

## EMCAT-ENG: A CATALOGUE OF 1,759 BASIC EMOTION TERMS IN ENGLISH

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### ABSTRACT

This study investigates the lexicalization patterns of six basic constructs of emotion in English: *anger*, *disgust*, *fear*, *joy*, *sadness*, and *surprise*. These words, along with all their synonyms in noun, verb, and adjective forms were recorded and supplied with corpus frequency data. The resulting catalogue of basic emotion terms in English was analyzed. The categories of words denoting different emotions were quantified in order to determine their relative cultural significance. Word frequency patterns were analyzed in order to determine any manifestations of display rules. The results indicate that in English all emotions are preferentially lexicalized as adjectives. Negative emotions are preferentially expressed as verbs, and positive emotions – as nouns. English boasts more words for negative than positive emotions, confirming the presence of the negative differentiation effect. At the same time, the less numerous words for positive emotions were found to be more frequently used, confirming the Pollyanna effect. The study revealed the central role of *fear* in the English-speaking world. Uniquely, *fear* was found to conceptually and semantically overlap with all other basic emotions regardless of their valence; the mean frequency of all the words denoting *fear* made it the second most frequent overtly, verbally communicated emotion in English – after *joy*.

Keywords: Basic emotions; lexicalization; emotion words; emotion concepts; English.

### 1. Introduction

The leading mainstream theory of emotions within psychology, Paul Ekman's basic emotions theory, is so well established within the field that even its critics dub it the standard view (Russell 1991). Since it was proposed, the basic emotions theory has produced a substantial body of evidence for its major tenet: the existence of a small selection of facial expressions for basic emotions that are linguistically and culturally universal. At the same time, cross-cultural research

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shows that there are limits to the universality thesis, and at certain depths analyses reveal unique, culture-specific characteristics of emotional concepts (Elfenbein & Ambady 2002). Evidence for the universal, pancultural nature of basic emotions has been demonstrated in the non-verbal channel of communication; in the human voice (Pell et al. 2009), body language (Kleinsmith, De Silva & Bianchi-Berthouze 2006), and, of course, facial expressions (Keltner & Ekman 2000). One aspect of emotion communication that has been long understudied but is currently attracting increasing interest, is the verbal channel of communication and various intersections of emotions and language (cf. Vigliocco et al. 2009). Researchers of basic emotions have long been deeply skeptical of language in general, and words denoting emotions in particular (Plamper 2015). This skepticism has largely been fueled by the notion that verbal expressions of emotions are too easy to control and, therefore, to fake (e.g., Ekman 1993).

The study of the language of emotions has a long, if intermittent, history in emotion psychology. Though few researchers pursued this topic systematically, several important findings have been made across a wide spectrum of theories and approaches within the field of research into emotions. First, that emotion concepts, like all acquired knowledge, are organized in the mind into prototypical structures, with the most representative category at the center and the less typical concepts scattered around the periphery (Russell 1983; Ekman 1994; Cowen et al. 2019). Another theory has it that words denoting those concepts are imperfectly but meaningfully connected with their underlying concepts (Ekman 1994; Russell & Barrett 1999), and the link significantly affects the processing of emotions (Lindquist et al. 2014). Researchers studying verbal expressions of emotion across languages observed that there are considerable differences in basic lexicalizations of emotion concepts. These differences mainly concern the parts of speech used to express the emotions and the number of words there are for different emotions (Clore & Ortony 1988). Linguistic anthropology of emotions has offered one explanation to such variations: Different emotions have different significance for different cultures, and this ethnopsychological importance of any given emotion in a culture is reflected in its language (Wierzbicka 1999). In practical terms this means that emotion concepts of high cultural significance are larger, more complex, and are denoted by more words (hypercognition), whilst less significant concepts of emotion are smaller, simpler, and represented by fewer words (hypocognition) (cf. Levy 1973; Heelas 1996).

Within the psychology of emotion there have been broadly two approaches to studying the intersections of language, conceptualization, and emotion. In one approach researchers catalogued words denoting emotional states while also attempting to establish the selection criteria for what might constitute an emotion word. These catalogues were typically moderately sized and focused on descriptive statistics and occasionally on qualitative analyses that probed the potential

relationships between words for emotions and their underlying concepts (Davitz 1969; Averill 1975; Clore, Ortony & Foss 1987). An approach focused on the same research goal, but implementing smaller, highly selective collections of emotion words was later developed to systematically and empirically study emotion concepts within and across cultures (Russell 1980; Russell, Lewicka & Niit 1989; Fontaine, Scherer & Soriano 2013). The largest resources created so far for the study of any emotive states in language are databases such as the seminal Affective Norms for English Words (ANEW; Bradley & Lang 2010). These tend to include impressively large collections of words, but the distinctions in emotional meaning are limited to the broad valence (positive, negative, neutral). In the face of a growing interest in studying specific emotions rather than broad affect in language, some researchers endeavored to supplement the existing affective databases such as ANEW with annotations classifying the words therein by their relatedness to basic emotions (Stevenson, Mikles & James 2007).

Attempts both to compile lists of words denoting emotions and to complement affective word collections with classifications of basic emotions point to the need for appropriate resources to study the language of emotions systematically. To study both words denoting emotions and their underlying concepts a dedicated resource would seem to be needed, and previous research lists the parameters such a resource should satisfy. Firstly, the words collected should be selected in such a way as to allow comparisons between languages (Osgood, May & Miron 1975). This could be achieved by determining a range of likely universal concepts and studying the way they are reflected in different languages. Secondly, it has been observed that different emotion concepts are lexicalized – i.e., coded into language – differently, so that the categories of words denoting emotions that differ in size and emotions are differentially expressed in different parts of speech (Clore, Ortony & Foss 1987; Clore & Ortony 1988; Dziwirek & Lewandowska-Tomaszczyk 2010; Foolen 2012). To include all major parts of speech: nouns, verbs, and adjectives, would therefore increase the utility of such a resource. Finally, as language is subject to constant change, and its speakers differ in their preferred or normative use of language, a means of investigating patterns of language use needs to be provided in any resources designed to study emotion words (Wallace & Carson 1973; Conway & Bekerian 1987; Galati et al. 2008). In applied linguistics and psycholinguistics language use tends to be determined through language corpora. Language corpora are large collections of texts from a variety of sources which allow users to establish the absolute frequency of words in the corpus, which indicates their relative frequency in the language as a whole. Adding word frequencies to a collection of words denoting emotions would allow researchers to seek evidence of certain patterns of overt verbal communication of emotions.

The EmCat-Eng (Emotion Catalogue – English) was created with all of the above considerations in mind. It was built on the assumption that the basic

emotion concepts are robustly represented in language. This robust representation was documented using lexicographic sources. Native monolingual dictionaries were referenced to compile a list of all the words denoting and related to basic emotion terms and the synonyms of those terms in noun, verb, and adjective forms. English language corpora were used to supplement the list with word frequency data. Every word on the list was tagged for a number of parameters, including part of speech, category of basic emotion, and frequency.

EmCat-Eng was thus created primarily as a resource for future research on emotion terms, particularly on the prototypical nature of emotion concepts. The parameters selected for inclusion in this database, along with its design, were determined in such a way as to allow replications in other languages. In fact, a sister database in the Polish language (Bąk [in press](#)) has been created based on the principles set for EmCat-Eng, allowing for the first systematic comparisons of two complete lexicons of basic emotion across two Indo-European languages. Every aspect of EmCat-Eng, including the analyses conducted on the collected material, was intended to make this a reliable resource for researchers, one that would allow them to make well-informed and rigorously controlled choices of stimuli for their research.

There are certain fundamental questions pertaining to the nature of lexicons of emotion that any researcher has to resolve in order to make valid selections of words for the study of emotions. The answers to these questions allow the researchers to contextualize and justify their choices, as well as to correct their results, factoring in the structural and functional aspects of language. The analyses conducted on the EmCat-Eng therefore sought to answer those fundamental questions, thus increasing the utility of this database as a resource.

One of those questions was whether the Pollyanna and negative differentiation effects are evident in the collective pool of words for basic emotions. The Pollyanna effect in language is the observation that the words denoting positive emotion, though less numerous, are significantly more frequently used; the negative differentiation effect is the observation that the words denoting negative emotions are significantly more numerous than words denoting positive emotions (Rozin & Royzman 2001). Both effects were observed in adjectives; here I also had the opportunity to look for the effects in nouns and verbs.

The second question the EmCat-Eng helps resolve concerns the sizes of categories of words denoting basic emotions. The studies in which existing affective databases were supplemented with a basic emotion tagging point to rankings of different categories of basic emotions rankings by size. According to Stevenson, Mikels & James (2007) *joy* should be the largest category, followed in order by *disgust*, *anger*, *sadness*, and *fear*. According to Strauss & Allen (2008) the order of size should be *joy*, followed by *anger*, *disgust*, *fear*, *sadness*, and *surprise*. However, these rankings are based on classifications of affective

words, few of which could be unambiguously classified as belonging to one or another category of basic emotions. With EmCat-Eng I would be able to verify their results against a systematic collection of terms denoting basic emotions.

## 2. Method: Word selection criteria

The words included in the EmCat-Eng were selected based on their semantics and using lexicographic sources as references. The selection process involved five stages: key term selection, synonym search, complementation, verification, and consolidation. The first stage – key term selection – was based on the existing literature in emotion psychology. The next three stages were based largely on lexicographic sources, specifically the online unabridged thesauri and dictionaries – the Merriam-Webster (henceforth: [MW](#)) and the Oxford English Dictionary (henceforth: [OED](#)). These specific dictionaries and thesauri were selected for their premier status as English language resources. The selection of the online unabridged versions was motivated by the fact that these are the most up-to-date and complete. The last stage involved final editing and consolidation of the recorded material.

Canonically, basic emotions theory focuses on six constructs of emotion: *anger*, *disgust*, *fear*, *joy*, *sadness*, and *surprise*. However, *disgust* has long been listed alongside *contempt*, the term *joy* is used interchangeably with *happiness* to denote the same construct, and the status of *surprise* as an emotion state is routinely questioned.

*Contempt* has long been considered one end of a conceptual and semantic spectrum, the other being occupied by *disgust* (cf. Tomkins 1962; Ekman, Sorenson & Friesen 1969). Recent studies, however, show *contempt* to be a much more complex concept than *disgust*. Conceptually, apart from emotion, *contempt* incorporates associations with social norms and moral evaluations (Fontaine, Scherer & Soriano 2013). Semantically, across multiple languages, *contempt* yields poor inter-rater agreements, strongly suggesting the term and its underlying concept are both highly culturally entangled and individually idiosyncratic (Soriano et al. 2013). For all these reasons *contempt* was not included as a key term at this stage.

The terms *happiness* and *joy* are used in emotion psychology to denote the same positive emotional state. This is hardly surprising, as the two terms overlap significantly in their semantics. The OED lists synonyms for both these terms which overlap at a rate of 53%; the MW shows a 59% overlap between the synonyms of *joy* and *happiness*. On conceptual and semantic grounds therefore I included both *joy* and *happiness* as key terms. For the sake of clarity in the planned analyses, however, all alternatives for both terms were logged in EmCat-Eng under the common label of *joy*.

The recent studies which endeavored to supplement existing affective language databases with classifications of basic emotions routinely excluded *surprise* as a category (e.g., Wierzba et al. 2015; Hinojosa et al. 2016; Stadthagen-Gonzalez et al. 2017). While the reasoning behind such exclusions is never listed, some previous research points to the questionable status of *surprise* as an emotion (Ortony & Turner 1990). More recent studies in the appraisal theory of emotions show that *surprise* is based on a significant and universal perception of stimulus novelty. This subjective sense of novelty appears to have connotations with emotions and has been found in multiple languages (Fontaine & Scherer 2013). Therefore, *surprise* was included as a key term for EmCat-Eng.

The seven basic terms for the six canonical states (*anger*, *disgust*, *fear*, *happiness/joy*, *sadness*, *surprise*) were initially listed in their noun forms. From these I derived single-word adjective and verb forms if such grammatically valid forms existed in contemporary English. *Happiness* alone lacked a single-word verb form, all other key terms had both the verb and adjective forms for a total of 20 key terms to conclude the key term selection stage. These 20 key terms are listed in Table 1.

Table 1. The basic emotion terms that served as key words for the EmCat-Eng word selection process.

Nouns	<i>anger</i>	<i>disgust</i>	<i>happiness</i>	<i>joy</i>	<i>fear</i>	<i>sadness</i>	<i>surprise</i>
Verbs	<i>to anger</i>	<i>to disgust</i>	–	<i>to enjoy</i>	<i>to fear</i>	<i>to sadden</i>	<i>to surprise</i>
Adjectives	<i>angry</i>	<i>disgusted</i>	<i>happy</i>	<i>joyful</i>	<i>fearful</i>	<i>sad</i>	<i>surprised</i>

These twenty terms became the base key words in the next stage. In it, the dictionaries and thesauri were referenced to identify all synonyms and words related to the key words. All of those were logged in a single repository, each tagged for its part of speech and the basic category of emotion it belonged to by its semantic association with specific key words. I found 1,262 such words in the MW (659 adjectives, 383 nouns, 220 verbs) and 744 words in the OED (415 adjectives, 223 nouns, 106 verbs). At this stage I therefore identified 2,006 words semantically related to basic emotion key words according to lexicographic sources.

The second stage revealed that words denoting basic emotions were unequally distributed among the different parts of speech. I therefore included the third stage – complementation. For example, within the 2,006 terms identified at the previous stage the key noun *anger* yielded the synonym *fury*. Its adjective form *angry* yielded the synonym *furious*. The verb form *to anger*, however, did not yield the verb *to infuriate*. The last is, however, clearly morpho-semantically related to both *fury* and *furious*, and it carries a clear meaning related to an emotional state. Therefore *to infuriate* was added to *fury* and *furious* in order to

complement the set and was tagged provisionally as belonging to the category of basic emotion *anger* by association.

Parallel to complementation, the fourth stage, that of verification, was carried out. At this stage, the dictionary definition of every word identified thus far was analyzed. Firstly, words labeled within the MW and the OED dictionaries as ‘rare’, ‘dated’, ‘archaic’, or ‘dead’ were excluded. Every word that had no clear, unambiguous denotation or reference to an emotional state in contemporary English was also excluded. The complementation added some words, while others were removed through verification. At the end of these two stages I identified 1,395 candidate words (577 adjectives; 488 nouns; 330 verbs) in the MW, and at 939 candidate words (399 adjectives; 327 nouns; 213 verbs) in the OED.

The final stage was consolidation, where the main purpose was to remove the redundancies from the final version of the EmCat-Eng. Both dictionaries of choice are dictionaries of contemporary English, so they naturally overlap considerably in their contents. I therefore compared the collections of words sourced from each dictionary and thus identified 570 redundant entries, i.e., words found in both dictionaries. These redundant entries were deleted, in each case leaving only one entry for the final version of the database.

Another category of redundancies were words denoting multiple emotions, meaning they were synonymous with more than one category of basic emotions. This led to them being logged more than once – each time with a different basic emotion tag. Such multiple entries are a reflection of polysemy on a semantic level and of blending on a conceptual level. These redundant entries were also deleted, leaving in each case just one tagged as a blend of all the basic emotions with which it was synonymous. A good example of this would be the adjective *upset*, logged initially four times as a synonym of *disgust*, *fear*, *surprise*, and *sadness*. The word *upset* was therefore ultimately logged once and tagged as a blended synonym of all four emotions. Other examples included words such as, e.g., *consternated* (synonymous with: *fear* and *surprise*); *fuss* (*anger*, *fear*); *awful* (*disgust*, *fear*, *sadness*, *surprise*); *horror* (*disgust*, *fear*); *outrage* (*anger*, *disgust*); or *troubled* (*fear*, *sadness*). In total, 195 blends were logged in the EmCat-Eng.

Following the fifth stage, the EmCat-Eng totaled 1,759 words denoting or semantically related to basic emotions. Of those 738 were adjectives, 619 were nouns, and 402 were verbs. Each word was tagged for its category of basic emotion and part of speech. Additional tags were provided signaling whether the words belonged to pure or blended categories, the lexical root they were derived from, and whether they were fully or partially lexicalized. The latter was a metric which expressed whether a given basic emotion concept had valid noun, verb, and adjective forms within the EmCat-Eng. Those that did were tagged as fully lexicalized; those that did not were tagged as partially lexicalized.



For the purpose of some of the following analyses, temporary tags pertaining to etymology and registers were also added. Those tags, however, are not included in the final version of the EmCat-Eng database<sup>1</sup>.

### 3. Results

#### 3.1. EmCat-Eng database: Basic breakdown

Table 2 contains a tally of EmCat-Eng database entries broken down according to their part of speech, basic emotion category, and pure vs. blended category status. The Venn diagram in Figure 1 illustrates the relative sizes of all categories of basic emotions and the extent to which these categories overlap in the semantic space.

Of the 1,759 words denoting emotions in the form of nouns, verbs, and adjectives in the EmCat-Eng database 1,564 ( $\approx 89\%$ ) belong to pure semantic categories, and 195 ( $\approx 11\%$ ) to blended categories. The human capacity to express non-prototypical and blended or conflicting emotions in their facial expressions has been documented before (Ekman & Friesen 1982; Ekman 1996). In EmCat-Eng we see, for the first time, a systematic record of non-prototypical and blended expressions in language. Viewed from a lay perspective, the canonical six basic emotions are an unbalanced set, with four negative emotions (*anger*, *disgust*, *fear*, *sadness*), but only one positive (*joy*), and one neutral emotion (*surprise*) (Ekman 1999). This classification of basic emotions by valence is, to a degree, reflected in the semantic space created by the basic emotion terms and their synonyms in English. The semantic overlaps between the negative emotions are relatively large and deeply interconnected, often blending more than just two categories together. The overlaps between the negative and the positive or neutral emotions are small and relatively weak, typically involving only two categories at a time. Quantitatively as well as qualitatively (cf. Supplementary Materials) the semantic overlaps between the four negative emotions are considerably larger and stronger than those between the negative emotions and the positive *joy* or neutral *surprise*. This observation is reflected in the results from studies in which affective language databases were supplemented with the categorizations of basic emotions. In several of those studies, across different languages, strong positive correlations were found between the negative emotions while negative correlations were found between the negative emotions and *joy* (Briesemeister, Kuchinke & Jacobs 2011; Wierzba et al. 2015; Hinojosa et al. 2016; Ferré et al. 2017).

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<sup>1</sup> Copyright reasons preclude the inclusion of the tags specifying word etymology and registers in the EmCat-Eng. Researchers interested in this aspect of the data should be advised that the data on etymology and registers is not always included in dictionaries across languages. This particular research avenue will therefore have limited replicability across languages with different lexicographic traditions and techniques.



Different researchers tackling the problem of the terminology of emotions have predicted that different emotion concepts are likely to be lexicalized differently with respect to parts of speech that carry the emotional meaning (e.g., Clore, Ortony & Foss 1987; Hinojosa et al. 2016). I found this to be the case in English. Grammatically, every word in the database has the potential to generate most major part-of-speech word forms, but not all the resulting words carry emotional meanings. Emotional semantics in English are found most reliably in adjectives – EmCat-Eng includes 739 verified emotion adjectives (41.96% of the whole), 619 nouns (35.19%), and 402 verbs (22.85%). Adjectives denote attributes, so it may be tentatively concluded based on the morpho-semantic makeup of basic emotion words in English that the linguistic expression of emotion in this language is primarily attributive.

Table 2. EmCat-Eng database: Tallies of items broken down according to their part of speech and their basic emotion category.

	Basic Emotion(s)	Adjectives	Nouns	Verbs	Totals
Pure Categories	Joy (J)	157	145	105	407
	Anger (A)	135	111	70	316
	Fear (F)	113	103	53	270
	Sadness (S)	97	76	38	211
	Surprise (Su)	83	60	49	192
	Disgust (D)	78	60	30	168
Blended Categories	DF	23	15	6	44
	FS	14	13	14	41
	AD	9	12	9	30
	AF	3	4	4	11
	JSu	3	3	5	11
	DFS	4	3	3	10
	FSu	3	3	4	10
	DFSSu	2	3	2	7
	DS	3	2	2	7
	AJ	2	2	2	6
	AS	3	–	3	6
	DFSu	2	1	1	4
	AFD	2	1	–	3
	FJ	1	1	1	3
	AFS	–	1	1	2
	Totals	738	619	402	1759



Figure 1. Venn diagram of pure vs. blended basic emotion concepts in the English language<sup>2</sup>.

In other words, when referring to emotional states verbally, speakers of English have the greatest number and variety of adjectives at their disposal. To express emotional nuance they may thus preferentially opt to describe emotions as attributes of things and people rather than as independent entities (nouns) or actions (verbs). This may serve as a tentative conclusion based solely on the morpho-semantic makeup of the semantic space of basic emotion words. This makeup is somewhat different from the overall makeup of the English language as a whole, determined on the basis of the OED data. According to the OED, it contains 304,328 headwords, with nouns comprising 55.43%, adjectives 28.35%, verbs 10.70%, and other parts of speech 5.52%. Against this backdrop, the semantic field of emotion words is much more balanced, with less dramatic differences in size between the parts of speech. It is also proportionally more adjectival than nominal.

English has a long and complex history of language contact and change and dictionaries of the English language typically give fairly detailed etymologies for their headwords. While the exact progression of a word from any given language into English is often complicated, a marked preference for borrowings from Latin

<sup>2</sup> Four blended semantic spaces are not included in this Venn diagram as the overlaps exceeded the capacity of a 2-dimensional visualization. These blends include: 7 *fear*, *sadness*, *surprise*, and *disgust* blends; 6 *anger* and *sadness* blends; 4 *fear*, *surprise*, and *disgust* blends; 2 *anger*, *fear*, and *sadness* blends.

and French has been exceptionally well documented (Finkenstaedt & Wolff 1973; Williams 1986 [1976]). I found this also to be true in the case of borrowed emotion words. Across the EmCat-Eng I found 368 (21% of all the whole) words borrowed from 12 other languages. For the majority of those only one word per language would be borrowed (e.g., *nirvana*, borrowed from Sanskrit), while the vast majority of borrowings were attributed to Latin and French. Of the 368 borrowings, 182 (49.46% of all borrowings) came from Latin, 104 (28.26%) came from French, and 54 (14.67%) are attributed with varying levels of certainty to either Latin or French<sup>3</sup>. Altogether, 92.39% of all borrowings come from Latin and/or French, which is typical given the general pattern of borrowings into English.

More telling is the distribution of borrowings between the categories of basic emotions. Overall, in EmCat-Eng the order by size of categories of words denoting basic emotions is: *joy* > *anger* > *fear* > *sadness* > *surprise* > *disgust* (cf. Table 2). The borrowings follow this size pattern almost exactly with 82 words (22%) belonging to the category of *joy*, 66 (18%) to *anger*, 63 (17%) to *fear*, 49 (13%) to *disgust*, 33 (9%) to *sadness*, and 29 (7%) to *surprise*; with an additional 49 (13%) belonging to semantic blends. The only outlier here is *disgust*, but on the whole – the larger a category is the more borrowings it appears to attract, which speaks to the conceptual robustness of these basic emotion categories.

EmCat-Eng was compiled in parallel with its sister database EmCat-Pol, created on the same principles and using the same procedures, but for the Polish language. In Polish, language registers turned out to be a significant variable in the overall makeup of the database, with formal registers inflating the sizes of the categories of *sadness* and *anger*, with important implications for the ethnopsychological portrait of the Polish language (cf. Bąk [in press](#)). I therefore inspected all information regarding registers of the words included in the EmCat-Eng. Whereas nearly 74% of the words in EmCat-Pol (Bąk [in press](#)) are marked for specific registers, only 4.15% (73 words) of EmCat-Eng were tagged in dictionaries as belonging uniquely to any specific registers. This is very likely the result of English-specific lexicographic tradition, which serves as a telling example of the limited potential replicability of fully tagging the words in the database for registers. On the other hand, this conspicuous absence of classification of vocabulary into specific registers (e.g. formal, informal, literary) may mean that the use of the entirety of vocabulary denoting emotions in English is potentially less contextually constrained than it is in Polish. Specifically, this might mean that the words denoting emotions in English are less constrained to or marked for specific social or communicative contexts of use.

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<sup>3</sup> Only borrowings from contemporary languages and from Latin into English were considered in the analysis. The aim was to consider words which can be reasonably assumed to be recognized as borrowings into English from another source language by the average users of language.

### 3.2. Overlaps between EmCat-Eng and the existing resources for basic emotion words in English

There exist two databases for the English language, where the researchers have attempted to supplement categorization data for basic emotions to words previously evaluated for core affect measures. In the first, participants were asked to use five scales of basic emotions (excluding *surprise*) to indicate the extent to which each word presented to them conveyed each basic emotion. The database used was ANEW and, of its 1,034 words, 536 (51.84% of the whole) could be classified as clearly belonging to discrete emotion categories. Of that number 358 (34.62%) words were classified as one of five of the canonical six basic emotions, 23 (2.22%) were classified as blends or just broadly negative, and 155 (14.99%) had an unclear classification, pointing to different categories depending on the participant. Of the words classified as canonical basic emotions: 90.5% were *joy*, 3.91% – *disgust*, 2.23% – *anger*, 1.96% – *sadness*, and 1.4% were classified as *fear*. The EmCat-Eng and this version of ANEW share 91 entries. A comparison of the basic emotion tagging – based on lexicographic information in EmCat-Eng and participant evaluations in the ANEW – indicated a high degree of overlap. Of the 91 words 71 (78.02%) matched exactly in tagging and, a further 9 (9.89%) matched partially, bringing the total of full or partial matches to 87.91%.

The second database that included categorizations of basic emotions was that created by Strauss & Allen (2008) using a variety of previously used word lists. They presented their collection of words to their participants to sort into eight categories – including anxiety, neutrality, and all six basic emotions. Their complete word list included 484 words, 251 (51.86% of the whole) of which could be classified as one of the eight categories specified to a satisfactorily high level of confidence. Of this number, a mere 89 (18.39%) words were categorized unambiguously as belonging to one of the six basic emotions, with another 162 (33.47%) classified as either anxiety or neutrality. The 89 words classified as belonging to basic emotions included: 47 (52.81%) words denoting *joy*, 12 each (13.48%) – *anger* and *disgust*, 8 (8.99%) – *fear*, 7 (7.78%) – *sadness*, and 3 (3.37%) – *surprise*. Comparing the basic emotions tagging between EmCat-Eng and the results from Strauss & Allen (2008) I found 45 overlapping terms. Of those, 36 (80%) words matched exactly in tagging; with a further 4 (8.89%) words matching partially, which meant full or partial matches here reached 88.89%.

All in all, whenever measures of categorization of basic emotions are thus imposed onto databases designed for measuring affect, a marked positive bias manifests itself. Looking at the sheer number of words per category, EmCat-Eng is broadly the same. Much like the other two datasets described, the largest EmCat-Eng category is *joy*, followed in order of category size by *anger*, *fear*, *sadness*, *surprise*, and *disgust*. Across all three datasets *joy* is therefore the most

prevalent, followed by *anger* and/or *disgust*, with the remaining three emotions showing a relatively high variability in numbers and proportions, all of which could be attributed to the nature of the word selection process. Where EmCat-Eng differs from the other two is in its inclusion of verbs, the one part of speech missing from most affective language resources. This inclusion is significant for two reasons. Firstly, verbs show a unique and hitherto unobserved pattern of frequency distribution (see below). Secondly, the inclusion of verbs allows for a systematic testing of the proposition that every emotion concept has its unique pattern of lexicalizations, specifically, that different emotions may be lexicalized preferentially as different parts of speech (Osgood, May & Miron 1975; Clore & Ortony 1988).

### 3.3. The lexicalization of basic emotions in English

English is an analytic language and therefore it conveys its complex relationships between meanings largely through syntax and a variety of function words. Languages of this type usually boast a relatively large number of moderately productive root morphemes from which various word forms are derived. This may open up the statistical probability that emotion concepts are largely lexicalized only partially – as one or two, but not as all three of the major parts of speech. Having the lexical means to describe emotions as discrete entities (nouns), their attributes (adjectives), or as actions (verbs) improves the strength of the associative connections, the relative conceptual salience, and consequently – the overall ethnopsychological significance of a given emotion concept (Harkins & Wierzbicka 2001). Apart from the relative sizes of the categories of words denoting basic emotions, it is thus worth investigating the extent to which the concepts that make up each basic emotion category are fully lexicalized.

To do this, root morphemes were extracted from every word in the EmCat-Eng, and compared with the part-of-speech and basic emotion category information. Every root morpheme in the database that produced valid nouns, verbs, and adjectives was tagged as belonging to a “fully” lexicalized concept. Every root that was lexicalized as only one or two of the three parts of speech was tagged as belonging to a “partially” lexicalized concept. This tagging revealed that, in total, EmCat-Eng contains 736 unique lexical roots. Of those 684 produce words that belong to only one basic emotion category, or words which belong to a single type of semantic blend. The 684 roots together produce 1,569 words. The remaining 52 roots produce words that belong to between 2 and 4 different pure categories and blends. A total of 190 words in EmCat-Eng are derived from these 52 roots. Here I will focus on the roots producing words in pure basic emotion categories; the analysis of the roots straddling different categories can be found in the Supplementary Materials. Table 3 tallies the full

and partial lexicalizations, expressed in the number of unique roots, across the different categories of basic emotions, and the percentage of all unique roots in each category that produces full lexicalizations.

Table 3. A tally of unique roots and lexicalizations across basic emotion categorizations.

	Full	Partial	Total	% full
<i>Joy</i>	68	97	165	41.21%
<i>Anger</i>	49	83	132	37.12%
<i>Fear</i>	38	68	106	35.85%
<i>Sadness</i>	23	66	89	25.84%
<i>Surprise</i>	32	51	83	38.55%
<i>Disgust</i>	23	44	67	34.33%
Blends	20	22	42	47.62%
Overall	253	431	684	36.99%

On the whole, English appears to have more partial than full lexicalizations of basic emotions, and the proportion is comparatively stable across all categories except *joy*, *sadness*, and semantic blends. By definition the semantic blends blend multiple categories, thus this category's propensity for a greater proportion of full lexicalizations was predictable. It is, however, the categories of pure basic emotions that are more telling with respect to the ethnopsychological makeup of the English language. The total counts of unique roots, whether they yield partial or full lexicalizations, by emotion category are a clear reflection of the overall word counts by emotion category (cf. Table 2). Both in terms of raw word counts and unique root counts the EmCat-Eng has the greatest number of entries denoting *joy*, followed in order of category size by *anger*, *fear*, *sadness*, *surprise*, and *disgust*. The overall proportion of full to partial lexicalization for the entire database is about 37%, and the categories of *anger*, *fear*, *surprise*, and *disgust* are roughly within that proportion. The category of *joy* represents a high point with 41.21% full lexicalizations, and the category of *sadness* represents a low point with 25.84% full lexicalizations. Given the relative sizes of the basic emotion categories, i.e., words and unique roots, and their lexicalization patterns, it may be tentatively concluded that *surprise* and *disgust*, and particularly *sadness* are of lesser ethnopsychological significance in English than *joy*, *anger*, and *fear*. This is a markedly different result than that found in Polish. In EmCat-Pol *sadness* and *fear* had the highest proportion of full lexicalizations, followed by *anger*, *joy*, *surprise*, and *disgust*, with the last four considerably less fully lexicalized than the first two (Bąk [in press](#)). The key difference between the two languages

appears to be, however, the significance of *sadness* and *joy* which appear to have opposing statuses of importance across the two languages and cultures.

#### 3.4. Frequency distributions within EmCat-Eng

The imbalance in the number of positive (*joy*) and negative (*anger, fear, disgust, sadness*) emotion words is roughly in line with a couple of routine observations about the English language of emotions. One of these observations is that there appear to be fewer words for positive emotions, but they are all used more frequently. This is known as a variation on the Pollyanna effect (Rozin, Berman & Royzman 2010). The other observation is that the words denoting negative emotions are both more varied and more numerous. This is known as negative differentiation (Rozin & Royzman 2001). Both observations have been made for the English language only and are limited to emotive adjectives (Osgood, May & Miron 1975). EmCat-Eng allowed me to quantify and systematically describe these effects for all valid terms for basic emotions in noun, verb, and adjective forms. To that end I tagged all words denoting *joy* as positive, all words denoting *surprise* as neutral, and all remaining words as negative, blends being excluded from this analysis. To these I added raw frequency scores from the Corpus of Contemporary American English (henceforth: COCA) (Davies 2008) and the Subtlex<sub>US</sub> corpus of frequencies (Brysbaert & New 2009). I focused on the frequencies for American English, as this is currently the dominant variant of English around the world with approximately 70% of all native English speakers identifying as American (Crystal 2003). Furthermore, in the later empirical stages of the EmCat project psychometric data was collected from English native speakers in the United States of America, so the choice of American English was further informed by that.

The following analyses are based on the COCA frequency data, while the analyses based on the Subtlex<sub>US</sub> data can be found in the Supplementary Materials. I opted for the COCA data here for two key reasons. Firstly, in the course of intellectual and emotional development people acquire passive and active vocabulary from both written and spoken sources. While the Subtlex<sub>US</sub> claims to be based on spoken language only, the COCA corpus includes both written and spoken language subsections. This allows for a more comprehensive assessment of both active and passive emotion vocabulary through a systematic analysis of word frequencies in the corpus (Wallace & Carson 1973). Secondly, a keyword search of both corpora yielded 1,315 hits in the Subtlex<sub>US</sub> (74.76% of all the words in EmCat-Eng), and 1,702 hits in COCA (96.76% of EmCat-Eng). The latter, then, yielded a more complete set of frequency data for EmCat-Eng. For these two reasons the COCA frequency data are used in the analyses presented here. All frequency data were corrected for part of speech (e.g.,



differentiating between the frequency of *upset* when logged in COCA as a noun, a verb, or an adjective). Figure 2 shows the proportional distribution of the word counts with the words categorized by valence. Figure 3 shows the mean frequency of these words categorized by their basic valence.

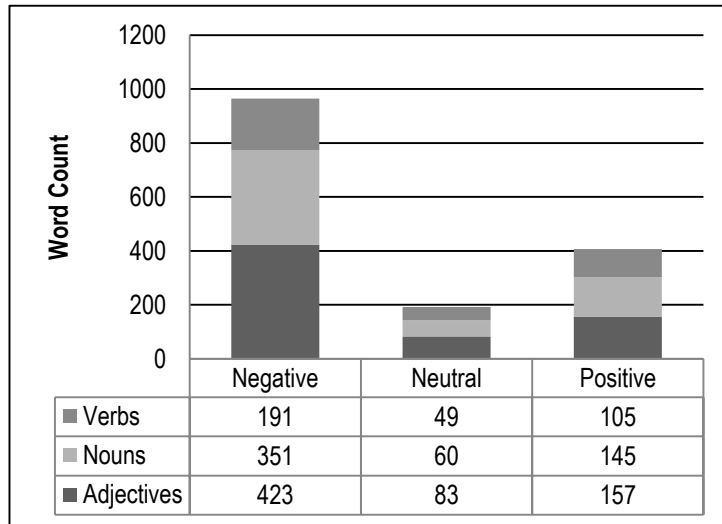


Figure 2. Counts of basic emotion terms sorted by their basic valence category.

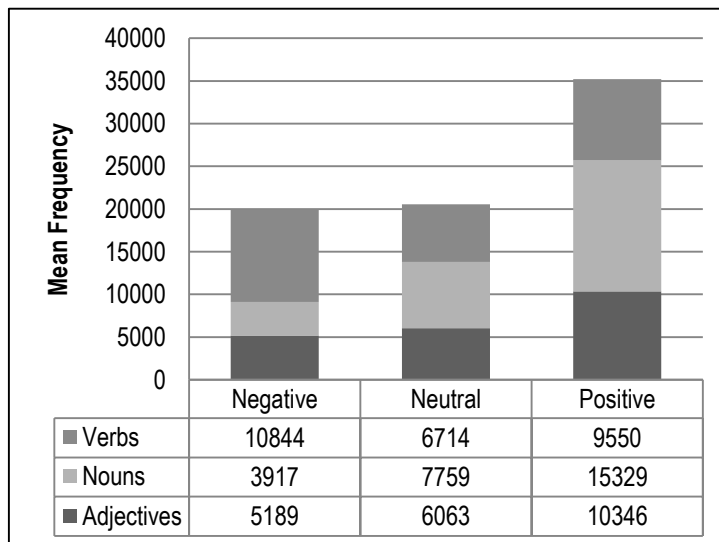


Figure 3. Mean frequencies of basic emotion terms sorted by their basic valence.

All in all, negative differentiation and the Pollyanna effects are both present across all parts of speech, and both appear to be differentiated by part of speech. Regarding negative emotions: verbs constitute the least numerous but the most frequently used category. Regarding positive emotions: the moderately sized category of nouns is the most frequently used. The general effect of negative differentiation is present as the negative emotions include four discrete categories, with all the words denoting them outnumbering the positive emotion words roughly two to one. The general Pollyanna effect is also present insofar as collectively positive emotion words are considerably more frequent than those denoting negative emotions. Interestingly, the smallest basic emotion category by valence, the neutral *surprise*, yields a disproportionately large frequency, on a par with that of all negative emotions combined. I observed the same “neutrality” effect in Polish, though there it was considerably more pronounced (Bağ *in press*). This cross-linguistic similarity speaks to the robust results from the appraisal studies which determined the “novelty” appraisal as a key component of the meaning of emotion words, which is what defines the status of *surprise* as a discrete emotional state (Fontaine & Scherer 2013). For the sake of thoroughness, I checked for both the Pollyanna and negative differentiation effects in the two largest affective language databases in English – the most recent version of Affective Norms for English Words (ANEW; Bradley & Lang 2010) and the database created by Warriner, Kuperman & Brysbaert (2013). Both effects manifested strongly in both databases, but the neutrality effect presented differently. A complete discussion of these results can be found in the supplementary materials.

Given the robust negative differentiation in terms denoting basic emotions in English and the curious spike in word frequencies for neutral (*surprise*) words, I took a focused look at the frequency distributions of the words denoting each basic emotion. Figure 4 shows the frequency distributions of nouns, verbs, and adjectives denoting each of the six canonical basic emotions.

The category of *joy* is the only positive basic emotion, the largest lexical category of all basic emotions, and it leads the board on mean word frequency in the English language. It also appears to be preferentially expressed in the form of nouns. Second in order of frequency is *fear*, only the third largest category by size. However, *fear* is also unique insofar as it is the only basic emotion with semantic overlaps with all other basic emotions regardless of valence. *Fear* appears to be preferentially expressed through verbs. *Surprise* is the third most frequent basic emotion, though it is also the second smallest category of basic emotion words. This is particularly interesting when considered with the reference to the similarly sized category of *disgust*. Were the frequency distribution roughly to mirror category sizes, *surprise* would find itself decidedly lower, but instead, words denoting *surprise* are paradoxically frequent in the corpus. *Surprise*, like *joy*, is also

preferentially expressed in nouns. *Anger* is the second largest category but ranks only the fourth most frequently discussed basic emotion. When discussed, *anger* is also preferentially expressed as a verb. *Sadness* is the second least frequent category of basic emotion with a unique distribution of expressions among parts of speech. Overall, it is preferentially expressed in verbs, with a secondary preference for adjectives, with the expressions in nouns decidedly infrequent. The same distribution is observable for *disgust*, the least frequent of the categories of basic emotion, although *disgust* shows a higher frequency expressed in adjectives, followed closely by verbs.

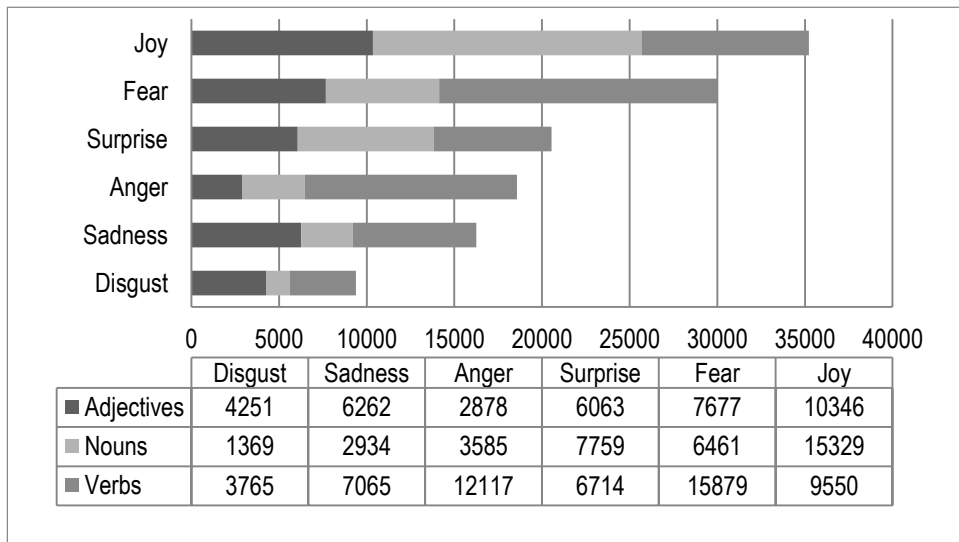


Figure 4. Frequency distributions of basic emotion terms expressed as nouns, verbs, and adjectives.

All in all, the negative emotions of *anger*, *fear*, and *sadness*, are preferentially expressed as verbs, a preference particularly marked in the cases of *anger* and *fear*. The one remaining negative emotion of *disgust* is preferentially expressed through adjectives, though verbs come a close second. The positive *joy* and the neutral *surprise* are both preferentially expressed through nouns, with the difference being more pronounced in *joy*. The magnitude of some of those differences in mean frequencies between the parts of speech prompted me to check their statistical significance. None of the comparisons, overall or across the different basic emotion categories, came back as statistically significant.

#### 4. Discussion

Emotional experiences relevant to members of any community occupy their thoughts and the need to cope with them and communicate them shapes the language of that community. The greater the significance ascribed to a given emotion within a given community the more nuanced the verbal expressions grow, forming increasingly large clusters of semantically related words (Wierzbicka 1999). At the same time, language change takes time and the members of different linguistic communities vary in their levels of language aptitude, education, and communication skills. This means that the average native speakers of any language will not typically know all the words for any given emotion in their language and will likely have specific preferences regarding the means of verbally communicating the concept (Wallace & Carson 1973). The verbal communication of emotions using words that specifically denote them constitutes overt and explicit emotional expression. One might therefore expect it to be subject to display rules – social norms governing the expressions of emotions that are acceptable and the circumstances under which they are acceptable in a given community (Ekman & Friesen 1969, 1974). In verbal communication such display rules become apparent, among other things, in the frequency distributions of words denoting individual emotions. The results of the analysis of EmCat-Eng offer an insight into both the basic conceptualizations of and the display rules for verbal communication of basic emotions in English.

The conceptualization of basic emotions as expressed in language appears to have a strong pancultural character on the general level of valence. The categories of words denoting the negative basic emotions of *anger*, *disgust*, *fear*, and *sadness* overlap to a significant degree, signaling the existence of conceptual blends that combine the meanings of multiple basic emotions. The existence of such blended categories has been postulated before, based on evidence from facial expressions (Tomkins 1962; Ekman & Friesen 1982; Cowen & Keltner 2020), as well as from language (Shaver et al. 1987; Stevenson, Mikles & James 2007; Scherer 2013). The results here further support this proposition by documenting a whole class of words in which blended semantics is an inherent trait.

Studies in multiple languages have pointed to a strong positive correlation between words associated with different negative emotions and a negative correlation between negative and positive emotions (Briesemeister, Kuchinke & Jacobs 2011; Wierzba et al. 2015; Hinojosa et al. 2016; Ferré et al. 2017). EmCat-Eng data demonstrate that these correlations are predicted by the structure of the language itself, further supporting the idea that emotion concepts may be mapped reliably through language (Ortony, Clore & Collins 1988).

Finally, the negative differentiation and the Pollyanna effects, formerly observed in adjectives only (Rozin & Royzman 2001), were both confirmed here

in nouns, verbs, and adjectives alike. The same valence-based results were found in the parallel study of Polish emotion terms (Bāk [in press](#)), which leads me to the conclusion that the sphere of broad affective dimensions is where most of the universality of emotional conceptualizations lies.

The display rules for the expression of emotions in verbal communication are most evident when the relative sizes of the individual basic emotion categories are compared with their use frequencies. The category sizes tell us the number of means of overtly and unambiguously communicating an emotion the speakers of a given language have at their disposal. The word frequency indicates how often they make use of those emotion words. In American English *joy* is the largest category of words, with the highest proportion of fully lexicalized concepts and highest frequencies. This is typical for Western, English-speaking, individualist cultures, which are intensely focused on the experience and maintenance of positive emotions such as *joy* and on various forms of positive reinforcement (Heine et al. [1999](#)).

In cultures that attribute great cultural significance to positive emotions and the act of pursuing them, negative psychological outcomes such as depressive states become very common (Ford et al. [2015](#)). This may explain the frequency distributions of words denoting *sadness* in EmCat-Eng. The category of *sadness* is moderate in size, but it also has the highest proportion of partial lexicalizations and has the second lowest frequency of all basic emotions. Some researchers have remarked that cultures oriented towards high emotional positivity show an equally strong desire to minimize the experience of and exposure to expressions of *sadness* (Safdar et al. [2009](#)). The considerable size, the robust lexicalizations, and the frequency of *joy* with the corresponding moderate size, poor lexicalization, and low frequency of *sadness* in EmCat-Eng could be a reflection of that.

Another set of display rules manifesting in the EmCat-Eng data pertains to the expressions of *fear*. The English-speaking world in general and Americans in particular have been characterized as living in a persistent and cultivated culture of *fear*. Some date this back to the very dawn of American nationhood, to the emotional turmoil of running from various forms of oppression, to perilous ocean crossings, and to rebuilding lives in an unknown and hostile land (Stearns [2006](#)). *Fear*, it has been argued, is ever-present in the cultural discourse, grown out of a variety of socioeconomic anxieties and often guided through social and political narratives to bloom into a *fear* of external enemies (Skoll & Korstanje [2013](#)).

This broad ethnopsychological observation may explain the unique dataset presented by *fear* in EmCat-Eng. Though moderately sized, it is the second most frequently overtly discussed emotion in English. It is also the only category which semantically overlaps with all other basic emotions regardless of their valence. Americans are relatively accepting of open displays of *fear* of various intensities

(Moran, Diefendorff & Greguras 2013), as the emotion is generally seen as non-threatening and relatively socially harmless (Safdar et al. 2009). Once again, the semantic structure and the frequency distribution of the *fear* category of words appear to reflect both its display rules and its cultural relevance.

*Disgust* and *anger* are commonly discussed together in display rule literature as parts of a triad also including *contempt*, as all three are elicited by specific violations of commonly accepted social norms (Rozin et al. 1999). Open expressions of *disgust* are generally not tolerated (Matsumoto, Hee Yoo & Fontaine 2008) and expressions of *anger* are only tolerated in narrowly defined contexts (Koopman-Holm & Matsumoto 2011). In Western individualist cultures open expressions of *anger* are seen as more socially acceptable when expressed within established communities, in in-groups, much as a tool helping to regulate interpersonal boundaries (Elwood & Olatunji 2009). All of these display rules may explain the fundamental differences in the way *disgust* and *anger* are coded into and used in English. *Disgust* is the smallest and least frequently discussed emotion. *Anger* is the second largest but only fourth most frequently discussed. In a fiercely individualistic culture that values personal autonomy *anger* is an important protective emotion (Eid & Diener 2001), but the way in which it is used and the frequency with which it is expressed are limited given the socially disruptive nature of behaviors it can provoke (Averill 1983).

Finally, the EmCat-Eng, much like its sister database EmCat-Pol, showed an unexpected spike in the frequency of words denoting *surprise*, the second smallest basic emotion and the only one to be broadly neutral. It is often identified as more of a quasi-emotional cognitive state of brief adjustment to a freshly detected violation of expectations in the perceived progression of events or the state of the world (Reisenzein, Meyer & Schützwohl 1994). When it is treated as an emotion its valence is often presented as ambiguous and largely determined by the requirements of the study design (Noordewier & Breugelmans 2013). When basic emotions are sorted by valence, the neutral category of *surprise* is the smallest, but it just outstrips the four negative emotions combined on mean frequency. Some speculate that open expressions of *surprise*, as a neutral emotion may follow the same pattern as does the positive *joy* (Safdar et al. 2009). On the other hand, evidence from appraisal studies shows that the basic cognitive-affective appraisal of novelty, which is at the core of the meaning of *surprise*, may carry a deal more pancultural significance than was previously thought (Fontaine & Scherer 2013). This seems also to be supported by the fact that I found the same result in Polish, in the EmCat-Pol database (Bąk [in press](#)).

The results from EmCat-Eng have considerable implications for further research in psycholinguistics. Firstly, the great majority of studies in psycholinguistics rely on the broad distinction between positive and negative valence of stimuli. The results here, however, demonstrate the robustness and

relative discreteness of negative emotion concepts as expressed in the varying lexicalization and usage patterns of words that denote those concepts. Negative differentiation is very strong in the taxonomy of words denoting emotions, as seen in the results from EmCat-Eng. Unlike positive emotions, every negative emotion is specifically negative, and treating all negative word stimuli as a homogenous class may constitute a confounding variable.

Grammatical aspects, such as parts of speech, also have a bearing on emotion conceptualization and therefore, potentially, on processing. Negative emotions are preferentially discussed using verbs, signaling that they may be conceptualized preferentially as actions. Positive emotions, on the other hand, are preferentially expressed as nouns, signaling that they may be conceptualized preferentially as entities. The final implication is that in the conceptualization and expression of emotions language is anything but inconsequential. Broad emotive character traits cultivated in individual communities and cultures are reflected in language, its morpho-semantic structure, and its patterns of use. The emotion concepts underlying the words denoting emotions may be meaningfully and reliably traced and mapped by a focused study of those words in the context of their culture. Therefore the results of this study may protect future psycholinguistic studies from confounds resulting from negative differentiation or grammatical variables.

#### *Data Availability Statement*

The data and materials for all experiments are available in the Open Science Framework repository of supplementary materials for this paper, <https://osf.io/wxftq/>

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