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Levels of Emotion Valence and Arousal in American Sign Language

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Cover Page Footnote

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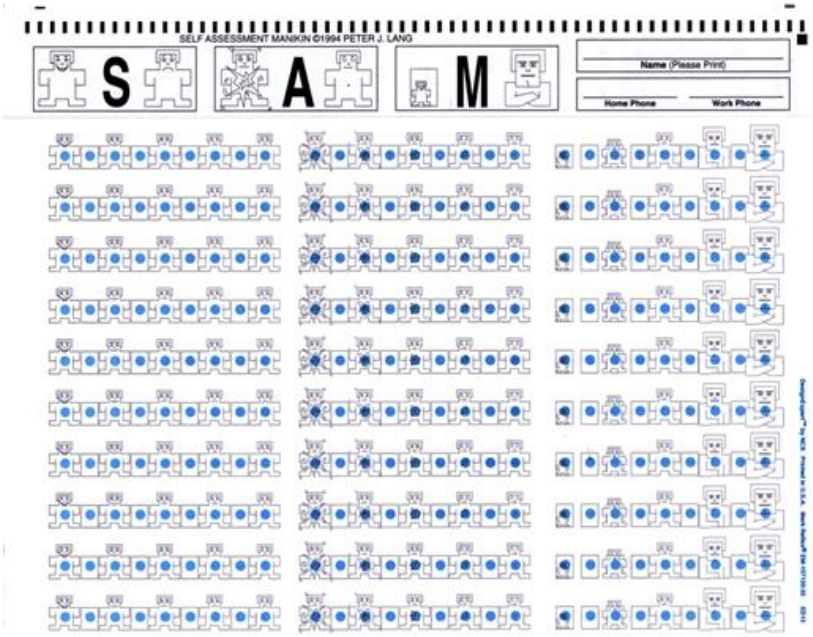
Different types of affective stimuli are used in studies about emotions, including visual images, facial expressions, and spoken and written words. One of the largest databases of emotion words in spoken and written English is the Affective Norms for English Words (Stevenson, Mikels, & James, 2007). The Affective Norms for English Words (ANEW) was initially developed and normed for English speakers in the United States in 1999 (Bradley & Lang, 1999). The ANEW database of emotion words was chosen from previous studies, and has 1,034 English words (Bellezza, Greenwald, & Banaji, 1986; Bradley & Lang, 1999; Mehrabian & Russell, 1974).

ANEW has been widely used to investigate English speakers' perceptions of emotional word valence and arousal. When a person is asked to evaluate the emotional word valence (S), the word may be rated positively or negatively. A neutral rating is also possible if the person does not feel the word has either a negative or positive connotation. For emotional arousal (A), the person's rating might depend on response to the intensity of emotional words. The rating for emotional arousal can range from calm to excited or nervous (Kensinger & Schacter, 2006). Figure 1 depicts a ScanSAM (Self-Assessment Mankin; Bradley & Lang, 1999) image sheet that is typically used to show a range of emotions from happy to sad on a valence (S) scale and excited to calm on an arousal (A) scale. There is a third dimension, dominance or control, but the dominance scale is not relevant for this study.

Figure 1: ScanSAM sheet for valence and arousal ratings



ANEW emotion words have been translated to other spoken languages (e.g. Spanish and Portuguese) and normed on the respective populations (Redondo, Fraga, Padron, & Comesana, 2007; Soares, Comesaña, Pinheiro, Simões, & Frade, 2011). Redondo and colleagues (2007) randomized 1,034 words in ANEW and administered them to Spanish speakers. Spanish participants had lower valence ratings for ANEW words compared to Americans, but the

differences were not significant. Researchers concluded that the differences could be from using a visual affective rating stimuli, known as the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1997). Soares and colleagues (2012) adapted and administered ANEW to 958 native European Portuguese participants. The rating normative data from this European Portuguese sample was then compared with the collected English and Spanish norms, showing a boomerang effect; that is, that the words with higher arousal values had higher valence ratings compared to the neutral words. Boomerang effects have been identified in other rating tasks with emotion words (Bradley & Lang, 1999; Ferre, Guasch, Moldovan, & Sánchez-Casas, 2011; Soares et al., 2012).

The Berlin Affective Word List Reloaded (BAWL-R; Võ, Conrad, Kuchinke, Urton, Hofmann, & Jacobs, 2009) evaluated the valence and arousal of German words using the original BAWL (Võ, Jacobs, & Conrad, 2006). The BAWL-R is the largest database of spoken and written German words for affective processing (Võ et al., 2009). The original study with the BAWL was developed in 2006, but did not include the arousal ratings. Võ and colleagues (2009) conducted a second study on 200 German psychology students (*M*=27.14-year-old, *SD*=9.11) to add arousal ratings for negative, neutral, and positive German words from the BAWL. Results showed that emotion words with higher valence also had higher arousal ratings, which was similar to those observed in previous rating studies normed for other spoken language populations (Bradley & Lang, 1999; Ferre et al., 2011; Soares et al., 2012; Võ et al., 2009).

Riegel and colleagues then adapted the BAWL-R from German to Polish, and created the Nencki Affective Word List (NAWL; Riegel, Weirzba, Wypych, Żurawski, Jednoróg, Grabowska, & Marchewka, 2015). Although most of the words were directly translated, modifications of some words helped adjust for cultural differences. For example, the researchers who developed the NAWL omitted positive valence words considered taboo in Polish. They developed a database of 2,902 Polish words with affective rating norms. Results from 266 participants demonstrated a boomerang pattern, which was similar to the normative data distribution in German (Riegel et al., 2015; Võ et al., 2009).

To date, no studies have attempted to adapt ANEW for a signed language, such as American Sign Language (ASL). ASL is a formal language that uses visual markers, such as body movements and facial expressions to convey syntax (Neidle, Kegl, MacLaughlin, Bahan, & Lee, 2000). Grammatical cues in ASL are frequently shown through facial expressions in conjunction with signed words (Letourneau & Mitchell, 2011; Pyers & Emmorey, 2008; Vogler & Goldenstein, 2007). Signers fully focus on faces, body language, and hand movements to read and interpret emotions in lieu of attending to voice tones. It is possible that the emotional arousal is more pronounced for Deaf ASL users due to the visual nature of facial expressions.

Letourneau and Mitchell (2011) examined native ASL signers' judgment of emotions and facial orientation. These adult signers were then compared with hearing controls who did not know any signed language. Both groups were shown isolated parts of the faces and whole faces with neutral and emotional expressions. Results showed that Deaf ASL users focused on different areas of the face compared to the non-signers for tasks that required identifying emotions. However, the authors did not discuss the valence or arousal levels associated with viewing neutral or emotional expressions.

No studies have examined how Deaf ASL users perceive the signed emotional valence and arousal conveyed through the combination of facial expressions and signs. We defined "Deaf" signers to include those who are culturally deaf and use ASL on a daily basis. Our research aim was to adapt a subset of the English ANEW emotion words to ASL, and compare our signers' valence and arousal ratings with the ANEW normative rating data for the English users. In this study, we looked at valence and arousal for emotional words to see if should be treated differently in Deaf signers. This supports Riegel et al's (2015) argument for the need to culturally adapt emotion words prior to their use with a cultural language group.

Method

Participants

Forty-two (*M*=23 years-old; *SD*=4.87 years) ASL users participated in this study. Most of the sample group was Caucasian (67%). Although all participants reported using ASL and English daily, ASL proficiency ratings on a 9-point scale were higher than the reported English proficiency ratings. The participants must be Deaf/Hard of Hearing and can watch and understand ASL videos. Half of the sample reported ASL as their first language. The mean age of acquisition of ASL for the sample was 5.67 years old (SD= 6.32 years). A descriptive summary of the sample characteristics is provided in Table 1.

Table 1. Demographics Characteristics of the Deaf Adult Participants

Characteristics	N	%
Gender		
Male	21	50%
Female	21	50%
Ethnicity		
Asian or Pacific Islander	3	7%
Black or African American	6	14%
Hispanic or Latino	5	12%
White	28	67%
Etiology		
Genetic	15	36%
Congenital*	10	24%
Unknown	17	40%

*Congenital includes infection, prematurity, and anything else that occurs after birth.

Hearing Level		
Mild (26-40 dB loss)	1	2%
Moderate (41-55 dB loss)	2	5%
Moderately Severe (56-70 dB loss)	5	12%
Severe (71-90 dB loss)	12	29%
Profound (91+ dB loss)	18	43%
Diagnosed Progressive Loss	4	9%
Highest level of education completed by mother:		
Did not complete	3	7%
High school	13	31%
College	25	60%
Unknown	1	2%
Highest level of education completed by father:		
Did not complete	0	0%
High school	11	26%
College	28	67%
Unknown	3	7%
Age (years old):		
Mean (SD)	23 (4.87)	
Onset of hearing loss (months):		
Mean (SD)	23 (27.91)	
Mean age of Language Acquisition (years): *Mean (SD)*		
ASL	5.67 (6.32)	
English	3.68 (2.66)	

Materials

Bradley & Lang (1999) have three dimensions for measuring emotion: valence, arousal, and dominance. Studies typically exclude dominance when the focus is on the perception of emotions (Bradley & Lang, 1999; Ferre et al., 2011). We followed a similar procedure in this study, and only included ratings for valence and arousal. The valence of the emotion words

ranged from positive to negative. For emotional arousal, participants rated the intensity of the emotions from excited, nervous to calm. Both ratings were performed on a Likert scale from 1 (negative/low) to 9 (positive/high).

In the first step of the translation procedure, 40 positive and negative emotion words with moderate to high arousal scores were chosen from ANEW. Positive and negative words that were moderate to high in arousal (only words with a value of 5 or above for arousal) were selected. The range for arousal was 1 to 9, so 5 was chosen as indicating at least moderate arousal. We considered words with a value of 3.5 and below as negative, and words with a value of 6.5 and above as positive.

A Deaf native ASL user, who was not a study participant, viewed the list of selected English words and signed the words, which was recorded on video. We matched the emotion words with neutral signed words of similar movement, location, and hand shape. After two Deaf ASL linguists reviewed and approved these signed pairs, cognitive debriefing interviews were held with three Deaf participants to test for concept equivalency. The participants were asked to view emotion signs in ASL, and then write down the equivalent English words. Cognitive debriefing results showed that two positive emotion signs and one negative emotion sign were perceived as ambiguous by a majority of the participants. These ambiguous items were removed from the list of ASL stimuli.

For the purpose of the rating study of ASL emotion signs, ASL emotions signs were matched on location and movement to create video pairs of emotion signs and neutral signs. There were more emotion signs video clips, but some of the positive emotion signs video clips were corrupt, resulting in an unbalanced number of positive and negative stimuli. We removed video clips from negative emotion signs to match the number of positive emotion signs. We selected and randomized four positive and four negative emotion signs, along with four neutral signs from the paired emotion-neutral list (see Table 2). The final ASL list included 10 practice video pairs (5 positive-neutral; 5 negative-neutral) and 12 experiment video pairs (4 positive-neutral; 4 negative-neutral; 4 neutral-neutral), which were then uploaded to the SensoriMotoric Instruments (SMI) Experiment Center script. Practice video pairs were used to test the participants' understanding of the instructions and practice viewing the videos in ASL.

Table 2: Stimuli words in ASL for ANEW

Negative	**Neutral**	**Positive**
Anxious	Tiger	Surprised
Stressed	Crossroads	Thrilled
Rage	Young	Consoled
Misery	Vague	Lucky

We selected and randomized four positive and four negative emotion words from ANEW to obtain deaf participants' ratings of English emotion words (see Table 3). Four neutral words were selected from the English Lexicon Project website (Balota, Yap, Cortese, Hutchison, Kessler, Loftis, Neely, Nelson, Simpson, & Treiman, 2007) and they were matched to the emotion words for word frequency, word length, and parts of speech. To control for word type,

we matched the positive and negative items based on word length and word frequency.

Table 3: Stimuli words in English for ANEW

Negative	Neutral	Positive
Anguished	Purple	Passion
Contempt	Scented	Awed
Startled	Swab	Aroused
Hurt	Grammar	Pride

Procedures

After obtaining approval from the university IRB, participants were recruited through flyers, emails, and word of mouth. Forty-two signers (21 males, 21 females) participated in the study. All participants completed a demographics questionnaire, language history questionnaires, and self-rating proficiency scales for ASL and English. When these were completed, participants were asked to rate the signs and words, and were encouraged to not overthink their responses.

Separate ScanSAM rating sheets were provided for each set of the individual English words and ASL signs. Participants viewed one video clip at a time, and rated each signed word for valence and arousal using the ScanSAM rating sheet. Next, the participants were instructed to write down the English equivalent of the sign.

A similar procedure was repeated for the set of English words. Participants viewed the word at the center of the computer screen, and then rated each word for valence and arousa using the ScanSAM rating sheet . Next, they were asked to either provide an ASL translation equivalent to the English word or explain the meaning of the English word to the researcher, who then wrote down their responses in real time. The study required about 30 minutes of the participants' time, and participants were given compensation.

Results

Chi-square tests were carried out on demographic and language proficiency data. The education level of the mothers was associated with the participant's self-reported ASL proficiency (x^2 =14.74, p <0.05). Higher hearing loss was associated with higher ASL proficiency level (x^2 = 17.4, p <0.05). Separate comparison analyses were conducted for ASL emotion ratings and English emotion ratings. Due to the differences in the comparison group sample sizes (Deaf = 28 to 42; ANEW English speakers = 100), an unpaired T-test was the chosen statistical method for the comparative analysis between Deaf ASL users in the study and the English speakers in the ANEW normative data.

All participants were familiar with the ASL signs in the list. As a result, all of the ASL emotion rating data was retained in the analysis and compared with the normative dataset for ANEW-English. This was not the case for the English emotion ratings by Deaf participants. A majority of participants with high English proficiency defined or translated English words differently. Some of the Deaf participants reported that they used these words less frequently than expected for the general population. If the participant was not familiar with the word, the

rating data was removed from the word analysis. For the current study, we required that at least 70% of our sample was familiar with a word in order to include this word in the analyses.

Emotion rating scores for valence and arousal ranged from 1 (negative valence and low arousal) to 9 (positive valence and high arousal). Bivariate correlation was performed on emotion ratings and Deaf ASL participants' characteristics. An unpaired t-test was used to compare between the emotion ratings for the ASL emotion signs and the normative ANEW emotion ratings for the original English emotion words. If the ASL and English ratings were similar for an emotion stimulus, this suggested equal emotional activation for the stimulus in both languages. If the ratings were significantly different, this suggested that the stimulus had a greater or lower emotional weight in a language compared to the other language.

Table 4 lists the means and standard deviations for valence and arousal ratings of four positive emotion signs and four negative emotion signs. Results indicated that two emotion words in ASL, "anxious" and stressed," yielded rating differences in both valence and arousal when compared to the ANEW ratings [t (41) = 2.08 to 4.13, $p < .05$]. Specifically, "anxious" was rated as more negative when presented in ASL and "stressed" was rated as more positive when presented in ASL. In addition, "anxious," "rage," and "stressed" were all rated as less arousing in ASL when compared to the ANEW norm. For the positive emotions, "consoled" was rated as more positive in ASL [t (41) = 5.92, $p < .01$] and "thrilled" was rated as less arousing in ASL [t (28) = 2.22, $p < .05$].

Table 4: T-tests for Selected Emotion Words from ANEW

Emotion Words	**English ratings by ANEW normative sample**		**ASL ratings by Deaf sample in current study**		**Unpaired T-test**	***p*-value**
Negative	M	SD	M	SD		
Anxious_Valence	4.81	1.98	3.65	2.1	3.08	**0.002**
Anxious _Arousal	6.92	1.81	5.88	2.6	2.69	**0.008**
Misery_Valence	1.93	1.6	2.1	1.91	0.54	0.59
Misery_Arousal	5.17	2.69	4.33	3.17	1.58	0.11
Rage_Valence	2.41	1.86	2.81	2.34	1.08	0.28
Rage_Arousal	8.17	1.23	5.62	3.04	7.14	**0.0001**
Stressed_Valence	2.09	1.41	2.7	1.91	2.08	**0.04**
Stressed_Arousal	7.45	2.38	5.48	2.94	4.13	**0.0001**
Positive						
Consoled_Valence	5.78	1.64	7.46	1.21	5.93	**0.0001**
Consoled _Arousal	4.53	2.22	4.46	2.9	0.16	0.88
Lucky_Valence	8.17	1.06	7.83	1.28	1.63	0.11
Lucky_Arousal	6.53	2.34	6.61	2.32	0.18	0.85
Surprised_Valence	7.47	1.56	7.78	1.48	1.08	0.28
Surprised_ Arousal	7.47	2.09	6.85	2.36	1.53	0.13
Thrilled_Valence	8.05	1.48	8.14	1.18	0.3	0.77
Thrilled_Arousal	8.02	1.65	7.11	2.67	2.22	**0.03**

For the English condition, rating data from 28 Deaf participants who self-rated their English proficiency as above average were included in the analysis. Within this sample, three out of eight English emotion words had less than 70% translation accuracy. The three English emotion words not translated or defined accurately by most participants in our sample were "contempt," "anguished," and "aroused.", These words were removed from the analysis. The retained emotion words (two negative and three positive) that all participants were familiar with were "hurt," "startled," "awed," "passion," and "pride." The valence and arousal ratings for these English emotion words were compared to the ANEW normative rating data for the corresponding words.

Results for the five emotion words are presented in Table 5. For the valence ratings of the English emotion words, two words ("pride" and "hurt") had significantly different ratings between the Deaf sample in our study and the ANEW normative sample [t (139) = 2.17, $p < .05$; t (139) = 3.16, $p < .05$]. "Pride" was rated as more positive by the Deaf sample compared to the ANEW sample, and "hurt" was rated as less negative by the Deaf sample compared to the ANEW sample. For arousal rating, two words ("startled" and "hurt") emerged as being rated differently by our Deaf sample [t (139) = 2.71, $p < .05$; t (139) = 5.14, $p < .05$] compared to the ratings by the ANEW normative sample. Both "startled" and "hurt" were rated as less arousing by the Deaf sample compared to the ANEW sample.

Table 5: T-tests for Retained English Emotion Words*

Retained Words	**English ratings by ANEW normative sample**		**English ratings by Deaf sample in current study**		**Unpaired T-test**	***p*-value**
Negative	M	SD	M	SD		
Hurt_Valence	1.9	1.26	2.83	2.17	3.16	**0.001**
Hurt_Arousal	5.85	2.49	4.33	2.83	3.14	**0.002**
Startled_Valence	4.5	1.67	4.49	1.48	0.03	0.98
Startled_Arousal	6.93	2.24	5.74	2.23	2.71	**0.01**
Positive						
Awed_Valence	6.7	1.38	6.86	1.66	0.56	0.57
Awed_Arousal	5.74	2.31	5.42	2.41	0.70	0.48
Passion_Valence	8.03	1.27	8.0	1.28	0.13	0.9
Passion_Arousal	7.26	2.57	6.5	2.65	1.57	0.12
Pride_Valence	7.0	2.11	7.8	1.56	2.17	**0.03**
Pride_Arousal	5.83	2.48	5.95	2.82	0.25	0.8

Note. *English emotion words that were accurately translated or defined by 70% or more of our Deaf participants were retained.

Discussion

Databases like ANEW are often used to examine emotional stimuli in experiments. Researchers select emotional words based on their valence and arousal values. These types of databases exist for spoken languages, but this current study is the first to examine emotional valence and arousal ratings in a signed language, specifically in ASL. The results indicate that

although some of the valence and arousal values for the words used in this study are similar in English and ASL, some of the values are significantly different. It is possible that some of the stimuli are more emotional in ASL because of the visual nature of the language, which lays the groundwork for developing a new norm for ASL.

Normative databases are often used when selecting words for studies examining the relationship between emotion and attention. Generally, negative words tend to capture attention, whereas positive words do not (McKenna & Sharma, 1995; Sutton & Altarriba, 2011). In addition, such norms are often used to select words for studies examining the relationship between emotion and memory (Ali & Cimino, 1997; Nagae & Moscovitch, 2002). A study on memory and the effects of valence and arousal suggested that emotional words are often remembered better than non-emotional words (Kensinger, & Corkin, 2003), which is true for both recall and recognition tests of memory. Based on this information, ASL normative data for emotion signed words would be especially useful for emotion and memory studies including Deaf ASL users.

The study findings by Kensinger and Schacter (2006) are consistent with the results in our study. In their study, participants' valence and arousal ratings were assessed after they viewed emotion pictures and read emotion words in English. Kensinger and Schacter found higher valence ratings with pictures compared to words, suggesting that nonverbal stimuli are responded to differently. This finding might explain the tendency for our ASL participants to rate relatively higher valence for ASL signs than for English words.

Viewing ASL signs might trigger higher valence rating, and a possible explanation for this trigger is the explicit visual emotional cues conveyed through facial expressions. Visual cues that involve affective processing, such as facial expressions and emotional pictures similar to those used in IAPS, elicit stronger emotional responses compared to viewing words. However, arousal responses tend to be more consistent for different types of stimuli (Britton, Taylor, Sudheimer, & Liberzon, 2006).

Although there were no group differences in the arousal ratings for some of the English words, the word frequency among ASL users differed from the norm. The word frequency issue should be considered when translating ANEW emotion words to ASL in future studies. If the original English word cannot be accurately translated to ASL, a synonym could be used to adjust for cultural differences as was done for the Nencki Affective Word List (NAWL; Riegel et al., 2015).

Previous studies used normed emotional words in various spoken languages, such as English (ANEW), German (BAWL-R), and Polish (NAWL). The current work represents the first attempt to norm emotional valence and arousal for a small subset of signed vocabulary in ASL. Although only a relatively small sample size of words and signs was used for this study, the goal of the current study was to determine if emotional valence and arousal in ASL were similar to or differed from the emotional valence and arousal in English. The results suggest that a separate normative data for emotion ratings may be required for sign language users.

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References

Ali, N., & Cimino, C. R. (1997). Hemispheric lateralization of perception and memory for emotional verbal stimuli in normal individuals. *Neuropsychology*, 11, 114-125.

Bradley, M. M., & Lang, P. J. (1999). *Affective norms for English words (ANEW): Instruction manual and affective ratings* (Technical Report No. C-1). The Center for Research in Psychophysiology, University of Florida.

Balota, D. A., Yap, M. J., Cortese, M.J., Hutchison, K. A., Kessler, B., Loftis, B., Neely, J. H., Nelson, D. L., Simpson, G.B., & Treiman, R. (2007). The English lexicon project. *Behavior Research Methods*, *39*, 445-459.

Bellezza, F. S., Greenwald, A. G., & Banaji, M. R. (1986). Words high and low in pleasantness as rated by male and female college students. *Behavior Research Methods, Instruments, & Computers, 18*(3), 299-303.

Britton, J. C., Taylor, S. F., Sudheimer, K. D., & Liberzon, I. (2006). Facial expressions and complex IAPS pictures: Common and differential networks. *NeuroImage*, *31*(2), 906-919.

Ferre, P., Guasch, M., Moldovan, C., & Sánchez-Casas, R. (2011). Affective norms for 380 Spanish words belonging to three different semantic categories. *Behavior Research Methods*, *44*(2), 395-403.

Kensinger, E. A., & Corkin, S. (2003). Memory enhancement for emotional words: Are emotional words more vividly remembered than neutral words? *Memory & Cognition*, *31*(8), 1169-1180.

Kensinger, E. A., & Schacter, D. L. (2006). Processing emotional pictures and words: Effects of valence and arousal. *Cognitive, Affective and Behavioral Neuroscience*, *6*(2), 110-126.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (2008). International affective picture system (IAPS): Affective ratings of pictures and instruction manual. Technical Report A-8. University of Florida, Gainesville, FL.

Letourneau, S. M., & Mitchell, T. V. (2011). Gaze patterns during identity and emotion judgments in hearing and deaf users of American Sign Language. *Perception*, *40*(5), 563-575.

McKenna, F. P., & Sharma, D. (1995). Intrusive cognitions: An investigation of the emotional Stroop task. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 21, 1595-1607.

Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. Cambridge, MA: The MIT Press.

Nagae, S., & Moscovitch, M. (2002). Cerebral hemispheric differences in memory of emotional and non-emotional words in normal individuals. *Neuropsychologia*, *40*(9), 1601-1607.

Neidle, C., Kegl, J., MacLaughlin, D., Bahan, B., & Lee, R. G. (2000). *The syntax of American Sign Language: Functional categories and hierarchical structure*. Cambridge, MA: The MIT Press.

Pyers, J. E., & Emmorey, K. (2008). The face of bimodal bilingualism: Grammatical markers in American Sign Language are produced when bilinguals speak to English monolinguals. *Psychological Science*, *19*(6), 531-536.

Redondo, J., Fraga, I., Padrón, I., & Comesaña, M. (2007). The Spanish adaptation of ANEW (Affective Norms for English Words). *Behavior Research Methods*, *39*(3), 600-605.

Riegel, M., Weirzba, M., Wypych, M., Żurawski, L., Jednoróg, K., Grabowska, A., & Marchewka, A. (2015) Nencki Affective Word List (NAWL): The cultural adaptation of the Berlin Affective Word List–Reloaded (BAWL-R) for Polish. *Behavior Research Methods*, *47*(4), 1222- 1236.

Soares, A. P., Comesaña, M., Pinheiro, A. P., Simões, A., & Frade, C. S. (2012). The adaptation of the affective norms for English words (ANEW) for European Portuguese. *Behavior Research Methods*, *44*(1), 256-269.

Stevenson, R.A., Mikels, J.A., & James, T.W. (2007). Characterization of the Affective Norms for English Words by discrete emotional categories. *Behavior Research Methods*, *39*(4), 1020-1024.

Sutton, T. M., & Altarriba, J. (2011). The automatic activation and perception of emotion in word processing: Evidence from a modified dot probe paradigm. *Journal of Cognitive Psychology*, *23*, 736-747.

Võ, M. L. H., Jacobs, A. M., & Conrad, M. (2006). Cross-validating the Berlin Affective Word List (BAWL). *Behavior Research Methods, 38*(4), 606-609.

Võ, M. L. H., Conrad, M., Kuchinke, L., Urton, K., Hofmann, M., & Jacobs, A. M. (2009). The Berlin affective word list reloaded (BAWL-R). *Behavior Research Methods*, *41*(2), 534-538.

Vogler, C., & Goldenstein, S. (2007). Facial movement analysis in ASL. *Springer Journal on Universal Access in the Information Society*, *6*(4), 363-374.

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.