A Positivity Bias in Written and Spoken English and Its Moderation by Personality and Gender

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A Positivity Bias in Written and Spoken English and Its Moderation by Personality and Gender

Adam A Augustine[1], Matthias R. Mehl[2], and Randy J. Larsen[1]

Abstract

The human tendency to use positive words ("adorable") more often than negative words ("dreadful") is called the linguistic positivity bias. We find evidence for this bias in two studies of word use, one based on written corpora and another based on naturalistic speech samples. In addition, we demonstrate that the positivity bias applies to nouns and verbs as well as adjectives. We also show that it is found to the same degree in written as well as spoken English. Moreover, personality traits and gender moderate the effect, such that persons high on extraversion and agreeableness and women display a larger positivity bias in naturalistic speech. Results are discussed in terms of how the linguistic positivity bias may serve as a mechanism for social facilitation. People, in general, and some people more than others, tend to talk about the brighter side of life.

Keywords

word frequency, word valence, linguistic positivity bias, big five, gender, Electronically Activated Recorder

The tendency to use positive words (''pretty'') more often than equally familiar negative words (''ugly') was originally called ''the Pollyanna hypothesis'' by Boucher and Osgood (1969). Contemporary researchers refer to this curious finding as a positivity bias in language use (e.g., Rozin, Berman, & Royzman, 2010). This linguistic positivity bias (LPB) is thought by some (e.g., Rozin et al., 2010) to reflect the fact that life provides most people with more positive than negative events to talk about (Gable, Reis, & Elliot, 2000). Boucher and Osgood (1969) speculated that positive valence leads to increased word use, whereas Zajonc (1968) speculated that increased word use leads to positive valence. Whatever the cause, demonstrations of the LPB have occasionally appeared in the literature.

Rozin et al. (2010) examined frequency data for seven positive adjectives, and their opposites, and report that the positive word was always used more frequently than its opposite. While Rozin et al. demonstrate a number of other interesting LPBs and that such biases are consistent across 20 languages, they acknowledge that examining seven highly positive adjectives and their opposites is not definitive evidence for an LPB. In the current research, we focus on the LPB in terms of how frequently words with different valance ratings are used, both in written (Study 1) and spontaneous spoken English (Study 2). We also examine (Study 1) whether an LPB is found in the use of nouns and verbs, in addition to adjectives. And finally, we examine (Study 2) personality and gender differences in the magnitude of the LPB.

Positivity Bias in Frequency of Word Use

A handful of older studies have directly demonstrated an LPB in adjective use. For example, Gough (1956) had judges rate personality adjectives for likability and found that frequency norms differed based on likability. Similarly, Zajonc (1968) used frequency information from Thorndike and Lorge (1944) to demonstrate a correlation between word frequency and word desirability. Others have used subsamples of words from the Thorndike and Lorge (1944) list and obtained significant correlations between word frequency and ''good–bad'' ratings of the words (e.g., Johnson, Thomson, & Frincke, 1960). Zajonc (1968) also used Anderson's (1964) 555 adjectives that had been normed for likability and found a strong correlation with Thorndike-Lorge frequency of use. Given that the Thorndike-Lorge word list was initially compiled in 1921 and the frequency data were gathered prior to that time, the frequency information in these studies is nearly a century

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old at this point. Do modern written word samples also show a general LPB? Moreover, many of these older studies focused only on adjectives used to describe persons. Does the LPB extend to other parts of speech? Finally, all studies on the LPB have been limited to written language, which is more controlled or effortful than spoken language (Aaron & Joshi, 2006). An important extension would be to test for an LPB in spontaneous speech.

Recent studies provide incidental evidence for an LPB. In a study of noun processing speed, Unkelbach et al. (2010) report a significant correlation between word frequency of use (in written English) and word positivity. In a study of Italian adjectives, Suitner and Maass (2008) report a correlation between frequency of use (in written Italian) and positivity ratings of those adjectives. These authors conclude that there exists ''a general positivity bias when describing human beings'' (Suitner & Maass, 2008, p. 1078). Based on their analyses of frequency and valence norms for 100 words, in 13 languages, conducted almost half a century earlier, Boucher and Osgood (1969) arrived at very similar conclusions: ''people tend to look on (and talk about) the bright side of life'' (p. 1).

In Study 1, we examine frequency information in a very large list of diverse words, including adjectives, nouns, and verbs. We used a word list that is well characterized on pleasantness and arousal. Frequency information was extracted from norms based on written corpora. There is some variability across the different indicators of word frequency (Burgess & Livesay, 1998). One of the most commonly used measures of word frequency is the set of norms published by Kucera and Francis (KF; 1967). However, these norms are over four decades old, and they are based on written works of professional authors.

Lund and Burgess (1996) have provided a more recent set of frequency norms, based on amateur writers, called the Hyperspace Analogue to Language (HAL). These norms are based on approximately 131 million words gathered across 3,000 Usenet newsgroups in February 1995. The HAL norms are stronger predictors of word recognition than the KF norms (Balota et al., 2004), and so in this study we employ the HAL norms as an index of word frequency. Because word frequency norms are not normally distributed, we will also use the log transform of both the KF and HAL frequency indexes (as recommended by Balota et al., 2007).

Regardless of whether the linguistic positive bias is due to valence (i.e., Boucher & Osgood, 1969) or mere exposure (i.e., Zajonc, 1968), we predict that we will find such a bias in Study 1. Specifically, we predict a positive and significant correlation between word pleasantness and frequency of use. We have no reason to expect these correlations to differ in subsamples of adjectives, nouns, or verbs, though this will be the first study to examine the LPB in different parts of speech. And finally, we will test if the arousal value of words is related to frequency of use.

Study 1

Method

Word selection. Words were drawn from the Affective Norms for English Words list (ANEW; Bradley & Lang, 1999). The 1,034 ANEW words have been normed by a large group of college students on pleasantness and arousal (see Bradley & Lange, 1999). The pleasantness dimension is a bipolar scale that runs from 1 to 9, with a rating of 1 indicating *extremely unpleasant*, a 5 indicating *neutral*, and 9 indicating *extremely pleasant*. The arousal dimension is a unipolar scale that runs from 1 to 9, with a rating of 1 indicating *low arousal* and 9 indicating *high arousal*. Information for obtaining the ANEW words is available from the Center for the Study of Emotion and Attention at http://www.phhp.ufl.edu/csea/index.html.

Frequency information on the ANEW words. The ANEW data set contains the Kucera and Francis (1967) frequency norms on each word. We also obtained the more modern HAL frequency information on each word from the English Lexicon Project (ELP). The ELP is a searchable Web-based database containing lexical characteristics and behavioral data on over 40,000 words and is available online at http://elexicon.wustl.edu/default.asp. We also used the log transform of both the KF and HAL frequency indexes, since frequency information is usually not normally distributed. The ELP database also contains part of speech codes on each word, coding whether it is a noun, a verb, or an adjective (some words can be used both as nouns and verbs [*shriek*], verbs and adjectives [*awed*], or adjectives and nouns [*adult*], and hence can have multiple codes).

We submitted the 1,034 ANEW words to the ELP search engine, which found exact matches for 1,021 words. The valence ratings from the ANEW database were then merged with the HAL frequency data and part of speech codes from the ELP database for each of these words. This list of 1,021 words forms the final data set used in our analyses. Thus, our valence and arousal ratings were taken from the ANEW database (Bradley & Lang, 1999) and our frequency index was taken from the HAL (i.e., Lund & Burgess, 1996) corpus via the ELP (Balota et al., 2007). All analyses were conducted across words.

Results and Discussion

Descriptive information on the words is presented in Table 1. Regarding pleasantness, the words averaged very close to the neutral point of 5 on the 9-point rating scale, though there was a good deal of variability on pleasantness. The average arousal rating fell in the moderately arousing range but again with variability across words. ANOVAs were conducted to examine for differences between adjectives, nouns, and verbs on the frequency indexes and pleasantness and arousal. No significant differences emerged, though there is a very slight tendency for adjectives to be used less often than nouns and verbs.

Pearson correlations between all variables are presented in Table 2. To summarize, frequency of use is significantly

Table 1. Descriptive Statistics on Words Broken Down by Parts of Speech.

	Freq-KF	Freq-HAL	log-KF	log-HAL	Valence	Arousal
Total Word Sample (N = 1021)						
Mean	52.30	21138.02	2.83	8.57	5.14	1.65
SD	109.63	52970.38	1.53	1.77	1.99	.38
Adjectives (N = 261)						
Mean	41.67	18905.34	2.72	8.40	4.98	1.67
SD	79.37	48978.4	1.44	1.82	2.07	.36
Nouns (N = 805)						
Mean	60.62	24608.55	2.99	8.82	5.26	1.65
SD	120.81	58275.79	1.56	1.72	1.94	.39
Verbs (N = 360)						
Mean	66.58	29559.81	3.14	8.94	5.09	1.64
SD	140.48	71035.31	1.50	1.80	2.00	.38

Note: Some words fall into more than one part of speech category; e.g., *fun* is both a noun and an adjective, *charm* is both a noun and a verb, and *loved* is both a verb and an adjective. Each word was counted in each part of speech category to which it is used. Consequently, the sum of the adjectives, nouns, and verbs exceeds the total word count.

Table 2. Pearson Correlations Between Word Frequency Indexes and Ratings of Word Pleasantness and Arousal

	Freq-KF	Freq-HAL	log-KF	log-HAL
Total Word Sample (N = 1021)				
Pleasantness	.18**	.18**	.28**	.28**
Arousal	−.02	.00	.00	.05
Adjectives (N = 261)				
Pleasantness	.21**	.20**	.25**	.22**
Arousal	−.01	−.01	.03	.04
Nouns (N = 805)				
Pleasantness	.19**	.19**	.29**	.29**
Arousal	−.02	.01	−.02	.05
Verbs (N = 360)				
Pleasantness	16**	.19**	.29**	.31**
Arousal	−.04	−.02	−.08	−.06

** $p < .01$.

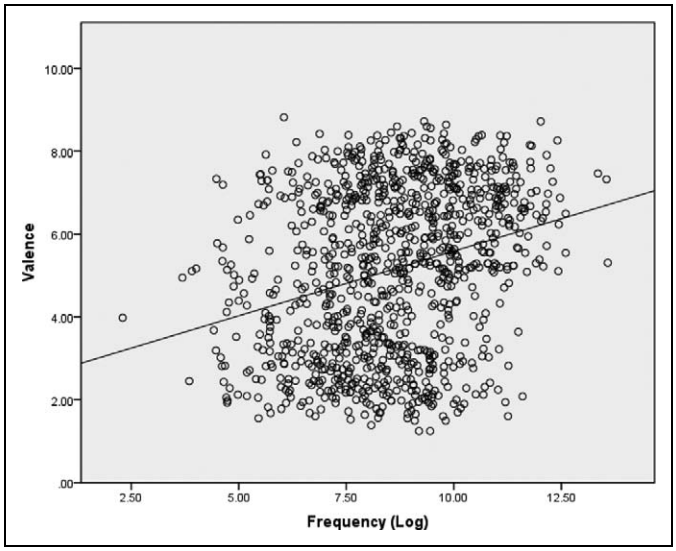

Figure 1. Study 1: Scatterplot Representation of the Relationship Between Valence and Frequency of Use (Log Transformation of the HAL Index)

related to the pleasantness value of words for both frequency norms. The correlations are stronger for log-transformed frequency norms, which correct for skewness in the frequency data. In addition, this effect appeared to be linear and not driven by, for example, a total disuse of negative words (see Figure 1). Arousal value of words showed no relationship to frequency norms. We used *z* tests used to compare respective correlations between the adjective, noun, and verb categories, and none were found significant, implying that frequency of use correlates with word positivity regardless of whether those words are adjectives, nouns, or verbs (see Table 2).

The frequency data used in this study were generated from written samples, and thus, the LPB we observed may not be present in naturalistic spoken language use. A second purpose of the current research is to determine if an LPB is present in everyday spoken language. Consequently, in Study 2 we will examine samples of spoken English. In addition, we will examine whether, as is the case with past research on language use (e.g., Mehl, Gosling, & Pennebaker, 2006; Yarkoni, 2010), theoretically relevant individual difference variables moderate the relationship between word positivity and frequency of use.

Individual differences in the LPB. Personality is widely predictive of the ways in which people use language in a number of contexts, such as everyday spoken language (Mehl et al., 2006), self-narratives (Hirsh & Peterson, 2009; Küfner, Back, Nestler, & Egloff, in press), interviews (Fast & Funder, 2008, 2010), and electronic mediums (Nowson, 2006; Nowson, Oberlander,

& Gill, 2005; Oberlander & Gill, 2006; Yarkoni, 2010). While personality has been related to a number of linguistic behaviors, it has yet to be examined in relation to the LPB. So the second specific aim of this research is to examine whether the LPB is moderated by personality factors.

The degree to which a personality trait predicts the magnitude of the LPB should depend on the social and affective nature of the trait and the ways that trait predicts other types of language use. In particular, we predict that extraversion and agreeableness should moderate the LPB such that those high in these traits show stronger relationships between valence and frequency of use. Extraversion and agreeableness are affective personality traits comprising a number of features relevant to social facilitation (Ozer & Benet-Martínez, 2006). Those higher (vs. lower) in extraversion talk more and spend more time with other people. To enable more positive interactions, the highly extraverted individual may use more positive words. In a similar vein, those higher (vs. lower) in agreeableness are more polite and cooperative and spend more time with others. To enable affirmative and upbeat dialogue, the highly agreeable individual may use more positive words. Said differently, consistently using positive words in everyday speech would likely act to facilitate the more constructive and enjoyable social interactions created and experienced by those higher in extraversion and agreeableness.

Past research on the associations between personality and word use also suggest that extraversion and agreeableness should moderate the LPB. Those higher in extraversion and agreeableness use more words that refer to other people, use more feeling words, and refer to social processes more (Gill, Nowson, & Oberlander, 2009; Gill & Oberlander, 2002; Hirsh & Peterson, 2009; Mehl et al., 2006; Yarkoni, 2010); all of those word categories are likely positively valenced. In terms of the use of individual words, those higher in extraversion are most likely to use words relevant to socializing, such as "bar," "drinks," and "dancing" (Yarkoni, 2010). In contrast, the traits of neuroticism, conscientiousness, and openness are less likely to predict the magnitude of the LPB. These traits are less relevant to socializing and do not predict word categories that would be relevant for social facilitation. While those higher in neuroticism are more likely, and those higher in conscientiousness are less likely, to refer to negative emotions, these traits do not consistently predict other categories of nonemotional words (Yarkoni, 2010). Finally, while openness shows broad associations with the use of a number of word categories (i.e., first person singular, articles, prepositions, etc.), these categories contain words that are not typically valenced.

Prior research also reveals consistent evidence of gender differences in the degree to which women and men use emotion words. For example, Mehl and Pennebaker (2003) found that women use more emotion words in everyday language. In addition, Newman, Groom, Handelman, and Pennebaker (2008) found that women use more feeling words (happy, joy, anxiety, and sadness) across a variety of text genres. Women also use more overtly positive words that refer to other people (Newman et al., 2008). Given these findings, we expect gender to also moderate the LPB.

In Study 2, we use three different samples of spoken language sampled in a naturalistic context (using the Electronically Activated Recorder [EAR]; Mehl, Pennebaker, Crow, Dabbs, & Price, 2001) to examine whether an LPB is present in everyday spoken language and if any theoretically relevant individual difference variables predict the magnitude of this bias. Given prior research, we predict that gender, extraversion, and agreeableness will moderate this bias, such that women and those higher in extraversion and agreeableness will show a larger relationship between frequency of use and valence.

Study 2

Method

Participants. Data from a total of 228 (Age: $M = 18.79$, $SD = 1.21$; 50.9% female) participants were used for the examination of natural language usage. The data from these participants were gathered as a part of three different studies (Sample 1, $n = 52$; Mehl & Pennebaker, 2003; Sample 2, $n = 96$; Mehl et al., 2006; see also Mehl, 2006; Sample 3, $n = 80$; Vazire & Mehl, 2008; see also Holtzman, Vazire, & Mehl, 2010; Mehl, Vazire, Holleran, & Clark, 2010).

Materials

Personality measures. Personality as organized by the Big Five personality traits was assessed using the NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992; Sample 1 $\alpha = .65$ to .86) and the Big Five Inventory (BFI-44; John & Srivastava, 1999; Sample 2 $\alpha = .77$ to .90; Sample 3 $\alpha = .76$ to .89). The personality data were centered prior to combining data from the three samples.

EAR monitoring. A representative sample of participants' daily spoken word use was recorded using the EAR (Mehl et al., 2001). The EAR is a naturalistic observation sampling tool that uses a digital recorder, a microphone clipped to participants' collars, and a controller microchip. It operates by periodically sampling brief snippets of ambient sounds from participants' momentary social environments. The sampling pattern used in the three studies was a 30-second on, 12.5-minute off cycle, which produced approximately five recording intervals each hour. Participants were unable to determine when recordings were taking place. The EAR was carried in a small case attached either to the belt or shoulder and was switched off overnight (see Mehl et al., 2001, for further detail).

Lexical characteristics. The words used in this analysis, as well as the comparison data for the valence and arousal ratings of words, were taken from the 1,021 words contained in the ANEW database (Bradley & Lang, 1999). For our index of usage frequency, we utilized the HAL project (Lund & Burgess, 1996) because this index was the more robust predictor of word pleasantness in Study 1.

Procedure. For all three samples, participants were brought into the lab in small groups to complete the personality measures and were then given detailed instructions and debriefings regarding the use of the EAR. For Sample 1, participants wore the EAR for two 48-hour periods (either Monday morning through Wednesday morning or Wednesday afternoon through Friday afternoon) separated by 4 weeks (see Mehl & Pennebaker, 2003). For Sample 2, participants wore the EAR for 2 consecutive weekdays (using the same start and end times as those in Sample 1; see Mehl et al., 2006). For Sample 3, participants wore the EAR for 4 consecutive days (beginning on a Friday; see Vazire & Mehl, 2008). Upon returning to the lab, participants were given the opportunity to delete any recordings they desired (deletion rate was very low, i.e., .01% of recorded files).

Transcription and linguistic analysis. Research assistants transcribed all of the participants' utterances. They received special training for how to handle ambiguities such as repetitions, filler words, nonfluencies, or slang. The frequency with which participants uttered specific words (all words contained in the ANEW database) was then calculated (using a user-defined dictionary) using the program Linguistic Inquiry and Word Count (LIWC; Pennebaker, Francis, & Booth, 2001).

Results and Discussion

Pearson correlations between the frequency of use in the combined EAR samples and the parameters reported in the ANEW (valence and arousal) and HAL (frequency of use) databases were calculated. Frequency of use was highly correlated between the HAL and EAR word counts across the 1,021 words ($r = .88$, $p < .05$), suggesting that the EAR frequency counts closely match the HAL norms.

Relationships between frequency of use and both valence and arousal were also consistent between the EAR samples (raw proportional frequency: valence $r = .16$, $p < .05$; arousal $r = .01$, *ns*; log-frequency: valence $r = .18$, $p < .05$, arousal $r = -.01$, *ns*) and the findings reported in Study 1. Although these effects may appear small, they are consistent with the effect size observed within Study 1 and the size of effects typically observed in studies of natural language use (i.e., Yarkoni, 2010). Thus, the frequency with which individuals use words in both daily life (EAR sampled language) and written samples (HAL) is associated with the valence of those words (based on the ANEW database), such that positive words are used more frequently.

To examine the extent to which gender or personality moderate the LPB, aggregation of the word frequency data was required. The reason for this is that there was extensive zero-level data (i.e., unspoken words) for any given word at the person level. In other words, one would not expect an individual to use every word present in the ANEW data set over the course of a month, let alone within a sample of 30-second periods occurring across several days (i.e., Yarkoni, 2010). Therefore, we aggregated words into groups having similar valence. The size of the word grouping was determined to ensure that there were enough words in each group to limit the amount of zero-level data. We also chose the size of the word grouping to allow for enough word groupings that within-person relationships could still be adequately determined.

Table 3. Personality Moderation of the Linguistic Positivity Bias

	E	A	C	O	N	Gender
Frequency–Frequency	.11	.10	.04	.02	−.12	.11
Frequency–Valence	.15*	.15*	.08	.06	−.12	.19*
Frequency–Arousal	.08	−.06	−.02	.02	.10	.15*

Note: Word Group $N = 68$, participant $N = 228$. E = extraversion; A = Agreeableness; C = conscientiousness; O = openness to experience; N = neuroticism; data represent correlation coefficients. Gender: positive effects indicate that women had higher values than men.
*$p < .05$

To form the groupings, we rank-ordered the words by valence rating. We then created groups of 15 consecutive words based on this ranking (i.e., the most negative 15 words form Group 1, the second most negative 15 words form Group 2, etc.), resulting in 68 groups of words. The mean frequency of use from both the HAL and EAR data sets as well as the mean valence and arousal ratings from the ANEW database were then calculated across the 68 word groupings. After aggregation, the frequency measures from both the HAL and EAR (mean proportion of use) data sets were still highly related ($r = .80$, $p < .05$) and the relationships between frequency and valence (ANEW $r = .58$, $p < .05$; EAR $r = .52$, $p < .05$) and arousal (ANEW $r = -.15$, *ns*; EAR $r = .07$, *ns*) exhibited the same pattern of relationships, though the positivity correlations are higher likely due to aggregation achieved by grouping words. Thus, this aggregation method produced a data set that both maintains the preexisting relationships among study variables and allows for the calculation of within-person effects.

To determine the potential moderating role of personality and gender, we first calculated within-person correlations between EAR-based frequency and HAL frequency, pleasantness, and arousal ratings.[1,2] As seen in Table 3, only the two socially facilitative personality variables of extraversion and agreeableness moderated the within-person relationships between actual spoken frequency of use and word pleasantness. As predicted, higher levels of extraversion and agreeableness were related to a larger LPB. Furthermore, none of the remaining Big Five dimensions predicted the magnitude of this bias. These results are consistent with our hypotheses and prior research regarding personality and language use.

Results also indicate that gender moderates the within-person relationships between frequency and valence. Consistent with our hypotheses and prior research, women displayed a stronger relationship between valence and frequency (Female $M = .35$, $SD = .13$; Male $M = .30$, $SD = .12$; $t(224) = -2.85$, $p < .05$). In addition, women displayed a stronger relationship between arousal and frequency (Female $M = .06$, $SD = .10$; Male $M = .03$, $SD = .11$; $t(224) = -2.29$, $p < .05$). Women use

positive emotion words and other positive, nonemotion words (i.e., words referring to other people) more frequently (Mehl & Pennebaker, 2003; Newman et al., 2008); women also display a larger LPB in these natural samplings of spoken language.

General Discussion

The results of these studies have several implications for existing and future research. First, these studies examined individual differences in a relatively broad pattern of language use. The majority of studies to date have focused on main effects (i.e., word categories from the standard LIWC dictionary; Pennebaker et al., 2001) or specific patterns of word usage (Gill & Oberlander, 2002; Oberlander & Gill, 2006; Yarkoni, 2010). The present research concerns personality predictors of naturalistic linguistic behavior across a wide number of word categories. Future research should attempt to determine the degree to which personality and other individual difference variables predict broad speech patterns.

Second, while there is a growing body of research examining individual differences in the number (Rozin et al., 2010) and use (Hirsh & Peterson, 2009; Mehl et al., 2006) of emotion words, these studies examined the use of emotionally relevant (i.e., valenced) words. Not all words that are emotionally relevant are emotion descriptors. In other words, while *cloudy* is not a negative emotion word and *sunny* is not a positive emotion word, both of these words have valenced connotations. By exclusively examining emotion words, one loses the potential differences in words with emotional connotations that are not emotion descriptors. Our findings also show that there is a difference between the bias and use of these emotionally relevant words. While individuals may show rapid and devoted attention to highly negative words (Larsen, Augustine, & Prizmic, 2010; Nasrallah, Carmel, & Lavie, 2009), they do not use these words to a greater degree. Thus, despite the greater cognitive weight of words like *murder* and *vomit*, words like *delight* and *lucky* are used to a greater degree.

Finally, our findings suggest a possible role for social facilitation in the use of more positive words (Fiedler, 2008). Using more positive words may lead to more positive social interactions and those who experience more positive social interactions should use positive words to a greater degree. Indeed, those individuals who spend more time with others and who refer to other people more frequently (i.e., women and people higher in extraversion and agreeableness) did show a higher LPB. However, it is also possible that our findings reflect the influence of emotion on language. People generally experience mild positive emotions and this typical experience may influence the language people use in an emotion-congruent manner, creating a tendency to use more positive words. This would be consistent with our moderation findings; those higher (vs. lower) in extraversion and agreeableness experience relatively more positive emotions (for a review, see Larsen & Augustine, 2008) and also display a relatively larger LPB. Similarly, those higher (vs. lower) in neuroticism experience relatively more negative emotion (for a review, see Larsen & Augustine, 2008); although not significant, our data reveal a marginal effect, such that those higher in neuroticism display a lesser LPB. Thus, our data suggest a possible role for both social facilitation and emotion-congruent language use in the LPB. Future research should examine other ways in which our social lives, emotions, and other categories of behavior percolate into and influence our use of language.

In sum, individuals display a generic LPB, such that they use positively valenced words to a greater degree than they do negatively valenced words. This applies to nouns and verbs as well as adjectives, and it applies to written and spoken words as well. Moreover, personality and gender predict the degree to which individuals exhibit this linguistic bias. People in general, and some people more than others, tend to talk more about the brighter side than the darker side of life.

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Notes

1. Although multilevel modeling is the default method of choice for examining the moderation of within-person effects, we are not examining the moderation of within-person effects but rather the moderation of the match between a within-person variable (frequency of word usage) and a fixed comparison/criterion variable (valence ratings from the ANEW database). Thus, the only true within-person variable is frequency, and we analyze these data using the process approach (Larsen, Augustine, & Prizmic, 2009), rather than multilevel modeling.
2. To ensure that effects were not due to data collection differences between the three samples used in this study, we examined if the frequency of use in each word grouping differed based on sample. A MANOVA (all 68 frequency groupings were entered as the dependent variables and sample was entered as the independent variable) revealed no sample-based differences in frequency, $F(136, 318) = 1.187$, *ns*.

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