the interviewer acted as if the loss of the umbrella were not a big deal and that the participant should not worry about replacing it. In the English interview, however, the interviewer suggested that the two retrace the participant’s steps to find the umbrella before reverting to buying a new one. These varied situations led the conversation in slightly different directions, but did not appear to have affected gesture production in any way as participants typically repeated most, if not all, of the same information in the second language interview that they said in the first language interview and merely added information according to the differences in conversation.

A similar situation occurred with the other two tasks as well. For the explanation/description task, the interviewer asked the participants to describe how to play their favorite game. The second interviewer was to invite the participant to describe the same game explained in the first interview. Despite these instructions, the interviewer did not always follow the script. In cases where the interviewer followed proper protocol, it did not always guarantee that the participant would follow the instructions. In either cases, when the game differed between the L1 and L2 interviews, the data for this task were not compared or included in the analysis.

For the narrative task, the first interviewer asked the participant to share a memory or experience that would be emotionally charged, or rather that the participant felt was a special or favorite memory. These memories were tied to a specific activity or interest that the participants
mentioned either in the “get-to-know-you” questions at the beginning of the language interview or in a small discussion about hobbies right before the third task was presented. For example, a large majority of the participants spent eighteen months to two years in an immersive experience in the L2 culture. The interviewers many times would ask the participants to share a memory from this experience, knowing it was a special time for many of the participants. As it occurred in the explanation task, the script gave explicit instruction to the interviewer to ask the participant to repeat the same memory or experience shared in the first interview. However, the interviewer did not always follow the script and did not invite the participant to share the same experience or memory. This resulted, in rare cases, that the participant shared different experiences in the L1 and L2 interviews. I excluded these data from the analysis also. In the majority of cases, however, participants described the same game and shared the same memory or experience in the second and third tasks in both language interviews.

The debriefing interview. After the two language interviews, I conducted a third interview to debrief the participants and acquire insights about how they felt during the previous interviews. I began by disclosing to them that their gestures would be the focus of analysis. Before this point, participants were never informed that their gestures were to be observed from their interviews. Even though the phrase "nonverbal communication" was used during the recruitment process, I ensured that the word "gesture" was not used in any description of the study until the debriefing interview. After disclosing this information, I reminded all participants of their freedom to rescind consent to use their data in the study, which would have required me to delete their data. Fortunately, no participants felt it necessary to take such action.

The debriefing interview consisted of several preplanned questions. These questions were directly related to how the participants felt during the interview process, allowing an analysis of
the types of gestures used during times of high anxiety and cognitive difficulty as well as how aware the participants were of the gestures they were using. Though not all of the information in the debriefing interview will be used for analysis in the current study, I felt it important to include for future analysis of this study.

At the end of the debriefing interview, participants were excused and data collection ended.

Coding

Both audio and video recordings aided in the transcription of the spoken words and the gestures produced throughout the study. The purpose of the first few minutes of each language interview was to allow the participants to become comfortable speaking with the interviewers and in the interview environment. Although I transcribed all spoken words for the purposes of timing and location reference of phrases deemed important to merit repeated observation and analysis, I did not code the “ice-breaker” portion of the language interviews for gestures, believing the data would overwhelm this study.

Gestures produced during task responses were transcribed using the transcription framework for gesture based on McNeill’s (1992) suggestions with some simplifications. For example, the purpose of this study was to measure qualitative and quantitative differences in gesture production from English/Spanish bilinguals. Whereas McNeill suggests recording the length of pauses, both filled and silent, during transcription, such a detail surpassed the purposes of this study, even though I included the presence of pauses. The next section will present the conventions used in transcribing gestures along with an example of what the gesture coding looks like superimposed on the transcription of the audio. However, it is pertinent to understand the phases of a single gesture in order to identify what is annotated in the transcription.
Coding gestures. Gestures were coded in a simplified manner in order to acquire the data needed for the study in a timely manner following a similar process described by McNeill (1992) and followed by other prominent researchers (e.g., Gullberg, 1998; Stam, 2006).


The preparation of a gesture is optional and therefore does not always appear, especially when two or more gestures start blending together. The preparation phase includes the movement of the arms and hands away from their rest position into the space where the gesture will be performed. For example, many participants kept their hands in resting position on their laps with their fingers interlocked. At the point of preparing to gesticulate, they would separate their hands and move them in front of their chests or off the side of their torsos (Figure 6) where they would produce the main gesture movement, or stroke phase.
Figure 6. The Preparation, Stroke, and Retraction Phases. Participant Eng1-A placed his hands in resting position as seen in 6a. He then moves his right hand into the position in 6b from which he will begin the stroke phase. 6c shows the stroke phase of the right hand moving downward reaching resting position again. The / symbol represents a pause in speech. The brackets [ ] show the preparation and retraction phases. The bolded word is the stroke phase of the gesture.

In the stroke phase, the meaning of the gesture is expressed, usually during the most prominent syllable of the spoken word or phrase. Many times, before a stroke phase is executed, the speaker will pause his or her hands and arms in the gesture space delaying the stroke phase momentarily for some reason yet to be researched. This phase is called the pre-stroke hold. A similar situation can also occur after the stroke phase, called the post-stroke hold, in which the hands pause after the stroke-phase before retracting back to rest position (e.g., back to hands in lap with fingers interlocked).

Retraction, the final phase of the series, is also optional. The hands and arms do not always return to the same or a new resting position after the stroke or post-stroke hold. Many times, the hands move from one stroke to another without including holds or retraction or preparation for the next gesture-phrase (Figure 7).
Coding for gestures. Gestures were coded and identified as one of four gesture types, as they are described in Chapter 2, namely: metaphoric, iconic, beats and deictic gestures. Some gestures were too ambiguous to determine between two or sometimes three gesture types. In these cases, such gestures were coded into a fifth category. This would allow them to be counted in the general gesture totals, despite their omission from the type-total calculations.

In order to calculate gesture frequency, spoken clauses also had to be identified. A clause is typically defined as a subject and predicate pair (Radford, 2004) including any objects and modifiers. A clause in relation to gesture studies has been described as a processing unit (Kita & Özyürek, 2003), in which information is linguistically formulated to convey the appropriate message the speaker intends to communicate. Accordingly, gesture and speech are both considered in order to identify the processing unit. Identifying these units, however, can be a rather difficult task, as spoken language tends to blur the lines of linguistic clauses due to clause
fragments (Gullberg, 1998). Given that a clause in gesture studies is harder to objectively quantify, and wanting to keep as much subjectivity out of my investigation as possible, I decided to mark—and not mark—clauses using only speech indicators for identification, according to the following situations.

- The most basic structure accepted as a clause for this study was a noun-verb pair functioning as a subject and predicate. This structure varies between Spanish and English, however. Whereas the subject must be stated in English, in Spanish the verb conjugation in many cases identifies the subject, which may or may not explicitly appear. Consequently, in English the clause usually includes both the subject and conjugated verb (e.g., I saw) and in Spanish, simply a conjugated verb (i.e., vi).

- When present, I included repeated direct or indirect objects and additional modifiers as part of the same clause, as long as a new subject-predicate pair was not added to them, and counted them as one clause. For example, Eng1-I stated, “I’ll buy one for you another one a replacement.” This was counted as one clause despite the repetition of the direct object on account of their only being one subject verb being stated. The same classification was applied to the Spanish interviews with little to no variance.

- Due to the many clause fragments existent in spoken speech, it was pertinent to decide when those fragments constituted a countable clause or not. Many times, in either language, a participant repeated a subject or verb or both. Sometimes, a participant changed the subject of the sentence before uttering the verb (e.g., “So um we um when Latinos have like their energy . . . .”). At other times, a participant started one clause with both the subject and verb and then chose a new subject-verb pair without completing the previous predicate with its required information (e.g., “and you need to we we can play
like four or six people in this game.”). In these cases, I considered a subject and complete grammatical predicate as one countable clause, and if that pair repeated, I did not count it twice. If a participant changed the grammatical subject before stating the verb, I also did not count it as a separate clause. I also did not count a verb (i.e., modal verbs and auxiliary verbs) that did not complete the thought with a specific lexical significance (e.g., “And then we were we had to use the umbrella.”). On the other hand, I did count subject-verb pairs that did have a lexical significance in context without adding any additional adverbial or other descriptive information counted as a clause, despite any immediate change of subject and/or verb or predicate (e.g., “Pues, tienes que pagar o tie–perdón, tienes que comprar, tienes que ir comprando la mayor cantidad de de países . . .” ‘So, you have to pay or you hav–pardon, you have to buy, you have to continue buying the most countries . . .’).

● Many spoken clauses assumed a subject-predicate pair despite its absence in the phrase. One of the most common of these instances was the Spanish phrase “muchas gracias,” or “thanks a lot” in English. This clause implies the subject-predicate phrase of “le doy muchas gracias” or “I thank you a lot.” Hence, I counted these instances, along with similar phrases, as separate clauses. For example, in the first task Sp1-K presented a problem that occurred with the umbrella by saying “pero un pequeño inconveniente.” This phrase could be understood as an abbreviated version of the complete clause "hay un pequeño inconveniente" or "tengo un pequeño inconveniente," so I counted it as a clause.

● I did not count backchannel feedback signals such as “okay,” “mhm,” and “yes” (or “sí,” in Spanish) as separate clauses. Nevertheless, the same lexicalizations used as adverbs to respond affirmatively or negatively to a question were counted as separate clauses. This
was due to the underlying context included in these simplified responses, as explained by Eshghi et al. (2015).

**Intra-rater reliability.** It was not feasible according to the practical timeline and financial availability of this study to train an independent coder to perform a second coding of the interviews. Thus, I coded all the interviews alone. Four weeks after the original coding of all interviews, I selected a series of six randomly chosen interviews, three from each L1 group, and coded them a second time without looking at the previous codes. Intra-rater reliability has been argued to show reliability through an equivalence in judgement over time (Gullberg, 1998). Gullberg also argued that training an independent coder would also reflect the views of the training researcher, and therefore similar outcomes result.

I ran a Pearson Correlation Test to estimate a reliability coefficient. This simulates a test-retest method between the coding of the first interviews and that of the second interview. The intra-rater reliability on these six interviews was .98.

**Hypotheses**

The first question this study intended to discover was: Do advanced-level second language learners gesticulate differently, either quantitatively or qualitatively, when speaking in the L2 compared to when speaking in the L1? The following hypotheses were formed according to what previous research (mentioned in Chapter 2) indicated is most likely to happen.

**Hypothesis 1:** There will be a significant increase in gesture production between the L1 to the L2 among all participants without regard for the first language of the speakers.

**Hypothesis 2:** There will be a significant difference in the type of gestures used between the L1 and the L2 among all participants.
The second question considered in this study’s design was: How aware are speakers of their gesticulation in the L1 and L2? I put forth no hypothesis because there has not been any research that discusses this question. However, I have included this question to investigate the level of consciousness or subconsciousness in which gesticulation is produced in comparison to the implications from the research in Chapter 2.
CHAPTER 4: Implementation and Results

Thirty-seven total participants volunteered to engage in two language interviews, one in their L1 and the same interview in their L2. Three tasks were incorporated into each interview in order to encourage a response that involved a different type of spoken text (i.e., a roleplay, instructions and description, and a personal narrative), from which I could draw conclusions on gesture-type frequencies. I transcribed each language interview in its entirety, but only coded the responses to the three tasks for clause and gesture. Due to the varying lengths of time that each of the 37 participants spoke during each task and the difficulty of measuring the duration of each gesture produced, a ratio of time spent gesturing by the total time speaking did not seem an efficient tool of measurement for this study. I determined clauses to be the most accurate tool to measure gesture frequency, in accordance with previous gesture research (see, for example, Gullberg, 1998; McNeil, 1992; Stam, 2006).

Descriptively speaking, the L2 interviews yielded higher means of gesture production from all participants without regard to their first language (L1: $M = 0.96, SD = 0.225$; L2: $M = 1.16, SD = 0.356$). Averages were also calculated with regard to the L1 groups to which each participant pertained. The native Spanish speakers (L1SSs) produced more gestures per clause in both the L1 and the L2 interviews (L1: $M = 1.11, SD = 0.232$; L2: $M = 1.32, SD = 0.333$) than did the native English speakers (L1ESs) (L1: $M = 0.83, SD = 0.188$; L2: $M = 1.02, SD = 0.33$). Although the means seem small, over the course of a language interview the differences in the number of gestures were statistically significant, especially when the mean total clauses in the L1 were 104.35 ($SD = 0.225$) and in the L2 were 100.13 ($SD = 0.356$). Table 1 shows these means with their standard error and ranges.
Table 1

*Mean Gestures Per Clause Ratios, Ranges, Std. Error, and Std. Deviation by Language Groups and Interview Languages*

<table>
<thead>
<tr>
<th>L1 Group</th>
<th>N</th>
<th>Interview Language</th>
<th>Estimated Gest./Claus. Means</th>
<th>Max</th>
<th>Min</th>
<th>Std. Error</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1ES</td>
<td>19</td>
<td>L1</td>
<td>0.83</td>
<td>1.18</td>
<td>0.56</td>
<td>0.065</td>
<td>0.188</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L2</td>
<td>1.02</td>
<td>1.65</td>
<td>0.53</td>
<td>0.065</td>
<td>0.330</td>
</tr>
<tr>
<td>L1SS</td>
<td>18</td>
<td>L1</td>
<td>1.11</td>
<td>1.29</td>
<td>0.55</td>
<td>0.072</td>
<td>0.232</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L2</td>
<td>1.32</td>
<td>1.70</td>
<td>0.67</td>
<td>0.072</td>
<td>0.333</td>
</tr>
<tr>
<td>TOTAL</td>
<td>37</td>
<td>L1</td>
<td>0.96</td>
<td>1.30</td>
<td>0.55</td>
<td>0.037</td>
<td>0.225</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L2</td>
<td>1.16</td>
<td>1.70</td>
<td>0.53</td>
<td>0.059</td>
<td>0.356</td>
</tr>
</tbody>
</table>

Within each task, the L1SSs, again, averaged more gestures per clause than the L1ES group in every task in both languages. However, comparing L1 tasks to their L2 counterparts, the mean gesture/clause ratios within each task increased for both groups when speaking in the L2. Table 2 shows the mean ratios, ranges, standard error, and standard deviation of each task by language group.
<table>
<thead>
<tr>
<th>L1 Group</th>
<th>N</th>
<th>Task</th>
<th>Interview Language</th>
<th>Estimated Gest./Clause Means</th>
<th>Max</th>
<th>Min</th>
<th>Std. Error</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1ES</td>
<td>19</td>
<td>Roleplay</td>
<td>L1</td>
<td>0.44</td>
<td>0.83</td>
<td>0.11</td>
<td>0.043</td>
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<td></td>
<td></td>
<td></td>
<td>L2</td>
<td>0.63</td>
<td>1.35</td>
<td>0.00</td>
<td>0.078</td>
<td>0.341</td>
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<td></td>
<td></td>
<td>Game</td>
<td>L1</td>
<td>1.11</td>
<td>1.76</td>
<td>0.60</td>
<td>0.065</td>
<td>0.282</td>
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<td></td>
<td>L2</td>
<td>1.34</td>
<td>2.47</td>
<td>0.71</td>
<td>0.100</td>
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<td></td>
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<td>Narrative</td>
<td>L1</td>
<td>0.79</td>
<td>1.14</td>
<td>0.47</td>
<td>0.050</td>
<td>0.220</td>
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<td></td>
<td>L2</td>
<td>1.00</td>
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<td>L1SS</td>
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<td>Roleplay</td>
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<td></td>
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<td></td>
<td>L2</td>
<td>1.60</td>
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<td>0.117</td>
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<td>0.059</td>
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<td></td>
<td></td>
<td>L2</td>
<td>1.34</td>
<td>2.10</td>
<td>0.60</td>
<td>0.110</td>
<td>0.467</td>
</tr>
<tr>
<td>TOTAL</td>
<td>37</td>
<td>Roleplay</td>
<td>L1</td>
<td>0.54</td>
<td>1.13</td>
<td>0.11</td>
<td>0.041</td>
<td>0.251</td>
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<td></td>
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<td></td>
<td>L2</td>
<td>0.68</td>
<td>1.35</td>
<td>0.00</td>
<td>0.052</td>
<td>0.316</td>
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<tr>
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<td>Game</td>
<td>L1</td>
<td>1.22</td>
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<tr>
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<td>L2</td>
<td>1.47</td>
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<tr>
<td></td>
<td></td>
<td>Narrative</td>
<td>L1</td>
<td>0.93</td>
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<td>L2</td>
<td>1.16</td>
<td>2.10</td>
<td>0.35</td>
<td>0.077</td>
<td>0.467</td>
</tr>
</tbody>
</table>
Total Gestures/Clause Ratios within Language Interviews

In order to answer my first research question, SAS (Statistical Analysis System) software was used to perform four mixed-model ANOVAs to calculate the least square mean of gestures produced per clause in the L1 and L2 within different contexts: 1) the total number of gestures per clause within the language interviews (i.e., all three tasks combined), 2) the total gestures per clause produced within each task, 3) the total amount of each type of gesture (i.e., metaphoric, iconic, beats, and deictic) within each language interview (i.e., across all three tasks), and 4) the total amount of each type of gesture within each individual task. Each ANOVA was run three times: once as a full model analysis, a second time as a reduced model analysis, and a third time with effect sizes, which calculated the maximum likelihood of the reduced models. A post hoc pairwise comparison was then performed with a Tukey-Kramer adjusted $t$-test, providing $p$-values that represent true significance at a .05 alpha level when a variety of factors must be considered.

The results of the ANOVA for estimated gesture/clause means within the language interviews suggest a significant difference between the number of gestures produced in the L1 and the L2, $F(1, 29) = 16.24, p = .0004, \eta^2_p = .3589$. When speaking in their L1, participants averaged an estimated mean of .96 ($SE = 0.049$) gestures per clause. In the L2, they reached a mean of 1.16 gestures per clause ($SE = 0.049$), resulting in a mean increase of 0.2 gestures per clause ($SE = 0.052$). Although a difference of 0.21 seems small, the results from the $t$ test helped to identify that this increase in gestures from the L1 to the L2 is statistically significant, $t(29) = -4.03, p = .0004$, despite their L1, considering the mean 104.35 and 100.13 clauses in the L1 and L2 interviews, respectively.
The difference in the amount of gesture production between the L1 groups was also significant ($F(1, 29) = 10.60, p = .0095, \eta^2_\text{p} = .4726$). The L1SSs ($n = 18$), seemed to have gestured more in both languages ($M = 1.1894$ gestures per clause; $SE = 0.061$), than did the L1ESs ($n = 19$; $M = 0.9223$; $SE = 0.055$), for an estimated mean difference of 0.27 gestures per clause ($SE = 0.082$). The Tukey-Kramer adjusted $t$ test suggested that this difference was significant, $t(29) = 3.26, p = .0029$. The ANOVA also took into consideration the interaction between L1 group and interview language. The results, however, showed no significant differences between these interactions, $F(1, 29) = .016, p = .6907, \eta^2_\text{p} = .0011$. In other words, the L1SSs produced more gestures per clause than the L1ESs, and both groups increased their gesture production from the L1 to the L2, regardless of whether their L2 was English or Spanish.

**Total Gestures/Clause Ratios within the Three Tasks**

Another ANOVA compared the number of gestures produced in each language per each task. The results of the ANOVA suggested a statistically significant difference between tasks, $F(2, 66) = 80.29, p < .0001, \eta^2_\text{p} = .8552$. According to the $t$ test, the second speaking task (i.e., instructions/description) prompted the most total gestures from the participants, averaging an estimated 1.36 gestures per clause ($SE = 0.048$). The narrative task (Task 3) came next averaging 1.03 gestures per clause ($SE = 0.048$), followed by the roleplay (Task 1) with the lowest mean of only 0.60 gestures per clause ($SE = 0.046$).

The difference between gesture/clause ratios in each language was also significant, $F(1, 36) = 24.82, p < .0001, \eta^2_\text{p} = .4402$. Across all three tasks, an estimated mean of .88 gestures per clause per task was calculated ($SE = 0.039$) in the L1. In the L2, 1.11 gestures were calculated as the estimated mean gesture/clause ratio per task, showing an increase of 0.23 gestures per clause.
\( SE = 0.046 \). Again, the \( t \) test indicated this difference as statistically significant, \( t(36) = -4.98, p < .0001 \).

Each ANOVA ran all numbers again considering the new factors and interactions. In the ANOVA considering tasks, the L1 groups also differed significantly from one another as they did in the ANOVA that did not account for task, \( F(1, 34) = 11.97, p = .0015, \eta_p^2 = .3993 \). The L1ES participants used an estimated mean of .88 gestures per clause per task, \( t(34) = 19.63, p < .0001 \), whereas the L1SSs used an estimated 1.11 gestures per clause per task, \( t(34) = 23.41, p < .0001 \). Thus, the native Spanish speakers produced 0.23 gestures more per clause per task, \( t(34) = -3.46, p = .0015 \), than the native English speakers did.

No interactions between any two or three of the main factors resulted in any significance except for the interaction between task and interview language, \( F(2, 66) = 3.19, p = .0474, \eta_p^2 = .0909 \). Whereas the difference of gesture frequency from L1 to L2 in Task 1 was not significant, \( t(66) = -1.87, p = .0658 \), the differences between languages in the other two tasks were: for Task 2, \( t(66) = -4.62, p = .0004 \); and for Task 3, \( t(66) = -4.21, p = .0011 \). In other words, when Tasks 2 and 3 were completed in the L2, participants tended to use more gestures, even though they tended not to use more gestures in Task 1. Table 3 shows the basic numbers of each estimated gesture mean within each task by interview language, including standard error. Table 4 and Figure 8 show the estimated mean differences in gesture frequency between both interview languages by each task.
Table 3

*Estimated Means of Gestures Per Clause within Each Task by Interview Language and Their Differences*

<table>
<thead>
<tr>
<th>Task</th>
<th>Interview Language</th>
<th>Estimated Mean</th>
<th>Std. Error</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roleplay</td>
<td>L1</td>
<td>0.54</td>
<td>0.056</td>
<td>9.80</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td>L2</td>
<td>0.66</td>
<td>0.056</td>
<td>11.91</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Game</td>
<td>L1</td>
<td>1.21</td>
<td>0.058</td>
<td>20.97</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td>L2</td>
<td>1.51</td>
<td>0.058</td>
<td>26.06</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Narrative</td>
<td>L1</td>
<td>0.89</td>
<td>0.058</td>
<td>15.39</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td>L2</td>
<td>1.17</td>
<td>0.058</td>
<td>20.12</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Table 4

*Estimated Mean Differences of Gestures Per Clause within Each Task by Interview Language*

<table>
<thead>
<tr>
<th>Task</th>
<th>Estimated Mean Difference between L1 and L2</th>
<th>Std. Error of Est. Mean Difference</th>
<th>t value of Est. Mean Difference</th>
<th>Tukey-Kramer Adj. p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roleplay</td>
<td>0.1173</td>
<td>0.063</td>
<td>-1.87</td>
<td>.4290</td>
</tr>
<tr>
<td>Game</td>
<td>0.2944</td>
<td>0.065</td>
<td>-4.62</td>
<td>.0004</td>
</tr>
<tr>
<td>Narrative</td>
<td>0.2739</td>
<td>0.065</td>
<td>-4.21</td>
<td>.0011</td>
</tr>
</tbody>
</table>
Another analysis considered the four gesture types (i.e., metaphoric, iconic, beats, and deictic), which revealed a highly significant difference between gesture types produced in both languages, $F(3, 87) = 183.14, p < .00001, \eta^2_p = .956$. Generally speaking, deictic and beat gestures were the least frequent gestures produced at 0.08 and 0.12 per clause, respectively. Iconic gestures more than doubled the frequency of beat gestures with 0.25 per clause ($t(87) = 5.78, p < .0001$, and metaphorics were the most frequently produced gestures on average, with a mean of 0.57 gestures per clause, more than doubling iconics ($t(87) = 13.62, p < .0001$). Each mean had a standard error of 0.017.

The frequency of these gesture types also differed between language interviews significantly, $F(1, 30) = 17.95, p = .0002$. In other words, the estimated average increase of any
one gesture type was 0.05 gestures per clause, which according to the adjusted $t$ test, is a significant increase, $t(30) = -4.24, p = .0002$.

First language group also had a statistically significant effect on type frequency, $F(1, 29) = 11.78, p = .0018, \eta^2_p = .403$. The L1ES group used any one type of gesture an estimated mean of 0.22 per clause, $t(29) = 17.02, p < .0001$. The L1SS group averaged an estimated 0.29 gestures of any one type, $t(29) = 20.08, p < .0001$. The difference between these two language groups also showed that the 0.07 gestures per clause difference was statistically significant at $t(29) = -3.43, p = .0018$.

The ANOVA reported that there was a two-way interaction of L1 group by gesture type ($F(3, 87) = 7.62, p = .0001, \eta^2_p = .4817$) and interview language by type ($F(3, 90) = 3.64, p = .0156, \eta^2_p = .1083$). Both L1 groups showed similar hierarchies of frequency of gesture types, as seen in Figure 11. Whereas iconic, beats, and deictic gestures did not result in any statistically significant differences of estimated means between language groups, metaphoric gestures did, $t(87) = -5.78, p < .0001$. The L1SSs used a mean of 0.62 metaphoric gestures per clause ($SE = 0.022$) across both interviews and the L1ESS used an estimated mean of 0.45 ($SE = 0.021$). In the interaction of interview language by type, metaphoric gestures were also the only type that resulted in any statistical significance, $t(90) = -5.02, p < .0001$. In the L2 interview, the participants produced an estimated mean of 0.59 metaphoric gestures per clause ($SE = 0.018$) compared to 0.48 in the L1 interview ($SE = 0.018$). Table 5 shows each of the individual type frequencies by L1 group and Table 6 and Figure 9 display the calculated differences between each type of gesture and each language group with their significance according to the $t$ test and standard error.
Table 5

*Estimated Means of Gesture Types Per Clause by L1 Groups*

<table>
<thead>
<tr>
<th>L1 Group</th>
<th>N</th>
<th>Gesture Type</th>
<th>Estimated Mean</th>
<th>Std. Error</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1ES</td>
<td>19</td>
<td>Metaphoric</td>
<td>0.47</td>
<td>0.023</td>
<td>2.33</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Iconic</td>
<td>0.24</td>
<td>0.023</td>
<td>1.59</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beats</td>
<td>0.1</td>
<td>0.023</td>
<td>4.11</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deictic</td>
<td>0.08</td>
<td>0.023</td>
<td>3.49</td>
<td>.0008</td>
</tr>
<tr>
<td>L1SS</td>
<td>18</td>
<td>Metaphoric</td>
<td>0.67</td>
<td>0.025</td>
<td>26.25</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Iconic</td>
<td>0.26</td>
<td>0.025</td>
<td>1.32</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beats</td>
<td>0.14</td>
<td>0.025</td>
<td>5.69</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deictic</td>
<td>0.08</td>
<td>0.025</td>
<td>3.18</td>
<td>.0020</td>
</tr>
</tbody>
</table>

Table 6

*Estimated Mean Differences of Gesture Type between L1 Groups*

<table>
<thead>
<tr>
<th>Gesture Type</th>
<th>Estimated Mean Difference between L1 groups</th>
<th>Std. Error Mean</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metaphoric</td>
<td>0.1989</td>
<td>0.034</td>
<td>5.78</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Iconic</td>
<td>0.01809</td>
<td>0.034</td>
<td>0.53</td>
<td>.9995</td>
</tr>
<tr>
<td>Beats</td>
<td>0.04987</td>
<td>0.034</td>
<td>1.45</td>
<td>.8313</td>
</tr>
<tr>
<td>Deictic</td>
<td>0.00032</td>
<td>0.034</td>
<td>0.01</td>
<td>1.0000</td>
</tr>
</tbody>
</table>
The interaction between interview language and type yielded only possible signs of significance. Similar to the data from the interaction between L1 group and type, only the difference in estimated means of metaphoric gestures from L1 to L2 showed any kind of significant increase, $M = 0.097$, $SE = 0.019$, $t(90) = -5.02$, $p < .0001$.

The interactions between three factors (i.e., L1 group, interview language and type) did not yield any statistically significant estimated differences and will not find place in this report.

**Gesture Types/Clause Ratios within Tasks**

The mixed-model ANOVA was also set to include observations that would consider any differences in type frequency within each of the three individual tasks. As expected, the speaking task had a highly significant effect on gesture type, $F(2, 66) = 83.05$, $p < .0001$, $\eta^2_p = .3144$. As seen in the other tests, both the interview language and L1 group also have a significant effect on
the frequency of gesture type within tasks (interview language: $F(1, 36) = 26.35, p < .0001, \eta^2_p = .0555$; L1 group: $F(1, 35) = 13.31, p = .0009, \eta^2_p = .0751$). The estimated mean differences of type resulted in the highest significant differences at $F(105) = 201.65, p < .0001, \eta^2_p = .7156$.

Of the several two-way interactions that can be analyzed from this test, only three showed any significant effect on gesture type frequencies within each task: the task by type interaction, $F(6, 578) = 50.40, p < .0001, \eta^2_p = .3463$, the L1 group by type interaction, $F(3, 105) = 6.56, p = .0004, \eta^2_p = .0722$, and the type by interview language interaction, $F(3, 578) = 3.93, p = .0086, \eta^2_p = .0202$.

In regard to task by type interactions, metaphoric gestures maintained a high estimated mean frequency of use throughout all tasks: for Task 1, $M = 0.41, SE = 0.02$; for Task 2, $M = 0.56, SE = 0.021$; and for Task 3, $M = 0.64, SE = 0.21$. The Tukey-Kramer adjusted $t$ test identified significant increases in metaphoric gestures between Tasks 1 and 2, $t(578) = -6.46, p < .0001$, and between Tasks 1 and 3, $t(578) = -9.29, p < .0001$. The difference between Tasks 2 and 3, however, did not yield any significant changes, $t(578) = -2.76, p = .2013$.

The most statistically significant differences of means in the type by task interaction were found in iconic gestures. The ANOVA identified an estimated mean difference of 0.46 iconic gestures per clause ($SE = 0.024$) between Task 1 and Task 2, $t(578) = -19.01, p < .0001$, and an estimated mean difference of 0.36 gestures per clause ($SE = 0.025$) from Task 2 to 3, $t(578) = 14.29, p < .0001$. Even the mean difference between Task 1 and Task 3 was calculated as statistically significant, $t(578) = -4.34, p = .001$ with an estimated mean difference of 0.11 iconic gestures per clause ($SE = 0.024$). Beats and deictic gestures did not yield any significant differences between tasks. However, gesture type frequencies differed significantly from one another within a single task. Beats and deictics differed significantly from metaphors in all
tasks. Iconic gesture ratios were also significantly different from metaphoric ratios in Tasks 1 and 3, but not in Task 2. In Task 2, the estimated mean frequencies of iconic gestures were not significantly different from metaphoric mean frequencies, but were significantly different from beat and deictic frequencies. Table 7 shows the comparative differences between gesture types within each task and Figure 10 presents those differences visually along with the varying estimated mean frequencies of the four types of gesture across tasks.

Table 7

*Estimated Mean Differences between Metaphoric Gestures and Iconics, Beats, and Deictics by Task*

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Comparison</th>
<th>Type¹</th>
<th>Type²</th>
<th>Mean Difference</th>
<th>Std. Error Mean</th>
<th>t value</th>
<th>Tukey-Kramer adjusted p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roleplay</td>
<td>Metaphoric</td>
<td>Iconic</td>
<td></td>
<td>0.3637</td>
<td>0.02738</td>
<td>13.28</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beat</td>
<td></td>
<td>0.3287</td>
<td>0.02738</td>
<td>12.01</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deictic</td>
<td></td>
<td>0.3638</td>
<td>0.02738</td>
<td>13.29</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Game</td>
<td>Metaphoric</td>
<td>Iconic</td>
<td></td>
<td>0.05791</td>
<td>0.02837</td>
<td>2.04</td>
<td>.6646</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beat</td>
<td></td>
<td>0.4263</td>
<td>0.02837</td>
<td>15.03</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deictic</td>
<td></td>
<td>0.4728</td>
<td>0.02837</td>
<td>16.67</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Narrative</td>
<td>Metaphoric</td>
<td>Iconic</td>
<td></td>
<td>0.4845</td>
<td>0.02837</td>
<td>17.08</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beat</td>
<td></td>
<td>0.5097</td>
<td>0.02837</td>
<td>17.97</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deictic</td>
<td></td>
<td>0.5468</td>
<td>0.02837</td>
<td>19.28</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

¹The mean frequency of iconic gestures in Task 2 was not significant to the frequency of metaphoric gestures within the same task. However, the frequency of iconic gestures was significantly different from both beats, $t(578) = 12.99$, $p < .0001$, and deictics, $t(578) = 14.62$, $p < .0001$. 
The interactions of L1 group by type only yielded one significant difference in mean gesture type ratios within any one task. The L1ES participants averaged an estimated 0.17 fewer metaphoric gestures per clause in any one task ($M = 0.45, SE = 0.021$) than the L1SS participants ($M = 0.62, SE = 0.022$) with a significance rating of $t(105) = -5.63, p = .030$. In other words, native Spanish speakers used more metaphoric gestures per clause per task than did the native English speakers. Figure 11 shows the interaction of L1 group by type.
The analytical comparison of gesture type frequency from first language to second language also resulted in a statistically significant difference ($M = 0.11, SE = 0.019$) existing only between metaphoric gesture frequencies in the L1 ($M = 0.48, SE = 0.018$) and those in the L2 ($M = 0.59, SE = 0.018$), $t(578) = -5.57, p < .0001$ (see Figure 12).
Figure 12. Estimated Means of Gesture Type per Task by Language Interview.

The ANOVA also analyzed the various three- and four-way interactions that occurred within task and gesture type with no significant differences (e.g., task by type by interview language: $F(6, 553) = .43, p = .8618$ and L1 group by task by type by interview language: $F(5, 553) = 1.79, p = .0992$).

**Participant Affect**

In the debriefing interview, I asked the participants when they felt the most comfortable, when they felt the most anxiety, and which task was the most linguistically difficult, with hopes that their responses would provide important data regarding the qualitative differences between first and second languages. This section will present the results of those questions.

At what point during the interviews did you feel most comfortable? I asked this question in general terms and encouraged a response that would yield a specific task within one
language interview or the other. The task in which 54% of participants felt most comfortable was Task 3, the personal narrative. Three L1ESs felt this task in the L2 interview was the most comfortable moment of the interviews, whereas four L1ESs and six L1SSs felt this task in the L1 interview was most comfortable for them. Seven participants, consisting of only one L1SS participant, answered that Task 3 in both interview languages were equally comfortable for them. Figure 13 shows these responses in comparison to the others received to this question.
Figure 13. Participant Responses to the Question, “At what point during the interviews did you feel most comfortable?”
When were the times of highest anxiety for you? I asked this question twice, once in reference to the L1 interview, and again referring to the L2 interview. When I asked each participant this question in the L1 context, I used the terminology for the first language of the participant. For example, I asked the L1ES participants when the time of highest anxiety was in the English interview, and for the L1SSs, in the Spanish interview. Eight participants responded that they did not feel any anxiety during the L1 interview, whereas 24 participants cited either a specific task, all of the interview, or the opening portion of the interview as causing more anxiety than others. Ten of those participants said Task 2 caused them the most anxiety and 14 participants said Task 1 caused more anxiety. Figure 16 shows these responses compared to the other tasks that were considered anxiety-causing in the L1 interview. Figure 14 shows these responses compared to the other tasks that were considered anxiety causing in the L1 interview.

Figure 14. Participant Responses to the Question, “When was the time of highest anxiety for you in the L1 interview?”
In the L2 context, Task 2 was the overwhelming response with eighteen total responses, eight from the L1ESs and 10 from the L1SSs. Task one was next with eleven responses. Figure 17 displays the other answers to this question in comparison to those mentioned here. I find it important to also mention that in contrast with the L1 reference to this question, all participants identified a task where they felt anxiety during the L2 interview. Thus, “None” is not a category in Figure 15.

![Participant Responses by Task](Figure 15. Participant Responses to the Question, “When was the time of highest anxiety for you in the L2 interview?”)

**What was the most linguistically challenging part of the interview?** Again, I asked this question specifically referencing the L1 and the L2 interviews separately. When questioned within the L1 context, twelve participants answered that none of the tasks were linguistically difficult. This total matched Task 2, also with twelve participant responses, as the top answer. Whereas in regard to the L2 interviews, all participants identified a specific task, or all tasks, as
being linguistically challenging. Task 2 was also the most linguistically challenging part of the L2 interview for more of the participants than any other task. Figures 16 and 17 show each of these responses for the L1 and L2 contexts, respectively.

![Participant Responses to the question, “What was the most linguistically challenging part of the L1 interview?”](chart)

*Figure 16. Participant responses to the question, “What was the most linguistically challenging part of the L1 interview?”*
Figure 17. Participant Responses to the Question, “What was the most linguistically challenging part of the L2 interview?”

**Participants’ Awareness of Gesture**

In order to answer my second research question and consider qualitative differences in gesture production in the L1 and the L2, I conducted a debriefing interview with all participants after both language interviews had concluded. In the debriefing interview, I revealed the study’s purpose of observing gesture frequency and asked, “Do you think you used more gesture in the English or in the Spanish interview?” Four response types resulted from this question: in the English interview, in the Spanish interview, both interviews equally, and unsure. These answers were coded as L1, L2, Both, or Unsure. Out of the 19 L1ES participants, ten reported that they felt they used more gestures when speaking in the L2 interview (i.e. the Spanish interview). Five claimed to have produced more gestures in the English interview (their L1). Two thought they
gestured equally in both interviews, and two were unsure in which interview they may have
gestured more

The L1SS participants responded in a somewhat opposing manner. Nine participants
reported that they felt they used more gesture in the L1 interview, with 5 claiming more in the L2
interview. Three participants thought they gestured equally in both interview languages and one
was not asked the question.

Participant responses were compared to actual occurrences on an individual level. In
order to measure participant awareness of gesture use in the L1 and L2, I had to define what
“more” and “equal” looked like numerically. To objectively find this number, I calculated the
standard error (L1ES: \( SE = 0.068 \); L1SS: \( SE = 0.065 \)) of each language group, multiplied it by
two, and then subtracted the total from the mean difference (L1ES: \( M = 0.211 \); L1SS: \( M =
0.242 \)). Thus, only about a 5% difference is the threshold determining if a participant used equal
or more gestures in one language or another. In the case of the L1ES group, for a participant to
have used “more” gesture in either the L1 or the L2, the difference would have had to equal a
minimum of 0.075 gestures per clause. Consequently, a participant was considered to have
gestured “equally” in both interview languages if the difference fell below 0.075 gestures per
clause.

With this understanding, 57% of the L1ES group (\( n = 19 \)) were correct in their
assumptions towards the interview language in which they used more gesture. Thirty-two percent
were incorrect in these inclinations and 11% were unsure, and therefore were not correct nor
incorrect. Dividing this up for further analysis, of the 10 participants who thought they had
gestured more in the L2, 90% were correct. Of the five participants claiming to have gestured
more in the L1, only 40% were correct. Neither of the participants claiming to have used equal
amounts of gesture in both interview languages were correct and both of those unsure about their gesture use produced more gesture in one of the two interview languages (one in each). Figure 18 shows the L1ES patterns of gesture awareness according to participants’ answers and their correctness.

Among the L1SS group (n = 18), 39% of the participants were correct in their suspicions and 56% were incorrect. One participant (6%) did not receive the opportunity to respond to the question, and could therefore be neither correct nor incorrect. Among the five participants who suspected to have gestured more in the L2, 80% were correct. Nine participants assumed they used more gesture in the L1, and 22% were correct. Of the three who believed to have gestured equally in both interview languages, one was correct and the others used more gestures in the L2 interview. Figure 19 shows the L1SS patterns of gesture awareness according to participants’ answers and their correctness. Figure 20 shows the L1SS and L1ES responses combined.
Figure 19. The Number of LISS Participants Who Were Correct or Incorrect in Their Responses to the Question “Do you think you used more gesture in the English or in the Spanish interview?”

Note: Totals equal only 17 participants due to the one participant who never received the question in order to provide an answer.
After the previous question, I asked the participants why they felt they gestured more or equally in the interview language(s) they answered. This was an open-ended question that yielded answers fitting into the following opinions: to communicate clearly to the interlocutor, interviewer influence, Hispanic culture, low confidence, memory, more comfortable, more confident, I talk with my hands generally, and unsure. Figure 21 shows these responses and shows how many of these responses came from which language groups. The L1SS group only answered within four of the response codes whereas L1ESs offered nine different responses.\(^1\)

\(^{1}\) Note that totals equal more than 37. Some participants gave more than one answer to the question, which were then included among all responses.
Participant Responses to the Question, “Why do you think you gestured more in that language?”

**Participant commentary.** The following subsections contain participants’ comments as categorized into the aforementioned codes. Each of the comments was in response to the question, “Why?” or rather, why did the participants think they gestured more in their L1 or L2?

**Communicate clearly.** All of the participants whose responses I coded under this category (n = 13) believed to have gestured more in the L2, except one who answered to have gestured equally in both interview languages.

Um, well, for two years I was in Mexico and that was just, I mean, you start out not being able to speak Spanish. I never knew any Spanish except for “Hola. ¿Cómo estás?” Being able to gesture and show people what you’re at least trying to say helps them understand that, I feel, more than just standing there not saying anything. (Eng1-A)

Cuz it’s my second language. Um, so I feel like probably if you’re at a lack for words, you kind of show it. (Eng1-BB)
I feel like I use gestures to try and explain things. Not by making a picture with my hands or anything, but just trying to help the other person understand what I’m trying to communicate a little bit more, in case I say something that I can’t say with words. (Eng1-C)

I don’t know. Um, maybe because I have to depend on the gestures a little more in Spanish. (Eng1-G)

Because I didn’t know a lot of—like, if I didn’t know a word, I would try to describe it with my hands, or something like that. (Eng1-O)

Um, sometimes, uh, with it not being my first language, it is a little bit harder sometimes to express myself in Spanish. (Eng1-S)

I don’t know. I just know that I use more gestures in Spanish. Um, maybe to compensate for my lack of language, maybe. I’m not sure. (Eng1-Y)

Because I can’t speak well and I just want, like, express with my hands . . . . (Sp1-A)

Probably just because it’s kind of harder to express myself. So I tend to involve my, my body. (Sp1-C)

Yes, um, when, for me in English I don’t know if people catch my, my idea. So, so if people catch my idea because I, I think might, my, like, I think that I need to express more myself because it’s not my language. So in Spanish, ehm, people can understand, cuz it’s my native language. So it’s easy for me express myself. But in English, sometimes the, like, this [gestures] help me to look for the person to understand more what I’m talking about. For me, I don’t know. It’s my idea. (Sp1-H)
Uh, I may read about it, because when we cannot say something, we use the, the simulation to do it. And I use to do that in Spanish because was, my work was with kids. I used to move a lot the, my hands. I know it’s part of me, but I think when I don’t, I cannot find the words in English. I just simulate what I want to do. (Sp1-Q)

Uh, I think because I need to explain more and I don’t know some words. So I need to act sometimes and I need to take more. Because in Spanish is more natural for me. So in English, I don’t know, maybe it’s a consequence for I don’t know very well English. (Sp1-S)

Cuz I feel like sometimes when I don’t know how to express myself, it is easier just to make some movement just to, to make people to understand the things that I want to say. Sometimes just to, or when I know the meaning of some words, or if I pronounce that a word just by making some gesture. Just helping me to better understand. I don’t know. (Sp1-T)

**Hispanic Culture.** The responses coded with this description only come from L1ES participants, claiming to have acquired gesturing as a cultural piece of language learning, explaining why they believed to have gestured more in the L2.

Plus, I feel, like, in Spanish, they are a lot more, uh, likely to gesture with their hands. Dealing with native speakers, I just feel like it’s a lot more emotional, whole body, just all hand, so. (Eng1-BB)

Uh, I don’t know. In Spanish, seems to make more sense, I guess. I mean, I don’t know if it’s true. I wasn’t paying attention, but it seems like in Spanish, it’s just kind of how you talk. I don’t know. Like, you, you, you kind of talk with your body. I guess that’s kind of
how I learned to do it. I don’t know. In English, ugh, I don’t know. I, if I really think about it, . . . seems like a cultural thing to me. Like, in English, it, uh, Spanish seems like a lot more intimate. Like, it’s, you know, like you’re completely engaged in what you’re doing. Whereas in English, you know, maybe a conversation, maybe, like, close or intimate or have those kind of feelings, but there’s still . . . there’s an intimacy that comes with Spanish that doesn’t exist in English. I don’t know. I would say it’s a cultural thing maybe. (Eng1-N)

. . . And I feel like Spanish is a lot more expressive . . . culturally . . . (Eng1-O)

. . . But I also think that, from what I’ve seen at least, the Latin American culture, and when you speak Spanish you’re just more prone to use hand gestures and I don’t know why. (Eng1-S)

**External influences.** The responses in this section credit the interviewers and the inherent situation of the interviews for the different amounts of gesticulation in each interview language. All three were from L1ES participants, and two believed to have gestured more in their L1, and the other was unsure in which she gestured more.

A large part of that is because I feel like, I don’t know if this was intentional or not, but I feel like your colleague had a lot less expression on his face and they’re just be, like, kind of sitting there like this. Kind of have to look at him . . . closed off and so forth. And so I think that might have affected it. But, so probably in English. (Eng1-HH)

I guess I also, just, it’s like an awkward situation being interviewed. So I tend to use my hands more in awkward situations. (Eng1-K)
I don’t know. However, however comfortable you feel, I think that also might change your number of gestures and, um, I don’t think my level of comfort had so much to do with the language at the moment. . . . I feel like when he [the L2 interviewer] came in, I felt like a little more uncomfortable because he, like, just because, like, he didn’t have a smile or whatever. It was just like a little one. Like, okay. And so I’m like, I don’t know. I don’t know that it really has to do with the language so much. (Eng1-R)

**Low confidence.** These comments originate from L1ES participants who believed they produced more gesture in the L2 due to low confidence in speaking Spanish.

I think I can explain myself a lot better in English. Even though I do feel like I can speak Spanish okay, I feel like my English is still a lot better than my Spanish. I’m much more comfortable. (Eng1-C)

I don’t know. Um, maybe because I have to depend on the gestures a little more in Spanish. (Eng1-G)

I don’t know. I just know that I use more gestures in Spanish. Um, maybe to compensate for my lack of language, maybe. I’m not sure. (Eng1-Y)

**Memory.** One L1ES participant commented that the only reason he believed he may have gestured more in the L1 was due to the only gestures he remembered producing throughout both interviews.

Just cuz I remember that’s when I was describing the, the goal in when I was describing soccer. And I don’t remember describing anything before then. (Eng1-EE)

**More comfortable.** One L1ES and seven L1SSs responded to have gestured more in their L1 because they were more comfortable to do what comes naturally, which in this case meant to gesture.
Maybe because I felt more comfortable in English and, yeah, I feel more comfortable in 
English. So I feel like I can use my hands more.² (Eng1-K)

Uh, because I’m more comfortable speaking in Spanish sometimes. But in English, like, I 
get really nervous. Sometimes it depends with who I talk. Like, for example, my brother, 
he always gets super nervous and he forgot, like, almost completely his English when he 
speak with a native speaker, that when he speak with someone that is not a native 
speaker. So I think, like, sometimes I have the same problem, that I get more nervous to 
speak with a native speaker. (Sp1-D)

Actually maybe in Spanish because when I imagine the situation, I start to, ah, that tree 
and now maybe in Spanish. I don’t know, pero, Now I’m thinking [I gestured more] in Spanish. (Sp1-G)

It’s more me. It’s more what I’ve been used to do my whole life. And I think that when I 
and some from friends have told me that when I feel more comfortable saying somethings 
or speaking in a certain place or with or talking with certain people, I move my hands 
more. (Sp1-J)

Mmm, I guess because my, my, oh, my first language. And I feel more comfortable with 
that, with, with Spanish. (Sp1-L)

Because is my, my first language, I feel more relaxed, you know, and more willing or 
more able to move my arms, my face, or be more expressive with my body. (Sp1-M)

² Note that Eng1-K gave somewhat opposing reasons for gesturing more in her L1. She first commented 
about feeling more comfortable in English and, therefore, used more gesture. She followed this commentary by 
saying that being interviewed was an awkward situation for her, and that she tends to gesture more in awkward 
situations.
Cuz that’s my first language and when I speak Spanish I feel more comfortable. Um, I can speak a little more clearly. When I speak English, there are some words I forget or I, concepts that I don’t know still. So I’m like, I was thinking, you know, that, like, it’s a lot of pressure, but when I speak Spanish, I just feel like myself. (Sp1-P)

**More confident.** Two L1ES and six L1SS participants gave responses directly relating to linguistic confidence as the reason they felt they gestured more in their L1. Even though confidence can surely be a factor towards feeling comfortable in a situation, it is not inherently inclusive. Thus, I have separated these eight comments about confidence from the previous eight about comfort.

Um, uh, for me, I think it’s like there’s just a lot more words one can, you use in English than in Spanish. And definitely, um, I think I just use more words. I just blabber on longer in English than in Spanish, so I have more time to use my hands. (Eng1-FF)

I think because I’m more confident when I speak in English. (Eng1-U)

I think because I feel more confident in myself, maybe. And I grew up doing that in Spanish. (Sp1-B)

Confidence. (Sp1-F)

Eh, cuz it’s my, my language. So I have all the vocabulary for you can explain more. (Sp1-G)

Because it’s my native language. So, and I can express better my feelings and my emotions. Something like that. And for easy for me. (Sp1-K)
Talk with hands generally. Two L1ES and one L1SS participants felt they speak with their hands generally and that this aided in gesturing equally in both interview languages.

Cuz I, I just generally kind of talk with my hands. So I think, probably, it’s pretty equally effort in talking in Spanish or English. (Eng1-J)

Um, um, I use my hands a lot. So I feel like in English and Spanish I use my arms . . . . (Eng1-Q)

I consider myself as a person who use my body and everything. Like, people just tell me, like, even your face, like, tell, tells what you feel. Like if you say, “ah, I’m fine.” But if my face is like “really”. And they say, like, like, you can’t even, like, pretend to be happy. So I don’t know. I know that I use my gestures a lot, but I haven’t recognized if I use it more in Spanish or English. (Sp1-N)

Unsure. These responses came from three L1ESs. Two (Eng1-I and Eng1-T) were unsure of which language they may have produced more gestures in. The responses I included for these participants were to the question “Do you think you used more gestures in English or in Spanish?” The other believed to have gestured more in the L2 and only includes the response to “why?” What they all have in common is that they are unclear or indecisive of what led them to these assumptions.

I have no idea. I have been told before that I talk a lot with my hands, but I don’t think about it, um, ever. So maybe in English because it’s, like, my native language. But it’s also possible that I do it in Spanish because it’s my secondary language and I’m, like, not that, like, established, and so . . . I don’t know. . . . Maybe I gesture more in Spanish out of insecurity in speaking the language. Um, because it’s not, you know, I have to think more about it. It’s not, you know, I mean, I speak it decently, but it’s still not, you know,
like, you think about, you worry about conjugations, like, ugh, am I using subjunctive right? Um, and also, uh, that I learned it in a different culture. Like, I learned it in Paraguay, and there the people are a lot more open than here in the United States. And maybe it’s just something I picked up from them.³ (Eng1-I)

I don’t know. I feel like my, the way I speak is different in Spanish than in English. Um, I don’t know. It’s a good question. I just feel like I use hands more in Spanish. I may not know. I have to look at myself on the video. (Eng1-L)

I’m not really sure, because if, I’m not really sure. If it’s hard for me to get a point across, then, uh, then I think I will use my hands in Spanish. It’d be a little bit harder for me, but I’m not really sure if I use more gesture in Spanish or not. (Eng1-T)

³ It is important to clarify that even though the participant was not sure if or why he produced more gestures in one language interview over the other, this participant offers possibilities that clearly fit into three of the previous codes.
CHAPTER 5: Discussion, Implications and Limitations

The purpose of this study was to identify differences in gesticulation between L1 speech and L2 speech in both quantitative terms (i.e., frequency of gesture production) and qualitative terms (i.e., types of gestures produced), and subsequently identify how aware advanced-level Spanish/English bilingual speakers were of their gesture production in either language.

This chapter will begin by discussing each hypothesis related to the first research question and then discuss the second research question with its implication towards second language acquisition and include suggestions for further research. A description of limitations in both study design and implementation will follow, along with suggestions for further research. This chapter will end with the contributions this study provides to the field of gesture research and second language acquisition.

Discussion of quantitative differences

Hypothesis 1: There will be a significant increase in gesture production between the L1 to the L2 among all participants without regard for the first language of the speakers.

The L2 compels more gesticulation. Both native English and native Spanish speakers averaged more gesture use in their L2 than in their L1, thus confirming the first hypothesis. Data suggested that this occurred across language tasks. There are various reasons that may explain this increase. First, as explained in Chapter 3, the participants varied in their self-declared level of proficiency in the L2. For instance, several participants stated they were less comfortable in their L2 than in their L1, and this may have accounted for the increase in gesticulation in the L2. With lower comfort levels, these L2 speakers may have applied gesture strategies (Gullberg, 1998) in the L2 interview with the purpose of allowing the interviewer to understand them better. This rationale could certainly be supported with the knowledge that a large portion of students
reasoned that they gestured more in one language over another to “speak more clearly.”

Another possible reason for the increase is that a lower comfort level may have caused the participants to subconsciously produce more gestures in order to lighten the cognitive load. The purpose of this study was to observe the gestures of advanced speakers in the L2; this was not always the case, as proficiency levels were not officially identified. Certainly, all participants spoke at a lower level in their L2 than they did in their L1. This required participants in this category to remember and incorporate the lexicon and grammatical structures of the L2, placing a heavier load on cognitive processes. More gesture may have then been produced in the L2, on average, just as it was in Goldin-Meadow, Nusbaum, Kelly, and Wagner’s (2001) study, in which they had students remember lists of words while solving math problems. Those who remembered more words at the end were also those who used more gesture. Even though the participants in this study were not compared one to another, the implication is that between a speaker’s L1 and L2, more attention is placed on remembering lexicon and grammatically correct constructions when speaking in the L2 and more gesture is naturally produced, displacing some of the working memory into motor modalities and physical imagery, thus relieving cognitive load. Examples of this are also apparent among participants who commented that they wanted to explain a game that they would be able to explain in their second language as well, or those who changed the game they described from one language interview to the other, implying a heightened level of anxiety on their cognitive processes.

The previous explanation also implies that an increase in gestures demonstrates the “intrinsic part of the process that produces speech, and that they [gestures] aid in the process of lexical access [extracting a specific word from memory through the use of a representational movement], especially when the words refer to concepts that are represented in spatial or motoric
terms” (Krauss, Chen, & Chawla, 1996, p. 44). In the present study, using more gestures in the L2 may signify a wider gap between image and linguistic formation. With a less extensive lexical bank in their second language, the participants might very well have used gesture to resolve the “dialectic,” as McNeill (2007) refers to it, between the imagery of concepts shared between languages and the linguistic constructions that differ between languages. Although Kita (2000) refutes that gestures are solely for aiding in lexical access, he explains a similar process of lightening cognitive load through the conceptualization of linguistic structure. He terms this phenomenon the Information Packaging Hypothesis, which says:

(1) the speaker is cognitively compelled to produce more representational gestures if the spatio-motoric event to be verbally conveyed does not readily lend itself to linguistic structuring, regardless of the difficulty in retrieving relevant lexical items or in activating an image of the described event;

(2) the frequency of representational gestures does not change if the difficulty in the linguistic packaging of the information to be conveyed is kept constant, and the difficulty in retrieving relevant lexical items or in activating an image of the described event is varied. (p. 180)

Still, all descriptions lead towards a strong relationship between increases in both cognitive load and gesticulation from the L1 to the L2 without regard for the first language of the speakers. This implies that the cognitive load increases generally among L2 speakers. Further studies on the topic may benefit from looking closer into which gestures are produced in both languages and which gestures are those only produced in the L2. This information could help identify the purposes for gesturing more in the L2, i.e., are they related to gesture strategies, cognitive load, or lexical access?
Difficulty level of the task affects L2 gesture production. As expected, the average gesture per clause ratios increased when combining the average gesture increase of all tasks. However, each individual task affected that increase differently. Understanding this occurrence provides considerations for language learning tasks and the organization of those tasks.

The roleplay simulated more of a conversation than the other two tasks. The participant had borrowed and then lost an umbrella as an exchange student (taken from the Spanish Speaking Test, Center for Applied Linguistics, 1995) from the Advanced-level question bank. From the L1 to L2, there was no significant increase in gesticulation. This may be related to low levels of anxiety the participants had during the task. For example, they did not need to answer with lengthy responses, the interviewer described the situation in the language of the interview before the participant assumed the role of the exchange student, including possible vocabulary the participant may have needed to use, and the situation was not emotionally relevant to the participant.

Contrastingly, the game description seems to have increased the difficulty level in each of these areas. When asked to explain how to play their favorite game, the task was more presentational than conversational, participants had not previously reviewed important vocabulary they would use, and had not been assigned a specific game to describe. These factors seemed to have been enough to raise the cognitive load sufficiently to increase gesticulation significantly.

However, the data imply some interesting details about what constitutes cognitive load in second language acquisition. When I asked the participants in the debriefing interview in which part of the interview they had the most anxiety, Task 1 was the number one response in regard to the L1 interview, with Task 2 in close second. In the L2 interview, Task 2 was overwhelmingly
the top response with Task 1 hardly on the radar (i.e., only two responses). Task 3 was among the lowest of the responses in both L1 and L2 contexts, in regard to anxiety. Despite the anxiety levels of the participants, when asked about which task was most linguistically difficult, the clear answer for both interview languages was Task 2. Task 3 was low among the responses regarding linguistic difficulty in the L1 and the second most popular answer in the L2 context, though much less popular than Task 2. There was no significant increase of gesture in Task 1 from the L1 to the L2, but there was in both Tasks 2 and 3, suggesting that any increase of gesture in each task from L1 to L2 was probably due to an increase in linguistic difficulty more so than a feeling of anxiety. These data suggest that even though linguistically difficult tasks can cause anxiety, they are not mutually inclusive. Future studies could benefit from looking at the relationship between gesticulation and anxiety as well as gesticulation and linguistic difficulty separately and compare the data post hoc.

Discussion of Qualitative Data

Hypothesis 2: There will be a significant difference in the type of gestures used between the L1 and the L2 among all participants.

Gesture type ratios remained the same in the L1 and the L2. I compared metaphoric, iconic, beats, and deictic gesture-to-clause ratios between first- and second- language interviews. There was no significant change that occurred among iconic, beats, and deictic gestures from one language to another, showing Hypothesis 2 to be untrue in the case of these three gesture types. Metaphoric gestures, however, did show a statistically significant increase in the L2. Considering this phenomenon with the data that compare L1 groups to one another, there may not be much

4 The responses in regard to which task was most linguistically difficult in the L1 interview were equal in “Task 2” and “None”. Twelve participants felt that nothing in the L1 interview was linguistically difficult, whereas another twelve felt Task 2 was the most linguistically difficult part of the L1 interview.
practical significance to this occurrence. The native Spanish speakers tended to use significantly more metaphoric gestures in general speech than the native English speakers, which could be culturally or linguistically related. The other gesture types were not produced at a significantly higher rate by the L1SSs than the L1ESs, however. Thus, the cause of a higher rate of metaphoric gestures in the L2 interview may simply be due to the combination of L1 groups, where the higher ratio of metaphors amongst the L1SSs in both the L1 and the L2 account for the statistically significant difference.

Another consideration for this increase of metaphoric gestures is in regard to the type of gestures produced when advanced-level speakers talk in their second language. If the only gesture that is significantly increased are metaphoric gestures, we may be able to understand what information second language speakers believe is not being communicated clearly. As mentioned in Chapter 4, many participants reported gesturing more because they believed they needed to communicate more clearly to their interlocutor than for any other reason. Assuming this belief accounts for the increase in gesture in the L2 and the increase in metaphorics in the L2, we must ask what information is presented through metaphoric gesture in the L2 that was not included in the L1.

As described in Chapter 2, metaphoric gestures represent abstract concepts or relationships. When speaking in the L2, it is possible that, although the total number of gestures increases, metaphoric gesture ratios increase more than the others because of the level of abstraction the speaker perceives in the linguistic constructions. Assuming gesticulation is the resolution of the dissonance between imagery and linguistic presentation (e.g., Kita, 2000; Krauss, Chen, & Chawla, 1996; McNeill, 1992), perhaps metaphoric gesture can be used to measure the amount of linguistic difficulty the speaking task presents for the speaker. The data
show that Task 2 elicited more iconic gestures than did the other tasks. However, iconics did not increase significantly from one language to the other. Metaphorics stayed somewhat constant between tasks, but increased significantly between languages. Task 2 was also reported by participants to have been the most linguistically challenging task of the interviews. Stam (2013) found that intermediate speakers gesture more than advanced speakers due to a lack in linguistic proficiency. If this is true, then I would hypothesize that the additional gestures produced when seeking the L2 linguistic constructions tend to reveal themselves as metaphoric gestures. More research is needed to assert this definitively, however.

Then again, Stam (2014) also reported that the higher the proficiency of a speaker in the L2, the more native-like the gesticulations become. In the case of the current study then, it is possible that the L1ES participants spoke at a high enough proficiency in which they were gesticulating as the L1SSs do, with more metaphoric gestures. After all, the data show that the L1SS group used significantly more metaphoric gestures throughout both interviews than did the L1ES group, statistically speaking. A study carefully designed to observe these differences may reveal more about L2 speakers’ concerns and why metaphoric gestures increased from the L1 the L2 even though the other gesture types did not.

**Awareness of gesture is linked to cultural attitudes**

My second research question asked how aware of their gesture use advanced-level Spanish/English bilingual speakers are. I asked participants to guess in which interview language they believed they had produced more gesticulation. The number of participants who answered the L1 was equal to those who answered the L2. A smaller number believed they gestured the same amount in both interview languages. The interesting information this provides, however, is that gesture awareness may very well be linked to the cultural attitudes towards gesticulation.
Over half of the native English speakers guessed to have gestured more in the L2 interview, all being correct in their assumptions. Within the native Spanish speakers group, over half guessed to have used more gesture in the L1, all but two being incorrect in their assumptions. It would seem then that there are cultural differences in the attitudes towards gesticulation. When asked why they believed to have gestured more in the L2, almost a third of the L1ES participants reported it was because the culture in which they learned to speak it generally gesture more than their English speaking cultures in the U.S.

The responses from the L1SSs support these notions. Half of the native Spanish speakers reported to have gestured more in Spanish than in English. This implies a certain cultural perspective and attitude toward gesturing that seem to differ between linguistic cultures (i.e., Hispanics gesture more when speaking). Even the comments suggesting why L1SS participants thought to have used more gesticulation in the L1 suggest these attitude differences. Of the four varying response categories among the L1SSs to why they felt they gestured more in their L1, three referred to the perspective that speaking Spanish as a first language generally induces gesture (the categories being, “More comfortable,” “More confident,” and “Talk with hands generally”). Even though over half the L1SSs who reported they gestured more in their L1 were inaccurate in that guess and actually gestured more in their L2, the fact that they perceived themselves as gesturing more in their L1 due to their comfort, confidence, and language habits supports the native English speaker claim stated previously that an increase in gesture during the Spanish interview was a result of perceived cultural associations with gesturing.

In response to the question, “how aware are speakers of their gesticulation in the L1 and L2?” the data are inconclusive. Out of all the participants who answered this question with a definitive guess (i.e., in the L1, in the L2, or in both equally) rather than answering that they
were “unsure,” about half were correct ($n = 18$) and the other half were incorrect ($n = 15$).
Considering three were unsure and one did not even receive the question, the difference is negligible. The reasons for being correct or incorrect, however, tended to coincide with the attitudes generated from the native cultures of the participants. Further research should investigate the effect these attitudinal differences between cultures has on the acquisition of a second language should be considered. Further research could also focus on how these perspectives on gesture are acquired and how they change through second language learning and teaching strategies.

Limitations

Despite the care I took in designing this study, I observed limitations throughout its administration. Firstly, the study set out to describe gesture differences between the L1 and L2 among advanced-level bilingual speakers. As mentioned in Chapter 3, not all participants had reached an advanced proficiency level in the L2. Further studies that begin by evaluating each participant’s proficiency level would ensure results in L2 gesture production that are not skewed by possibilities of using gestural strategies due to a lower skill level in speaking in the L2.

Additionally, even though the L1SS participants seemed to have matched the L1ESs in proficiency, the time spent learning and speaking the L2 in an immersive environment differed between L1 groups. Assuming gesture production is related, in part, to cultural speech, participants who have spent between 18 and 24 months immersed in the L2 culture differ in their gesture production in the L2. It is suggested that future studies consider time spent immersed in the L2 culture as an important factor among all L1 groups.

The number of participants in the study also contributes to low generalizability. This study consisted of 37 participants, which was a limitation due to the time constraints. A similar
study performed on a larger scale with more flexible time constraints would allow for more
generalizable data. A variety of languages could also be examined through several identical
studies for further generalizability.

My personal experience working with gestures limited my ability to code accurately. This
limitation did not affect, in my opinion, the general quantities of gesture observed in each
interview, but did affect my identification of gesture types and gesture phases. With more
experience and training, a repeat of this study could allow for more qualitative observations of
the potential differences in gesture mismatching, the physical location of gesture production, and
the gesture phases between the L1 and L2.

Finally, I recognize the malformation of select debriefing questions that, if phrased
differently, could have yielded additional data. For example, I only asked the participants for one
moment during both language interviews in which they felt most comfortable. However, the
questions about anxiety and linguistic difficulty were divided into one moment per language
interview. Splitting the question about comfortability into one moment per language interview as
well may have provided more information to allow for easier interpretation of participant affect
and its effect on gesture production.

Another question that should be altered was “do you think you gestured more in the L1 or
the L2?” This question seems to coerce the participants into feeling like they must have gestured
more in one language or the other. In further studies following this design, I suggest asking the
question with three possible options: in the L1, the L2, or equally in both. Thus, the participants
may feel more comfortable choosing one of the various options instead of being unsure of which
to pick. It may also provide more accurate data on the personal and cultural perspective about
gesticulation.
Contributions

As mentioned in Chapter 2, there are few studies comparing gesture differences in first and second languages. This study adds to the existing body of research in the psychology of language acquisition and teaching.

In combination with the research presented in Chapter 2 on gesture in the L1, the data from the current study suggest that similar processes are occurring in the L2. This study has shown the probability that intermediate- and advanced-level L2 speakers, like L1 speakers (Nobe, 2000), produce more gestures during descriptive tasks. As concepts become more difficult to conceptualize in L1, gesture also becomes more frequent (Alibali, Kita, & Young, 2000; Hostetter & Alibali, 2004; Melinger & Kita, 2007). This same pattern seems to continue in the L2 amongst the speakers tested. Additionally, this study provides insight into cultural attitudes towards gesticulation and their effects on L2 gesture production. Whereas gesture awareness is inconclusive, cultural perspectives of gesticulation are apparent. Previous studies have identified explicit cultural differences in gesticulation, such as the avoidance of using the left hand (Kita, 2009). This study suggests that certain cultural groups may implicitly produce more of one gesture type over another, such as metaphoric gestures.

In correlation with gesture acquisition studies, the current research suggests the possibility that L2 speakers acquire cultural idiosyncrasies with time immersed in the L2 and cultural attitudes. It seems that the L1ES group, having spent more time immersed in the L2 culture, may be acquiring more cultural patterns of the L2 (i.e., use of more metaphoric gestures in the L2) than the L1SSs, who collectively had spent significantly less time immersed in the L2 culture despite their proficiency. Nicoladis, Mayberry, and Genesee (1999) concluded that at two years old, gesture-speech patterns are formed and only become more complex as the child grows.
into adulthood. This study shows that the time it takes for these patterns to appear in the L2 take more time. Stam’s (2006) research showed this through gestures relating to verbs of motion, in which children in immersive school programs, despite their proficiency in the L2, were still producing gestures following L1 patterns. The current study suggests, then, that further studies mapping cultural gesture acquisition through time may reveal both increases in proficiency (Stam, 2014) and perceptions of L2 linguistic complexities.

One last contribution to this study relates to that of gesture acquisition in memory. Several L1 and L2 studies have mentioned the importance of embodiment and movement in memory and language acquisition (e.g. Asher, 1966; Macedonia & Knösche, 2011; McCafferty, 2002; Stevanoni & Salmon, 2005; Tellier, 2010). With the increased amount of gesture in the L2 that this study presents, I suggest that further investigations look into the connections that strategies such as TPR (Asher, 1966) and enactment (Macedonia & Knösche, 2011; Tellier, 2010) may have on the retention of those movements while L2 proficiency increases. In addition, comparative observations could be done in this same area between sequential bilingual and concurrent bilingual speakers.

In conclusion, the present study contributes to research regarding the factors involved in increased gesture production from the L1 to the L2 as well as factors involved in the processes of second language acquisition. Whereas this study only conclusively shows that L2 speakers gesture more in spontaneous L2 speech, it implies other important factors involved with L2 cognitive processes. Further investigation is needed in these specific areas in order to find solid conclusions that have merely been touched upon in this work.
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APPENDIX A: English Interview Guide/Script

Symbols:

- This symbol appears next to directive instructions for the data collector to follow. DO NOT read these instructions out loud. DO follow them specifically as described.

- This symbol appears next to the portions that should be read verbatim by the data collector. The font of these portions will be in italics.

ARRIVAL:

- If the participant is a native Spanish speaker, hand them the informed consent document and video release documents on the clipboard. Allow them a few minutes to read and sign. If the participant refuses to sign the document, thank the participant for his/her time and excuse him/her from the study.

- These are informed Consent and Video Release documents. Please read and complete the documents if you agree to the terms to continue with the study.

- Collect the video release document and start the audio and video recorders.

- Direct the participant into the room. Indicate where the participants may place their effects during the experiment. Invite the participant to sit in the chair without armrests in the back of the room.

ENGLISH INSTRUCTIONS:

- State the participant’s pseudonym (found on their folder) for the study and begin asking questions to help the participant be more comfortable speaking in front of the camera. Request that the participant respond in English. After about 3 minutes, lead the interview as follows. During the interview, you may respond to the participant with clarifying questions and with responses of affirmation or confusion (e.g. “mm-hmm”, “yeah”, “hmmm...”, “I don’t understand”, etc.).

- Let’s do a little role play for a minute. You are participating in a language exchange program in Cali, Colombia. One day, you decide to go out on a short trip. Because the weather has been rainy, the daughter of your hosts, Norma, has lent you an umbrella. On your way home, you realize that you have lost the umbrella. When you return home, Norma asks you if you enjoyed your trip. She also asks if you had to use the umbrella. Tell her about the umbrella, apologize for losing it, and offer to replace it with another.

- Respond in conversation-like manner after his/her response and ask if the participant likes to play games. During the interview, you may respond with clarifying questions and
with responses of affirmation or confusion (e.g. “mm-hmm”, “yeah”, “hmmm…”, “I don’t understand”, etc.).

- **Could you explain to me in detail how to play one of your favorite games, assuming I don’t know the game or how it is played?**

- Respond in conversation-like manner after his/her response and ask the participant about his or her hobbies. Lead the conversation to the following prompt. During the interview, you may respond with clarifying questions and with responses of affirmation or confusion (e.g. “mm-hmm”, “yeah”, “hmmm…”, “I don’t understand”, etc.).

- The following question should relate to the hobby spoken about in conversation.

- **Tell me about your favorite memory dealing with ________?**

- Thank the participant for sharing his/her experiences with you.
APPENDIX B: Spanish Interview Guide/Script

SPANISH INSTRUCTIONS (first interview):

- Comienza con preguntas simples al participante para ayudarle a sentirse más cómodo al hablar frente de una cámara. Pide que el participante responda a tus preguntas en el idioma en español. Después de 3 minutos, conduce la entrevista según los temas a continuación. Durante la entrevista, puedes responder al participante con preguntas de clarificación y con frases de afirmación o confusión (e.g. “mm-hmm”, “sí”, “hmmm...”, “no entiendo”, etc.).

  - ¿Podemos hacer un mini-drama? Es un(a) estudiante en un programa de estudiantes extranjeros en Cali, Colombia. Un día, decide hacer una excursión pero está lloviendo. La hija de los anfitriones, Norma, le presta un paraguas. En camino a casa, se da cuenta de que ha perdido el paraguas. Al llegar a casa, Norma le pregunta si se divirtió. También le pregunta si tenía que usar el paraguas. Dígale sobre el paraguas, pídale perdón por perderlo, y ofrézcale comprar otro para reemplazarlo.

- Responde a la respuesta del participante en más conversación y pregúntale si le gusta jugar juegos. Durante la entrevista, puedes responder al participante con preguntas de clarificación y con frases de afirmación o confusión (e.g. “mm-hmm”, “sí”, “hmmm...”, “no entiendo”, etc.).

  - Me podría enseñar con detalle cómo jugar uno de sus juegos favorito, suponiendo que yo nunca he escuchado de su juego favorito, ni sé jugarlo.

- Responda a la respuesta del participante en más conversación y pregúntale sobre sus hobbies. Durante la entrevista, puedes responder al participante con preguntas de clarificación y con frases de afirmación o confusión (e.g. “mm-hmm”, “sí”, “hmmm...”, “no entiendo”, etc.).

- La pregunta siguiente debe completarse según el hobby mencionado en conversación.

  - Cuéntame una memoria favorita en cuanto a ________?

- Agradecerle al participante por compartir sus experiencias contigo.
APPENDIX C: Debriefing interview Questions

- Reveal the purpose of gesture observation to the participant and remind him/her that they may rescind their consent to the study now that they have this new information.

- Discuss how this interview process may simulate the OPI in certain aspects and how it could serve as a reference point to the challenges the participant faces in preparing him/herself.

  - Do you consider yourself bilingual?
  - Are you right or left handed?
  - Do you think you used more gestures in English or in Spanish? Why?
  - At what point in the interview did you feel most comfortable?
  - When were the times of highest anxiety for you in English?
  - When were the times of highest anxiety for you in Spanish?
  - What was the most linguistically challenging part of the English interview?
  - What was the most linguistically challenging part of the Spanish interview?
  - Do you remember what kind of movements you did with your hands at any portion of the interviews?
APPENDIX D: Language Background Questionnaire

Instructions

Thank you for your willingness to participate in this study. Please complete the following questions truthfully and completely. All information will be kept confidential.

I. Personal Data

First Name

Last Name

Age

Biological Sex

Male

Female
e-mail address

Phone Number (so we may contact you in the case there are problems with your email)

Birthplace (city, state, country)

Did you serve an LDS mission?

YES

NO

In which mission did you serve?

In months, how long did you serve in that mission?

In what month did you return home from your mission?

Month

In what year did you return home from your mission?

Year
II. Personal Language History

At what age did you first begin to speak English?
Since birth
1-5 yrs old
6-11 yrs old
after age 11

Where did you first begin to speak English?
Home
School
Both Home and School
Mission

At what age did you first begin to speak Spanish?
Since birth
1-5 yrs old
6-11 yrs old
after age 11

Where did you first begin to speak Spanish?
Home
School
Both Home and School
Mission
What language did the following people use when speaking to you while growing up?

<table>
<thead>
<tr>
<th></th>
<th>only Spanish</th>
<th>mostly Spanish</th>
<th>both equally</th>
<th>mostly English</th>
<th>only English</th>
<th>other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal grandmother</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal grandfather</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paternal grandmother</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paternal grandfather</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If other, what language? (Mother)


If other, what language? (Father)


If other, what language? (Maternal Grandmother)


If other, what language? (Maternal Grandfather)


If other, what language? (Paternal Grandmother)


If other, what language? (Paternal Grandfather)


110
What language did YOU mostly use when speaking to your parents/caregivers while growing up?

English
Spanish
Mixed
Other

If other, what language?

What language did you use mostly when speaking with your siblings while growing up?

English
Spanish
Mixed
Other

If other, what language?

What language did your siblings mostly use when speaking with you while growing up?

English
Spanish
Mixed
Other

If other, what language?
What language did you use mostly when speaking with your friends while growing up?

- English
- Spanish
- Mixed
- Other

If other, what language?

Did you attend Daycare or cared for at home before the age of 5?

- Yes
- No

In what language were you mostly spoken to at daycare/home care?

- English
- Spanish
- Mixed
- Other

If other, what language?

What language did you use when speaking with your caregiver at daycare/home care?

- English
- Spanish
- Mixed
- Other
If other, what language?

III. Family History

Did any of the following people immigrate to the United States? If so, where from?

- Mother
- Father
- Maternal Grandmother
- Maternal Grandfather
- Paternal Grandmother
- Paternal Grandfather

What are the native languages of the following people?

<table>
<thead>
<tr>
<th></th>
<th>English</th>
<th>Spanish</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Grandmother</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Grandfather</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Paternal Grandmother</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paternal Grandfather</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If other, what language? (Mother)

If other, what language? (Father)
If other, what language? (Maternal Grandmother)

If other, what language? (Maternal Grandfather)

If other, what language? (Paternal Grandmother)

If other, what language? (Paternal Grandfather)

IV. School

IV. School

Where did you attend Elementary School? (city, state, Country)

What language did you speak to the following people during elementary school?

<table>
<thead>
<tr>
<th>school teachers</th>
<th>Only Spanish</th>
<th>mostly Spanish</th>
<th>both equally</th>
<th>mostly English</th>
<th>English only</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>siblings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
If other, what language? (School Teachers)

If other, what language? (siblings)

If other, what language? (Friends)

How many years of Spanish instruction had you had in elementary school?

Where did you attend middle school? (city, state, country)

Where did you attend high school? (city, state, country)

What language did you speak to the following people during middle and high school?

<table>
<thead>
<tr>
<th></th>
<th>Only Spanish</th>
<th>mostly Spanish</th>
<th>both equally</th>
<th>mostly English</th>
<th>English only</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>school teachers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>siblings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If other, what language? (School Teachers)
If other, what language? (Siblings)

If other, what language? (Friends)

How many courses/years of Spanish instruction had you taken in middle and high school?

College/University

What is your major?

What is your minor?

How many Spanish courses have you taken in college?

Which Spanish courses (or equivalents) have you taken at the university level? (Press "ctrl" and click to choose multiple courses)
V. Current Proficiency

What languages do you speak? Please rate yourself as a speaker of these languages with 1 = beginner, 2 = intermediate, 3 = advanced, 4 = native-like, and 5 = native speaker.

<table>
<thead>
<tr>
<th>Language</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>☐</td>
</tr>
<tr>
<td>Spanish</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>☐</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>☐</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>☐</td>
</tr>
</tbody>
</table>

If other (#1), what language?

If other (#2), what language?
Where do you usually speak and use each language? With whom do you speak each? Check all that apply.

<table>
<thead>
<tr>
<th>Language</th>
<th>At Home</th>
<th>At School</th>
<th>At Work</th>
<th>With friends</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td></td>
<td></td>
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<tr>
<td>Other</td>
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<tr>
<td>Other</td>
<td></td>
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</tr>
</tbody>
</table>

If other (#1), what language? (At Home)

If other (#1), what language? (At School)

If other (#1), what language? (At Work)

If other (#1), what language? (With Friends)

If other (#2), what language? (At Home)

If other (#2), what language? (At School)

If other (#2), what language? (At Work)
If other (#2), what language? (With Friends)

What language do you currently use in the following situations?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Only Spanish</th>
<th>Mostly Spanish</th>
<th>Both equally</th>
<th>Mostly English</th>
<th>Only English</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>I watch television/movies in...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I listen to music in...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I read magazines, books, newspapers, articles/information on the internet in...</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>At church, I speak...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At school with friends I speak...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At work with colleagues I speak...</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
APPENDIX E: Informed Consent

**Introduction**
This research study entitled “A Qualitative Analysis of Nonverbal Communication in Second Language Speech Output” will be conducted by Dustin Hemsath of Brigham Young University, which contributes to the completion of his master’s thesis, and advised by Dr. Michael Child, Ph.D. The purpose of the study is to investigate the differences in nonverbal communication used in a native language and in a second language. You are invited to participate because you are enrolled in a SPAN 321 course (or higher) and are more likely to speak Spanish and English fluently.

**Procedures**
If you agree to participate in this research study, the following will occur:
- You will be asked to fill out an online survey asking for personal, educational, and language background information that will take approximately ten (10) minutes.
- You will be sent an email with a link to available appointment times.
- You will be asked to set a thirty (30) minute appointment that best fits your schedule.
- At the appointment, you will be interviewed in both Spanish and English in an unknown order and you will be expected to answer in the same language the interview is conducted in.
- You will be asked to perform certain linguistic tasks during the interviews.
- You will be audio and video recorded for the entirety of the session, which recordings will later be transcribed for audio and visual.
- Each appointment will take place in the Humanities Learning Resources (HLR) located at 1141 JFSB.

**Risks/Discomforts**
Risks to you are minimal. You will be asked to make arrangements to attend the appointment you sign up for. This may result in class or personal schedule conflicts. However, you will be able to choose an appointment time that best fits your schedules according to the available appointments.

Due to the audio and video recording, you may feel uncomfortable moving and speaking, knowing that you are being recorded. The recording location will be a small room which may also cause some spatial discomfort. You may also feel self-conscious about your second language speaking abilities while speaking to a native speaker of that language. Each interviewer will allow some time for you to become comfortable with the situation. The interview will allow some time for you to become comfortable speaking with the recording equipment before asking you questions pertaining to the study.

The task prompts given in the interviews may ask you to be creative on the spot, which may give you some anxiety and cause hesitation. The interviewers understand this and will be patient while you think of your response. You will not be judged on speaking ability, fluency, or proficiency. The study is for observation only.
Benefits
There is no direct benefits this study will provide to you. You may, however, see value in the interviews. You may appreciate the practice of performing the tasks in the second language and view it as an assessment of your progress towards personal goals and towards the OPI (Oral Proficiency Interview).

Confidentiality
The results of this research may be presented at conferences throughout the United States. Thus, the results of this project will be coded in such a way that your identity will not be attached to the final forms of this study. The researcher retains the right to use and publish non-identifiable data. While individual responses will remain confidential, aggregate data will be presented representing averages or generalizations about the responses as a whole. All data will be stored in secure locations, either physically or digitally, accessible only to the researcher and his advisors through either a password (digital data) or key (physical data). Upon completion of the study, all information that matches you up with your responses will be deleted and unidentifiable information, including video and audio recordings, will be kept indefinitely and stored in a secure location.

Compensation
Each participant will receive a $10 gift card at the end of the interview process for participating in this study.

Participation
Your participation in this activity is completely voluntary. You have the right to withdraw your consent to be video and audio recorded and for your data to be used in the study at any time without jeopardizing class status, grades, or standing with the university.

Questions about the Research
If you have any questions regarding this study, you may contact Dustin Hemsath at (714) 381-9706 or elderdjh@gmail.com or Michael Child at michael_child@byu.edu for further information.

Questions about Your Rights as a Research Participant
If you have questions regarding your rights as a research participant, you may contact an IRB administrator at (801) 422-1461, irb@byu.edu or visit A-285 ASB, Brigham Young University, Provo, UT 84602.

Statement of Consent
I have read, understood, and received a copy of the above consent and desire of my own free will to participate and allow my data to be used in this study.

Name (Printed): __________________________  E-mail: _______________________

Signature: _______________________________   Date: _________________________
Video Release Form

As part of this project, I will be making video recordings of you during your participation in the research. Please indicate what uses of this video you are willing to permit, by initialing next to the uses you agree to and signing at the end. This choice is completely up to you. I will only use the video in the ways that you agree to. In any use of the video, you will not be identified by name.

_____ Video can be studied by the research team for use in the research project.
_____ Video can be used for scientific publications.
_____ Video can be shown at scientific conferences or meetings.

I have read the above descriptions and give my express written consent for the use of the video as indicated by my initials above.

Name (Printed): __________________________ Signature __________________________ Date: __________