Article

An English Word Database of EMOtional TErms (EMOTE)

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Abstract
Research in the socio-emotional domain may require words for experimental settings rated on emotionally and socially relevant word characteristics (e.g., valence and desirability). In addition, cognitively relevant word characteristics (e.g., imagery) are important for research in the interface of emotion and cognition (e.g., emotional memory). To provide researchers with a corresponding word pool, the database of English EMOtional TErms (EMOTE) provides subjective ratings for 1287 nouns and 985 adjectives. Nouns and adjectives were rated on valence, arousal, emotionality, concreteness, imagery, familiarity, and clarity of meaning. In addition, adjectives were rated on control, desirability, and likeableness. EMOTE norms provide an easily accessible word pool for research in the socio-emotional domain. To illustrate the usefulness of this database, norms were linked to memorability scores from a word recognition task for EMOTE nouns. The database as well as future directions are discussed.

Keywords
words, norms, valence, arousal, emotionality

Introduction

Words are frequently used in experimental research settings. Words have the advantage of being easily described on several dimensions that are relevant for experimental settings including objective word characteristics, such as length and frequency, and subjective word characteristics, such as the emotional tone or the ease of forming a mental image (Grühn & Sharifian, 2016). Growing interest in socio-emotional research, such as emotional processing, priming, or

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impression formation, may require words rated on emotionally and socially relevant word characteristics (e.g., valence and desirability), in addition to cognitively relevant word characteristics (e.g., imagery). For example, research on emotional memory may select and match words according to valence, arousal, imagery, word length, and word frequency. To do so, researchers may need an easily accessible word database. To serve that goal, we present a database of English EMOtional TErms (EMOTE). EMOTE is intended to provide a framework for a variety of subjective and objective word characteristics for the use in research focusing on emotional, social, and personality aspects.

In cognitive psychology, words have been used to investigate the influence of word characteristics on cognitive processes, such as memory (e.g., Kausler, 1994; Rubin & Friendly, 1986). For example, words with a high frequency are better remembered in free recall tasks than words with a low frequency and the reverse is true for recognition tasks (Gorman, 1961; Schulman, 1967). Research in the cognitive domain tends to carefully select and match word material for their experimental settings on these dimensions. In the socio-emotional domain, words are also used in a multitude of different contexts. In contrast to the cognitive domain, however, research in the socio-emotional domain tends to focus on one dimension (e.g., valence) or very few dimensions (e.g., valence and arousal) rather than on a multitude of word characteristics. Given that some word characteristics are probably important confounding variables, a neglect of these characteristics might be problematic for the interpretation of findings. For example, research on emotional memory may compare performance for remembering positive, negative, and neutral words. Negative words, however, tend to have a lower frequency in written and spoken text than positive words (e.g., Garcia, Garas, & Schweitzer, 2012; Kloumann, Danforth, Harris, Bliss, & Dodds, 2012; Ortony, Clore, & Foss, 1987). Given that word frequency is a memory-relevant characteristic, ignoring frequency when selecting positive, negative, and neutral words for a memory task may produce spurious effects that might be attributed to valence rather than frequency.

One reason why other word characteristics are not taken into account might be a lack of easy availability of corresponding word norms including both emotional and cognitive aspects. Most word norms focus on dimensions relevant for cognitive experimental settings rather than socio-emotional settings. For example, research on emotion typically investigates the influence of valence, that is, how positive or negative a stimulus is, and arousal, that is, how emotionally exciting or arousing a stimulus is. Most of the widely used norms, however, do not contain emotional aspects at all (e.g., Paivio, Yuille, & Madigan, 1968) or contain only ratings of emotionality, that is, from neutral to very emotional, how emotional is the stimulus (e.g., Strauss & Allen, 2008). Emotionality is, however, not the same as valence or arousal. For example, "love" and "rage" are highly emotional words; however, they are on opposite ends of the valence dimension and "rage" is typically a more arousing word than "love." There are

few word norms that contain valence ratings, also called goodness or pleasantness (Brown & Ure, 1969; Clark & Paivio, 2004; Rubin & Friendly, 1986). To our knowledge, there are only three word databases assessing affective ratings in a multidimensional framework on a substantial number of English words: (a) the Affective Norms for English Words (Bradley & Lang, 1999) contains ratings of valence and arousal for 1034 words, (b) Whissell's Dictionary of Affect in Language (2009) contains ratings of pleasantness, activation, and imagery for 8742 words, and (c) Warriner, Kuperman, & Brysbaert (2013) published ratings similar to the Affective Norms for English Words of valence, arousal, and dominance for 13,915 lemmas. These word sets tend to assess ratings for a very large number of words on few dimensions. The goal of the EMOTE database was to close a gap in providing a framework for ratings on many emotionally and cognitively relevant dimensions.

Research in the social domain, such as impression formation (Baldwin, 1992; Higgins, Rholes, & Jones, 1977) or research on the distinction between self and others (e.g., Anderson & Chen, 2002; Wentura, Rothermund, & Bak, 2000) may use desirability as well as likeableness ratings. Desirability refers to how desirable a certain characteristic is for oneself. For example, intelligence is a highly desirable characteristic. In contrast, likeableness refers to how much one would like another person who possesses a certain characteristic. For example, trustworthy is a characteristic highly preferred in social partners. Anderson (1968) provides likeableness ratings for 555 personality characteristics. Desirability and likeableness are highly correlated with each other and with ratings of valence; positive aspects are desired in the self and liked in others whereas negative aspects are not desired in the self and not liked in others (Grühn & Smith, 2008). Despite their high correlation, these two dimensions assess different aspects. For example, dominant is more desired in the self than in social partners, whereas lonely is less desired in the self than in our social partners. Norms for desirability and likeableness are, however, rarely available together or available with other norms.

To provide easily accessible norms for the use in emotion, social, and personality research, we conducted a word rating study for adjectives and nouns. The goal was to compile a database of English words with a focus on including emotional terms and on assessing a wide variety of emotionally and socially relevant word characteristics relevant for experimental settings, such as using emotional words for a memory task. This focus on experimental settings contrasts to other current word databases, such as Whissell's Dictionary of Affect in Language (2009; see also Warriner et al., 2013), which were developed for analyzing the emotional content of texts. EMOTE will not replace these other databases but will add a different perspective to word ratings. To provide a valuable source for experimental settings, EMOTE includes a large set of adjectives and nouns as well as a large number of diverse rating dimensions in a unified framework. In particular, we included three dimensions covering

emotional aspects (i.e., valence, arousal, and emotionality) and three rating dimensions related to memorability (i.e., imagery, concreteness, and familiarity). We also included one rating dimension capturing the clarity of meaning, that is, whether participants have a clear understanding of the meaning of the word. For adjectives, we included three additional dimensions that do not apply easily to nouns: control, likeableness, and desirability. Control refers to a feeling of being in control; it is similar to dominance assessed in other databases (Bradley & Lang, 1999). Depressed or helpless would signal low control, whereas determined or aggressive indicate high control. Moreover, to provide an example of the usefulness and potential application of EMOTE norms, we conducted an additional study assessing word recognition memory for the EMOTE nouns. We then used EMOTE norms to predict memorability of the nouns.

Study 1: Rating studies

Method

Sample. Young adults were recruited from a large southeastern U.S. university. Undergraduates received course credit as partial fulfillment of their enrollment in an introductory psychology course. Because of the different rating dimensions involved, we assessed nouns and adjectives separately. As a consequence, we had two separate samples for the nouns and adjectives and participants were aware that they evaluate either adjectives or nouns. Undergraduates were recruited until every word was rated by at least 30 individuals. The adjective sample consisted of 1627 adults ranging from 18 to 32 years ($M = 20.0$, $SD = 1.7$; 71.2% female). The noun sample consisted of 1341 adults ranging from 18 to 31 years ($M = 19.1$, $SD = 1.8$; 57.2% female). The adjective and noun samples were composed of 73.3% and 75.2% European Americans, 9.1% and 8.4% African Americans, 5.6% and 6.3% Asian, 3.9% and 2.7% other race, and 8.1% and 7.4% indicated multiple groups.

Words. For the selection of word material, we compiled nouns and adjectives previously used in rating studies focusing on emotional ratings (Anderson, 1968; Bellezza, Greenwald, & Banaji, 1986; Bradley & Lang, 1999; Brown & Ure, 1969; Strauss & Allen, 2008). The resulting list contained 2197 words. Some words could be used as both adjectives and nouns. Given that the meaning of these words and the corresponding norms may differ depending on whether the word is perceived as a noun or an adjective, we included these words in both rating studies. For example, *rash* as a noun may refer to hives (among other meanings) whereas *rash* as an adjective may refer to something done impulsively (e.g., a rash decision). A total of 75 words appeared in both rating studies. Thus, the final list contained 985 adjectives and 1287 nouns.

In addition to the assessed rating dimensions, we also collected objective word characteristics, such as word length and word frequency. For word length, we included the length in letters and in syllables. For word frequency, we sampled five sources. We included the widely used word frequency norms by Kučera and Francis (1967) as well as frequency norms derived from newer corpora, including the British National Corpus, the Wiktionary frequency list derived from TV and movie scripts, the corpus of the Project Gutenberg, and SUBTL frequency norms from the SUBTLEX corpus (Brysbaert & New, 2009). There were two reasons to include different word frequency sources: First, word frequency was not available from all sources for all words. By including five different word frequency sources, we ensured that each word had word frequency data from at least one source. Second, word frequency data may differ depending on the context of obtaining the frequency data. For example, the Kučera and Francis norms are widely used in cognitive research; however, the data are based on English literature published in 1961, more than 50 years ago. Some words, such as "computer," may differ in their usage over time.

Rating dimensions. Both adjectives and nouns were rated on seven dimensions: valence, arousal, emotionality, imagery, concreteness, familiarity, and clarity of meaning. Adjectives were rated on three additional dimensions: control, likeableness, and desirability. All dimensions were rated in a unified framework on seven-point scales. Only endpoints were labeled. For each dimension, the item question text as well as the endpoint labels for the seven-point scales are presented in Table 1.

Procedure. After assessing demographic background details, participants completed either the adjective or the noun survey. The survey consisted of three blocks for adjectives and four blocks for nouns. Each block contained 10 words selected at random from the total list of words (either nouns or adjectives). In each block, every rating dimension was presented separately on one page together with the 10 words. The order for the dimensions within one block was set at random. In sum, persons rated either 30 adjectives or 40 nouns. The number of ratings for any given word varied; however, in the selection of the words, we employed a quasi-random procedure that ensured that every word was rated by at least 30 persons. The number of ratings for adjectives ranged from 30 to 79 ($M = 48.0$) and for nouns from 30 to 85 ($M = 41.5$).

Results

Marker words. To illustrate the range of the EMOTE database as well as the assessed dimensions, Table 2 presents the three words at the end points for each dimension. In general, the nouns and adjectives rated very high or very low on each dimension were consistent with expectation. It is noteworthy that 38

Table 1. Word dimensions with corresponding question text and scale points in EMOTE.

		Scale points	
Dimension	Question text	*Low* (1)	*High* (7)
Adjectives and nouns			
Valence	*How positive or negative is the feeling elicited by each word?*	very negative	very positive
Arousal	*How relaxed or tensed is the feeling elicited by each word?*	very relaxed	very tensed
Imagery	*How easily can you form a visual image of each word?*	very difficult/ hardly	very easily/ vividly
Concreteness	*How concrete or abstract is the meaning of each word.*	very abstract	very concrete
Meaningfulness	*How well do you know the meaning of each word?*	not at all/hardly	very accurately
Familiarity	*How frequently do you encounter each word (e.g. in books, TV)?*	very infrequently	very frequently
Emotionality	*How emotional is the meaning of each word?*	not at all/neutral	very emotional
Adjectives only			
Control	*How strong is the feeling of control elicited by each word?*	low control	high control
Likeableness	*How much would you like a person who is "X"?*	least desirable	most desirable
Desirability	*How much would you like to be "X"?*	least desirable	most desirable

adjectives received the highest score on clarity of meaning; thus, for these 38 adjectives, all persons indicated that they have a clear understanding of the meaning. For the table, we selected three words at random. Tables 3 and 4 provide the means and standard deviations for each rating dimension for nouns and adjectives, respectively. With the exception of clarity of meaning, all dimensions showed reasonable variation across the scales. Clarity of meaning was negatively skewed for both, nouns and adjectives. The meaning for most words was well known documented by the high mean values of 6.2 and 6.1 for nouns and adjectives, respectively. The online supplement provides the ratings for each word.

Table 2. Three marker words at the bipolar ends for nouns and adjectives.

	Low	High
Nouns		
Valence	killer (1.15), devil (1.19), terrorist (1.24)	peace (6.52), heaven (6.55), paradise (6.68)
Arousal	bliss (1.30), calm (1.31), breeze (1.32)	terror (6.37), rape (6.42), suicide (6.63)
Imagery	medley (1.64), occurrence (2.19), ennui (2.32)	bunny (6.94), desk (6.95), moon (6.96)
Concreteness	fantasy (2.00), beauty (2.18), art (2.35)	arm (6.71), rabbit (6.73), pineapple (6.77)
Meaningfulness	ennui (1.68), medley (2.00), bereavement (3.00)	seat (6.96), ankle (6.97), grass (6.97)
Familiarity	baronet (1.32), scurvy (1.47), medley (1.52)	phone (6.44), girl (6.50), people (6.56)
Emotionality	desk (1.32), cork (1.32), column (1.34)	abortion (6.19), death (6.24), love (6.39)
Adjectives		
Valence	abusing (1.03), deceitful (1.08), ungrateful (1.13)	alive (6.69), respectful (6.70), respectable (6.92)
Arousal	easy (1.19), thankful (1.25), calm (1.29)	violent (6.31), abusive (6.72), abusing (6.91)
Imagery	idealistic (2.05), impetuous (2.06), uninhibited (2.09)	adventurous (6.90), cheerful (6.91), angry (6.92)
Concreteness	easy (1.96), zestful (2.04), majestic (2.08)	youngest (6.77), nude (6.85), alone (6.92)
Meaningfulness	homespun (2.57), ardent (2.71), embattled (2.84)	e.g. happy (7.00), good (7.00), consistent (7.00)
Familiarity	zestful (1.08), homespun (1.31), slothful (1.32)	interesting (6.51), strong (6.73), easy (6.73)
Emotionality	blond (1.10), youngest (1.11), smoking (1.18)	pessimistic (6.25), angry (6.55), loved (6.63)
Control	depressed (1.46), youngest (1.58), nude (1.71)	forgiving (6.54), self-sufficient (6.67), muscular (6.74)
Desirability	dead (1.00), stupid (1.03), insane (1.05)	knowledgeable (6.95), alive (6.96), nice (6.96)
Likeableness	hostile (1.06), neglectful (1.06), phony (1.08)	courteous (6.81), alive (6.84), trustworthy (6.86)

Table 3. Descriptive statistics for 1287 nouns in EMOTE.

	V	A	I	CC	M	F	E
Descriptive statistics							
Mean	3.93	3.46	5.37	4.89	6.20	4.06	3.19
Standard Deviation	1.30	1.15	1.05	1.05	0.55	1.03	1.19
Subjective Ratings							
Valence (V)							
Arousal (A)	−.85**						
Imagery (I)	.13**	−.24**					
Concreteness (CC)	.0300	−.20**	.80**				
Meaning (M)	.16**	−.12**	.58**	.40**			
Familiarity (F)	.18**	.06*0	.0200	−.20**	.40**		
Emotionality (E)	−.18**	.47**	−.28**	−.48**	.0200	.43**	
Objective characteristics							
Length in Letters	−.05	.12**	−.19**	−.15**	−.12**	−.05	.12**
Length in Syllables	−.03	.11**	−.19**	−.12**	−.09*	−.03	.12**
Frequency KF (1190)	.15**	−.09**	−.00	−.09*	.10*	.40**	.05
Frequency BNC (1280)	.17**	−.08**	−.01	−.09**	.10**	.43**	.06*
Frequency WIK (1109)	.10**	−.04	−.05	−.12**	.03	.33**	.15**
Frequency PG (1076)	.17**	−.10**	−.01	−.10**	.08*	.36**	.11**
Frequency BN (1282)	.12**	−.06*	.02	−.07*	.09**	.36**	.13**

Note. Values in parentheses indicate the number of overlapping words. KF: Kučera and Francis (1967); BNC: British National Corpus; WIK: Wiktionary word frequency in TV shows and movies; PG: Project Gutenberg; BN: Brysbaert and New (2009).
*$p < .05$. **$p < .01$.

Inter-correlations. Table 3 provides the correlations among the seven subjective word characteristics assessed for nouns. Consistent with previous findings, the correlation pattern was largely as expected. Imagery and concreteness were highly positively correlated ($r = .80$). Easy to imagine words tended to be concrete words. Clarity of meaning was substantially correlated to imagery and concreteness as well as to familiarity. Thus, words with a clear-cut meaning tended to be easy to imagine, concrete, and familiar. Emotional words tended to be more familiar and more arousing; however, emotional words were also more abstract and difficult to imagine. Remarkably, valence and arousal were highly negatively correlated ($r = -.85$). Thus, negative words tended to be high arousing words whereas positive words tended to be low arousing words. Table 4 shows the inter-correlation matrix among the 10 word characteristics assessed for adjectives. In general, the pattern of findings was similar to the nouns. For example, valence and arousal were strongly negatively correlated

Table 4. Descriptive statistics for 985 adjectives in EMOTE.

	V	A	I	CC	M	F	E	L	D	CO
Descriptive statistics										
Mean	3.65	3.86	5.08	4.38	6.11	4.07	3.57	3.61	3.45	4.00
Standard deviation	1.57	1.14	0.91	0.84	0.75	1.07	1.01	1.64	1.89	1.00
Subjective ratings										
Valence (V)										
Arousal (A)	−.80**									
Imagery (I)	.04	.05								
Concreteness (CC)	.01	.04	.34**							
Meaning (M)	.11**	−.02	.52**	.24**						
Familiarity (F)	.19**	−.08*	.40**	.20**	.50**					
Emotionality (E)	−.14**	.22**	.21**	−.03	.19**	.21**				
Likeableness (L)	.96**	−.78**	.04	.01	.12**	.21**	−.10**			
Desirability (D)	.96**	−.76**	.03	−.00	.12**	.21**	−.09*	.96**		
Control (CO)	.57**	−.37**	.01	.07*	.10*	.15**	−.02	.56**	.60**	
Objective characteristics										
Length in letters	−.00	.06	−.17**	−.15**	−.05	.19**	.05	.01	.04	.11**
Length in syllables	−.01	.04	−.19**	−.15**	−.06*	.12**	.03	.01	.03	.10**
Frequency KF (827)	.11**	−.13**	.15**	.08*	.11*	.25**	−.16**	.10**	.10**	−.03
Frequency BNC (965)	.12**	−.13**	.16**	.08*	.12**	.29**	−.14*	.10**	.10**	−.03
Frequency WIK (590)	.05	−.08	.12*	.00	.09*	.23**	−.02	.03	.03	−.08*
Frequency PG (697)	.09**	−.12**	.18**	.08*	.11**	.25**	−.10*	.08*	.08*	−.05
Frequency BN (928)	.09**	−.12**	.18**	.08*	.11**	.25**	−.10*	.08*	.08*	−.05

Note. Values in parentheses indicate the number of overlapping words. KF: Kučera and Francis (1967); BNC: British National Corpus; WIK: Wiktionary word frequency in TV shows and movies; PG: Project Gutenberg; BN: Brysbaert and New (2009).
*$p < .05$; **$p < .01$.

($r = -.80$). In addition, valence, desirability, and likeableness were highly correlated with each other (all rs $> .95$), indicating that positive attributes are generally desired in oneself and liked in others, whereas negative attributes are generally not desired in oneself and disliked in others.

Associations to objective characteristics. Subjective word ratings are partly linked to objective word characteristics. For example, negative words tend to be less frequent than positive words (e.g., Ortony et al., 1987). To provide the associations of EMOTE norms with objective word characteristics, such as word length and word frequency, Tables 3 and 4 display the corresponding correlations for nouns and adjectives, respectively. We included two measures of word length (in letters

and in syllables) and five measures of word frequency based on different sources. In general, the pattern of findings was consistent with previous research. For nouns, easily to imagine, concrete, and clear nouns were shorter; and high arousing and high emotional nouns were longer. Positive, low arousing, low concrete, familiar, clear, and emotional nouns tend to be more frequent. For adjectives, easily to imagine, concrete adjectives were shorter; and familiar and high control adjectives were longer. Positive, low arousing, easy to imagine, concrete, clear, familiar, less emotional, likeable, and desirable adjectives were more frequent.

Associations to other word norms. To verify the generalizability and reliability of the obtained ratings of the EMOTE norms, we compared EMOTE ratings with available ratings from previous studies. In particular, we focused on previous word rating studies assessing emotional aspects. Ratings of previous studies were based on different sets of words resulting in different numbers of words overlapping with words used in EMOTE. For the analyses, we considered only such previous studies that had at least 100 words in common with EMOTE.

Nouns. Table 5 provides the associations of EMOTE noun norms with previous rating studies. Values depicted in bold represent correlations between EMOTE dimensions and corresponding dimensions of previous studies. Thus, high values document high consistency between EMOTE norms and past norms. With the exception of arousal, we found high consistency between EMOTE norms and previous norms for nouns. Arousal in EMOTE was only moderately correlated (.31 to .47) with arousal ratings from other word rating studies. Our arousal ratings were more related to past valence or past dominance ratings.

Adjectives. Table 6 shows the correlation matrix of the 985 EMOTE adjective norms with previous word norms. In general, there were fewer adjective norms with considerable overlap with EMOTE adjectives. We found high consistency between EMOTE adjective norms and previous norms for valence ($r = .90$ to .92), emotionality ($r = .66$ to .75), and likeableness ($r = .92$). Again, the arousal ratings were only weekly correlated (.17 to .32) with past arousal ratings. Concreteness ($r = .48$) and clarity of meaning ($r = .33$) were moderately correlated with previous ratings.

Study 2: Memorability

The purpose of the EMOTE norms is to provide easily accessible word norms for research in the social-emotional domain. One potential application of the EMOTE norms is in the context of research on emotional memory. In this line of research, memory for positive, negative, and neutral to-be-remembered material is often compared. Many studies show that people typically remember

Table 5. Correlations to previous word norms for the 1287 nouns in EMOTE.

	V	A	I	CC	M	F	E
Valence							
BU Goodness (487)	**.88****	−.72**	.18**	.15**	.13**	.13**	−.12**
BU Pleasantness (487)	**.90****	−.78**	.21**	.14**	.14**	.12**	−.13**
BL (754)	**.95****	−.83**	.13**	−.03	.15**	.23**	−.13**
WKB (1208)	**.94****	−.84**	.15**	.05	.19**	.18**	−.22**
W (817)	**.81****	−.66**	.02	−.06	.04	.15**	−.01
Arousal							
BL (754)	−.14**	**.41****	−.17**	−.26**	−.01	.24**	.60**
WKB (1208)	−.24**	**.47****	−.10**	−.22**	−.02	.19**	.56**
W (817)	−.10**	**.31****	−.09*	−.18**	.02	.19**	.40**
Dominance							
BL (754)	.81**	−.67**	.04	−.08*	.09*	.20**	−.09*
WKB (1208)	.80**	−.73**	.05	−.01	.15**	.12**	−.26**
Imagery							
D&W (310)	.03	−.17**	.88**	.82**	.32**	−.18**	−.36**
C&P (478)	.02	−.05	.40**	.33**	.10*	−.03	−.07
PYM (337)	.04	−.20	.89**	.82**	.35**	−.19	.35**
W (817)	.01	−.15**	**.81****	.73**	.39**	−.13**	−.27**
Concreteness							
B&U (487)	.08	−.24**	.68**	**.78****	.19**	−.19**	−.39**
D&W (310)	−.03	−.16**	.81**	**.88****	.27**	−.02	−.22**
PYM (337)	−.02	−.21**	.82**	**.88****	.29**	−.28	−.59**
Familiarity							
C&P (478)	.34**	−.28**	.13**	−.02	.30**	**.69****	.01
PYM (337)	.40**	−.34**	.19**	.04	.38**	.70**	−.03
Emotionality							
B&U (487)	−.01	.28**	−.10*	−.36**	.07	.38**	.82**
S&A (306)	−.32**	.59**	−.47**	−.67**	−.07	.47**	.94**
PYM-EX (337)	.02	.30**	−.23**	−.42**	.03	.39**	**.83****

Note. Values in parentheses indicate the number of overlapping words. Correlations in bold are convergent correlations. V: Valence; A: Arousal; I: Imagery; CC: Concreteness; M: Meaning; F: Familiarity; E: Emotionality; BL: Bradley and Lang (1999); BU: Brown and Ure (1969); CP: Clark and Paivio (2004); DW: Di Vesta & Walls (1970); PYM: Paivio et al. (1968); PYM-EX: Extended PYM norms as described in Clark and Paivio (2004); SA: Strauss and Allen (2008); W: Whissell (2009); WKB: Warriner et al. (2013). *$p < .05$; **$p < .01$.

Table 6. Correlations to previous word norms for the 985 adjectives in EMOTE.

	V	A	I	CC	M	F	E	L	D	CO
Valence										
BU (132)	**.90****	−.75**	−.02	−.09	.10	.17	−.17	.85**	.85**	.46**
BL (285)	**.92****	−.78**	.11	−.02	.10	.10	−.17**	.87**	.88**	.51**
WKB (722)	**.93****	−.82**	.05	−.04	.09*	.17**	−.19**	.90**	.89**	.55**
W (445)	**.81****	−.71**	.11*	−.04	.12**	.16**	−.06	.79*	.79**	.44**
Arousal										
BL (285)	−.01	.25**	.24**	.06	.18**	.25**	.32**	−.01	.04	.05
WKB (722)	−.11**	**.32****	.25**	.01	.12**	.11**	.25**	−.12**	−.08*	−.07
W (445)	.09*	**.17****	.25**	.01	.13**	.16**	.25**	.08	.13**	.08
Dominance										
BL (285)	.76**	−.54**	.14*	.03	.08	.11	−.06*	.69**	.74**	.40**
WKB (722)	.84**	−.71**	.02	.01	.11**	.18**	−.17**	.82**	.83**	.60**
Imagery										
W (445)	−.14**	.11*	**.40****	.27**	.16**	.12*	.05	−.15**	−.16**	−.12*
Concreteness										
BU (132)	−.04	−.01	.11	.48**	−.05	.03	−.35**	−.10	−.13	.05
Meaning										
And (545)	.01	.00	.29**	.20**	.33**	.31**	.20**	.01	.02	.03
Emotionality										
SA (148)	−.09	.27**	.34**	−.03	.36**	.41**	.75**	−.03	−.03	.04
BU (132)	.01	.19*	.11	−.09	.20*	.22*	.66**	.04	.04	.02
Likeablenss										
And (545)	.93**	−.78**	−.02	.08	.12*	.22**	−.20**	**.92****	.91**	.59**

Note. Values in parentheses indicate the number of overlapping words. Correlations in bold are convergent correlations. V: Valence; A: Arousal; I: Imagery; CC: Concreteness; M: Meaning; F: Familiarity; E: Emotionality; L: Likeableness; D: Desirability; CO: Control; And: Anderson (1968); BL: Bradley and Lang (1999); BU: Brown and Ure (1969); CP: Clark and Paivio (2004); DW: Di Vesta and Walls (1970); PYM: Paivio et al. (1968); PYM-EX: Extended PYM norms as described in Clark and Paivio (2004); SA: Strauss and Allen (2008); W: Whissell (2009); WKB: Warriner et al. (2013).
*$p < .05$; **$p < .01$.

emotionally toned material better than neutral material (for reviews, see Christianson, 1992; Reisberg & Hertel, 2004) and specifically negative information (for reviews, see Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Rozin & Royzman, 2001). This processing priority of negative information has been demonstrated in many studies of memory for words (e.g., Grühn, Smith, & Baltes, 2005). However, it is unclear whether the emotion memory effect is unique or whether other factors are related to the emotional influence on

Table 7. Standardized regression weights for hits, false alarms and d' for three different models.

	Hits			False alarms			d'		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Step 1									
Length in syllables		.09**	.12**		−.08**	−.11**		.15**	.15**
Frequency—BNC		−.26**	−.07**		.05	−.05		−.17**	−.02
Step 2									
Imagery			.13**			.04			.04
Concreteness			.24**			−.13*			.25**
Meaning			−.12**			.04			−.10**
Familiarity			−.37**			.18**			−.36**
Step 3									
Valence	−.24**	−.20**	.01	.22**	.24**	.15*	−.32**	−.31**	−.11
Arousal	−.14*	−.12	.03	.24**	.26**	.21**	−.28**	−.27**	−.14*
Emotionality	−.01	−.03	.24**	.02	.04	−.08	−.01	−.03	−.22**
Explained variance									
ΔR^2 Step 1		.08	.08		.01	.01		.06	.06
ΔR^2 Step 2			.13			.05			.14
ΔR^2 Step 3	.02	.01	.04	.02	.02	.01	.03	.03	.02

Note. BNC = British National Corpus.
*$p < .05$; **$p < .01$.

memory. To investigate this research question and to provide an example of the usefulness of the EMOTE norms, we conducted a word recognition task for the EMOTE nouns.

Method

Sample. We recruited 163 college students ($M = 18.77$, $SD = 2.04$, 61.1% female) from a large southeastern U.S. university, who received course credit as partial fulfillment of their enrollment in an introductory psychology course. The sample was composed of 76.6% European Americans, 10.2% African Americans, 7.8% Asian, 2.1% other race, and 3.3% indicated multiple groups.

Procedure. After completing a short demographic questionnaire, participants completed the memory word recognition task. The memory task consisted of

11 blocks. In each block, participants saw a list of 20 words on the screen positioned in a 4×5 (row $\times$ column) layout. Words and their position were selected at random from the list of 1287 nouns in the EMOTE database. Words were presented for 1 minute. Afterwards, participants saw a list of 40 words arranged in an 8×5 (row $\times$ column) layout. The words consisted of the 20 words studied on the previous screen as well as 20 new words selected from the database. The position of the words on the screen was determined at random. Participants were instructed to click on the words that they had seen on the previous screen. Before moving on to the next block, participants were given feedback about their performance. For each block, different words were selected; thus, it was not possible to see a word twice or more often in different blocks. The quasi-random selection procedure also selected words evenly to ensure that every word was presented at least 20 times as a target and 20 times as a distractor in the memory recognition task. On average, words were 25.8 times either a target or a distractor. The memory task lasted for about 25 minutes.

Results

For each noun, we calculated the percentage of hits, percentage of false alarms, and d' (d-prime).[1] For each of these three memorability scores, we ran three regression models. Model 1 investigated the effects of the emotional word characteristics (valence, arousal, and emotionality) on word memorability. Model 2 investigated the emotion effects after entering two objective word characteristics (word length in syllables and BNC word frequency) in the first step. Model 3 investigated the influence of the emotional word characteristics after entering two objective word characteristics and the four memory-related word characteristics in the EMOTE database for nouns (imagery, concreteness, clarity of meaning, and familiarity). The purpose of these three models was to show the predictive value of the emotion-related dimensions alone and after controlling for objective and other subjective dimensions. Table 7 provides the standardized regression weights for each model.

Words tended to be better remembered in the recognition task (more hits and fewer false alarms) when the words were negative and low arousing. This was the case for Model 1 and for Model 2, when word length and word frequency were entered first. Thus, word length and word frequency did not change the effects of valence and arousal. In Model 1 and Model 2, emotionality was not a significant predictor for memorability. However, when entering the other word characteristics in Model 3, valence and arousal were no longer significant predictors for hits, but emotionality was now a significant predictor for hits. Thus, the pattern for the emotion-related dimensions flipped. For false

alarms, however, the pattern of emotion effects was hardly changed for Model 3 compared to Model 1 and Model 2. Given that d' is calculated based on hits and false alarms, the pattern of findings for d' was very similar to the pattern for hits.

In addition to the emotion effects, other word characteristics tended to be related to memorability. In particular, longer, less frequent, easier to imagine, more concrete, less clear, and less familiar words produced more hits, whereas shorter, less concrete, and more familiar words created more false alarms.

General discussion

EMOTE, an English database of emotional terms, was developed to provide easily accessible word norms for adjectives and nouns that could be used in emotionally, socially, or personality relevant research. EMOTE norms might be useful, for example, in selecting words for research on emotional memory, emotional attention, impression formation, or stereotype research.

The associations among the EMOTE norms were generally consistent with expectations. For example, imagery, concreteness, and clarity of meaning were highly related. Consistent with some studies using emotional words (Gilet, Grühn, Studer, & Labouvie-Vief, 2012) or emotional images (Grühn & Scheibe, 2008; Keil & Freund, 2009; Ribeiro, Pompéia, & Bueno, 2005), we found a strong negative association between valence and arousal ratings, that is, negative words were rated high in arousal and positive words were rated low in arousal. However, this finding is inconsistent with some other studies reporting a U-shaped function (Bradley and Lang, 1999), in which highly positive and highly negative words or images received the highest arousal ratings. For adjectives, we also found that valence, likeableness, and desirability were highly related. This suggests that desired characteristics in oneself as well as in others tend to be positive (Grühn & Smith, 2008; Wentura et al., 2000). Regarding the associations between EMOTE norms and objective word characteristics of word length and word frequency, we found relatively consistent patterns. For example, positive and familiar words tended to be more frequent (e.g., Ortony et al., 1987) and easy-to-image words tended to be shorter.

One application of the EMOTE norms might be for selecting words for memory research. To provide an example, we linked the norms to the memorability for nouns. Largely consistent with expectations, we found that negative words were better recognized than positive words; however, the pattern of effects for hits changed when all norms were entered into the model. Thus, there is some portion of variance shared that is actually responsible for the negative

enhancement effect. Moreover, the pattern of findings was slightly different for hits and false alarms. Different mechanisms and processes seem to influence memorability for these two memory scores. Future research will benefit from examining the mediating links between the emotional characteristics of the to-be-remembered material and their memorability. The memorability scores for the EMOTE nouns may help with this endeavor.

For the norms, we assessed nouns and adjectives separately. This decision was made intentionally given that some words (e.g., rash) could be both and that experimental work tends to use either nouns or adjectives as stimuli. As a consequence, raters may have adjusted their ratings for nouns and adjectives, that is, a score for a noun might not mean exactly the same for an adjective. It is noteworthy that these subjective ratings are an abstraction in which raters were asked to evaluate the words in isolation. In common language, we typically use words in a larger context, where the meaning changes depending on the context. However, experimental work needs to isolate words for the experimental investigation.

EMOTE is conceptualized as a long-term project, that is, we will assess ratings continuously to improve the quality and accuracy of the norms. In particular, future work will focus on three aspects: First, we want to expand the current corpus of 1287 nouns and 985 adjectives. Although the number of words is relatively large compared to other word norms, a larger number of words may provide more opportunities for researchers to find and match words on selected characteristics for their experimental designs. Second, we may want to include additional rating dimensions (e.g., pleasantness, gender typicality) and we are open for suggestions from the scientific community to further the usefulness of these norms. Finally, we want to assess evaluations from different groups, such as groups based on sex, ethnicity, or age. Males and females may evaluate words differently and future research may easily be able to generate separate scores.

The current ratings in EMOTE are based on young adults' evaluations. However, previous work revealed substantial adult age differences in the evaluation of German-based words (Grühn & Smith, 2008; Keil & Freund, 2009), French-based words (Gilet et al., 2012), and images (Grühn & Scheibe, 2008). On a practical level, if there are substantial age differences in the evaluation of emotional material, these age differences has to be taken into account when using the material. On a theoretical level, these age differences may provide insights into the development of emotion, word comprehension, and semantic networks. Thus, future work would benefit from expanding the database with ratings from different periods of the lifespan. In sum, EMOTE provides a unified source for researchers using English words in their research on emotional, social, and personality issues.

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Note

1. For calculating d', hits of 100% and false alarms of 0% were recoded to 99% and 1%, respectively.

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