Good hand, bad hand:

Correlations between gesturing hand and speech valence

Linea Brink Andersen

Supervisors: Prof. Jordan Zlatev, Ass. Prof. Erica Cartmill
Centre for Language and Literature, Lund University
BA Thesis, General Linguistics

September 2018

Abstract

There is general agreement that the body expresses emotion, and while there is research on the expression of emotion in so-called "body language" (e.g. facial expression, posture), only little research exists on the expression of emotion in hand gestures. Two previous studies (Casasanto & Jasmin, 2010; Kipp & Martin, 2009) found opposing patterns of correlation between the gesturing hand and the valence of the co-occurring speech, and this thesis aims to help fill the research gap with the help of two empirical studies, the first on gesture production and the second on gesture perception, both in relation to valence.

The first study analyses the handedness of gestures and valence of speech produced by three guests on the Tavis Smiley Show. For two of the three speakers it was found that gestures produced with the dominant hand tended to co-occur with positive speech, while gestures produced with the non-dominant hand tended to co-occur with negative speech, a pattern similar to that found by Casasanto and Jasmin (2010). No pattern of correlation was found for the third speaker.

The second study used an experiment to explore whether the handedness of gesture affect the valence ratings of co-occurring speech, using systematically varied video data of one-word utterances and pragmatic gestures. This study found some evidence that words co-occurring with gestures performed with the right hand receive higher valence ratings, while words co-occurring with gestures performed with the left hand receive lower valence ratings, with a larger effect for negative words than positive words.

In sum, this thesis supports previous findings of correlations between the handedness of gestures and the valence of speech in production, but also shows inter-individual variation and points out the need to consider demographic factors in future research. It found some evidence of the effect of handedness of gesture on the perceived valence of speech, but more research is needed, and should include left-handed participants and speakers to determine the pattern of correlation between handedness of gesture and speech valence.

Keywords: Body-specificity hypothesis, embodied cognition, emotion, gesture, pragmatic gestures, valence.

Acknowledgements

Writing this thesis have felt like a solitary activity at times, but I owe much gratitude to a lot of people who have helped shape this thesis and made the process of writing it enjoyable.

First, I would like to thank my main supervisor Jordan Zlatev, who introduced me to gesture studies through semiotics during my first semester of studying. Jordan has been an inspiring and engaging teacher throughout my years at Lund, and his joy of the field is contagious. I truly appreciate how he has welcomed us to participate actively in guest lectures and seminars at SOL, it has really enriched my studies. As a supervisor, Jordan has guided me through the process of writing this thesis, with a perfect balance of enthusiasm and pragmatism, despite the challenges of transatlantic communication.

A huge thank you, to Erica Cartmill, who has supervised the development of the experimental designs, data collection and annotations for this thesis. It has been a long process, and Erica has been encouraging and helpful, sharing her expertise at every step of the way, helping me calibrate my compass when I was getting off track.

Thank you also, to Joost van de Weijer, who helped with data analysis at a very short notice, and Kensy Cooperrider, who kindly shared the Tavis Smiley Corpus with me.

I have been inspired by the work of the members of Cartmill's gesture lab, and received great feedback on my own. I have enjoyed every geeky conversation and *fika* with my fellow linguistics students at Lund. Angelica and Thomas deserved so much more than cookies for their patience during the recording of stimuli. Thank you for your help, and your friendship. And to Christian, for great company on many long days at Powell library, and for helping me work through my data. The summer would not have been the same without you.

I would also like to thank everyone who took their time to participate in my study, and friends and family who helped me, by sharing it online.

Last, but not least, so much gratitude to my family. To Jon, who helped me edit the stimuli, and pulled me away from the screen for some fun adventures. My parents, who always have my back through everything. And Cody, who has supported me all the way. Thank you for bearing with me and cheering for me, thanks for cooking for me and caring for me. I love you.

Table of contents

List of Figures

List of Tables

List of Abbreviations

B-G: Both gesture (used for a gesture produced with both hands)

L-G: Left gesture (used for a gesture produced with the left hand)

PAD dimensions: Pleasure, arousal, and dominance dimensions

R-G: Right gesture (used for a gesture produced with the right hand)

Chapter 1. Introduction

When we speak, we often move our hands to produce a multimodal utterance (Kendon, 2004, 2014). The *co-speech gestures* produced by speakers[1] occur with great variation in form and function, one of which is to express *emotional valence*.[2] An analogous phenomenon is the expression of emotion in voice quality (Gobl & Ní Chasaide, 2003). In general, communication between people depends on more than the words we say. In spoken language, both gestures and the tone of our voice can contribute to the meaning of the utterance by, among other things, expressing a speaker's emotional state or attitude.

While research exists on the bodily expression of emotion in facial expressions (Schlosberg, 1952), eyebrows (Ekman, 1999), posture (Dael, Mortillaro, & Scherer, 2012), gait (Roether, Omlor, Christensen, & Giese, 2009), etc., only little has been done on the expression of emotional valence through gestures. The focus in the present thesis is the possible existence of correlations between the handedness[3] of gestures and the emotional valence of the co-occurring speech. Such have been reported in two previous studies, which, however, report opposing patterns of correlation, as reviewed in Chapter 2.

The aim of this thesis is to help address this research gap with the help of two empirical studies, the first on gesture production and the second on gesture and valence perception. In the first study, I investigate a number of interviews from a public television talk show. The guests' speech from these interviews was coded for valence, and the gestures produced during valenced speech was identified and coded for handedness. The second study employs a novel experimental design to test whether the hand of gestures affects listeners' judgements of the valence of co-occurring speech.

Thus, the following three research questions are addressed in this thesis:

- Does the handedness of a speaker's gesture systematically correlate with the valence of their speech?

[1] I use the word "speaker" in a multimodal sense, thus the person with this role may be speaking, gesturing, or both. Correspondingly for "listener".
[2] The concept of *valence*, informally, refers to how "positive" or "negative" something feels; see Section 2.1.2 for discussion.
[3] I use the terms *handedness*, *handedness of gesture* and *gesture-handedness* to refer to the fact that gestures can be performed with right or left hand. I use the terms *right-handed* and *left-handed* to refer to the dominant hand of speakers.

- If so, what is the pattern of correlation, i.e. which hand correlates with positive and negative valence, respectively?
- Does the handedness of a gesture affect the listener's perception of the valence of speech?

The structure of the thesis is the following. In chapter 2, I present theoretical background and prior research within the field and state my general hypotheses. Chapter 3 presents the first study, of the production of gestures, exploring the possible correlation between handedness and valence, addressing the first two research questions. In chapter 4, an experiment that studies the effect of the handedness of gestures on the perceived valence of speech is presented, addressing the third research question. I summarize the findings of the two studies jointly, conclude, and offer suggestions for future research in chapter 5.

Chapter 2. Theory, previous research and hypotheses

2.1 Definitions of key concepts

2.1.1 Gestures

In this section, I state the definition of *gesture* used in this thesis, following Andrén (2010) and Zlatev (2014, 2015). This serves the purpose of providing theoretical rigor and making this research comparable to other studies. Methodologically, it serves to specify which types of movements are not included in the operational definitions of gestures in the studies described in chapter 3 and 4.

According to Andrén (2010), a movement must reach a certain level of (a) communicative explicitness, (b) representational complexity, or both, to be considered a gesture. Zlatev (2015) summarizes and elaborates these levels formulating (a) in terms of communicative intent and (b) as an explicit sign in which "Expression E *stands for* object, action, property or event X" (Zlatev, 2015, p. 461). For example, a BYE-BYE hand gesture (in a Western culture) does not stand for, but enacts the interpersonal act of parting. However, it is clearly meant to be recognized by the addressee as such, and hence embodies communicative intent. This definition provides a "lower boundary" for gesture, which excludes simpler forms of "body language" such as postures and simple instrumental actions like reaching for desired objects. Andrén (2010) also defines an "upper boundary" between gestures and bodily movements that are highly complex and normative, by which the movements of signed languages like ASL or Swedish Sign Language can be distinguished from gestures.

Two additional constraints are required for the purpose of this thesis. Since it focuses on the handedness of gestures, only movements performed by arms/hands are considered. Further, since the research questions concern the correlation between the emotional valence of speech and the handedness of gesture, only gestures produced concurrently with speech, co-speech gestures, are included in the analysis.

Many different classification systems for gestures have been presented in the literature of gesture research, but most systems include categories of gestures used for pointing, representing objects and actions, and for structuring discourse (Kendon, 2004). Classifications of gestures into separate types can be useful for the purpose of scientific study, but it is important to stress that gestures can be multifunctional, taking on characteristics of multiple distinguished categories of gestures (Kendon, 2014; Zlatev, 2015). Three kinds of gesture may be classified based on their

predominant semiotic ground (Zlatev, 2015), together with a fourth kind classified based on its function in communication (Kendon, 2004).

Indexical gestures are proximity-based and include gestures of pointing and gestures bringing objects into attention. *Iconic gestures* are similarity-based and include gestures in which there is an aspect of similarity between the gesture and the represented object, property, action, or event. This includes gestures representing the size or shape of an object, the path of a movement, an action performed, etc. *Emblematic gestures* are based on conventionality, implying that they have a normatively regulated form, i.e. gestures that can be performed in a right and wrong way, such as waving goodbye or giving the thumbs up. Although some gestures of this kind may appear to be "arbitrary", this is not a requirement, as they often combine aspects of the previous two kinds of ground (see Zlatev & Andrén, 2009; Andrén, 2010; Zlatev, 2015).

Pragmatic gestures are used for structuring discourse (Kendon, 2004). These gestures do not share semantic content with the co-occurring speech, but are temporally aligned with speech (McNeill, 1992).

As pointed out above, gestures are multifunctional, as (a) it is possible for a gesture to be grounded in multiple coexisting semiotic grounds, where one ground may be predominant and (b) any one of these may also have pragmatic functions, making the definition given above not mutually exclusive. This is an important observation, since this thesis does not assume a specific type of valence-expressing gesture. Rather, it is proposed that the expression of valence can be one of the functions that a gesture can have, while also having other functions. In study 1, gesture types have not been identified in coding, in following with previous studies on the topic (Casasanto & Jasmin, 2010; Kipp & Martin, 2009). The gestures used as stimuli in study 2 may be regarded as predominantly pragmatic.

Gestures are often segmented according to a model proposed by Kendon (2004), who distinguished four phases of a gesture: *preparation*, *stroke*, *hold*, *recovery*. The *stroke* is defined as the part of the movement characterized by displaying most effort and a characteristic shape. The *preparation* is the phase of movement leading up to the stroke, and the *recovery* follows the stroke, and is characterized by relaxing or withdrawing the hand (Kendon, 2014, p. 112). In a *post-stroke hold* "the articulator is sustained in the position at which it arrived at the end of the stroke" (Kendon, 2014, p. 112), a phase potentially occurring between the stroke and recovery. These four phases can be combined into larger segments, a *nucleus*, a *gesture phrase* and a *gesture unit*, as shown in

Table 1. Only the stroke is a mandatory part of any of the three segment-combinations.[4] The nucleus is interpreted as the most meaningful part of a gesture, and multiple nuclei may occur in sequence, making up a gesture unit of multiple strokes (Kendon, 2004, p. 111).

Table 1. Gesture phases, following Kendon (2004)

<table>
<tr><th>Preparation</th><th>Stroke</th><th>Post-stroke hold</th><th>Recovery</th></tr>
<tr><td></td><td colspan="2">Nucleus</td><td></td></tr>
<tr><td colspan="3">Gesture phrase</td><td></td></tr>
<tr><td colspan="4">Gesture unit</td></tr>
</table>

2.1.2 Emotion and valence

If defining gesture is challenging, defining *emotion* is even more problematic (see Foolen, Lüdke, Racine, & Zlatev, 2012). Here, I present a theoretical framework on the expression of emotion that serves the purposes of the present thesis. According to this framework, the expression of emotions can be described along three dimensions. The theory is often ascribed to Osgood, Suci and Tannenbaum (1967), who proposed that while other factors may be relevant for emotional meaning, three dimensions: *evaluation*, *potency* and *activity*, are consistent factors in semantic ratings of various concepts such as BABY, FIRE, and MY IDEAL SELF (p. 77).[5] Participants rated concepts along 50 individual scales made up of adjective pairs such as "good-bad", "loud-small", and "bright-dark" (Osgood et al., 1967, p. 37). Factor analysis on the collected rating-data showed that the three dimensions, named after the fact, accounted for high degrees of variance between concepts, with degrees of magnitude decreasing from evaluation to potency to activity (Osgood et al., 1967, p. 72).

Prior to that, Schlosberg (1952) had shown that photographs of facial expressions of different emotions could be classified along two dimensions: *pleasantness/unpleasantness* and *attention/rejection*. Schlosberg (1954) introduced a third dimension of emotion: *activation*. This dimension was suggested to be reflected by blood-pressure, heartrate, breathing, hand steadiness, and tension in skeletal muscles, and most easily measurable through galvanic skin response (Schlosberg, 1954, p. 83). Schlosberg (1954) suggested that the two dimensions of facial expressions, along with

[4] However, McNeill (1992) has defined beat gestures as having two bidirectional movement-phases (e.g. up/down), but no stroke (p. 15), as is the case for two gestures used in study 2, illustrated in Figure 4 and Figure 6.
[5] Most concepts used as stimuli in this study were represented by words, primarily nouns, adjectives, and noun phrases. However, the authors use the term "concept" in a broad sense, meaning stimuli for the participants' rating, and state that the method also applies to pictures or Rorschach tests (Osgood et al., 1967, p. 77).

the bodily activation dimension, could be taken to be dimensions of emotional variation (p. 88). This theory combines judgements of facial expression with the measurement of physiological changes, not typically accessible for direct observation, which makes it unclear whether the theory is one of emotional expression or internal emotional state, or a combination of both.

Further, Russell and Mehrabian (1977) proposed that three dimensions, which they call *pleasure, arousal,* and *dominance* (abbreviated PAD) are necessary and sufficient to distinguish a wide range of individual emotional states. This claim was based on two studies of participants' judgements along the PAD dimensions, as well as a number of dimensions drawn from other theories of emotion (e.g. Izard, Bartlett, & Marshall, 1972; Johnson & Myers, 1967; McNair & Lorr, 1964). In one study, participants rated how they would feel in a described emotional situation. In a second study, participants rated words and phrases. Based on these ratings, Russell and Mehrabian (1977) concluded that the PAD dimensions could account for a wide range of individual emotional states, and that they were sufficient to distinguish the states from each other. The consistency in participants' ratings were highest for the pleasure dimension, followed by arousal and dominance.

More recently, Warriner, Kuperman and Brysbaert (2013) crowd-sourced judgements of emotional ratings of 13,915 words along three dimensions, which they called *valence, arousal,* and *dominance*. The authors found high interrater agreement of emotional rating of words, most consistently for valence, followed by arousal and last dominance. The dataset included words taken from prior datasets, e.g. Bradley and Lang's (1999) ANEW corpus which contained 1,034 words rated along the three emotional dimensions. Warriner et al. (2013) found a high degree of consistency in ratings between the two datasets, which further supports the finding that participants consistently judge words along the three emotional dimensions.

As can be seen, there is variation in the terminology used to define the three dimensions in the research presented above. Still, the categories appear to overlap, as, for example Warriner et al. (2013) define *valence* as being a measure of "pleasantness", *dominance* a matter of "control", and *arousal* one of "intensity" (p. 1191). However, the third category of *dominance/control* appears to differ from Schlosberg's (1952) initial *attention/rejection* dimension, which was defined as a matter of "openness to stimuli".[6] Such a category is not included in later research, and it is therefore placed in parenthesis in Table 2, to distinguish it from other dimensions in the column.

[6] Schlosberg's (1952) participants did in fact struggle to judge this dimension without receiving explicit instructions of physical indicators or image examples.

Table 2. Terminology of emotion dimensions across different publications

	Dimension 1	Dimension 2	Dimension 3
Schlosberg (1952, 1954)	Pleasantness/ unpleasantness	Activation	(Attention/rejection)
Osgood et al. (1967)	Evaluation	Activity	Potency
Russell and Mehrabian (1977)	Pleasure	Arousal	Dominance
Bradley and Lang (1999)	Valence	Arousal	Dominance/control
Warriner et al. (2013)	Valence	Arousal	Dominance

The studies discussed above have shown that participants rate a wide range of emotional stimuli consistently along the three dimensions summarized in Table 2, showing their applicability to scientific studies of the perception of expressed emotion. As mentioned above, multiple studies have shown that Dimension 1 is rated most consistently of the three dimensions (Bradley & Lang, 1999; Russell & Mehrabian, 1977; Schlosberg, 1952; Warriner et al., 2013), and Osgood et al. (1967) found that this dimension accounts for the highest degree of semantic variance. Since Dimension 1 has shown high levels of consistency in rating, and previous research has shown this dimension to correlate with the handedness of gestures (Casasanto & Jasmin, 2010; Kipp & Martin, 2009), the studies in this thesis focus on this dimension, which will be called *valence*, in keeping with recent research (Bradley & Lang, 1999; Warriner et al., 2013).

According to Schlosberg (1952), the dimension *pleasantness/unpleasantness* "needs no further explanation" (p. 230), and not much can therefore be said of his definition, apart from the name he gave the dimension. According to Osgood et al. (1967), the *evaluative* dimension is a cluster of scales such as:

> good-bad, beautiful-ugly, sweet-sour, clean-dirty, tasty-distasteful, valuable-worthless, kind-cruel, pleasant-unpleasant, sweet-bitter, happy-sad, sacred-profane, nice-awful, fragrant-foul, honest-dishonest, and fair-unfair (p. 36).

These scales all concern subjective evaluation where one end of the scale represents something "positive" while the other end of the scale represents something "negative". For Russell and Mehrabian (1977), "pleasure is a continuum ranging from extreme pain or unhappiness at one end to extreme happiness or ecstasy at the other end." (p. 274). For Bradley and Lang (1999), *valence* ranges "from pleasant to unpleasant" (p.1), while Warriner et al. (2013) define *valence* as "the pleasantness of a stimulus" (p. 1192), which they range from unhappy to happy. In the instructions given to their participants they state:

> [a]t one extreme of this scale you are happy, pleased, satisfied, contented, hopeful […]. The other end of the scale is when you feel completely unhappy, annoyed, unsatisfied, melancholic, despaired, or bored. (p. 1193).

As can be seen, some of these studies include a narrow definition of valence, which is based on specific emotions such as happiness, pain, etc., while others allow a broader definition, inclusive of subjective evaluation, e.g. of goodness, badness, etc.

A limit to the dimensional approach to emotions is that it does not relate measures of perceived emotion with measures of the actual emotional state of the individual expressing the emotion. This limitation is at least partly due to the fact that it is difficult to "measure" a person's emotional state. While it is possible to collect subjective reports of emotional state, this does not apply to the type of research that has utilized emotional dimension ratings, where the expressions of emotions have been studied in detachment from an individual experiencing the emotion. Stimuli in such studies have consisted of actors enacting the expression of an emotion (Schlosberg, 1952), concepts (Osgood et al., 1967), emotional scenarios (Russell & Mehrabian, 1977), or words (Russell & Mehrabian, 1977; Warriner et al., 2013), which have been produced and administered to participants for rating in written form, rather than being produced by people engaged in social interactions. Such methodologies mean that the obtained ratings of expressed emotions cannot be correlated with subjective reports of internal emotional states.

Still, this limitation is not damaging in the present context, since this thesis studies the possible correlation between gestures and the valence of speech, and the potential for gestures to affect the perceived emotional valence of the expression. It is therefore sufficient to focus on expressed emotion, without including data on the actual emotional state of the speaker.

2.2 Bodily expression of emotion

The study of so-called "body language" and the expression of emotion reaches back at least to Darwin (1872), and more recent research includes studies of the expression of emotion through facial expression (Schlosberg, 1952), eyebrows (Ekman, 1999), posture (Dael et al., 2012), and gait (Roether et al., 2009). Meanwhile, the expression of emotion in co-speech gestures produced with the hands has been rather understudied. This section reviews existing research on gesture and emotion, while research on handedness and valence is presented separately in section 2.3.

2.2.1 Emotion and gesture

Bolinger (1983) suggested that there exists a mapping between the vertical dimensions *up* and *down*, and the emotional state of the speaker, based on increase and decrease in physical tension. This mapping is supposedly reflected in parallel movements of tone of voice, as measured by F_0, and bodily movements including gestures, thus if F_0 moves up,[7] then face, corner of mouth, hand, shoulder, etc. will also tend to move up, if they are in motion. Bolinger (1983) suggested that upwards and downwards movements have attitudinal functions grounded in the up/down dimension as a mapping to GOOD/BAD. Such mappings are presented by Lakoff and Johnson (2003 [1980]) as *orientational metaphors*, which "arise from the fact that we have bodies of the sort we have and that they function as they do in our physical environment" (p. 14). Orientational metaphors allow for concepts to map on to a spatial orientation, as expressed in linguistic metaphors such as "I'm feeling up today" (Lakoff & Johnson, 2003[1980], p. 14), and possibly also in gestures.

However, Bolinger (1983) does not provide empirical support for this proposal, apart from a few examples for illustrative purposes. A hypothesis could be that the emotional valence of speech correlates with a bi-directional spatial orientation of gestures, namely movements up and down. If evidence confirms correlations between valence of speech and gesture features such as movement upwards or downwards, or gesturing with right or left hand, this would lend support to the general hypothesis that the embodied experience of existing and interacting with the world, systematically affects the organization of metaphors in general, and gestures in particular, in line with the proposal of Casasanto & Jasmin (2010), see section 2.3.

Dael, Goudbeek, and Scherer (2013) studied whether there are correlations between what they call "gestural arm movements"[8] and the three dimensions *arousal*, *valence*, and *potency*. They hypothesized that high/low *potency* would correlate with forceful/weak arm movement and expansive/contracted arm movement. Positive/negative *valence* was hypothesized to correlate with fluency/abruptness of movement and movements occurring at higher/lower location in space. High/low *arousal* was expected to correlate with abundant/few movements and speed of movement (p. 645). The stimuli used in the study were video clips of actors portraying 12 different emotions. In

[7] The "movement" of tone is not an actual movement, but a metaphorical expression used for an increase in frequency of F_0.

[8] Dael et al. (2013) did not limit the production of the speakers' movements and asked the participants to judge arm-movements without any constraint to the type of arm movements. No definition of "gestural" was included, and no illustrations or descriptions of the types of movements produced were given. It is therefore unclear if the movements studied would fall within the group of movements defined as gesture in section 2.1.1.

each portrayal the actor performed a script consisting of non-sense sentences (e.g., "ne kali bam soud molen", Dael et al., 2013, p. 645). The actors were instructed to portray a specific emotion in each clip, but were not given explicit instructions on how to perform this emotion or how to move their bodies. Participants rated six aspects of the actors' arm movements (frequency, speed, force, size, fluency, and height), as well as the perceived emotion along the three emotion dimensions (see section 2.1.2).

Participants' judgement of the emotion perceived in each video clip, confirmed the expected ratings and since they did not have access to the sound and the facial expression of the actor in the video clip, the authors argued that these ratings must be based on the actors' body movements. However, it cannot be determined if these judgements relied on the arm/hand movements, as other factors of bodily motions which have been shown to be expressive of emotion, such as posture, gait, etc. could also have affected the participants' ratings.

The authors found, as hypothesized, that arm/hand movements performed during the portrayal of high potency emotions were rated as more forceful and expansive than movements during portrayals of low potency emotions. Emotions with high arousal were portrayed with more abundant and fast hand/arm movements than emotions with low arousal. For valence, they found that movements were rated to be more fluent for emotions with positive valence than emotions with negative valence. However, arm/hand movements were not performed higher in space during performances of positive valence, as hypothesized. While this study did not find support for a spatial relationship between valence and gesture,[9] it does show that there are correlations between expressed emotions and gesture. One such correlation, which has been the topic of other research, is between valence and handedness, which is of special relevance for this thesis, and is thus further discussed in the next section.

2.3 Valence and handedness

As previously mentioned, the correlation between handedness of gestures and the valence of speech has been a topic of prior studies. Two of these, by Kipp and Martin (2009) and Casasanto and Jasmin (2010) studied the phenomenon with similar methodology yet reported opposite results. As these two studies have not previously been compared, this will be the purpose of the first half of this section,

[9] The feature up/down can be both static and dynamic., i.e. absolute location in relation to the body, and movement trajectories. Dael et al. (2013) included only the static aspect, asking their participants to judge the "vertical location of the arms compared to the person's body: low (close to the ground)/high (stretched up in the air)" (p. 646). Thus, these findings do not necessarily contradict Bolinger's (1983) hypothesis, which regards movement, i.e. trajectory.

where I also review the only published paper which has studied whether listeners are perceptive to systematic correlation between handedness of gesture and valence of speech. This correlation has been proposed to arise from our embodied experience of interacting with the physical world, as reviewed in the second half of this section.

2.3.1 Production and perception studies

Kipp and Martin (2009) studied possible correlations between features of gestures (palm-orientation, handshape, movement-direction, and handedness) and the emotional value of speech, encoded along the three PAD-dimensions (Russell & Mehrabian, 1977), but found correlation only between valence/pleasure and handedness. The researchers annotated features of gestures and the emotional values of speech[10] for two speakers, who were both right-handed. The speakers were actors playing the role of Willy Loman in two recorded versions of the play *Death of a Salesman*. Pleasure was encoded on the utterance level as "low", "neutral", or "high". Utterances were decomposed into smaller segments when expressing multiple emotional states (Kipp & Martin, 2009, p. 4). The definition of gesture used in the study is not explicitly stated, only that the researchers coded "the motion part of what the coder deemed to be a gesture" (Kipp & Martin, 2009, p. 4), rather than gesture strokes (see section 2.1.1 for definition). The handedness of gestures was coded as "right-hand", "left-hand", or "both-hands".

Kipp and Martin (2009) found that the speakers gestured more with their dominant hand during utterances rated as having low pleasure (in particular hostile speech, characterized by low pleasure, high arousal, and high dominance), and more with their non-dominant hand during utterances rated as having high pleasure (in particular relaxed speech, characterized by high pleasure, low arousal, and high dominance). They motivate this pattern with the fact that the dominant hand is used for fighting and therefore would be more active in gesturing during hostile speech, while by contrast, the non-dominant hand would be more active during non-dangerous, relaxed situations (Kipp & Martin, 2009, p. 6).

Casasanto and Jasmin (2010) took a similar approach in their study of valence and handedness in four American politicians' speech during presidential debates. However, their annotation scheme differs from that of Kipp and Martin (2009) in certain aspects. Casasanto and Jasmin's (2010) dataset includes speech produced by two right-handed and two left-handed

[10] It is not stated whether the coders had access to video or audio-only during the annotation of speech, which was performed in the ANVIL-tool.

presidential candidates, equally divided between the Republican- and Democratic party. They annotated the valence of the spoken language based on written transcripts, which were parsed into clauses. Valence was encoded as "positive", "negative", "neutral", or "indeterminate".[11] It is not specifically stated what definition of gestures was adopted in this study, but individual gestures were identified by their stroke. Gestures were encoded as "right-hand", "left-hand", or "both-hands".

The authors found systematic correlation between handedness of gestures and the valence of the transcribed spoken language. The speakers were found to gesture more with their dominant hand during speech with positive emotional valence and with their non-dominant hand during speech with negative emotional valence. The authors take this finding to support the so-called *body-specificity hypothesis*, which is further discussed in section 2.3.2.

Çatak, Açık, and Göksun (2018) have also studied the correlation between handedness and valence. However, their main focus was on the perception of gestures and valence, which is further discussed below. Participants in their production study watched videos of a person telling stories with different emotional valence. After watching the videos, participants were videotaped as they retold the story to the experimenter, which they were informed served to test their memory for the stories' content. In this study, the emotional valence of speech was not coded, but the production of gestures produced with right and left hand was correlated to the predetermined emotional valence of the story. The authors did not find a correlation between the emotional valence of the story and the gesturing hand, and they propose that this might be because participants were more focused on the details of the story than its emotional content, as they believed they were participating in a memory study. Another factor, which the authors do not discuss, is that participants were retelling events that had not occurred to themselves, thus, they may not have a strong emotional relation to the story.

Casasanto and Jasmin (2010) suggest that it is possible that listeners perceive the systematicity between handedness of gesture and emotional valence of speech, and that it might affect their perception of the speaker's emotional state. Çatak et al. (2018) are the only authors who have reported a study exploring this possibility, using eye-tracking methods. The researchers recorded short video clips of a person telling stories, which had been constructed and rated with positive and negative emotional valence. Each video clip contained two gestures produced with right hand, left

[11] The intermediate category was applied to clauses of ambiguous or mixed valence. Only clauses rated to be "positive" or "negative" was of interest to the further study.

hand, and both hands, respectively. The time participants spent watching each half of the screen was recorded, as a measure of time spent watching each hand.

No support was found for the prediction that viewers would spend more time watching one hand over the other as an effect of the valence of the story.[12] Apparently, the authors expected that the viewer would be focusing on a certain hand depending on the valence of the story. However, it seems more reasonable to expect that participants would spend time watching the side of the screen where a hand is actually moving. Since the videos in the study included an equal number of gestures produced with each hand during each video, it is unsurprising that participants spent an equal amount of time watching each side of the screen, regardless of the valence of the story.

2.3.2 The body-specificity hypothesis

The body-specificity hypothesis, proposed by Casasanto (2009), states that people systematically associate their dominant side with positive emotions and their non-dominant side with negative emotions. This means that the association differs between people who are right-handed and people who are left-handed, as supported by the gesture production study by Casasanto and Jasmin (2010). The effect is proposed to arise from the embodied experience of interacting with the world, where the experience is taken to be more pleasant or fluent with one's dominant hand, and opposite for one's non-dominant hand (Casasanto, 2009).

Evidence for the body-specificity hypothesis has been found by Casasanto and colleagues in a number of studies utilizing a particular task. This was subsequently named the "Bob-task." In this experiment, a character (Bob), is displayed on a piece of paper. The participants are asked to place two objects (e.g. animals) in two boxes to the right and left of Bob, respectively. Participants are informed that Bob likes one of the objects and dislikes the other object. In early versions of the task, Bob was shown as a line-drawn character, with his nose pointing forward (away from the participant, i.e. the participants and Bob shared the left/right dimensions). Participants (both right- and left-handed) in this study were shown to place the "good" animal (i.e. the one that Bob likes) in the box on their dominant side, and the "bad" animal in the box on their non-dominant side at rates above chance (Casasanto, 2009).

However, in face-to-face interaction, which is where gestures most often occur, our conversation partner is mirrored, i.e. our right is their left. Kominsky and Casasanto (2013) designed

[12] Analysis of both-handed gestures only, showed some relation between the time spent watching each half of the screen and the valence of the story.

a number of experiments to discern whether participants take Bob's perspective when answering the Bob-task, thus placing the "good" animal to his dominant side, or if this placement is egocentric, placing the "good" animal to the participant's own dominant side. They found that when Bob was drawn as facing the participants, i.e. his nose was pointing towards the participants, a small majority of the participants (all right-handed), would place the "good" animal to Bob's right, i.e. the left side of the paper from their perspective. This effect was larger when the drawing of Bob was replaced with a photograph of a person.

In order to determine whether participants took Bob's bodily characteristics into considerations when assigning the values "good" and "bad" to the right and left side, Kominsky and Casasanto (2013) repeated their experiment, with photos of Bob, in which he was wearing a sling on either right or left arm. This study showed that people considered Bob's fluent hand according to his sling, and the majority of participants placed the "good" animal in the box on the side where Bob did not have an arm in a sling.

Casasanto and Chrysikou (2011) performed a study which supports the theory that body-specificity arises due to specific embodied experience, as opposed to a long-term consequence of having a dominant hand. They found that naturally right-handed patients with weakness or paralysis in the right side of their body, causing them to function as left-handed, performed as naturally left-handed individuals in the original Bob-task, i.e. placing the "good" animal to Bob's, and their own, left, while participants with the same damage to their left side, thus remaining right-handed, placed the "good" animals to Bob's, and their own, right. They also showed that short intervals of disfluency to healthy participants' dominant side, could create a shift in preference. Healthy participants were asked to solve a meticulous motor-skill assignment while wearing a bulky glove on one hand. Naturally right-handed participants who wore the glove on their right hand, performed the original Bob-task with results like left-handers, placing the "good" animal to their, and Bob's, left side, which had been their most fluent side during the motor-skill assignment.

2.4 Summary and general hypotheses

This chapter provided a definition of gesture, which is used in the studies presented in chapter 3 and 4. In short, for the purpose of this study, gestures are arm/hand movements co-occurring with speech, and displaying high levels of communicative explicitness, representational complexity, or both (Andrén, 2010; Zlatev, 2015). The review of previous research showed that (the expression of) emotional content can be estimated along three recurrent dimensions: *valence/pleasure*, *dominance*

and *arousal* (see Table 2). In studies of participant judgements of various stimuli (facial expressions, emotional situations, concepts, and words), it was shown that the emotional content was judged consistently along these three scales, with valence judgements being most consistent.

There is general agreement that emotions are expressed through our bodily movements, yet not much research has been done on the expression of emotion through gestures. Bolinger (1983) proposed that the valence of speech correlates with vertical trajectories in gesture, but no empirical support for this hypothesis have been presented. Dael et al., (2013) have shown that participants' judgements of features of hand/arm movements produced while expressing different emotions correlate with the expressed emotion's placement along the three emotional dimensions. This finding suggests that features of gesture may vary systematically depending on the expressed emotion, and that participants are perceptive to this difference in movement quality, at least when explicitly instructed to rate it.

Handedness is a feature of gesture that has been shown to correlate systematically with valence in two separate studies (Casasanto & Jasmin, 2010; Kipp & Martin, 2009). However, the two studies found opposite patterns. Kipp and Martin (2009) found that two right-handed actors gestured more with their dominant hand during speech with low pleasure, and with their non-dominant hand during speech with high pleasure, while Casasanto and Jasmin (2010) found that American politicians gestured more with their dominant hand during speech with positive valence and with their non-dominant hand during speech with negative valence. A third study by Çatak et al. (2018) found no systematic relation between pleasure/valence and handedness, but as discussed in section 2.3.1, this may have been affected by the study's methodology.

Both Kipp and Martin (2009) and Casasanto and Jasmin (2010) propose the systematicity they found to be based on embodied cognition. Kipp and Martin (2009) explain their findings with the fact that their right-handed participants fight with their right hands, which would therefore be associated with low pleasure. They do not discuss whether they assume that all individuals tend to fight with their right hand, or rather with their dominant hand, but since they did not include left-handed participants, we do not know whether their results would be similar or mirrored for left-handed individuals. Casasanto and Jasmin (2010) take their results to support the body-specificity hypothesis (Casasanto, 2009), according to which the embodied experience of human interaction in the world is lop-sided, i.e. people have a dominant and a non-dominant side. The authors suggest that listeners may be perceptive to the systematic mapping between handedness and valence, but it is still an open question whether this is the case.

This thesis aims to help fill the gaps in previous research, and proposes two hypotheses, to be addressed in the following two chapters.

- *Hypothesis 1: The handedness of a gesture correlates systematically with the valence of the co-occurring speech, which can follow one or more of the following patterns:*

a) Positive valence correlates with dominant hand, negative valence correlates with non-dominant hand;
b) Positive valence correlates with non-dominant hand, negative valence correlates with dominant hand;
c) Positive valence correlates with right hand, negative valence correlates with left hand;
d) Positive valence correlates with left hand, negative valence correlates with right hand.

This hypothesis is tested against a null hypothesis stating that there is no systematic correlation between the handedness of a gesture and the valence of the co-occurring speech.

Of the four correlation patterns, (a) is supported by Casasanto and Jasmin (2010). Since Kipp and Martin (2009) did not include left-handed speakers in their data, their results could either support pattern (b) or (d). Patterns (a) and (b) are consistent with the theory of embodied cognition which states that the pattern is dependent on our embodied experience of the world, which varies for right- and left-handed individuals. However only (a) is consistent with the body-specificity hypothesis, at least as stated by Casasanto (2009).

- *Hypothesis 2: The handedness of gestures affects the listeners' perceived valence of spoken language.*

This hypothesis has not previously been tested, but relies on the research on participants' consistent judgement of words along the three emotional dimensions (see section 2.1.2 and Table 2). If there is a systematic correlation between handedness and valence, then performing gestures with either the right or left hand while uttering the same spoken expression may be hypothesized to affect the perceived valence. Specifically, it is hypothesized that speech produced together with a gesture by the hand correlating with negative valence is judged as having lower valence than the same speech produced together with a gesture by the hand correlating with positive valence. The null hypothesis would be that valence ratings will not increase or decrease in correlation with the handedness of the co-occurring gesture.

Chapter 3. Gesture production and valence (Study 1)

3.1 Introduction

A study was conducted to explore whether there is a systematic correlation between handedness of gestures and the valence of co-occurring speech in production data. The main question was, if any of the patterns of correlation found in previous studies (see Hypothesis 1, section 2.4) occur in a new type of data, which consists of dyadic talk show interviews. The present data includes both female and male speakers, unlike the studies by Casasanto and Jasmin (2010) and Kipp and Martin (2009), who only used male speakers. Otherwise, the study largely follows their methodology to allow for comparison with these studies.

3.2 Materials

The speech and gestures analyzed were produced by three individual speakers, guests on separate episodes of the public television talk show *The Tavis Smiley Show*. The speakers were drawn from a subset of the guests from the Tavis Smiley Corpus (Cooperrider, 2014).[13] Image searches were conducted on Google, looking for images of the guests writing by hand, in order to determine their dominant hand. Guests for which none or only one picture was found were excluded (6 individuals). Furthermore, guests who were actors by profession were excluded (3 individuals). After exclusion, five guests remained (3 right-handed, 2 left-handed). However, one guest (left-handed) was excluded, as his right hand was out of view of the camera for the majority of the conversation. Another guest (right-handed) was excluded as she produced only three utterances with positive valence during the interview. Information about the three speakers included for analysis is given in Table 3.

[13] I thank Kensy Cooperrider for sharing this corpus with me.

Table 3. Speaker information

Speaker number	Dominant hand	Profession	Gender	Age	Name	Main topics of interview	Air-date
1	Left	Singer	Female	58	Natalie Cole	Family, disease, drug addiction, music.	21/11/08
2	Right	Athlete (Basketball)	Male	38	Alonzo Mourning	Career, sports-injury, religion	09/10/08
3	Right	Author	Female	53	Anne Lamott	Religion, politics	21/03/08

3.3 Method

3.3.1 Annotation of spoken language

Speech produced by the guest in each conversation was transcribed from audio using ELAN 5.0, a software for multimodal annotation of multimedia (Wittenburg, Brugman, Russel, Klassmann, & Sloetjes, 2006). Speech produced by the host of the talk show, Tavis Smiley, was not transcribed or analyzed for the purpose of this study. Transcriptions included filler-words such as "uh", repetitions of words and false starts of words or sentences. The transcripts are given in Appendix A.

Subsequent analysis of the spoken language was performed on the transcribed speech following the methodology of Casasanto and Jasmin (2010). Transcriptions were segmented into clauses,[14] which gave rise to challenges, e.g. how to treat incomplete sentences where the speaker changes topic or restarts a sentence halfway during a sentence. In the transcriptions, abrupt fragments were included as part of following segment if the interruption was deemed to be a reformulation of the interrupted fragment, while fragments that were deemed to be unfinished due to the speaker abandoning the utterance were coded as separate from the following segment. Lists of subordinate clauses, containing a verb each, were segmented as individual clauses, which enabled the coding of valence for each item on the list individually, as shown in example (1), from Speaker 3.[15]

[14] Casasanto and Jasmin (2010) segmented the spoken language into clauses, while Kipp and Martin (2009) segmented speech into utterances, for which they did not give a theoretical definition.
[15] This follows the method of Kipp and Martin (2009) of splitting up utterances of mixed valence, but in the present study it was only done for lists.

(1) but [uh] the right to life and prolife ought to mean | that we don't kill people either | that we don't support capital punishment | that we don't expect people to live on garbage | /and-that/ we don't force women to have a child | to bring a child to term | and then refuse to give her any money to help raise that child.

Clauses were annotated for their valence with one of five labels: “negative”, “positive”, “neutral”, “indeterminate”, and “formalities”. The annotator (myself) had access to the full transcript during annotation, i.e. all clauses were read in the context they appeared in. The “indeterminate” category was applied to clauses with mixed or ambiguous valence (Casasanto & Jasmin, 2010), which differs from the methodology of Kipp and Martin (2009), where annotators split utterances with mixed valence into smaller units of single valences. The “indeterminate” category was also applied to unfinished utterances, since it was not possible to determine their valence. The “formalities” category was used for clauses included in the beginning and end of conversations such as thanking the conversational partner, as these parts of a conversation are highly conventionalized and socially expected, and thus may not reflect true valence. A broad definition of valence (see section 2.1.2.) was used for the categories “positive” and “negative”, and clauses which had neither “positive”, “negative”, “mixed”, or “indeterminate” valence was coded as “neutral”.

3.3.2 Annotation of gestures

Gesture annotation was performed in ELAN, and only those segments of video during speech that had been annotated as “positive” or “negative” were annotated for occurrences of gesture. During these segments of speech, hand movements which expressed communicative intent, served as explicit signs, or both (section 2.1.1) were highlighted and coded for the handedness of the gesture, i.e. “right”, “left”, or “both”. While the individual phases of the gesture were not annotated, it was ensured that each annotation contained only a single stroke, and that the stroke occurred during the utterance of valenced speech while preparation or retraction phases for a gesture were allowed to occur before or after the segment of valenced speech. Given the low number of speakers (due to the selection criteria), only descriptive statistics were performed in the analysis of the data.

3.4 Results and discussion

Segmentation of the spoken language resulted in 503 individual clauses, of which 239 were annotated as valenced (47.5 %).[16] Of these, there was a higher occurrence of clauses with positive valence (60.2% of valenced clauses) than negative valence. Forty-four gestures were produced with the left hand, and 86 with the right during valenced speech. Figure 1a-c shows the distribution of gestures produced during valenced speech for each of the three speakers.

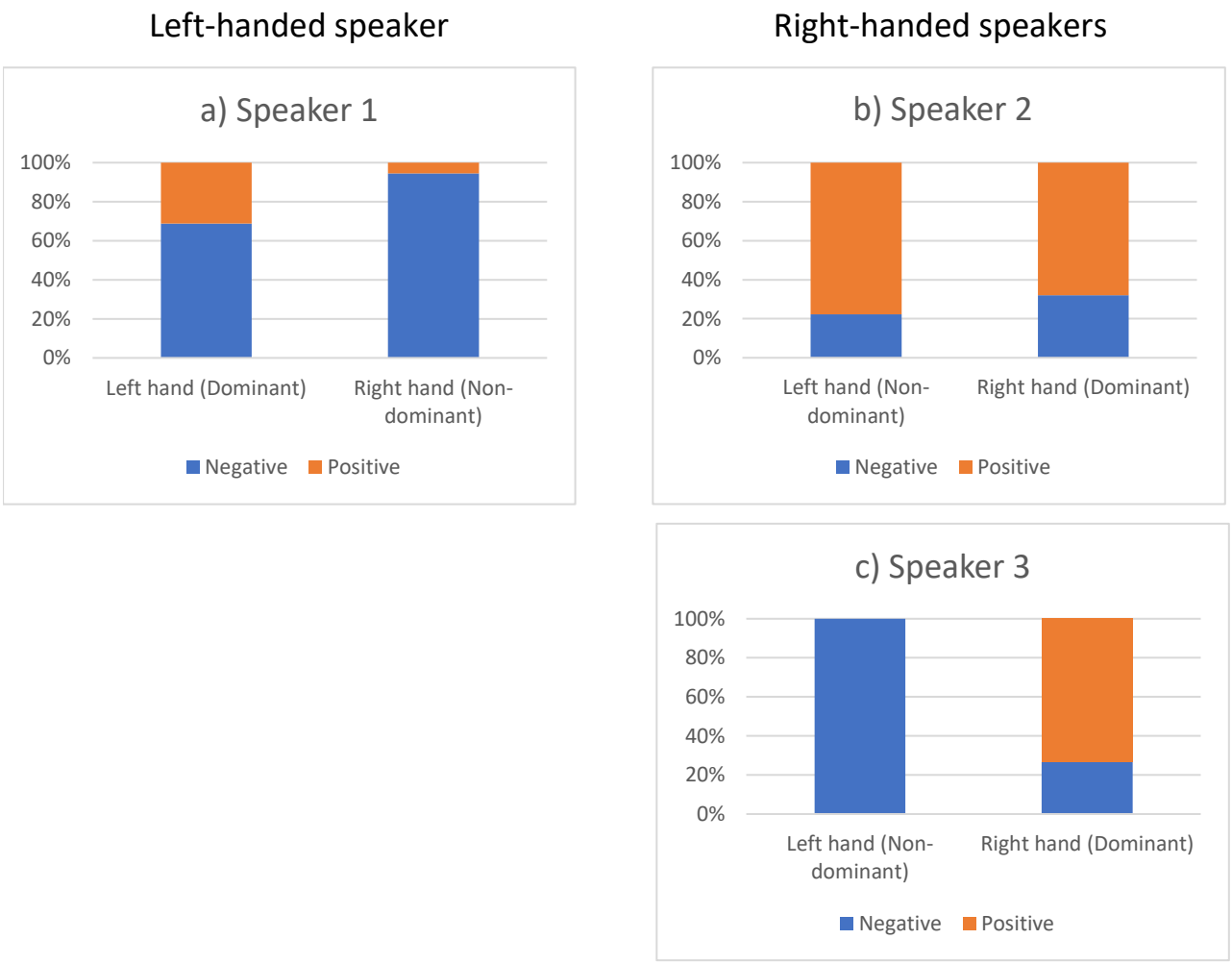


Figure 1a-c. Distribution of gestures produced during valenced speech for the three speakers

As seen in Figure 1, Speaker 1 and especially Speaker 3 displayed a pattern similar to the one reported by Casasanto and Jasmin (2010), i.e. for those speakers, gestures performed with the dominant hand tend to occur during speech with positive valence, while gestures with the non-dominant hand tend to co-occur with speech with negative valence.

[16] This compares to Casasanto and Jasmin (2010) who found 44% of clauses to be valenced. Kipp and Martin (2009) did not report this data.

However, there was only a small difference in the distribution of gestures for Speaker 2 (differing in gender, age, and occupation from the others, see Table 3), who displayed a slight tendency to gesture more with the dominant hand during speech with negative valence, and with the non-dominant hand during speech with positive valence, which is similar to the pattern found by Kipp and Martin (2009). During gesture annotation, it was observed that Speaker 2 gestured more frequently than the other speakers, often performing long gesture units with multiple strokes. Therefore, reanalysis was performed, annotating gesture units performed with the right and left hand[17], respectively, rather than individual strokes. As can be seen in Figure 2a-c, when correlating the handedness of gesture units with the valence of the co-occurring speech, all three speakers displayed the same pattern of correlation, performing more gesture units with the dominant hand during speech with positive valence, and with the non-dominant hand during speech with negative valence, although the difference between the two hands is quite marginal for Speaker 2. However, this way of annotating resulted in fewer data-points than when annotating individual strokes, and since the study is based on a limited dataset, the results should be taken with reservation.

[17] In the annotation of gesture units, it was decided to split a unit into two separate entities if during the unit the speaker went from performing gestures with one articulator (I.e. right or left hand), to performing gestures with two articulators (i.e. both-handed gestures). No units were recorded in which the speaker changed from producing gestures with right hand to left hand (or vice versa) during a unit. One case occurred in which a one-handed gesture unit spanned over both a positively and negatively valenced clause, and this unit was counted twice (once for the positive clause and once for the negative clause). Several cases of units spanning a valenced and a neutral/indeterminate clause were recorded, and these were counted as one occurrence during valenced speech.

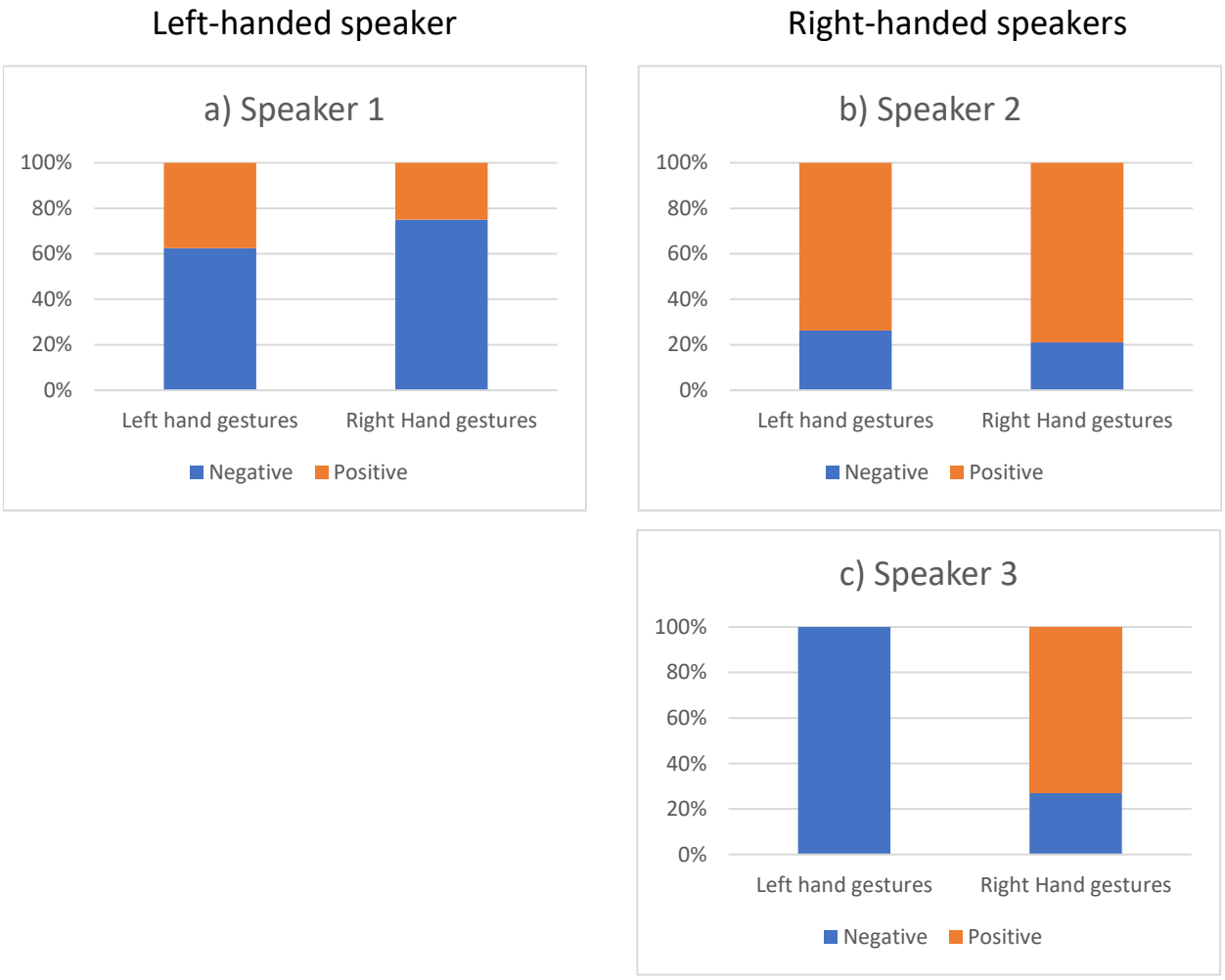


Figure 2a-c. Distribution of gesture units produced during valenced speech for the three speakers

3.4.1 Other factors

As discussed in section 2.3.1, Kipp and Martin (2009) reported the correlation between pleasure and handedness to be especially strong in the case of "hostile" and "relaxed" emotions, which differ not only in their level of pleasure (valence), but also in their level of *arousal*, with hostility being characterized by high arousal, while relaxation is characterized by low arousal. In their study, arousal did not separately correlate with handedness, but an interaction between the factors arousal and pleasure was seen to correlate with the handedness feature of gesture. A later study has shown that videos of actors portraying emotions with high arousal were rated as performing a higher number of hand/arm movements, and vice versa for videos of portrayals of low-arousal emotions (Dael et al., 2013). In the present study, it was the case that Speaker 2 produced many more gestures (1.3 gestures pr. valenced clause), than Speakers 1 and 3 (0.3 and 0.2 gestures pr. valenced clause, respectively), which may indicate a higher degree of arousal.

It should be noted that existing research on handedness and valence (Casasanto & Jasmin, 2010, Kipp & Martin, 2009) is based on small and homogenous groups of participants; politicians and actors respectively, and perhaps it is less surprising that the authors find that their participants follow the same pattern of correlation (though different across studies). The current study includes participants with various professional backgrounds (singer, author, and athlete), and finds that the athlete does not follow the same pattern as the two other speakers, who both share similarities with the participants included in previous studies.[18]

Similarly, all participants in previous research have included older males (age 47-72),[19] while this study included two female speakers (age 53-58), and a slightly younger male speaker (age 38). The two female speakers showed a similar pattern of correlation as Casasanto and Jasmin's (2010) male participants, suggesting that their body-specificity hypothesis may extend to both males and females. Meanwhile, the younger speaker did not show a strong pattern of correlation between the handedness of gestures and the valence of speech. While the low number of participants in this study make it impossible to determine if occupation, gender, and age are factors that influence the correlation between handedness and valence, it stresses the need for future research to include larger and more diverse groups of participants to determine any possible influence of demographic factors such as age and occupation, as well as possibly cultural background, educational level, etc.

3.5 Summary

This study tentatively confirmed hypothesis 1, pattern (a) for the two female speakers (speaker 1 and 3), while it was inconclusive for speaker 2 (male). It is possible that different levels of arousal may influence the correlation between the gesturing hand and valence, as more gestures may be produced during sentences with high levels of arousal than low levels of arousal. Future studies should explore this possible correlation by annotating speech for both valence and arousal. Similarly, it was suggested that future studies include larger and more diverse groups of participants to be able to account for any possible influence of demographic factors such as gender, age, occupation, cultural background, educational level, etc.

[18] Speaker 1 has acting experience ("Natalie Cole", n.d.), while speaker 3 is a public speaker and political activist ("Anne Lamott", n.d.)

[19] Age of participants: Cobb 55, Hoffmann 48 (Kipp & Martin, 2009). Bush 58, Kerry 60, McCain 72, Obama 47 (Casasanto & Jasmin, 2010). The ages of the participants for Kipp and Martin (2009) are approximate, calculated based on the release of the plays, not the time of recording.

Chapter 4. Gesture and valence perception (Study 2)

4.1 Introduction

Previous research has shown systematic correlations between the valence of speech and the handedness of co-occurring gestures in production. However, only one study has previously explored the perception of this systematicity (Çatak et al., 2018). In this chapter, I present an experiment that uses systematically varied video stimuli to study whether the handedness of gestures affects participants' valence ratings of co-occurring utterances, consisting of a single word, addressing Hypothesis 2 (see section 2.4).

4.2 Materials

The stimuli consisted of 40 videos of speakers uttering a single English word while producing a pragmatic gesture (see Section 2.1.1) with either their right hand (henceforth R-G for right-gesture) or their left hand (henceforth L-G for left-gesture). Ten word-pairs (i.e. 20 words in total), consisting of one word with positive valence and one word with negative valence, were selected from a dataset of English words rated for valence, arousal and dominance along 9-point scales (Warriner et al., 2013) (see Appendix B). Positive words were selected from words with a valence rating of 7-8, and negative words were selected from words with a rating between 2-3. Thus, the words were clearly "positive" and "negative", but not belonging to the extreme ends of the valence scale. The two words in each word-pair were selected to match for valence,[20] frequency of the word,[21] and part of speech.[22] Furthermore, the average number of syllables (1.9) was balanced for the lists of words with positive and negative valence respectively. The positive words had a higher average arousal rating than negative words (0.59 difference).

Four predominantly pragmatic gestures were selected for the stimulus of this study. These gestures were selected to appear as natural as possible, while being easy to produce consistently and repeatedly with both the right and left hand. These kinds of gestures were used since they do not share

[20] A match of valence was defined as an equal distance from the neutral rating (5) for both the positive and the negative word. A margin of 0.1 was allowed in matching, thus a positive word with a distance of 1.8 and a negative word of 1.9 from neutral were considered a match for valence.
[21] Frequency data from a dataset of the 5000 most frequent lemmas of the Corpus of Contemporary American English (COCA) was used (Davies, 2008). Free dataset retrieved from: http://www.wordfrequency.info. Words were considered as matching for frequency if there was a difference of 600 of less between their frequency ranking.
[22] Four pairs of adjectives, four pairs of verbs, and two pairs of nouns.

semantic content with the co-occurring speech, allowing for the same gestures to occur with multiple words in the stimuli. The four gestures are illustrated in Figure 3, 4, 5, and 6.

As discussed in section 2.1.1, gestures can be categorized based on their *primary* semiotic ground, or function. However, depending on context, what is taken to be primary may differ for the same gesture. For example, Gesture 3 could be taken to be iconic if it occurred with the word *chop*, and if gesture 4 was oriented towards an object, it could be taken to be deictic.

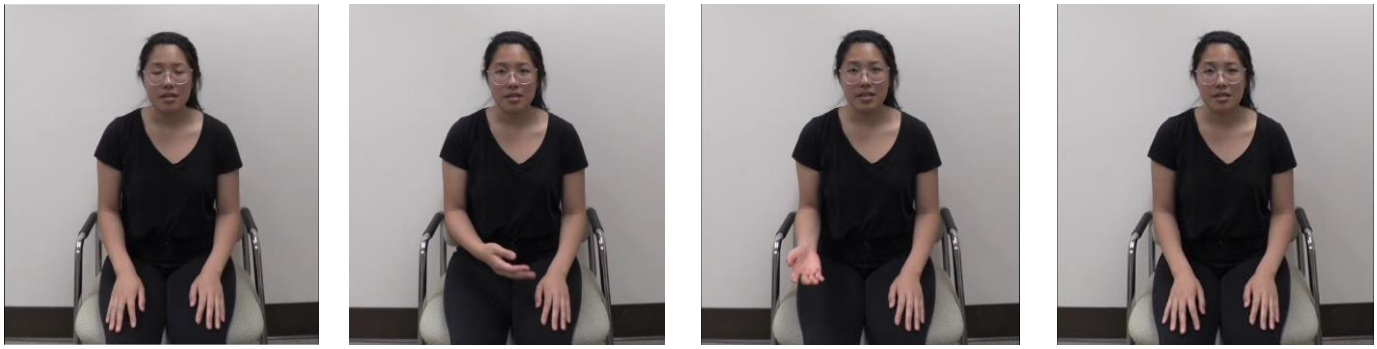


Figure 3. Gesture 1 - Horizontal sweep

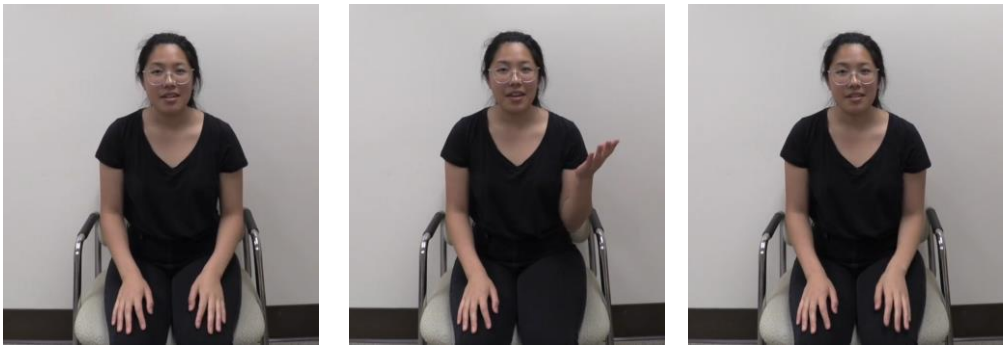


Figure 4. Gesture 2- Side palm

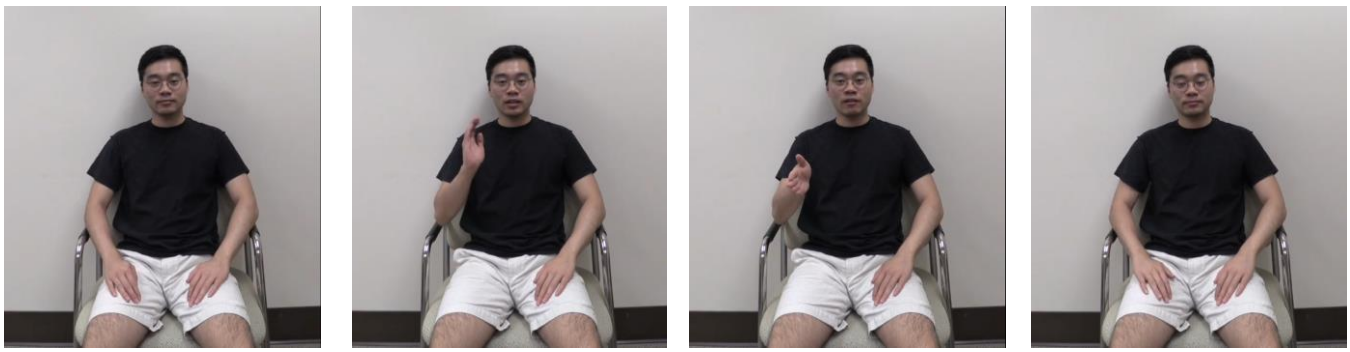


Figure 5. Gesture 3 - Vertical chop

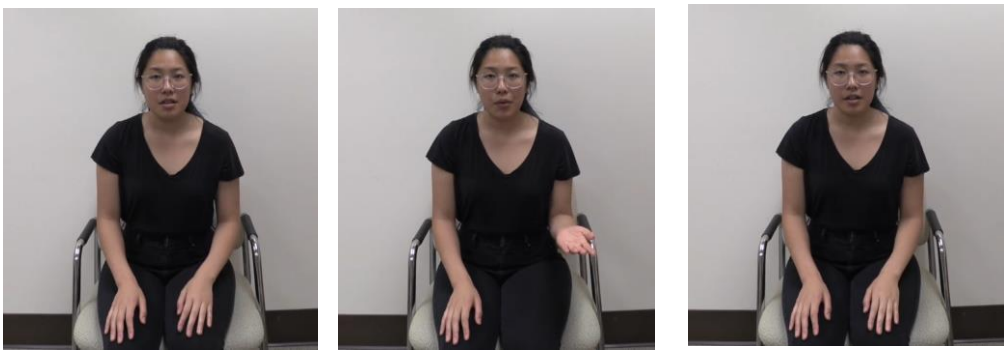


Figure 6. Gesture 4 - Forward palm

Two additional words were included to control for the participants' attention to the stimuli. With these words, speakers produced two-handed gestures (henceforth B-G for both-gesture), which are illustrated in Figure 7.

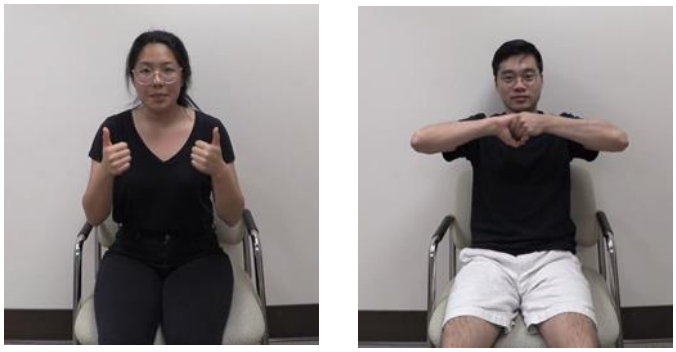


Figure 7. Control gestures

Speakers were one male and one female student from the University of California, Los Angeles, both right-handed. The speakers were recorded against a white wall, wearing neutral clothing and seated in a chair with armrests. Speakers were instructed to keep a neutral tone of voice and maintain the same pronunciation for each word as much as possible. They were given correcting instructions during recording if a gesture was produced differently with the right and left hand, or if pronunciation differed noticeably between each repetition. Speakers were instructed to keep a neutral facial expression, and to produce the gestures from a consistent place of rest, e.g. their lap.

For each word, two different gestures were recorded, and the speakers repeated the word and gesture multiple times. After recording, one gesture produced with the right hand and one gesture produced with the left hand was selected for each word, ensuring that each of the gestures and the pronunciation of the word were as identical as possible for both conditions. For each word-pair, the same type of gesture and the same speaker was selected. During selection, it was found that the consistency of both speech and gesture across conditions was highest for the female speaker, who

was thus selected for 14 of the 20 word-pairs. No attempt was made to balance the occurrence of each type of gesture, as focus during selection was to ensure similarity between the conditions for each word.

The stimuli were divided into two test-sets, each list containing 10 words in the R-G condition (5 positive, 5 negative), and 10 words in the L-G condition (5 positive, 5 negative), see Table 4. All participants saw the same 20 words, but half of the participants saw the word in the R-G condition, while the other half saw the same word in the L-G condition. Both lists included the two control-condition videos (B-G). The words were presented in a pseudo-random order that was kept the same for both lists.

Table 4. Subgroups of words with positive and negative valence for experimental conditions.

Valence	**Positive**		**Negative**	
Word-group	**P1**	**P2**	**N1**	**N2**
Words	Shine Enjoy Pizza Colorful Confident	Thank Sing Helpful Bake Talented	Boring Mad Guilt Lie Punish	Depressed Uncomfortable Fail Disagree Threaten
Average valence (Warriner et al., 2013)	7.55	7.57	2.52	2.50
Difference	0.02		0.02	
List 1 conditions	L-G	R-G	R-G	L-G
List 2 conditions	R-G	L-G	L-G	R-G

4.3 Participants

Participants were recruited by sharing the link to one of two online surveys (containing test-set 1 or 2, respectively) with friends and family from the United States,[23] who were in turn encouraged to share the link by email or social media. 30 participants completed the survey (17 for list 1, 13 for list 2) and consented to have their data included in the study. 26 participants self-reported as right-handed

[23] Friends or family who were familiar with the topic or hypotheses of the thesis were not invited to participate, but some shared the link with friends or family of their own.

and reported usually using their right hand to operate their computer mouse or trackpad. Four participants, who self-reported as left-handed or ambidextrous, were excluded from analysis, as previous research on the correlation between produced gestures and the valence of speech suggests that a participant's dominant hand might influence their association between horizontal side and valence (Casasanto & Jasmin, 2010; Kipp & Martin, 2009; Chapter 3 this thesis). There were not enough participants who self-reported as left-handed to test if valence-ratings from left-handed participants differed systematically from those of right-handed participants.

Ten more participants were excluded from analysis. One participant reported to have completed the survey on a smartphone, despite explicit instructions only to participate on tablets or computers. This exclusion was necessary, as the rating scale was displayed vertically on smartphones, which means that the positive and negative ends of the rating-scale were not placed to the participants right and left side.[24] While all participants self-reported to be fluent in English, one reported to have learned English after the age of 10, and was therefore excluded from analysis to ensure comparability between the participants. Additionally, eight participants' data was excluded based on anomalies in their ratings or their answers to the control questions testing their attention to the stimuli. These exclusions are further discussed in section 4.5.1. Ratings provided by 16 participants (eight per list) were thus finally included in the analysis.

As a consequence of the collection method, the two participant groups were not homogenous, as older participants received the link to list 1, while younger participants received the link to list 2. See Figure 8 for the age distribution of participants included for analysis.

[24] In a reaction-time study using valenced words, it was found that participants only had a faster reaction time to positive and negative words when the right and left side was actively contrasted (de la Vega, De Filippis, Lachmair, Dudschig, & Kaup, 2012).

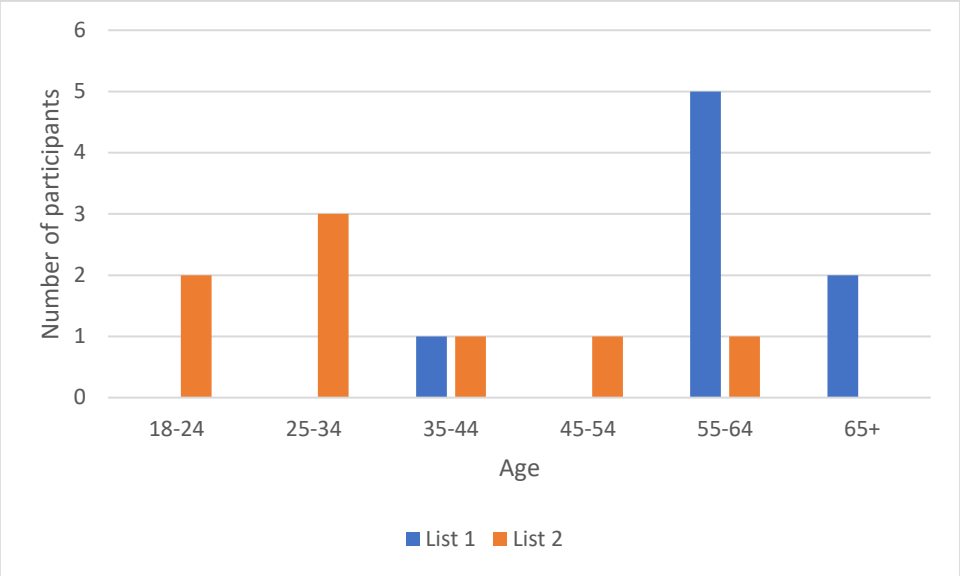


Figure 8. Distribution of age of the participants of list 1 and 2

More participants identified as female than male, which may also be a consequence of who were sharing the links for the study (List 1: 5 female, 2 male, 1 other. List 2: 5 female, 3 male).

4.4 Procedure

The study was run online, using SurveyMonkey[25] to collect responses from participants. Responses were collected between August 8th, 2018 and August 12th, 2018. During recruiting and instructions, the study's interest in gestures was not disclosed to participants, who were informed that the study was interested in the valence of spoken words.

The survey began with an informed consent sheet (see the survey in Appendix C). Participants who consented were given instructions to rate the valence of the word in each video ("By valence, we mean how positive or negative a word makes you feel"). They were informed that questions would test their attention to the videos afterwards.

The 22 videos (approximately 2 seconds each) were presented one by one, together with a rating scale (see Figure 9), with positive placed to the participants' right and negative at the participants' left, consistent with the mapping between dominant hand and positive found by Casasanto and Jasmin (2010).[26] Participants progressed through the survey at their own pace, but were instructed not to spend too much time and to go with their first feeling when rating. It was possible for participants to play back each video an unlimited number of times, but once a page was

[25] SurveyMonkey Inc. San Mateo, California, USA. www.surveymonkey.com
[26] It was expected that the right hand would be the dominant one for the majority of the participants.

left by clicking “Next”, participants were not able to go back and change their ratings to previous words.

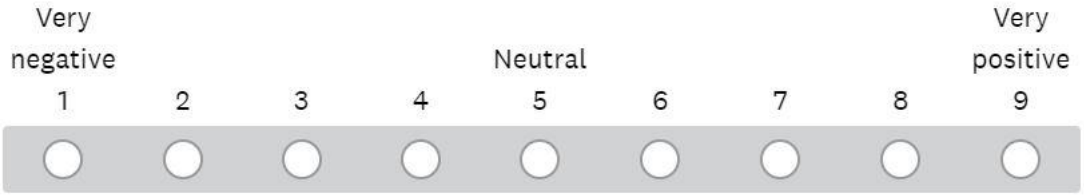


Figure 9. Valence rating scale used in Study 2

To control that participants had been paying attention to the videos, they were shown four still-images of the speakers performing two-handed gestures, two of which had been included in the stimuli. Participants were asked to indicate which gestures they had seen by checking a box next to the images. Participants also answered which hand they thought to be the dominant hand of each of the two speakers. Finally, they answered demographic questions about gender-identification, dominant hand, hand used for computer manipulation, fluency and age of acquisition of English, and age.

The survey concluded with a debriefing page explaining about the study’s interest in gestures and including information about why this had not previously been disclosed. Participants were asked to reconfirm or withdraw consent for their data’s inclusion in the study.[27]

4.5 Results and Discussion

4.5.1 Data cleaning

As previously mentioned, data from eight participants was removed during data cleaning before commencing data analysis. No participants answered incorrectly to the control questions, but four participants (3 for list 1, 1 for list 2) failed to identify one (out of two) of the both-handed gestures. All missing answers were to the female speaker’s “thumbs-up” gesture, which was presented earlier in the experiment than the male speaker’s both-handed gesture. The lack of correct identification may therefore have been a memory issue, but given the simplicity of the control assignment and the high number of participants who correctly identified the two gestures, the data from the four participants was excluded from analysis.

[27] No participants withdrew their consent after the debriefing, but two participants failed to reconfirm, and their data was excluded from analysis.

For each word, it was noted if a participant's rating belonged to the opposite end of the valence-scale than the word's original valence rating (Warriner et al., 2013). For words selected as negative, ratings between 6-9 were marked as opposite, for words selected for positive valence, ratings between 1-4 were marked as opposite. Warriner et al. (2013) similarly cleaned their data for such answers, but rather than remove opposite ratings, they reverted them, arguing that the rating-scale was likely to have been flipped by the participant (p. 1193). This was not done in the present study, as it would have risked misinterpreting the participants' intent. Data from participants who provided a high number (between 3 and 6) of opposite ratings, were excluded from analysis (two per list). Opposite ratings from the remaining participants were removed from analysis (9 opposite ratings, 6 for list 1, 3 for list 2), but the participant's remaining data was included.

4.5.2 General valence ratings

Participants who saw list 1 (henceforth Group 1) and participants who saw list 2 (henceforth Group 2) provided relatively similar average valence ratings for the 20 words, as seen in Table 5, and their ratings compare to the original valence ratings for the 20 words obtained by Warriner et al. (2013): 4.94.

Table 5. Average valence ratings for the 20 words for the two groups (one per list)

	Group 1	**Group 2**
Average valence for the 20 words	4.92	4.82

However, it was found that the ratings provided by the two groups differed in strength, with Group 2 rating positive words more positively, and negative words more negatively (on average), than Group 1, as seen in Table 6. This was the case for 18 of the 20 individual words (see ratings in Appendix B).

Table 6. Average valence ratings for positive and negative words

	Positive	**Negative**
Group 1	6.31	3.53
Group 2	6.82	2.78
Difference	**0.51**	**0.75**

The difference between the two groups' perception of the strength of the valence is also reflected in the distribution of their ratings, which is shown in Figure 10. The ratings provided by

Group 1 centralize around the center of the scale (4-6) closer to a neutral rating, while the ratings by Group 2 are distributed across the scale, with more ratings occurring at both extremes.

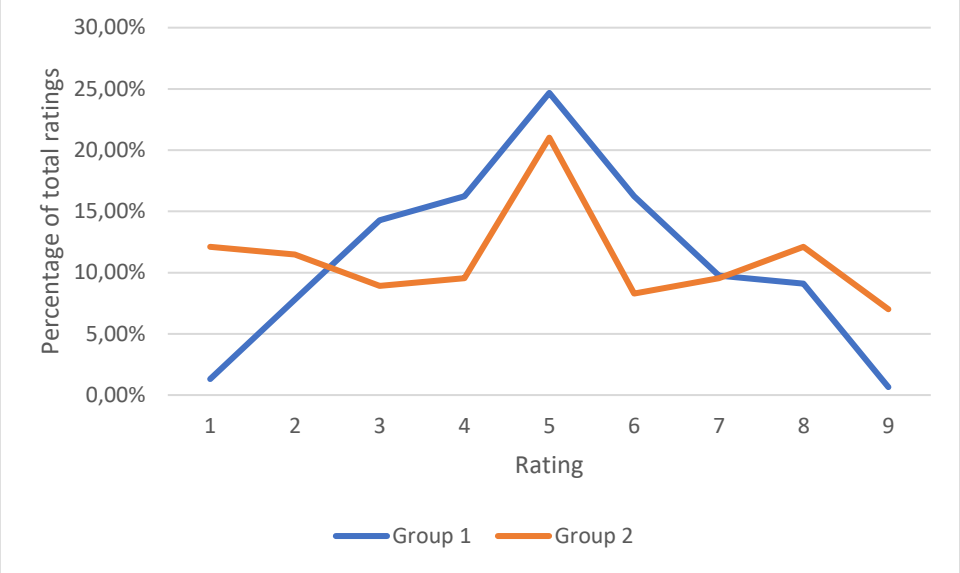


Figure 10. Distribution of ratings along the valence scale for Group 1 and 2

Given the difference in age distribution between the two groups of participants (see Figure 8), I tested whether age as a factor correlated with the difference in ratings between the two lists. Warriner et al. (2013) found that younger participants (age 16-29) rated words slightly, but significantly, higher than older participants (age 30-87). However, reanalysis of the valence-ratings for the 20 words selected for this study, showed no difference between the two age-groups.[28]

To further explore the effect of age, participants in Group 2 were divided into a younger group (age 18-34, 5 participants) and an older group (age 35+, 3 participants) for comparison.[29] As seen in Figure 11, the younger participants rated negative words as more negative than the older participants, while positive words were rated similarly. When looking at the distribution of ratings for the two age-groups (see Figure 12), it is seen that the younger participants' ratings are distributed quite evenly along the rating scale, while the older participants tend to rate words more neutrally (5), which was also the tendency for the participants of list 1, who were all above the age of 34.

[28] 4.92 average valence rating by younger participants, 4.94 by older participants, 0.02 difference.
[29] It was not possible to divide the participants in Group 1, as all were above the age of 34, and seven out of eight was 55+, allowing no meaningful age division for this group.

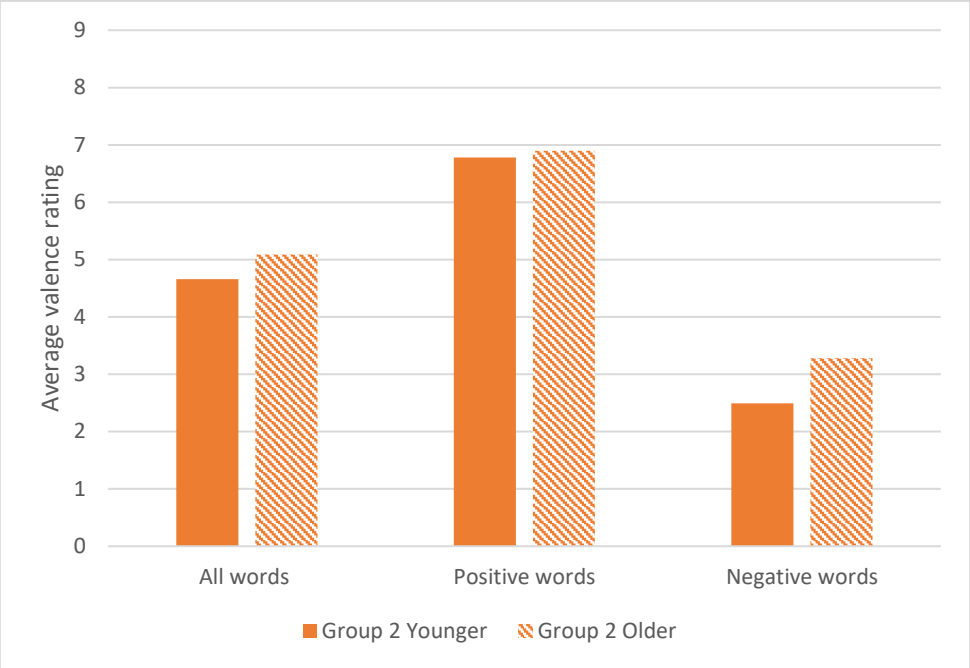


Figure 11. Average valence ratings for younger and older participants of Group 2

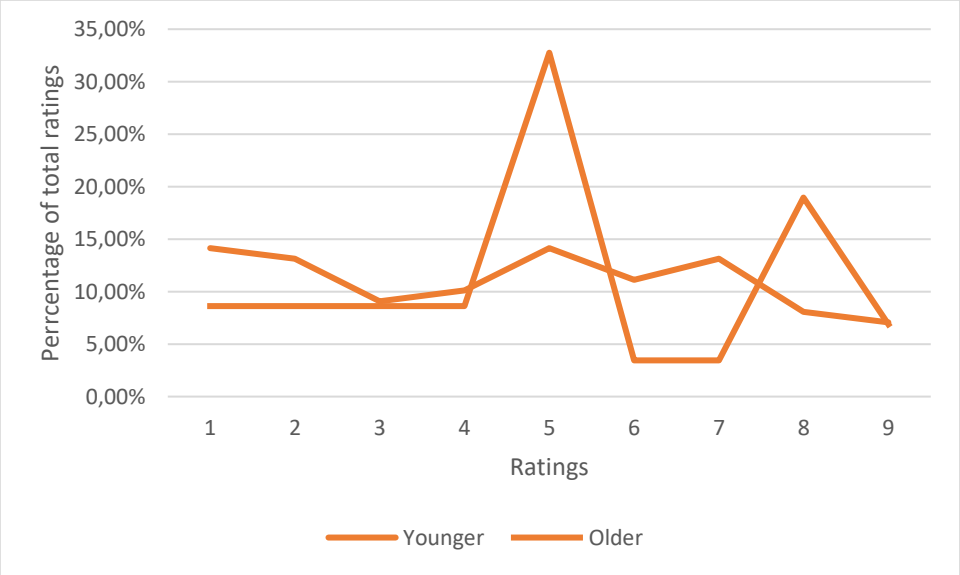


Figure 12. Distribution of valence ratings by younger and older participants of Group 2

4.5.3 Effect of handedness on valence

The ratings for positive words in the R-G and L-G conditions, respectively, and the negative words in the R-G and L-G conditions, respectively (see Table 4), were combined, and the two conditions for each valence were compared (See Figure 13). It was found that negative words co-occurring with gestures produced with the left hand were rated as more negative than negative words which co-occurred with gestures produced with the right hand. For positive words, there was only a small difference in the ratings of each handedness condition. Casasanto and Jasmin (2010) discussed the

possibility that the effect on perceived valence may only occur for the left hand and negative valence (in right-handed speakers), as they perform fewer gestures with the left hand overall, which could potentially make the correlation more salient to perception.[30]

A statistical analysis (mixed effects regression with random intercepts for words and subjects) showed that the effect of word valence was significant (*EST* = 3.406, *SE* = 0.209, *df* = 17.680, *t* = 16.335, *p* = 0.000), but not the effect of handedness (*EST* = 0.194, *SE* = 0.142, *df* = 276.410, *t* = 1.367, *p* = 0.173), or the interaction between handedness and valence (*EST* = -0.140, *SE* = 0.285, *df* =275.340, *t* = -0.491, *p* = 0.623).

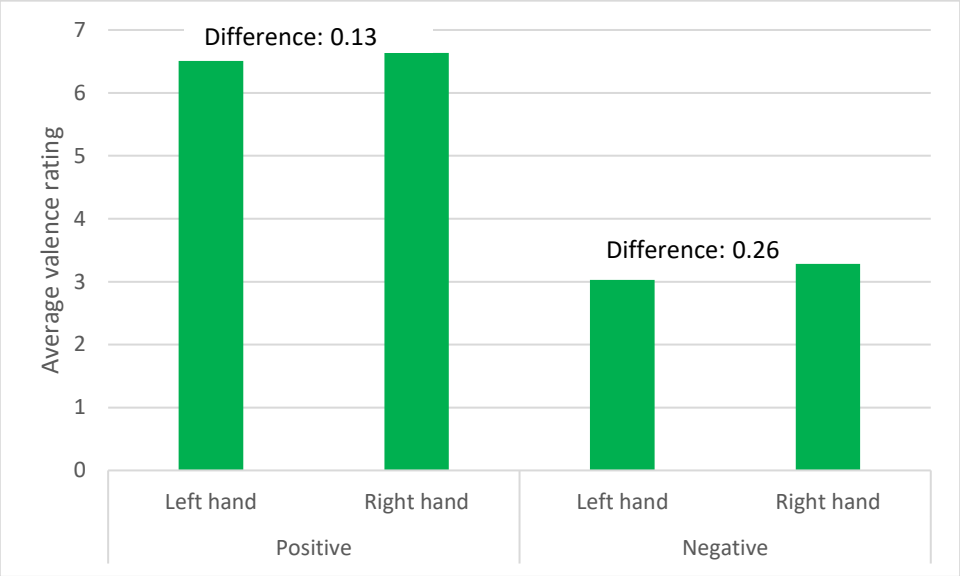


Figure 13. Comparison of valence ratings for the two handedness conditions

Given the substantial age difference between the participants in the two age groups (see Figure 8), and the differences in their patterns of rating (see Figure 10), the above analysis was repeated for each of the groups separately. Figure 14a shows that the ratings differed only slightly between the two handedness conditions for each valence in Group 1 (0.13 difference for positive words, 0.17 difference for negative words). However, as seen in Figure 14b, Group 2 rated positive words in the R-G condition as more positive than positive words in the L-G condition (difference 0.36), and negative words in the L-G condition more negative than negative words in the R-G condition (difference 0.63), which matches the correlation between gestures with the dominant hand and positive valence and gestures with the non-dominant hand and negative valence reported by

[30] It should be noted also, that negative words (6.57 average valence, 1.57 distance from neutral) were rated as slightly stronger valenced than positive words (3.15 average valence, 1.85 distance from neutral) Thus, the distance from neutral was 0.27 larger for negative than positive words, and given the possibility that the effect of handedness is greater for words of stronger valence (see section 4.5.4), this may be a confounding factor.

Casasanto and Jasmin (2010). Statistical analysis for the two groups separately, showed that the effect of handedness was not significant in Group 1 (*EST* = -0.148, *SE* =0.206, *df* = 17.721, *t* = -0.717, *p* = 0.483), but it was marginally significant in Group 2 (*EST* = 0.500, *SE* = 0.249, *df* = 16.558, *t* = 2.003, *p* = 0.062). The observed effect was larger for the negative words, which may again be caused by the overall fewer number of gestures being produced with the left hand by right-handed speakers, making the correlation between negative valence and gestures produced with the left hand more salient.[31]

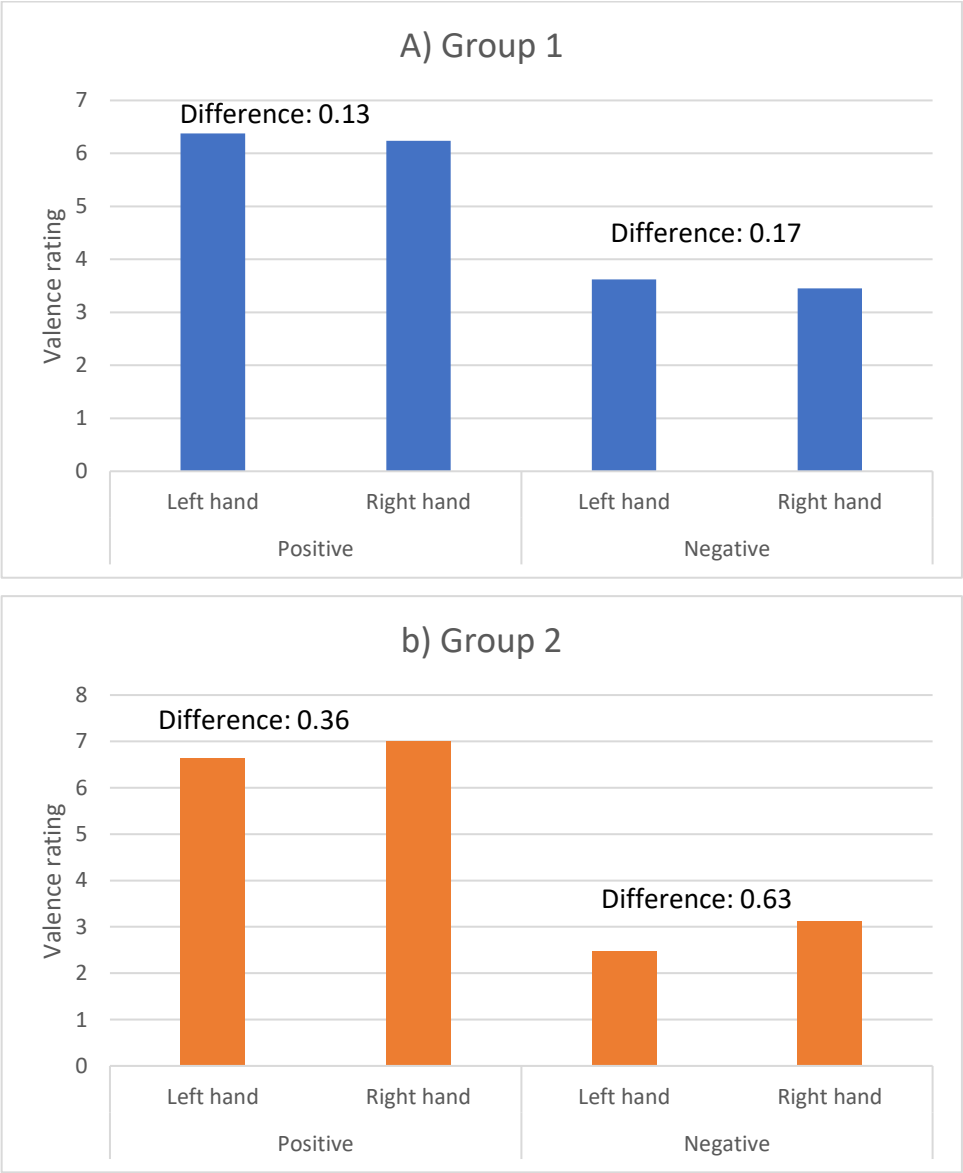


Figure 14a-b. Within-group comparison of average valence ratings by handedness conditions

[31] However, as for the combined analysis, Group 2 rated the negative words (average valence 2.78, 2.22 distance from neutral) as having a stronger valence than positive words (average valence 6.82, 1.82 distance from neutral). 0.4 difference in distance from neutral. See footnote 30

The observed effect of the handedness of gesture on perceived valence of speech for Group 2 is not large, and overall positive words were still perceived as positive and negative words were perceived as negative regardless of the handedness of the co-occurring gesture. This implies that the handedness of a gesture is not able to drastically alter the valence of the co-occurring speech, but the result does suggest that a gesture produced with the right hand may slightly increase the perceived valence of a word, while a gesture produced with the left hand may slightly decrease the perceived valence of a word. However, as seen, this was not always the case, and in the following subsection, I discuss a few factors that may influence whether handedness affects the perceived valence.

4.5.4 Other factors

As mentioned in section 4.5.3, a (marginally) significant effect of handedness on valence was observed for Group 2, who were also shown to provide more ratings at both extremes of the valence scale. It is therefore possible that the effect of handedness on valence only exists for words with a strong valence. However, this study showed that the strength of perceived valence varies greatly between participants, and thus it may be that for some listeners a word is perceived to have a strong valence, and the handedness of gestures may affect the perceived valence for those listeners, while for others, the same word is perceived to be more neutral, and there is no or only minimal effect of the handedness of a co-occurring gesture for those listeners.

Further, the results of the study suggest that age may affect the strength of the perceived valence, with older participants rating words more neutrally, and younger participants rating words more strongly (see Figure 10 and 12). However, due to the small number of participants, it is also possible that this is an effect of individual variation. In future studies, it should be considered along with other demographic factors, such as gender, occupation, and level of education.[32]

A remaining question is whether the pattern of correlation between handedness and valence is always between the right hand and positive valence and left hand and negative valence. Given differences in valence/handedness correlations for right- and left-handed speakers in gesture production (Casasanto & Jasmin, 2010; Chapter 3 this thesis), it is possible that the perceived valence could be subject to a body-specific pattern of correlation, if the listener would be able to identify a speaker's dominant hand.

As discussed in section 2.3.2, Kominsky and Casasanto (2013) have shown that participants consider the mirroring of a person facing them, assigning the valence according to that person's

[32] Warriner et al. (2013) found a slight but significant difference in valence ratings provided by participants with high and low levels of education.

right/left, rather than their own. They also showed that when an external clue, in the shape of an arm-sling, was present, participants would assign negative valence to the side of the sling, and positive valence to other side, thus considering the other person's experience of fluency, rather than their own, when assigning valence. However, it has not yet been determined if listeners are able to determine the dominant hand of a speaker, when they do not have access to external clues such as an arm in a sling.

In the current study, participants were asked which hand they thought was each speakers' dominant hand after watching the stimuli, and as seen in Figure 15, their responses varied extensively. The participants were not aware that they would be asked to determine the dominant hand of the speakers, and no instructions were given to pay specific attention to the gestures, so it is likely that participants did not explicitly consider which hand was the speaker's dominant hand while watching the stimuli. Thus, participants had to after-rationalize their answer to this question due to the forced-answer paradigm.[33] Based on their answers, it does not appear that participants are generally successful at discerning a speaker's dominant hand, but the stimuli differed from what would naturally occur during conversations, as there was an equal number of gestures produced with each hand by each speaker. Information such as the number of gestures produced with each hand, and the fluency of motion could possibly be salient information about the dominant hand of a speaker in natural conversation.

[33] Çatak et al. (2018) similarly asked participants to determine the dominant hand of a right-handed speaker after watching videos of the speaker in an eye-tracking study (the speaker produced an equal number of gestures with their right, left, and both hands). They found that 38.1% of participants thought the speaker was left-handed. They do not report whether participants had the option to answer that the speaker was ambidextrous, so it is unclear whether the remaining 61,9% thought the speaker was right-handed.

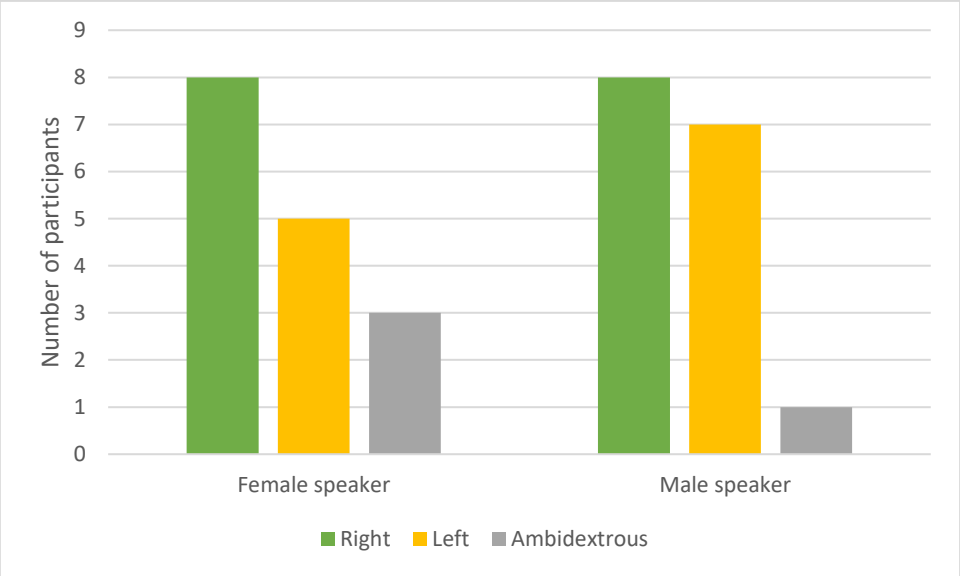


Figure 15. The perceived dominant hand of the male and female speaker

4.6 Summary

As mentioned throughout this chapter, the current study is based on a relative low number of participants, and therefore warrants careful conclusions. A correlation between the handedness of gesture and the perceived valence was found in some cases, thus providing limited support for Hypothesis 2 (see section 2.4). When a systematic correlation between handedness of gestures and valence ratings was observed, it was the case that gestures produced with the right hand increased the perceived valence, while gestures produced with the left hand decreased the perceived valence.

Since this study only included right-handed speakers and participants, it is not possible to distinguish between the patterns suggested in Hypothesis 1(a) and 1(c) (adapted to perception rather than production), as it is unknown if the pattern of correlation would differ for left-handed speakers and participants. Future research should therefore include data from both right- and left-handed speakers, as well as participants, if possible. This should be done in order to determine whether listeners correlate gestures with the speaker's dominant hand with positive valence, gestures with their own dominant hand with positive valence, or gestures with the right hand with positive valence. The first suggested pattern of correlation would require that listeners are able to discern a speaker's dominant hand, which is currently unknown.

It remains to be determined if older people generally tend to rate words more neutrally (closer to a rating of 5) than younger people, as the current data suggest, and future research should also consider the influence of other demographic factors such as gender, occupation, length of education, etc. Regardless of the factors that influence this difference in ratings, this study suggests

that an effect of handedness on valence ratings is more likely to occur for words of strong valence (as discussed in section 4.5.4) and that not all listeners perceive the valence identically. This means that the effect of handedness on valence may differ depending on who we are speaking to.

Chapter 5. Summary and conclusion

This thesis aimed to answer the following three research questions, here repeated from Chapter 1:

- Does the handedness of a speaker's gesture systematically correlate with the valence of their speech?
- If so, what is the pattern of correlation, i.e. which hand correlates with positive and negative valence, respectively?
- Does the handedness of a gesture affect the listener's perception of the valence of speech?

The results of the two studies presented in this thesis allow some tentative answers to these questions. However, it should be pointed out once again, that since the data for both study 1 and study 2 was rather limited, all conclusions should be considered as preliminary, and more research is necessary in order to corroborate them or not. I therefore include suggestions for future research, both to provide better supported answers for the research questions, and to address some further questions which have arisen based on the results presented in this thesis.

Study 1 found that for two of the three speakers, gestures with the dominant hand tended to co-occur with positively valenced speech, while gestures with the non-dominant hand tended to co-occur with negative speech, while no clear correlation was observed for the last speaker. We may therefore answer the first two research questions as follows: *for some speakers a pattern of correlation between the handedness of a gesture and the co-occurring speech may indeed exist, and this is a pattern between dominant hand and positive valence and non-dominant hand and negative valence.* This study therefore provides some evidence in favor of Hypothesis 1, pattern (a), as well as the body-specificity hypothesis (Casasanto, 2009). At the same time, this conclusion does not concern the speaker who differed from the other two speakers, in that he was younger, had a career as a basketball player and was male. Furthermore, it was suggested that high levels of arousal may increase the number of gestures produced, and that this may affect the pattern of correlation, which may explain the difference in the patterns reported by Kipp and Martin (2009) and Casasanto and Jasmin (2010). Future research should code speech for both valence and arousal and compare these emotion-dimensions with the co-occurring gestures to determine if this is the case.

This study was the first of its kind to include a diverse group of participants, but due to the low number of participants, it was not possible to determine whether the difference in patterns of

correlation was caused by individual variation or by the variation in demographic factors. Future research should therefore include a larger and more varied group of participants to determine if demographic variations such as age, occupation, and cultural background affect differences in the correlation between handedness of gesture and valence of speech.

This study, as well as the existing production studies (see section 2.3.1), have treated valence as a binary category, i.e. speech was considered either to be valenced (positive/negative), or not valenced. Given the discussion of the effect of strength of valence in the second study of this thesis (Chapter 4), a coding scheme which distinguishes levels of expressed valence should be developed for future research in order to explore if the correlation between gesturing hand and valence of speech is stronger for speech of extreme positive and negative valence, as opposed to more moderately positive and negative speech.

As for the third research questions, Study 2 provided some support for a positive answer and Hypothesis 2. However, the handedness of gestures was seen to only affect the ratings of valence for the participants who provided more ratings at both extremes of the valence scale, while no systematic effect of handedness was observed for those who provided more ratings at the neutral centrum of the scale. Thus, the answer to the third research question appears to be: *the handedness of gesture affects listeners' perceived valence only for words perceived to have strong valence*. It was found that the effect of handedness was larger for negative words, which may be due to right-handed speakers producing fewer gestures with their left hand overall, making the connection between gestures produced with the left hand and negative valence more salient for listeners (Casasanto & Jasmin, 2010). But it is also possible that this was an effect of the negative words being rated as stronger valenced than the positive words.

When handedness affected the participants' valence rating, it was the case that gestures with the right hand increased the valence rating, while gestures with the left hand decreased the valence rating. Since the study did not include speakers and participants who were left-handed, this may be in support of the correlation patterns proposed in Hypothesis 1(a) or 1(c). The current study can therefore neither be taken in support for nor against the body-specificity hypothesis (Casasanto, 2009). Future research should include both right- and left-handed speakers and participants to determine if listeners correlate either (i) the speaker's dominant hand with positive valence and the speaker's non-dominant hand with negative valence, or (ii) their own dominant hand with positive valence and their own non-dominant hand with negative valence, or (iii) the right hand with positive valence, and the left hand with negative valence.

To determine if the effect of handedness and valence is in fact dependent on the (perceived) strength of the valence of the word, it may be suggested that future research include words within a broader range of the valence spectrum, including some neutral words. Similarly, to determine if it is the case, as this study suggests, that older participants tend to rate words more neutrally, and younger participants more extremely, future research should include participants of a wide age-range, and should also determine if other demographic factors such as gender, occupation, length of education, etc. influences the perceived valence of speech, as this may determine the effect of the handedness of gestures.

In sum, this thesis has provided few straightforward answers to the question of correlations between gesturing hand and speech valence. But it has raised a number of new questions and has hopefully shown that this is a productive line of research, with a number of different paths for future exploration.

References

Andrén, M. (2010). *Children's Gestures from 18 to 30 Months*. Lund: Centre for Languages and Literature, Lund University.

Anne Lamott. (n.d.). In *Wikipedia*. Retrieved September 1, 2018, from https://en.wikipedia.org/wiki/Anne_Lamott

Bolinger, D. (1983). Intonation and Gesture. *American Speech, 58*(2). 156-174.

Bradley, M. M. & Lang, P. J. (1999). *Affective norms for English words (ANEW): Instruction manual and affective ratings*. Technical report C-1, the center for research in psychophysiology, University of Florida.

Casasanto, D. (2009). Embodiment of abstract concepts: good and bad in right-and left-handers. *Journal of Experimental Psychology: General, 138*(3), 351-367. 10.1037/a0015854

Casasanto, D. & Chrysikou, E. G. (2011). When left is "right" motor fluency shapes abstract concepts. *Psychological Science, 22*(4), 419-422. https://www.jstor.org/stable/25835391

Casasanto, D. & Jasmin, K. (2010). Good and bad in the hands of politicians: Spontaneous gestures during positive and negative speech. Plos one, 5(7), 1-5. https://doi.org/10.1371/journal.pone.0011805

Çatak, E. N., Açık, A., & Göksun, T. (2018). The relationship between handedness and valence: A gesture study. *Quarterly Journal of Experimental Psychology*, 1-12. https://doi.org/10.1177%2F1747021817750110

Cooperrider, K. (2014). Body-directed gestures: Pointing to the self and beyond. *Journal of Pragmatics, 71*, 1-16. https://doi.org/10.1016/j.pragma.2014.07.003

Dael, N., Goudbeek, M., & Scherer, K. R. (2013). Perceived gesture dynamics in nonverbal expression of emotion. *Perception, 42*(6), 642-657. https://doi.org/10.1068/p7364

Dael, N., Mortillaro, M., & Scherer, K. R. (2012). Emotion expression in body action and posture. *Emotion, 12*(5), 1-17. 10.1037/a0025737

Darwin, C. R. (1872). *The expression of emotions in man and animals*. London: John Murray. Retrieved from: http://darwin-online.org.uk/content/frameset?pageseq=1&itemID=F1142&viewtype=text

Davies, Mark. (2008) [Corpus] *The Corpus of Contemporary American English (COCA): 560 million words, 1990-present*. Available at: https://corpus.byu.edu/coca/.

de la Vega, I., De Filippis, M., Lachmair, M., Dudschig, C., & Kaup, B. (2012). Emotional valence and physical space: limits of interaction. *Journal of Experimental Psychology: Human Perception and Performance, 38*(2), 375-385. 10.1037/a0024979

Ekman, P. (1999). Emotional and conversational nonverbal signals. In L. S. Messing & R. Campbell (Eds.), *Gesture, Speech, and Sign*. (pp. 45-55). Oxford: Oxford University Press.

Foolen, A., Lüdke, U. M., Racine, T. P., & Zlatev, J. (2012). *Moving ourselves, moving others: motion and emotion in intersubjectivity, consciousness and language*. Amsterdam, Philadelphia: John Benjamins Publishing Company.

Gobl, C. & Ní Chasaide, A. (2003). The role of voice quality in communicating emotion, mood and attitude. *Speech Communication, 40*, 189-212.10.1016/S0167-6393(02)00082-1

Izard. C. E., Bartlett, E. S., & Marshall, A. G. (1972) *Patterns of emotions*. New York: Academic Press.

Johnson III, E. & Myers, T. I. (1967). *The development and use of the Primary Affect Scale (Technical Report)*. Bethesda, Maryland: Naval Medical Research Institute.

Kendon, A. (2004). *Gesture: Visible action as utterance*. Cambridge University Press.

Kendon, A. (2014). Semiotic diversity in utterance production and the concept of 'language'. *Phil. Trans. R. Soc. B, 369*(1651), 1-13. 10.1098/rstb.2013.0293

Kipp, M. & Martin, J. C. (2009). Gesture and emotion: Can basic gestural form features discriminate emotions? In: *3rd International Conference on Affective Computing and Intelligent Interaction and Workshops* (pp. 1-8). IEEE. 10.1109/ACII.2009.5349544

Kominsky, J. F. & Casasanto, D. (2013). Specific to whose body? Perspective-taking and the spatial mapping of valence. *Frontiers in psychology*, *4*, 1-10. 10.3389/fpsyg.2013.00266

Lakoff, G.& Johnson, M. (2003 [1980]). *Metaphors we live by*. Chicago: University of Chicago.

McNair, D. M. & Lorr, M. (1964). An analysis of mood in neurotics. *The Journal of Abnormal and Social Psychology, 69*(6) 620-627. http://psycnet.apa.org/doi/10.1037/h0040902

McNeill, D. (1992). *Hand and mind: what gestures reveal about thought*. Chicago: Univ. of Chicago Press.

Natalie Cole. (n.d.). In *Wikipedia*. Retrieved September 1, 2018, from https://en.wikipedia.org/wiki/Natalie_Cole

Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. (1967) *The measurement of meaning.* Urbana, London: The university of Illinois press

Roether, C. L., Omlor, L., Christensen, A., & Giese, M. A. (2009). Critical features for the perception of emotion from gait. *Journal of vision*, *9*(6):15, 1-32. 10.1167/9.6.15

Russell, J. A. & Mehrabian, A. (1977). Evidence for a three-factor theory of emotions. *Journal of research in Personality*, *11*, 273-294.

Schlosberg, H. (1952). The description of facial expressions in terms of two dimensions. *Journal of experimental psychology*, *44*(4), 229-237. http://dx.doi.org/10.1037/h0055778

Schlosberg, H. (1954). Three dimensions of emotion. *Psychological review*, *61*(2), 81-88.

Warriner, A. B., Kuperman, V., & Brysbaert, M. (2013). Norms of valence, arousal, and dominance for 13,915 English lemmas. *Behavior research methods*, *45*(4), 1191-1207. https://doi.org/10.3758/s13428-012-0314-x

Wittenburg, P., Brugman, H., Russel, A., Klassmann, A., Sloetjes, H. (2006). ELAN: a Professional Framework for Multimodality Research. In: *Proceedings of LREC 2006, Fifth International Conference on Language Resources and Evaluation.*

Zlatev, J. (2014). Image schemas, mimetic schemas, and children's gestures. *Cognitive Semiotics*, *7*(1), 3-27. 10.1515/cogsem-2014-0002

Zlatev, J. (2015). The emergence of gestures. In B. MacWhinney & W. O'Grady (Eds.), *The handbook of language emergence*, 458-477. New York: Wiley

Zlatev, J. & M. Andrén. (2009). Stages and transitions in children's semiotic development. In J. Zlatev, M. Andrén, M. Johansson-Falck, & C. Lundmark (eds.), *Studies in Language and Cognition*, pp. 380–401. Newcastle: Cambridge Scholars.

Appendix A – Study 1. Tavis Smiley Show transcripts

/ /	Unclear speech, presumed meaning
{ }	False start, repetition
[ ]	“filler-words”
( )	Sounds other than speech
NT	Neutral
NG	Negative
P	Positive
I	Indeterminate
F	Formalities
TAVIS	Indicates placement of the talk-show host, Tavis Smiley’s, utterances.

Speaker 1 (Cole)

	TAVIS	
001	/but hey/ who's counting	NT
	TAVIS	
002	absolutely	NT
003	absolutely	NT
004	and you know what I remember my mom talking about that	NT
005	she said the same thing about dad	NT
006	and when I decided to you know actually follow this as a career that's one of the thing that she said you gotta make sure /that/ they can understand you	NT
	TAVIS	
007	{they} they don't always	NT
008	if you heard some duet of {p} of people singing together not always a great blend	NG
009	I think we just got blessed	P
010	I think it's just you know we got lucky that I have that similar tone in my voice that dad did	P
011	but it doesn't always happen you're right	NT
	TAVIS	
012	15 I'd just turned 15	NT
	TAVIS	
013	[uh] I do I do	NT
014	it's very bittersweet you know	I
015	[uh] I'd just say the time	NT
016	it's the time ‘cause we had such you know when dad was around it was just special it was different because he wasn't around that much	I
017	so I spend as much time and he spend as much time with us as he possible could so that's what I miss	I

018	you know is that I wish that [uh] when I was in my 40's he would {st} you know he would [uh] he'd still be there	I
	TAVIS	
019	Child, twice over	NT
	TAVIS	
020	[uh] in a way yes I mean	NT
021	{I I} I must say that when this particular episode happened by the way [uh] the [uh] the hepatitis was the first thing that I was diagnosed with earlier this year I was on chemo	NG
022	I am happy to say that I/'m/ no longer are in chemo /and/ my liver is pretty healthy [uh] which I'm {interrupted} yeah {it} it really is	P
023	but then we were hit with the kidney thing [uh] in the midst of [uh] chemo therapy [uh] that actually worries me more	NG
024	or at least /worried/ me [uh] because when that episode occurred I was in New York	NG
025	I really had a {ver} a bad breathing issue	NG
026	I could not breathe	NG
027	and	NT
	TAVIS	
028	[uh] well you know what's interesting /there/ was I had done the view and a couple of shows that week {of uh} doing PR for the record I sang fine	NT
029	but when I would talk	NT
030	(heavy breating)	
	TAVIS	
031	/init/ weird	NT
032	yeah it was very strange	NT
033	but [uh] I think I didn't realize how close I came to dying until I got to the hospital and {they} they put me on dialysis within (snaps) like three or four days because {my function} the function of my kidney was just about gone	NG
034	I didn't realize it	NT
035	{I did} I didn't really understand	NT
036	I just kept saying I need to breathe I need to breathe	I
037	I wasn't thinking about I don't wanna die I don't wanna die	I
	TAVIS	
038	yeah {it's not as} it's not where we'd like it to be	NG
039	but [uh] you know {I'm I} I feel really good	P
040	and obviously the dialysis {is} is the reason	NT
041	[uh] but you know {we're} we're gonna have to see	NT
042	I may need a transplant	NG
	TAVIS	
043	yes you say that now	NT
	TAVIS	
044	{it's a} it's a very serious issue	NG
045	and I must say that {the the} the upside of this is how many organizations and how many individuals have actually come forward offering either to find a match or to give me their kidney	P
046	I mean {it} it just almost makes me start crying thinking that people would care that much	P

047	and so I don't think I'm gonna have a problem finding a Kidney (laughs)	P
	TAVIS	
048	it really is it really is	NT
049	but my son has come forward and offered	P
050	my sister	P
051	and I think that we're in pretty good shape	P
	TAVIS	
052	all of those	NT
	TAVIS	
053	yeah I was mad at God	NG
054	I was mad at me	NG
055	you know and I was	I
	TAVIS	
056	why me?	NG
	TAVIS	
057	how could you let this happen?	NG
	TAVIS	
058	what are you {ho} how could you let this happen you know /how co/	NG
059	how come you didn't know	NT
060	and someone asked me in an interview you know do you have any regrets and [uh] you know when you were doing the drugs back in the day	NT
061	and I said /ge/ I was having fun back in the day, no	P
062	I didn't have any regrets ‘cause I was having a good time	P
063	obviously had I known then what I know now maybe, maybe I would've done it differently	I
064	I can't say for sure cause when you're in the moment you just in the moment you're having a good time you're you know that kind of thing	I
065	so it's very interesting but	I
066	[uh] yeah I was mad at me	NG
067	{and} and then I just it didn't last for very long Tavis	NT
068	it really didn't	NT
069	I was okay with it	I
070	[mhmm] I really was	I
	TAVIS	
071	absolutely	NT
	TAVIS	
072	yeah {I was} I was a very [uh uh] insecure young woman as I was growing up	NG
	TAVIS	
073	but I didn't know about the voice thing	NT
074	and I'd lost my father by then okay	NG
075	so I didn't get into drugs until after he passed	NG
076	and I think that was a big hole in my life that I continued to find ways to fill it whether it was with you know relationships or drugs or	NG
077	yeah and I think that I think that almost anyone that gets involved in drugs and pills and those kinds of things {there's a} there's a big hole there's an insecurity there that we just try to fill	NG
	TAVIS	

078	no because {e} I did	NT
079	{I} I used to {interrupted} okay	I
080	we're good	NT
081	/well/ good	NT
	TAVIS	
082	no I don't think I really do because I've learned so much from that	NT
083	and I know now that I can help so many other people when they get an honest look at a star who has been through trials and tribulations it gives them a sense of wow they're not that different and yet they still have this you know this gift but they really are trying to use it to the best of their ability	I
084	I think that at the end of the day you know despite what you go through it really does shape who you are	I
085	without these problems that I had these different issues in my life I wouldn't be the women that I am today	I
086	you know and I know that I'm a strong woman	P
087	I'm a very brave courageous type of person	P
088	I'm a good friend	P
089	all /of/ those things are because of what I've been through and what I've learned	I
090	so you know I think that I can always help someone when I talk about it	P
	TAVIS	
091	[mhm] yeah it does	NT
092	yeah because what I think we often use it for is excuses to justify other things that we should be doing that we're not doing	NG
093	absolutely	NT
094	so you know you can't	I
095	you have to tell people they have a gift at the right time otherwise they will /absolutely/ misuse and abuse	NG
096	it's easy to do	I
097	we're human you know	I
098	but I mean I have learned once again to embrace my gift to totally cherish it	P
099	it's so precious to me	P
100	nobody can mess with it other than me	I
	TAVIS	
101	no I don't sometimes I /don't/ like to think about it because I think that was {part of} a little part of my insecurities too was that [uh] for years and years and years I would say I don't wanna be special I don't wanna be special I wanna be normal you know like everybody else	NG
102	and finally I guess I had come to that conclusion just a few years ago you are special	I
	TAVIS	
103	just a few years ago	NT
	TAVIS	
104	[uh] because I think {it was} I was rounding up because there was other things I was dealing with as well	I
105	so I wanted to put it all in a pile and understand that [uh] every aspect of my life is just not gonna be normal	NG
106	and that that has to do with relationship as well	NG
107	/and/ I had to you know come to terms with that too	NG

108	you know wanna be normal	NG
109	wanna have a normal relationship	NG
110	you can't have a normal relationsship	NG
111	you know you're not a normal person	NG
112	{you don't} you don't come from that place	NG
113	and when I look back on you know some of the people that I've known and	I
114	they've all wanted to	I
115	they didn't {un} they didn't get it	NG
116	they didn't get me	NG
117	you know and they all wanted to take something from me	NG
118	you know so I've had to finally start protecting myself more which is something I really didn't do because I was like (gasp) I can do this you know I can be like everybody else you know and no one is gonna take advantage of me or	I
119	you know but that's what people do	NG
	TAVIS	
120	[uh] you know unforgettable the song was so incredible	P
121	[uh] I knew that we couldn't match it	NT
122	and so I just looked you know at his discography and said what can we pick that won't have any reflection on that song because if we'd try to do another ballad we would've gotten killed	I
123	you know I think that the [uh] the critics were /like er/ she's trying to do another	NT
124	{in this in this in the fear} in the sense of just giving that /presence/ that's why I chose {walk} walking my baby	NT
125	I wanted something fresh little more fun little more happy you know not the drama	I
126	{un} unforgettable made so many people cry to this day	I
127	they just buhu you know	I
128	they do	I
	TAVIS	
129	oh it's so much fun	P
130	I've always liked that song	P
131	I remember when we were little and we'd sing it with my dad	P
	TAVIS	
132	I gotta tell you that there is a CD coming out in January that my sister and the family has put together	NT
133	it's called regenerations	NT
134	and we've got all kinds of hip-hop artists producer artists doing songs with my father	NT
135	wait to you hear this stuff	P
136	it is it is crazy	P
137	you were the first person {interrupted} you were the first person to get this news	P
	TAVIS	
138	there's [uh] /NAS/	NT
139	there's [uh] Will.I.Am	NT
140	there's [uh] the Brazilian girls	NT
141	I mean {d e it} it is wild	P
142	wait to you hear what they've done	P
143	they took their choice of dad's track of a track of dad's and remixed it	NT
144	it is	I

145	I'm on there too with Will.I.Am doing straightening up a flower /right/	NT
146	ours is probably the more normal version everybody else is so crazy	I
147	there's a song on there that dad does called anytime any day anywhere	NT
148	beautiful song I'd never heard it before	I
149	I never heard it	NT
150	it is fascinating this whole CD you've got to check it out Tavis	P
	TAVIS	
151	regeneration	NT
	TAVIS	
152	yeah well he was not a {tr} you know he was {n} he was a pacesetter	I
153	he was not a trend follower	I
154	that's just not who he was	I
	TAVIS	
155	he'd be fascinated	P
156	he'd be absolutely fascinated because I'm sure that he never heard any of those songs that way when he was recording them you know {that 50 years later} that somebody would come along and just turn it inside out	I
157	that it's great it's absolutely great	P
	TAVIS	
158	totally	NT
159	that's and that was the whole point	NT
160	Yeah it's really really great	P
161	and they were so enthusiastic to you know come together	P
162	and the challenge was to take the smoothness of dad's voice and that tone and put it with some serious beats and some serious [uh]	NT
163	{d} you know there's additional lyrics that they've added	NT
164	and then there you know some of the artists are putting a little something on there	NT
165	[oh uh] it {i} it's just wild	P
166	when {I} I heard it and I {I} it blew my mind	P
167	I mean it is one of the probably the most extreme records I've heard in a {w} in a long time	I
168	I'm very proud {interrupted} I'm very proud of my sister	P
	TAVIS	
169	oh definitely silky smooth sophisticated	P
170	but wait till you hear it	P
171	it's really cool	P
172	it's really cool	P
173	{w we'll} we'll make sure that we send you make sure we send him a copy	NT
	TAVIS	
174	[uh] you know this record is a tribute more to the artists that I met through my father	NT
175	[uh] or I met their music	NT
176	[uh] Lena Horne /Niancy/ [uh] Sammy Davis junior they all did versions of these songs	NT
177	and that's how I chose them	NT
	TAVIS	
178	I did	NT
	TAVIS	

179	yeah I mean [uh] and he wasn't a great singer but Danny Tomas was someone that I enjoyed his	I
180	[oh] he was just so wonderful to us	P
181	[uh] Ella was a friend of the family	P
182	she really was	P
183	Peggy Lee, I mean my father knew a lot of great women	P
184	but they all {loved} just loved him	P
185	but you know my mom was cool with it	P
186	but {there w} there were quite a lot of women that [uh] we loved	P
187	[uh] /Pearl Bailey/ was always at the house	P
188	[s uh] Lena Horne and my mother were good friends	P
189	[uh] /Ge/	I
190	Sammy Davis jr.	NT
TAVIS		
191	yeah and didn't know nothing	NT
192	you know couldn't really appreciate the moment you know because I just was like uncle Sammy, auntie Ella	NT
TAVIS		
193	and it was so great because during that time almost at every kind of a Christmas party at least at our house those same people {would} would be over the house	P
194	and [uh] you know they'd sit around the piano they were still musicians at heart	P
195	they'd sit around that piano	P
196	and they would just jam you know till the wee hours of the morning	P
197	and I remember going to a party as an adult to Frank Sinatras home same thing	P
198	you know years later and he would tell me how they used to do that all the time	NT
199	{you} so it was him so it was him	NT
200	it was [uh] it was Dean Martin	NT
201	it was [uh] /Edie/ and [uh uh]	NT
TAVIS		
202	/Edie and Steve/	NT
203	it was [uh] a couple other people /that/ I don't remember	NT
204	and we were all sitting around that piano	NT
205	Steve was playing	NT
206	we were just sitting around	NT
207	oh god it was just such a moment	P
208	really great	P
TAVIS		
209	I got you now	NT
TAVIS		
210	well again I think [uh] being a pacesetter	P
211	not trying to follow what everybody else is doing having the courage and /the/ confidence to you know set your own footprints	P
212	[uh] hard to do especially in this time that we're in with the with the way the business is	NG
TAVIS		

213	[uh] because the {i} I guess the [uh] {the f the the the} the hype that we're giving to young people now {ll is} is all about you know making the dollars making the green bags you know	NG
214	it's really not about the art	NG
215	it's not about the passion	NG
216	you know I get crazy because I hear some talent	NG
217	but it ends up getting swooped up you know and suppressed by [uh] I think a misnomer from either the record label or from the managers or from the people that are kind of supposedly in charge	NG
218	you can't let them be that much in charge	NG
219	you have to be in charge	I
220	they are working for you	I
221	that's why it's called show business it's still part of the business	NT
222	dad was not great at the business	NG
223	you know he just wanted to sing	I
224	so my mom had to step in and make sure that he didn't get ripped of you know because that is part of the business	I
225	and so {you're your} your gift or your talent will end up getting you know sometimes misplaced displaced because you're not paying attention	NG
226	so you gotta be able to do both	I
227	you gotta be smart	I
228	and you gotta be strong	I
	TAVIS	
229	that's right	NT
	TAVIS	
230	okay that's exactly right	NT
231	but that's exactly right	NT
232	you know {and and} and so many times [uh] so many of our wonderful black talents didn't have anybody watching their back you know	NG
233	and it's too bad because they ended up with no money	NG
	TAVIS	
234	thank you and same to you	F
	TAVIS	
235	thank you	F
	TAVIS	
236	I do it appreciate it	F
237	thank you for the prayers yes	F

Speaker 2 (Mourning)

	TAVIS	
001	it is always a pleasure	F
	TAVIS	
002	[good] always good to see you	F
	TAVIS	
003	okay	NT
	TAVIS	

004	/well/ that's old news	NT
005	İ already just said	NT
	TAVIS	
006	I am trying to catch you up man, with these current events	NT
007	I made that news known months ago	NT
008	I said I want to come back	P
009	[uh] unfortunately I had this knee injury back in December	NG
010	my rehab is going extremely well	P
011	and it takes a year to recover from this particular {injury} injury	NT
012	and [uhm] I'm excited about the opportunity of possibly getting back out there and helping this young /heat/ team providing some better leadership	P
013	but I mean I gotta be patient	NT
014	it'll happen when it's supposed to happen	NT
015	but I'm working {diligent} diligently to try to get it right	NT
	TAVIS	
016	[well] {I can't just say} I can't just say right now okay I am gonna come back you know	NT
017	I gotta wait until it heals up	NT
018	[uh] and I have gotta {wait} make sure my doctors are happy with the way my strength is which is extremely important for me to get back out	I
019	I wanna be a 100 percent	NT
	TAVIS	
020	well [uh] last December we were in Atlanta	NT
021	and [uh] /D. Wade/ he turned the ball over	NT
022	and I was running after his man	NT
023	trying to catch his man on the fast /break/ trying to block shots which is [uh] what {i'm} I'm known for doing	NT
024	and [uhm] I took off /planted/	NG
025	and my foot went out from under me	NG
026	[uhm] I thought the floor was wet or something	NT
027	but my knee {just} just went out from under my feet	NG
028	and everything just went different places	NG
029	and I look down	NT
030	and my knee was disconfigured	NG
031	and I tore the patella and the quad muscle connected to the knee cap	NG
032	and [uhm] the surgery was successful	P
033	and my rehab is going extremely well	P
034	{I just} I just gotta be patient you know	NT
035	Unfortunately, injuries are part of every sport	NG
036	So, it is just how you come back	NT
	TAVIS	
037	Well [uh] because of my resilience	NT
	TAVIS	
038	Exactly (laughs)	NT
	TAVIS	
039	exactly (laughs)	NT
040	No I mean {I} I still have it in my heart	P

041	and I am very passionate about the game	P
042	and I [uhm] still feel like I got a little bit to offer	P
043	{and} and in life you follow your heart man	P
044	you follow whatever you're passionate about	P
045	you follow your heart you know	P
046	it is never our plan regardless of what I had the intentions to do	I
047	it's god's plan brother you know	P
	TAVIS	
048	Exactly, exactly	NT
049	/you know/{so} so {I'm} I'm planning to come back on the court	P
050	but if it is not meant for me to be back out there again	I
051	plus the doctor told me he said look you gotta rehab this like you are gonna come back and play just so you can have an opportunity to run after you grandkids one day you know	I
052	[uhm] I don't do anything halfway brother	P
053	I go all out you know	P
054	{and} and {I wanna} I wanna get this right again so I can you know explore the opportunity of possibly playing again	I
	TAVIS	
055	It is very difficult to explain becuase they haven't been in this particular atmosphere and understand the passion we carry about our profession	I
056	that's just like me telling you trhis is your least show Tavis this is it [laughhs] [huh] you know what I am saying	N
	TAVIS	
057	but I mean you are passionate about your job, your profession	P
058	and [uhm] I know that you know one day it's gonna all come to an end	NG
059	I don't wanna wait	I
060	I don't wanna go ten years from now and say you know what I should've probably tried to come back and play just you know one more year	I
061	{and} and to tell you the truth no athlete wants to be forced out of the game	I
062	and my last memory of my career is being helped and carried off the court that is not how I envision /it/	NG
	TAVIS	
063	I wanna be able to walk of the court on my own terms on my own powers	NT
064	and just say hey I am done, I did it	NT
	TAVIS	
065	/well/ I don't see myself as a preacher you know	NT
066	But I do know that [uh] I am a man of God	P
067	and I understand that [uh] the creator is the one that designed all that is around us	NT
068	and our purpose in life {is} is not {we} we not really	I
069	we get so tied up into ourselves you know	NG
070	and we don't realize our true meaning our purpose here until some type of devastating [uh] event in our life comes about	I
071	and then it puts life in perspective [and says] and lets you know exactly what's your true purpose here you know {and and}	P
072	and what I am getting at is that I went through [uh] a kidney disease	NG
073	and I was at a particular point in my life where everything was going extremely well	P

074	first team [on] NBA all-star defensive player of the year gold medal winner [uh] witnessing the birth of {my} my second child you know everything was fantastic	P
075	{and {I was} I was counting} I got caught up in [uh] this world {that} and not realizing my true purpose here, so	NG
076	when I was struck with this kidney disease it truly humbled me	I
077	and I had to stop	NT
078	and I had to think okay lord [uhm] not why me what do you want me to do now	I
079	'cause evidently it is not basketball at this particular time	NT
080	and just through that particular adversity and I believe in every adversity there's a /seed of/ equivalent benefit through that particular time and having to go through [uh] the discomforts of the medications you know dealing with /the/ symptoms of the disease going through transplantation in 2003 I touched so many lives brother	I
081	I touched so many lives	P
082	I changed so many lives	P
083	I inspired other individuals	P
084	and that was my answer that's what you're here for	P
085	you're here to enhance other peoples' lives {throughout} through your experiences	P
086	and this is why I wrote resilience because I knew that my life's events will help inspire and encourage people to take a different path towards some of the [uh] from the issues and obstacles that they may be dealing with	P
TAVIS		
087	it was extremely difficult	NG
088	and it was very challenging you know because I kind of look at the overall situations	NG
089	and I say to myself [uh] lord okay what do you want me to do now	NT
090	and now I see [uhm]	I
091	I saw an opportunity where okay I gotta make {some the} the right decisions	P
092	and I know I gotta surround myself with the right folks	P
093	[uhm] so when I look at the whole scenario [uhm] through trials and /tribulations/ in your life then if you give up and you don't believe that there is an opportunity to succeed then it is all gonna go the wrong way	NG
094	I just believe that okay I gotta keep pushing and I gotta keep working and {gotta} I gotta think nothing but positive things and know that it is gonna be allright	P
095	so that is where the faith comes in	NT
096	I {gotta} I knew that okay lord I am going through this for a reason help me understand it	I
097	and a lot of people are afraid to communicate and have faith in something they do not see you know	NG
098	I walk by faith not by sight	P
099	{and} and I know that that /it's/ somebody else up there orchestrating what's going on throughout my life and helping me understand my true purpose /here/	P
TAVIS		
100	you know what, just very much so	NT
101	[uh] if you look at that book it has a lot of chapters in it, you know	NT
102	and as you finish a chapter you start another one all right	P
103	so once you finish that book once it is over with another chapter opens up and you go on to the next thing	P
104	that's what's gonna happen to me	P

105	you know once {that that} that chapter in my life of {my} my professional basketball career closes I know there's gonna be other opportunities out there for me	P
106	so I just gotta ask god for the guidance [uh] {what's} [uh] what he wants me to do	NT
107	and {he's} he's slowly showing me that you know	P
108	and I am doing it through all of my philanthropical work	P
109	[uhm] I'm doing it though this particular book you know	P
110	[uh] {and I am} [uh] I am doing it through helping to just change lives overall you know	P
111	we're living in some very tough and disturbing times you know	NG
112	and I think that each of every one of our lives if we were able to put them on paper carries a story	P
113	{and each} and each of every one of us can take something from everybody's story and use it and connect with it and use it {as} as a strength to get through some of the issues that we're dealing with cause we all go through different problems you know	I
114	so [uh] I want people to know a totally different side of Alonzo Mourning other than {they would} the intensity and the /style/ that they see on the court	NT
115	they gonna see a totally different side of me	NT
116	and I'm gonna connect with so many individuals just through my overall experiences because it is not a sports book it's a life book	P
	TAVIS	
117	I don't know about all that	NT
	TAVIS	
118	/we'll see about/	I
	TAVIS	
119	although I did minor in theology	NT
120	but I don't see myself preaching	NT
	TAVIS	
121	/how 'bout that/	NT
	TAVIS	
122	hey thanks Tavis I appreciate /it/	F
123	I just want everybody to know that not only do the words of this particular memoir change lives but the /sale/ of every book goes towards kidney research as well	P

Speaker 3 (Lamott)

	TAVIS	
001	I I I'm just like the princess or something	P
002	I don't know	NT
003	I don't know	NT
004	I have a great publisher, a great publicist	P
005	[um]	NT
006	people are starving to hear about faith	I
007	they're starving to hear about spirituality from somebody who isn't telling them that they have to get on the straight and narrow or they're doomed forever so	I
	TAVIS	
008	well definitely I think Jim /Wallace/ has been really really important to the [um] progressive left the whole [um] the whole {movement} movement to include under	I

	the [uh] right to life the [uh] which I [uh] you know I am a ferocious proponent of women's rights but I've done conferences from him for him with him cause we believe in almost everything together	
009	but [uh] the right to life and prolife ought to mean that we don't kill people either	I
010	that we don't support capital punishment	I
011	that we don't expect people to live on garbage	I
012	/and-that/ we don't force women to have a child to bring a child to term	I
013	and then refuse to give her any money to help raise that child	NG
014	so he and I agree on about 95%	P
015	/and-then/ the other part I just think he is wrong	NG
016	/and/ he'll come around like you	I
	TAVIS	
017	yeah well I think that right after	I
018	first of all {the the} the bad [uh] {the} the appropriation of Jesus began {with the} in the Reagan administration	NG
019	and it began when the republicans began to [uhm] embrace the [uhm] church as a political arm of the republican party	NG
020	but certainly after 9/11 it {wa} [uh uh] terror was used to [uh] keep us holding our breaths and not saying what we really	NG
021	{well and trying} people went along with the program because you were branded a [uh uh] /traitor/ if you didn't if you thought that [uh] if you didn't just follow a straight and narrow	NG
022	and I think people have are starting to wake back up	P
023	/I mean I/ that's what spirituality is about	P
024	it's about coming to /live/ you know	P
025	it's like [uh] I think people all of a sudden just felt like {s} terrified more about what was gonna happen to their children and grandchildren than about what happened to us on 9/11	NG
026	i.e. that the most precious gift America has given to the world which is the separation of church and state has been blurred almost out of existence	NG
027	and that /the I mean/ terrible catastrophe of Iraq	NG
028	and /I think/ people are rising back up	P
029	/that's the/ you know /it's the/ only thing that's ever saved us is the rising up	P
030	and people were too afraid	NG
031	{and} and they're not afraid anymore	P
	TAVIS	
032	[uh hu uh] well I just wanna say that before we would look at {mis} at president Bush and [uh] and you would just I would feel	I
033	and certainly in my last book Plan B I /put/ very angry and just horrified kind of {stu} stunned by what he was getting away with	NG
034	and [uh] that there didn't {seen} seem to be an end in sight	NG
035	and now I look at him and I {j} I think very calmly tik tok tik tok (laughs)	I
036	although I just want to say /that this/ {I'm} I'm not positive anyone has told him that he has to leave in January	NT
037	and I'm concerned I think probably /Condi/ is gonna be selected to tell him	NG
038	I don't know if he knows /what's/ the term limits in the oval office	NT
039	I know he is the decider	NT

040	and I think he will just decide that he would like to stay	NG
041	and he loves the chair	NT
042	he's been very clear about the chair	NT
043	{I don't} I'm not convinced he knows that he has to leave the chair behind too	NT
044	but anyway I feel [uh] that a lot of us as soon as we realized that there was gonna be a spring, the metaphoric spring of a new beginning {began to} we began to get oxygenated again	P
045	and we began to [uh] mobilize like we've always done	P
046	we began to [uh] realize	I
047	it's like it's Good Friday which is the most profound day of the Christian calendar certainly	I
048	and [uh] it's a terrible day of [uh] darkness and dispair and death and yet because of it {the} the world starts over	I
049	life begins	P
050	life becomes [uh] infinite again instead of this tiny tightly little wrapped little package of these crazy neocons who [uh] told us that we were all doomed unless we did what they want	I
051	and now you know I have sort of given up on ever seeing them on trial at the Haag	NG
052	but now I no longer care because it is lame duck	P
053	/and/ so [uh] with both of the democrats /which/ I'm much happier talking about ‘cause I would be so thrilled if [uh] either of them got elected	P
054	I would cry	I
055	and I will cry	I
056	/belive/ one of them will	I
057	but you know {the} the old Christian saying is that we're Easter people living in a Good Friday world	I
058	and what we've been living in has been a Good Friday world what with [uh] you know Iraq and Iran and [uh] just devastation of [uh] the global economy and the global environment and what not	NG
059	and these two people Hillary and Barack Obama are coming out and saying {wer} we really are {ar} the truth of our spiritual identity is that we're Easter people	P
060	we're people of love	P
061	we're people of compassion	P
062	American people are so decent and they wanna share what they have	P
063	they're not going for the old republican [uh] you know no regulation Wallstreet [uh] political arm again	I
064	and they're saying {well we} we know we're hungry for what we're not giving	NT
065	we don't need more	P
066	we don't want more	P
067	we're not trying to get richer richer richer	P
068	we're trying to be who we truly are	P
069	it's like to me it's like when [uh] in Ezekiel just to get a little religious for one minute when Ezekiel see's the valley of dried bones and just these death spiritless bodies	I
TAVIS		
070	can these bones live again	NT
071	and we have not felt for the longest time that they could	NG
072	that it was over	I

073	that if we could undo what the Bush administration has done	I
074	it might be 50 a 100 years	I
075	{and} but what Ezekiel does is [uh] what we're all urged to do which is to look upon the despair and the destruction and the hopelessness and to see the vision of hope and restoration and rebirth and spring	I
076	and I would say both of the democrats are about that	P
077	{I} I don't think John McCain is a good candidate	NG
078	I think he /wears/ a little thin	NG
079	and he has a terrible temper	NG
080	and he has episodes	NG
	TAVIS	
081	well I think that like Ezekiel you [uh] agree not to look away	I
082	you agree not to look away from the suffering	I
083	/and/ you agree not to look away from what if happening in Darfur or in the streets of Oakland	I
084	you bear witness	P
085	you register voters	P
086	you do what Jesus always said to do which was to go get thirsty people glass of water and to if the people are hungry that you feed them	P
087	/and/ you know {tr} Jesus very clear about {trying} that we try not to kill people today	I
088	/you/ know maybe make little notes to ourselves and put it by the phone don't kill people today	I
089	and that's what we do you know	NT
090	/it's/ that {we we} we see the vision of hope	P
091	and we carry the hope /which is/ like a glass of water	P
092	and that it's small you know	I
093	the progress is small	I
094	/and/ {it's not gonna be like} there's not a hero out there that's gonna save us	I
095	there's a hero inside	P
096	{there's the} there's the beauty {of} of the good people that we were raised to be inside	P
097	and {that it's not} God doesn't seem to have a magic wand	NG
098	and God knows {there's n} congress doesn't have a magic wand	NG
099	and it's {sl} small and slow incremental	I
100	/and/ it's messy	NG
101	{and} [uh] and we just do it one day at a time	I
102	{and} [uh] and we have seen miracles	P
103	and we know that the miracle begins in the problem	I
104	we don't run from the problem	P
105	like Bush's crazy little talk last Friday	I
106	I mean no offense	I
107	I mean that in a loving and Christian way	I
108	but his craziness about the economy and how well things are actually going followed by his little dance that little soft shoe he did the week before while waiting for McCain to come	I
109	I mean he and I are both recovering alcoholics	I
110	so I wanna call him because I am afraid they'll use that little softshoe at his commitment hearings or the intervention or something	I

111	but at any rate you say what is true	I
112	you say the economy is a god-awful mess for almost all Americans	NG
113	the rich will survive whatever /shakes/ down in the next couple of months	I
114	the poor /will/ the poor will be much much poorer	NG
115	and [uh] and so we do what we can	I
116	/and/ so we rise up	P
117	/and/ we say no	P
118	and we [uh] take care of the poor right now	P
119	we don't wait for November to get our marching orders from the from the White House you know	P
120	{we do what} {yuyu} you gather together in community	P
121	what's the new UN {Secr} [uh] {Bon} Ban Ki-Moon when we went into the refugee camps in Darfur he did more good more profountly to the plates of the earth's shift than all the meetings that took place that month in Washington D.C.	I
122	and so when Barack and Hillary are up against each other	NT
123	and everyone is going [uuuu] why can't they be nice why did she say why did he	NG
124	it's like grow up	NG
125	this is gonna be a nightmare by about October	NG
126	and Barack cannot beat McCain without Hillary's you know pushing him as hard as {she} and vice versa	I
127	they absolutely need each other	I
128	/it's nautilus/ you know	I
129	{and it's} and whoever wins it's gonna be a fantastic day for liberals and progressives	P
	TAVIS	
130	/well/ you know I really believe in prayer	P
131	{I believe} you know {I've always} I've told you this before	I
132	but I really have only two prayers one is help me help me help me one is thank you thank you thank you 'cause I know when I pray I will {yea} a hundred percent of the time it will be heard	P
133	and I will be helped	P
134	the reason it is called grace eventually is that it is the eventually that kills you	I
135	there will be grace	P
136	and [uh] I think we breathe	I
137	/i think that's what we/ how Ezekiel helped those people come back to life was the holy spirit moving through him	NT
138	and his compassion brought those bones back to life	P
139	but so we breathe	I
140	and {I} I do believe in getting people water	NT
141	and [uh] you know I don't understand much about Grace [uh] except that it meets you exactly where you are and that it doesn't leave you where it found you you know	I
142	you can breathe a little better	P
143	little /water wing/ sensation of being lifted up just enough	P
	TAVIS	
144	you too	F

Appendix B – Study 2. Stimuli and valence ratings

					Gesturing hand		VALENCE RATING	
#	**Word**	**Valence**	**Speaker**	**Gesture type**	**Group 1**	**Group 2**	**Group 1**	**Group 2**
1	Thank	Positive	Female	Side palm	Right	Left	5.50	6.25
2	Boring	Negative	Female	Forward palm	Right	Left	3.38	2.25
3	Sing	Positive	Male	Horizontal Sweep	Right	Left	6.33	5.86
4	Shine	Positive	Female	Forward palm	Left	Right	6.75	6.75
5	Mad	Negative	Female	Forward palm	Right	Left	3.88	2.63
6	Depressed	Negative	Female	Horizontal sweep	Left	Right	3.43	1.88
7	Helpful	Positive	Male	Vertical chop	Right	Left	7.25	7.63
8	(Cupcake)	(control)	Female	(control)	(Both)	(Both)	6.86	8.14
9	Uncomfortable	Negative	Male	Vertical chop	Left	Right	3.83	3.71
10	Guilt	Negative	Male	Vertical chop	Right	Left	3.38	2.38
11	Enjoy	Positive	Female	Horizontal sweep	Left	Right	6.63	6.75
12	Bake	Positive	Female	Horizontal sweep	Right	Left	6.00	6.38
13	Fail	Negative	Female	Side palm	Left	Right	3.75	3.63
14	Pizza	Positive	Male	Vertical chop	Left	Right	6.13	7.13
15	Disagree	Negative	Female	Horizontal sweep	Left	Right	4.25	3.86
16	(Relax)	(control)	Male	(control)	(Both)	(Both)	6.43	6.88
17	Lie	Negative	Female	Horizontal sweep	Right	Left	3.25	2.38
18	Colorful	Positive	Female	Forward palm	Left	Right	5.88	7.38
19	Confident	Positive	Female	Forward palm	Left	Right	6.50	7.00
20	Punish	Negative	Female	Forward palm	Right	Left	3.38	2.75
21	Talented	Positive	Female	Horizontal sweep	Right	Left	6.13	7.00
22	Threaten	Negative	Male	Horizontal sweep	Left	Right	2.88	2.63

(green highlighting indicates highest rating pr. word)

Appendix C – Study 2. Survey

Informed consent

Thank you for your interest in participating in this study! We are interested in understanding how people perceive the valence of words (whether different words are perceived as positive or negative).

What will happen if you take part in this study?
If you choose to participate in this study, you will be watching a number of short videos of different people saying different words. For each video there will be a scale for you to judge the valence of that word. The judgements are your opinion of how positive or negative each word is.

We will also ask you a couple of demographic questions about yourself in the end of the study, which we will use to ask whether factors like age or gender affect the ways people see words. Your answers to these questions will not make your identity known to the researchers.

Confidentiality
Any information that is obtained in connection with this study that might identify you will remain confidential. It will be disclosed only as required by law. However, as with all online activities, a risk of a breach of confidentiality is always possible. To the best of our ability, your answers in this study will remain confidential.

Length of participation
It should take you approximately 15 minutes to complete this study, including answering the demographic questions at the end.

Potential risks
There are no anticipated risks or discomforts involved with participating in this study.

Potential benefits
You will not individually benefit from participating in this study. By providing your answers, you help contribute to our knowledge about the valence judgements of words.

Your rights
You can choose whether or not you want to participate in this study, and you may discontinue your participation at any time.

Contact
If you have any questions, comments or concerns about the research, please contact Linea Brink Andersen (lin15lbr@student.lu.se)

By clicking "I agree" below you are indicating that you are at least 18 years old, have read and understood this consent form and agree to participate in this research study. **Please print a copy of this page for your records.**

By clicking "I agree" below you are indicating that you are at least 18 years old, have read and understood this consent form and agree to participate in this research study.

- ◯ I agree
- ◯ I do not agree

Instructions

Thank you for choosing to participate in this study.

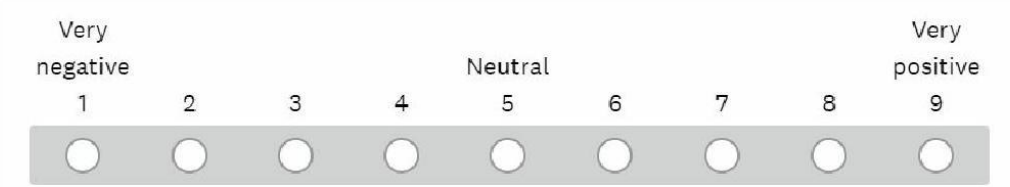
This study must be completed on a computer or tablet, please do not complete it on your phone.

In this study, you will be watching 22 short videos. In each video, a person will be saying a word. Please watch the video and listen closely to the word spoken.

To watch a video, click the play button.

After each video, you will be asked to rate the valence of the word. By valence, we mean how positive or negative the word makes you feel.

You will be rating the words on a 9-point scale, which will look like this:



The scale ranges from Very negative to Very positive.

If a word makes you feel completely unhappy, annoyed, or sad, select 1.

If a word makes you feel completely happy, satisfied or joyful, select 9.

If a word makes you feel completely neutral, neither happy nor unhappy, select 5.

You can select any number on the scale to describe feelings in between the two extremes.

Don't spend a lot of time thinking about each word. Try to answer with your first feeling.

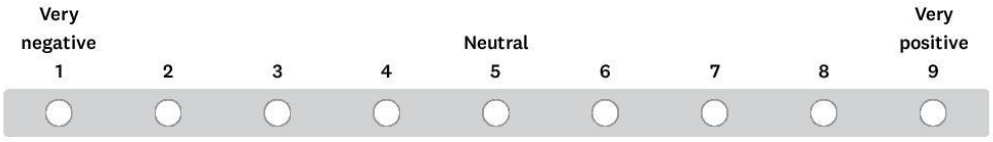
After rating each word, click next to proceed to the next video.

After you have rated all the words, we will ask you some questions about what you saw in the videos, so please pay attention when they play. It is important for this study that you watch the videos before making your judgments.

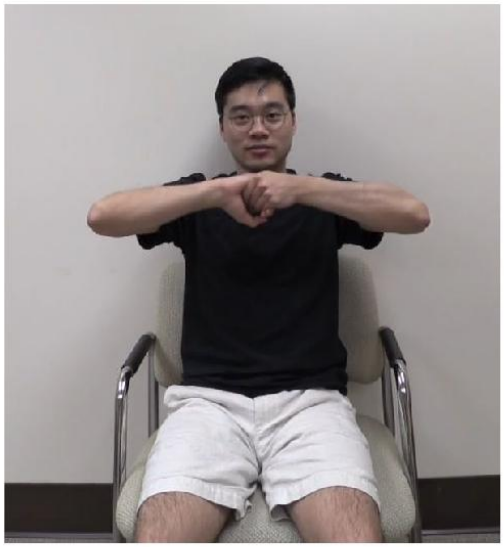
At the end, we will also ask you a few demographic questions to get a sense of the composition of our participant pool.

Please click next when you are ready to start.

Video displayed here.
(This page repeated for each of the 22 videos.)



Which of the following gestures did you see in the videos?



☐ 

☐ 

Which hand do you think is this speaker's dominant hand?

- ◯ Right
- ◯ Left
- ◯ Ambidextrous (both)

Which hand do you think is this speaker's dominant hand?

- ◯ Right
- ◯ Left
- ◯ Ambidextrous (both)

Demographic questions

What gender do you identify the most with?

- ◯ Female
- ◯ Male
- ◯ Do not wish to answer
- ◯ Other (please specify)

Which hand is your dominant hand?

- ◯ Right
- ◯ Left
- ◯ Ambidextrous (both)

Which hand do you use to control your computer mouse or trackpad most often?

- ◯ Right
- ◯ Left
- ◯ Ambidextrous (both)

Do you speak English fluently?

- ◯ Yes
- ◯ No

When did you learn to speak English?

- ◯ Before the age of 10
- ◯ After the age of 10
- ◯ I do not speak English

What type of device did you use to take this survey?

- ◯ Smartphone
- ◯ iPad or Tablet
- ◯ Laptop Computer
- ◯ Desktop Computer
- ◯ Other (please specify)

How old are you?

- ◯ 18-24
- ◯ 25-34
- ◯ 35-44
- ◯ 45-54
- ◯ 55-64
- ◯ 65+

Debriefing

Thank you for participating in our study. We greatly appreciate your participation!

Purpose of the study
Previously, we explained that the purpose of our study was to gather information about people's valence judgments of words. While this is true, we were not previously able to explain that our study is specifically interested in how a speaker's gestures affect people's valence judgements of words.

In order to test our hypothesis, it was important to not tell you that were primarily interested in gestures. If we did, you might have watched the videos in an unusual way, paying particular attention to the gestures. We wanted you to watch the videos similarly to how you would normally perceive speech in everyday communication. In everyday speech, gestures might affect your judgement of valence, but you are not instructed to pay explicit attention to a speaker's gestures.

We regret that we could not inform you of the full purpose of this study before you agreed to participate, but we hope you understand our reason for it.

Background for the study
This study grew out of two prior studies that found correlations between the hand a speaker gestures with and the valence of their speech.

Casasanto & Jasmin (2010) found that four politicians tended to gesture with their dominant hand during sentences with positive valence, and their non-dominant hand during sentences with negative valence.

Kipp & Martin (2009) found that two actors tended to gesture more with their dominant hand during sentences with negative valence, and their non-dominant hand during sentences with positive valence.

We are currently conducting more research into these patterns, and this is why we wanted to study whether the hand a speaker used to gesture affected your valence judgement of their words.

Confidentiality
Please be ensured that although we did not originally inform you of the full purpose of this study, all other information you have received before you agreed to participate is correct. This includes information about your confidentiality.

Final report
If you would like to receive a copy of the final report or summary of findings of this study when it is completed, please feel free to contact Linea Brink Andersen (lin15lbr@student.lu.se)

Contact

If you have any questions, comments or concerns about the research, please contact Linea Brink Andersen (lin15lbr@student.lu.se)

Relevant literature

If you are interested in reading more about the systematicity between the hand of a gesture and the valence of speech, please see the following references:

Casasanto, D., & Jasmin, K. (2010). Good and bad in the hands of politicians: Spontaneous gestures during positive and negative speech. Plos one, 5(7), e11805.

Çatak, E. N., Açık, A., & Göksun, T. (2018). The relationship between handedness and valence: A gesture study. Quarterly Journal of Experimental Psychology, 1747021817750110.

Kipp, M., & Martin, J. C. (2009, September). Gesture and emotion: Can basic gestural form features discriminate emotions?. In Affective Computing and Intelligent Interaction and Workshops, 2009. ACII 2009. 3rd International Conference on(pp. 1-8). IEEE.

We kindly ask that you do not share information about the purpose of this study with other potential participants or online.

Please keep a copy of this form for your future reference. Thank you again for your participation.

If this information changes your consent to participate in this study, you can indicate so by clicking the button at the bottom of this page, and your data will not be included in our study.

- ◯ YES, I agree to have my answered included in the study (Nothing has changed)
- ◯ NO, I do not wish my answers to be included in this study (I have changed my mind)