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Norming studies for lexicosemantic and affective characteristics of European Portuguese words: A literature review

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Words are widely used as stimuli in cognitive and linguistic research. As words may vary on various domains (e.g., lexicosemantic and affective), which can influence performance in many ways, it is essential to select them carefully. However, databases of European Portuguese words are still relatively scarce, and their presentation is spread in various sources. The aims of this work were: (1) to provide a review of the databases containing information on lexicosemantic, affective, and free association norming data for European Portuguese words published since the year 2000; (2) to summarize the definitions of the different variables; and (3) to combine in a single database the norming data available at this point. We found 25 databases with 18 containing lexicosemantic and affective norming data and seven containing word free association norms. These databases include words from various categories (e.g., nouns and adjectives), characterized on different variables (e.g., familiarity, imagery, valence, age of acquisition and animacy). This review provides a useful tool for researchers looking for Portuguese word-related resources. A thorough review of the databases, including some details about each one, is presented. The combined database is shared with the scientific community via the Open Science Framework: https://osf.io/9ta3y/.

Key words: Word norms, Lexicosemantic variables, Affective variables, Free association, European Portuguese.

Words are rich stimuli commonly used as materials in research across various areas such as linguistics, cognitive psychology, affective priming, social perception, among others. However, words can differ along several variables (e.g., concreteness, imagery, age of acquisition) that can impact the way they are processed. Sometimes the characteristics of the stimuli themselves are the object of the study but, in others, researchers need to equate stimuli sets on these characteristics to insure the internal validity of their work. Therefore, being knowledgeable about the studies that have collected information on these characteristics is crucial when selecting research materials.

According to Andrews and colleagues (2009), the mental representation of the meaning of the words can be learned through *distributional* and *experiential* variables. The *distributional variables* refer to "how words are statistically distributed across different spoken or written texts" (Verheyen et al., 2020, p. 1109), and include variables such as written frequency, mean bigram frequency and the orthographic neighborhood size. The *experiential variables* capture the "perceived attributes associated with the words" (Verheyen et al., 2020, p. 1109), and can be further divided into *lexicosemantic* (e.g., concreteness, imageability, familiarity and age of acquisition) and

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affective variables (e.g., emotional valence, arousal); however, as the authors note, it's not always simple to distinguish them. We should note that, although we are adopting this form of classifying the variables, other conceptualizations also exist (Brysbaert et al., 2019). This review focuses on studies that have reported norms for lexicosemantic and affective features of European Portuguese (EP)[1] words and norms of free association of EP words.

Studies aiming to gather information on experiential variables of words usually require participants to provide their subjective assessment regarding specific features that they think best describe the words (Kremer & Baroni, 2011); this is based on their mental representation of the presented concept (Hyde & Jenkins, 1973; Kremer & Baroni, 2011). It is known that some experiential variables influence the way words are processed in various cognitive domains. For example, in memory, concrete words (that is, words that refer to things that may be experienced by the senses, such as *chair*) are better encoded and, therefore, better remembered than abstract words (that is, words not referring to material things, or that cannot be experienced by the senses, such as *happiness*), a phenomenon known as the *concreteness effect* (Paivio, 1991). On the other hand, Kousta and collaborators (2011) reported that, in semantic decision tasks, abstract words seem to take a processing advantage when compared to concrete words. However, as pointed out by the authors, this advantage seems to be (at least partially) explained by the fact that abstract words have more affective associations.

The effect of emotional valence (i.e., if a word has a positive or a negative emotional connotation) in cognition has also been exploited. For example, Carretié et al. (2008) conducted a lexical decision experiment in which participants had to identify if a string of letters corresponded to a word or not; importantly, the presented words differed on emotional valence (compliments, insults and neutral adjectives). Participants not only were more accurate, but also faster, at responding to compliments (positive-valenced words) than to insults (negative-valenced words).

Another example is animacy, which refers to whether something corresponds to a living / animate or a nonliving / inanimate entity (Caramazza & Shelton, 1998; Félix et al, 2020). Animacy has been identified as the best predictor of free recall, so people tend to recall animates (e.g., people and animals) significantly better than inanimates (e.g., objects; Nairne et al., 2013; see also Aka et al., 2020). The second-best predictor of free recall, identified by Nairne et al. (2013), was imageability, that is, the ease with which a word produces a mental image (e.g., *television* has high whereas *evidence* has low imageability). In spite of the fact that imagery and concreteness (mentioned above) correlate highly (r=.88, Soares et al., 2017), studies have revealed differences between them. For example, although concrete words tend to evoke a mental image more easily than abstract words (e.g., Paivio et al, 1968), some abstract words (namely, those denoting affective states; e.g., *happiness*), although scoring low on concreteness, possess high imageability ratings; in these cases, the high correlation between imagery and concreteness is not observed.

The variable age of acquisition (AoA) is the estimated age at which a specific word was introduced in the individuals' vocabulary. This variable was been reported to be a significant predictor of word naming latencies (that is, when reading aloud, words that are acquired earlier are read faster than those acquired later), as well as of lexical decision latencies and accuracy. The influence of AoA in the cognitive processing of stimuli (namely, words) has been named the *AoA effect* (Cortese & Kahanna, 2007).

The individual experience with a word also influences the way it is processed. Such experience might be operationalized by subjective frequency (that is, a rating of how often a person is exposed to the word) or familiarity (i.e., the degree to which one finds a word familiar, considering one's mental lexicon; Kuperman & Van Dyke, 2013). For example, the more frequent a word is considered to be, the faster one reads it (Kuperman & Van Dyke, 2013). Even though subjective word frequency is sometimes used to indicate familiarity, these variables differ in important ways. For instance, a

[1] European Portuguese refers to the Portuguese language written and spoken in Portugal.

regression analysis performed by Balota et al. (2001) revealed that subjective frequency provides a better index to the exposure to a word than familiarity, whereas the later seems to relate more to a series of other words' characteristics (e.g., meaningfulness) than subjective frequency.

The semantic relatedness among stimuli is another variable of broad interest. This variable expresses how close two words are in terms of meaning; for example, words from the same category are semantically related (e.g., *dress* and *shirt* are both clothing), as are words that attempt to define another (e.g., *apples* are *red*; McNamara, 2005). Semantic relatedness can be captured in free association norms. In free association tasks, participants are usually asked to produce the first word that comes to their minds (target) when presented with a specific word (cue); the association between the cue and the target is often a lexicosemantic association (Altarriba et al., 1999), although links of other nature can also be evoked (e.g., phonological or lexical). Moreover, these norming studies provide evidence about the strength of association between two words (i.e., the likelihood that a particular target occurs in the presence of that cue). It is possible to calculate the cue-to-target (forward strength), as well as the target-to-cue strength of association (backwards strength; Nelson et al., 1998). The former is relevant in predicting free and cued recall (Nelson et al., 2000), whereas the latter has been especially used to study the occurrence of false memories after the presentation of lists of words (Carneiro et al., 2011; Roediger & McDermott, 1995).

Furthermore, free association of words has been used to explore the semantic organization of memory (Hutchison, 2003), and even prospective memory (e.g., McDaniel et al., 2004). It has also been a topic of interest in the investigation of the development of word learning and semantic networks (Chou et al., 2006; Sloutsky et al., 2017), or in studying the neurological underpinnings of semantic processing (Graves et al., 2010). Such characteristic has also been relevant to explore general aspects of memory in clinical groups (Alkathiri et al., 2015).

Given the overall relevance of these word characteristics, norming studies are relevant to support the careful selection of research stimuli. Databases covering lexicosemantic and affective variables are freely available in several languages, such as in Italian (Della Rosa et al., 2010), English (Clark & Paivio, 2004; Rubin & Friendly, 1986; Wilson, 1988), French (Ferrand et al., 2008), Spanish (Hinojosa et al., 2015), German (Schröder et al., 2012) and Croatian (Ćoso et al., 2019), just to name a few. Similar norming studies for EP words also exist; these contain, for the most part, a relatively small number of words and each covers a limited number of variables. Besides, these studies have used different measurement scales (e.g., 9- and 7-point scales to measure the same variable), methods and contexts to collect their data (e.g., data collected individually or in group). They have also been published in various sources making it hard for researchers to easily find and use them. This often "duplicates" the work and efforts of researchers in that they opt to do their own pilot norming studies when they need to control for such variables.

This work aims to minimize this problem and to provide a useful tool for researchers by summarizing the existing norming databases covering lexicosemantic and affective variables, as well as norms of free association in EP. We define the variables as they were used in the corresponding studies and describe the main aspects of their procedures. Finally, we compiled the norming data available in these studies into a single database; it contains all the EP rated words, along with their scores as reported in each of the original studies. In spite of the above-mentioned differences among studies, we present evidence of discrepancies but also of communalities in the gathered data; these suggest that one can use some data from various studies in a safe way.

Method

We conducted our search for databases of European Portuguese words in Scopus and Web of Science, as well as in Portuguese journals – *Laboratório de Psicologia*, *Análise Psicológica* and

Revista Portuguesa de Psicologia – that are often used to publish this type of work. A couple of studies developed by the authors (one accepted for publication the time this work was being prepared and another currently under preparation that reports two norming studies) were also included in this review.

After a literature review on databases of words and lexicosemantic / affective variables (e.g., Rubin & Friendly, 1986; Wilson, 1988), we identified the following search terms of interest: familiarity [*familiaridade*], frequency [*frequência*], valence [*valência*], emotional valence [*valência emocional*], mental valence [*valência mental*], arousal [*ativação*], dominance [*dominância*], age of acquisition [*idade de aquisição*], concreteness [*concreteza*], imageability [*imageabilidade*], availability [*disponibilidade*], goodness, concept typicality [*tipicidade*] and animacy [*animacidade*]. The following additional terms were also used in the search procedure: word* [*palavra**], Portuguese [*português*], Portuguese tongue [*língua portuguesa*], European Portuguese [*português europeu*], word database [*base de palavras*] and norming study [*estudo normativo*]. The search was conducted with all these terms in Portuguese and in English (see Appendix 1 for the searched keywords, and the results obtained in each source). We only considered studies that comprised EP written words as their basic unit of analysis (instead of text excerpts or spoken words, for example), that contained lexicosemantic / affective norming data, and that were published since 2000. As language has been changing with the introduction of new concepts (e.g., *mouse* can now mean both a rat or a computer device; Rodd et al., 2012), norming studies need to be time-adjusted (Comesaña et al., 2014). Thus, this time-period criterion was settled to present an up-to-date review of the existing databases that could be currently of use to other researchers. The search strategy used is presented in Figure 1.

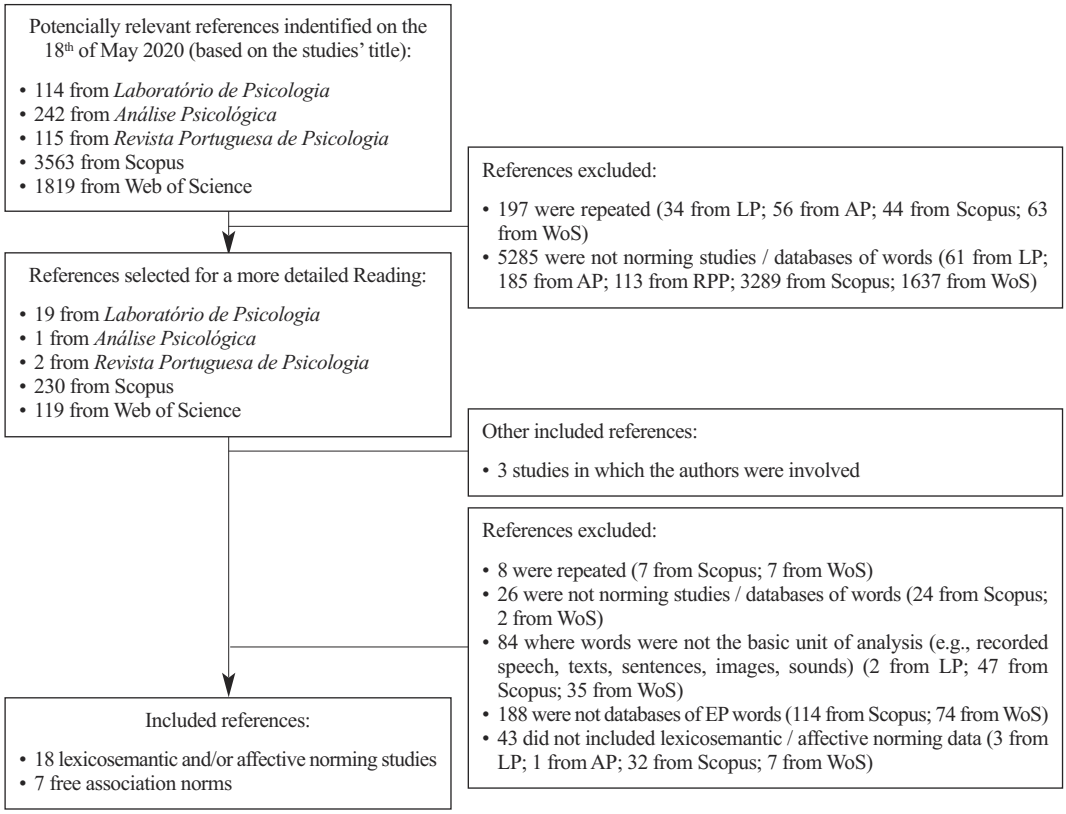

Figure 1. Flow diagram of the search methodology and studies selection

Notes. AP – Análise Psicológica; LP – Laboratório de Psicologia; EP – European Portuguese; RPP – Revista Portuguesa de Psicologia; WoS – Web of Science

Results

The results of the present research are summarized in Tables 1 and 2 (see also Appendixes 2 and 3 for more details), organized by alphabetical order of the first author's surname. We found 25 studies that met our inclusion criteria. Of those, 18 refer to norming studies on lexicosemantic and affective characteristics and seven on free association norms for EP words. These databases include different categories of words, such as nouns (in most studies), adjectives, verbs, and / or adverbs. All the considered databases were accompanied by supplemental materials and / or appendixes containing the norming information and are freely available.

Table 1

Summary of studies reporting data on lexicosemantic and / or affective variables for European Portuguese words

Citation [Database name]	*N* (Words)	*N* (Subjects)	Variables measured
Cameirão & Vicente (2010)[a]	1749	685 undergraduate students	Age of acquisition
Félix et al. (2019)	170	40 undergraduate students	Familiarity Concreteness
Félix et al. (2020)	224	248 adults and young adults	Animacy
Garcia-Marques (2003)	429	256 undergraduate students	Emotional valence Familiarity
Garrido & Prada (2018)[b]	640	230 students	Emotional valence Emotional intensity Familiarity
Garrido et al. (2011)	336	230 students	Emotional valence Spatial content
Garrido et al. (2010)	123	54 students	Emotional valence Political connotation (left-wing / right-wing)
Gaspar (2009)	270	183 undergraduate students	Emotional valence Familiarity
Jerónimo (2003)	284	140 students	Subjective frequency of written words Synonymy
Leitão et al. (2010)	252	214 students	Age of acquisition Familiarity Imageability
Marques (2004)	459	79 + 34 undergraduate students	Familiarity – word's meaning Familiarity – word's referent
Marques (2005)	250	103 undergraduate students	Imagery Concreteness
Marques et al. (2007)	834	110 undergraduate students	Age of acquisition
Pimentel & Albuquerque (2014)	12	90 students	Concreteness Emotional valence Familiarity
Prada & Silva (2008)	400	173 students	Emotional / Affective valence Familiarity
Santi et al. (2015)	280	110 students	Domain typicality Familiarity Superordinate typicality
Soares et al. (2012) **[ANEW]**	1034	958 under- and graduate students	Arousal Dominance Emotional valence
Soares et al. (2017) **[MWP – Minho Word Pool]**	3800	2357 undergraduate students	Imageability Concreteness Subjective frequency

Notes. [a]Cameirão and Vicente (2010) report presenting AoA ratings for 1749 words, although we found that 31 of those words appear twice; [b]Garrido and Prada (2018) present norming data for 320 EP words and 320 English words. See Appendixes 2 and 4 for detailed information on each study.

Table 2

Summary of the studies regarding the free association norms for European Portuguese words

Citation	*N* (Words)	*N* (Subjects)	Variables measured
Carneiro et al. (2004)	16	300 children; 100 undergraduate students	SS First associate RSA IDIO
Carneiro et al. (2011)	790 (79 lists of 10 words each)	526 undergraduate students	Backward associative strength
Comesaña et al. (2014)	139	325 children	SS First associate RSA IDIO Non-responses Distance between the first and the second associate
Félix et al. (2019)	100	70 undergraduate students	SS First associate RSA IDIO
Marques (2002a)	278	129 undergraduate students	SS First associate RSA IDIO Non-responses
Marques et al. (2013a)	200	106 undergraduate students	SS First associate RSA IDIO Non-responses
Valchev et al. (2005)	38	91 undergraduate students	SS First associate RSA

Notes. IDIO=Idiosyncratic responses; RSA=Relative Strength of Association; SS=Set size. See Appendixes 3 and 5 for more detailed information about these studies.

The searched databases comprise, on average, 523.08 words (*SD*=780.45; *Range*: 12 – 3800). The variables covered by these databases, along with the definitions used in each study, are provided in Appendixes 4 and 5. The mean sample size was of 317.64 participants (*SD*=475.45; *Range*: 40 – 2357). Twenty-two studies used samples only of university students, one also included non-university adults (Félix et al., 2020), another also included children (Carneiro et al., 2004), and one collected data only from children (Comesaña et al., 2014).

We also created a database containing all the scores reported in the studies, comprising a total of 5346 words[2]. This database is available in our Open Science Framework project (https://osf.io/9ta3y/). In some of the referenced works, the authors provided their collected information along with information on other variables that was extracted from other studies. For example, Cameirão and Vicente (2010) collected new data on age of acquisition but also presented data on the variables of familiarity, imageability, concreteness, frequency, grammatical class, length, orthographic and phonological neighbors that were retrieved from other studies. In our database we only present the new information provided by each study.

We start by describing the data gathered from the 18 norming studies on lexicosemantic and affective variables. For most variables, words that are included provide assessments that range from the lower to the upper values of the rating scales. Also, 11.3% of the words have data

[2] Words in our database are spelled according to the latest Portuguese spelling agreement (*Acordo Ortográfico*). For this reason, some of the words will differ between our database and their original database, although they correspond to the same word (e.g., *arquitecto* vs. *arquiteto*).

available for only one variable and each word was rated in just one study. For most of the words (87.5%), norming data for two or more variables is available (1.2% of the words contain information only of free-association norms or typicality). Within this last group, 89.9% of words (representing 78.7% of the total words from the overall database here presented) contain data collected from different studies; however, for roughly a quarter of those words (22.9%; 20.1% of the total words), data on the same variable were collected in various studies[3]. These results not only reveal that most of the ever-rated EP words are characterized on different lexicosemantic and / or affective variables, but also that these data are repeated (or "duplicated") among studies.

Most norming studies conducted in Portugal collected data on familiarity (nine studies[4]) and on emotional valence (eight studies). However, as the norming studies on familiarity considered a relatively small number of words, we only have information on this variable for about 27.7%[5] of all words; differently, about 41.8% of all words have been rated for emotional valence. Information on concreteness, subjective frequency and imageability is available for about 73.0% of all the rated words; these are the variables best represented in the presented database, largely due to the high number of words rated in Soares and collaborators' work (2017).

In order to explore communalities in the ratings obtained for the same word and variable between / among studies, we calculated Pearson correlations; these are presented in Appendix 6. Some of the obtained correlations included a small number of items; we opted to present only the correlations that included at least 15 data points (Bonett & Wright, 2000) which provide more reliable information.

High and significant correlations between ratings of the same variable were obtained across studies ($.707<|r|<.996$). For example, the correlations among the three studies providing concreteness ratings varied between .938 and .968, and for AoA between .884 and .943. One exception can be found for the variable of familiarity ($.032<|r|<.957$) where the disparate results were mostly due to the adoption of different scales and concepts across studies[6]. Overall, the results revealed consistency on the normative data collected over the last 20 years in different studies.

An inspection of the relations between variables that have been described in the literature provides another form of validation of the presented data. Although an in-depth consideration of these relations is out of the scope of this work, we describe a few potentially interesting results. Statistically significant moderate to high correlations were obtained between concreteness and imageability ratings ($.680<r<.960$), as expected according to Paivio and coworkers (1968). The values for familiarity and subjective frequency were also moderately correlated (average of the absolute values of the various correlations=.627) in agreement with the results obtained by Balota et al. (2001). Significant moderate and negative correlations were found between AoA and

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[3] The familiarity data from Marques (2004) and the typicality data from Santi et al. (2015) were not included in this analysis. In case they were included, the proportion of "repeated" norming data here reported would become inflated, as these studies report different norming data for a single variable (familiarity with the referent and the meaning, and superordinate and domain typicality, respectively). If those studies were included, 10.9% of words would contain norming data on just one experiential variable, while 87.9% would contain data on two or more variables (the remaining 1.2% of the words contain only data on free association norms); from the last group, 28.4% of the words would have data on a given variable from different studies.

[4] Data on familiarity from Santi et al. (2015) are not available.

[5] If the familiarity ratings obtained from Marques (2004) were also considered, then 33.5% of the overall words included in the present database would contain familiarity norming scores.

[6] Negative and low correlations were obtained between the variable *familiarity with the meaning* from Marques (2004) and other familiarity values ($-.540<r<.957$). These results might be due (at least partially) to the inverse rating scale used in that study (see Appendixes 2, 4 and 6), although the high correlation absolute values suggest that the familiarity concept used across studies might be tapping into a similar feature.

imageability (-.859<*r*<-.572), a relation that has been reported in the literature (Brown, 1957). In sum, the confirmation of these relations suggests that one can reliably use the present data.

Regarding the free association indexes, Appendix 7 reports the correlations obtained among studies. Again, only correlations that included a minimum of 15 datapoints are reported. The idiosyncratic responses index varied between studies, revealing the heterogeneity among people when generating a single associate. Not surprisingly, moderate negative and significant correlations (-.420<*r*<-.779) were obtained between the relative strength of association (of the first associate) and set size; this is because RSA is a quotient containing SS in the denominator (thus, the higher the SS, the lower RSA is).

Discussion

This study provides an overview of the norming studies of EP words published in the last 20 years. These include both lexicosemantic and affective norming data of words (e.g., familiarity, animacy and arousal) as well as free association norms of words. We also provide a brief definition of the variables for which data are presented along with information on the corresponding studies.

Our search revealed the existence of 25 norming studies that, on average, provide information for a reasonable number of words. The obtained results not only reveal that information on several experiential variables is available for most of the EP rated words, but also that data are frequently spread across different databases (68.1% of times). This dispersal of information comes as at a cost to researchers who have to spend more time searching for databases and aggregating dispersed information. In addition, data collected on the same variable are sometimes (for 20.2% of the words) repeated or duplicated, as they were collected in different studies. Although replication studies are needed (e.g., to update the norming data of a language in permanent change; Comesaña et al., 2014), it might also correspond to an unnecessary duplication of work and a waste of researchers' time and resources in collecting data that are already available; the high correlation values here reported among the data obtained for the same variable in different studies (at least for some of the variables) support this idea. For all these reasons, the aim of presenting a single database that brings together the norming data for European Portuguese words made available in the last 20 years, is more than justified.

Although these norming studies cover a variety of dimensions, other word variables of potential interest can be found in the literature that still lack research in our language. Some examples of that are: *goodness, meaningfulness* (Rubin & Friendly, 1986)*, pleasantness* (Clark & Paivio, 2004), *gender association / ladenness* (Scott et al., 2019), *number of senses / meanings* (Miller, 1995), *sensory experience* (Juhasz & Yap, 2013), and *body-object interaction* (Pexman et al., 2019). For more information on these variables, see the cited studies.

Regarding the available data here reported, some disparity seems to exist in the way some of the variables were defined and how they were measured; this somehow mimics the state of the international literature. For example, there are various operationalizations of *subjective frequency* and different conceptions on how it differs from *familiarity*. In some studies, these two terms are used interchangeably (e.g., Garcia-Marques, 2003; Jerónimo, 2003). However, the instructions given to the participants direct them to a familiarity or a subjective frequency judgement. Although familiarity and subjective frequency are related variables (see Appendix 6), Balota et al. (2001) argue that subjective frequency may be a better estimate of the subjective exposure to a word than familiarity; this relates to the fact that some of the instructions used to assess familiarity seem to be vague, allowing participants to support their familiarity ratings on other variables or aspects.

Two other concepts that have raised debate are those of pleasantness and emotional valence. Although they have been used, to some extent, indiscriminately in the literature (Whissell, 2008), they might appeal to different meanings. According to Scott and colleagues (2019) emotional valence corresponds to a measure of value where items rated as more positive are thought to be good, whereas those rated more negatively are considered to be bad. On the other hand, pleasantness seems to refer more to the feelings of the rater regarding the word's connotation (Gelin et al., 2017). More recently, based on a set of factorial analysis, Brysbaert and coworkers (2019), have argued that pleasantness and emotional valence seem to belong to the same factor, under a larger umbrella called *valence*. In our search we found a set of studies reporting both emotional valence and a broader measure of emotionality.

As denoted in Appendixes 2 and 4, across studies that report information on a given variable, different conceptions and operationalization of that variable, as well as methods and scales have been used. We caution the reader to take these elements into consideration.

We should also note that we only report the studies obtained from our literature search strategy which misses unpublished studies (e.g., data reported in Master or PhD unpublished thesis) and studies published prior to year 2000. For example, there is an unpublished study on free association norms by Albuquerque (2010) that is frequently referenced in publications that have used it (this study is available upon request to the author). In that work, a total of 1264 students provided free association norms for a set of 489 words (including nouns and adjectives). In that study, participants were asked to write down the first word that came to their minds when presented with the cue-word.

The EP studies on free association norms of words contain a low number of words each, as compared to studies such as the South Florida Free Association Norms (Nelson et al., 1998). Although free association research has slowed down through the years, it remains an interesting field of research, as it is considered by many to be a way of accessing semantic memory. As words are versatile stimuli, used in several research domains (e.g., neuropsychology, social perception), it is important to control for the semantic relatedness of words when selecting them for research experiments, as it can bias some results (e.g., memory recall; Buchanan et al., 2006).

We should also acknowledge the existence of other EP word databases that cover word variables that were not of interest to the present work or that did not show up in our search. Examples are the PORLEX (Gomes & Castro, 2003), P-PAL (Soares, Iriarte, et al., 2014), SUBTLEX (Soares et al., 2015), ESCOLEX (Soares, Medeiros, et al., 2014), the corpora from the Centro de Linguística da Universidade de Lisboa (CLUL, 2019) – including CORLEX (Nascimento, 2003) –, or the *Corpus do Português* (Davies, 2012). Studies containing norming data for stimuli other than written words were also excluded from our review. Thus, for example, we did not include the Domingos and Garcia-Marques's study (2008) which provided norming data for nonwords, or the Soares and colleagues' work (2013) with norming data for sounds.

It is interesting to note that the studies reported in the present work collected their normative data mostly with young adults. Only a couple of studies on free association norms included younger samples. While this is understandable, as most research that will benefit from these norms will most likely be conducted with these age groups, the growing interest in other age groups (namely older adults) could lead to the development of normative studies with those specific groups. While one might think that the assessment of some word variables could be relatively stable across the life span, others could vary. For example, the words *acácia* [acacia], *traineira* [trawler], or *alpendre* [porch] which were rated as not very familiar by the young adults would probably be more familiar to older adults (Garcia-Marques, 2003; Marques, 2004). Also, Duarte et al. (2007) reported a significant interaction between age (young *vs.* older adults) and animacy (animate *vs.* inanimate words) in a familiarity rating task. Post-hoc analysis revealed that animates received significantly higher scores of familiarity than inanimates only in the older adults group; for the younger adults groups, the difference was non-significant. There are also age differences

reported in the literature on other variables. For example, older people seem to rate negative stimuli as more arousing than young participants; on the other hand, they seem to rate positive stimuli as less arousing than young people (Fairfield et al., 2017).

Finally, with this study, we make available a database that congregates the information from the various Portuguese norming studies on the word variables here considered. We hope this resource will be of use to other researchers needing to select stimuli for their studies.

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Appendix 1

Search method

Source	Keywords	Results	Included
Laboratório de Psicologia	familiaridade; familiarity; familiarity AND word; frequência; frequency; valência; valence; valência emocional; emotional valence; valência mental; mental valence; a(c)tivação; arousal; dominância; dominance; idade de aquisição; age of acquisition; concreteza; concreteness; imageabilidade; imageability; imagética; imagery; disponibilidade; availability; animacidade; animacy; tipicidade; (concept) typicality; contextual diversity; diversidade de contexto; diversidade contextual; palavra*; word; português; Portuguese; língua portuguesa; portuguesa, Portuguese tongue; português europeu; European Portuguese; base de palavras; word database; estudo normativo; norming study; normas	114	14
Análise Psicológica	Idem	242	0
Revista Portuguesa de Psicologia	Idem (FILTER: RANGE: 2000-2019 – last year of publications available)	115	2
Scopus	familiaridade; familiarity AND word AND portuguese; frequência; frequency AND word AND portuguese; valence AND word AND Portuguese; "valência emocional"; "emotional valence" AND word AND portuguese; "valência mental"; "mental valence" AND word AND portuguese; arousal AND word AND portuguese; dominância; dominance AND word AND portuguese; "idade de aquisição"; "age of acquisition"; concreteza; concreteness AND word AND portuguese; imageabilidade; imageability AND word AND portuguese; imagética; imagery AND word AND portuguese; disponibilidade; availability AND word AND portuguese; animacidade; animacy AND word AND portuguese; "contextual diversity"; "diversidade contextual"; "diversidade de contextos"; "concept typicality" AND portuguese; palavra; "european portuguese"; "base de palavras"; "word database" AND portuguese; "estudo normativo"; "norming study"; normas AND portuguese; goodness AND european Portuguese (FILTER: Article title, abstract and keywords; YEAR RANGE: 2000-2020)	3563	6
Web of Science	Idem (FILTER: Topic – Article title, abstract, keywords and Keywords Plus; RANGE: 2000-2020)	1819	0
Authors	–	–	3

Note. The key words separated by ";" represent a new search.

Appendix 2

Extended information of studies reporting data on lexicosemantic and / or affective variables for European Portuguese words

Citation [Database name]	*N* (Words)	Type of words	*N* (Subjects)	*N* (ratings per word)	Participants' age: *M* (Age range or *SD*)	Variables	Measurement scales	Comments / Observations	Data availability
Cameirão & Vicente (2010)[a]	1749	1008 nouns, 373 verbs, 332 adjectives, 36 adverbs	685 undergraduate students (Males=21%)	*M*=48 (range: 40-50)	20.5 (2.4)	– Age of acquisition (Data extracted from other studies regarding the following variables are also included: Familiarity, Imageability, Concreteness, Frequency, Grammatical class, Length Orthographic neighbors, Phonological neighbors)	9-point scale "The points of the scale correspond to the ages (in years): 2; 3; 4; 5; 6; 7-8; 9-10; 11-12; +13" (p. 475)	– 106 words in common with Marques et al. (2007); *r*=.944	doi: 10.3758/BRM.42.2.47
Félix et al. (2019) [Study 1]	170	137 nouns, 31 adjectives, 2 verbs	40 undergraduate students (Males=40%)	*M*=20 (range: 18-20)	21.5 (2.7)	– Familiarity – Concreteness	7-point scale 1=*unfamiliar / very abstract;* 7=*very familiar / very concrete*	–	Data available by request to to the corresponding author: [sara.felix@ua.pt

Appendix 2 (cont.)

Citation [Database name]	*N* (Words)	Type of words	*N* (Subjects)	*N* (ratings per word)	Participants' age: *M* (Age range or *SD*)	Variables	Measurement scales	Comments / Observations	Data availability
Félix et al. (2020)	224	Concrete nouns	248 adults and young adults (Males=21%)	*M*=125 (range: 97-148)	33.3 (14.1)	– Animacy	7-point scale 1=*totally nonliving, inanimate*; 7=*totally living, animate*	– Words retrieved from Cameirão and Vicente (2010); Marques et al. (2007), and Soares et al. (2012, 2017)	Available at http://evo.psych.purdue.edu/data/ and in the appendix of the article
Garcia-Marques (2003)	429	213 concrete nouns, 216 abstract nouns and adjectives	256 under-graduate students	32 ratings (per word, for each variable)	*	– Emotional valence – Familiarity (Data extracted from other studies regarding Concreteness – concrete and abstract words – are also included)	7-point scales 1=*negative / slightly familiar*; 7=*positive / very familiar*	– Words are divided into two categories: concrete and abstract words; However, there was no data collection on the concreteness dimension	Table 1 of the article
Garrido & Prada (2018)	640	380 nouns and 260 adjectives (320 EP and 320 English words)	230 students (Males=19%)	(range: 26-32)	23.5 (6.9)	– Emotional valence – Emotional intensity – Familiarity	7-point scales 1=*very negative / not very intense / not very familiar*; 7=*very positive / very intense / very familiar*	– Participants were bilinguals: EP native speakers, also fluent in English (self-reported)	Authors' OSF Project (https://osf.io/jzy42/)
Garrido et al. (2011)	336	282 nouns, 28 adjectives, 16 verbs, and 10 words that can be both nouns and adjectives	230 students (Males=20%)	<30 ratings (per word, for each variable)	24.8 (7.5; range: 17-63)	– Emotional valence – Spatial content	7-point scales 1=*negative / down*; 7=*positive / up*	–	Tables 1 to 4 of the article
Garrido et al. (2010)	123	117 nouns, 2 adjectives, and 4 words that can be both nouns and adjectives	54 students (Males=22%)	$M_{Political}$=51.8 (range: 49-53); $M_{Valence}$=42.4 (range: 39-44)	24.2 (6.7)	– Emotional valence – Political connotation (left-wing / right-wing)	7-point scales 1=*negative / left wing*; 7=*positive / right wing*	– Words related with politics	Tables 1 to 3 of the article
Gaspar (2009)	270	277 nouns, 38 adjectives, and 5 words that can be both nouns and adjectives	183 under-graduate students (Males=13%)	$M_{Valence}$=84.5 (range: 80-89 ratings); $M_{Familiarity}$=82.0 (range: 79-85)	19.7 (1.9)	– Emotional valence – Familiarity	7-point scales 1=*very unpleasant / not familiar*; 7=*very pleasant / very familiar*	– Words extracted from PORLEX (Gomes, 2001; Gomes & Castro, 2003)	Tables 1 to 2 of the article

Appendix 2 (cont.)

Citation [Database name]	*N* (Words)	Type of words	*N* (Subjects)	*N* (ratings per word)	Participants' age: *M* (Age range or *SD*)	Variables	Measurement scales	Comments / Observations	Data availability
Jerónimo (2003)	284	Adjectives (almost all)	140 students	N/A (the article each word was r ated by 70 participants)	*	– Subjective frequency of written words – Synonymy	7-point scales 1=*never encountered this word in my life / these two words have completely different meanings;* 7=*encountered this word several times a day / these two words have exactly the same meaning*	– Words related to four personality traits – 111 words extracted from Garrido's (2001) and Jerónimo's (2001) Master thesis, as cited in Jerónimo (2003)	Appendix of the article
Leitão et al. (2010)	252	Nouns *Words from different categories*: Living (32 animals, 22 fruits, 28 vegetables); Non-living (24 instruments, 20 transports, 26 clothes, 16 other); 26 Human agents/Jobs; 33 Events; 25 States or Psychological attributes	214 students (Males=50%)	(range: 35-37)	24.4 (range: 18-42)	– Age of acquisition – Familiarity – Imageability (Data extracted from other studies regarding the following variables are also included: Frequency, Length (long/short word)	Familiarity and Imageability: 7-point scales 1=*never used the word / low imageability;* 7=*very frequent use of the word / high imageability* Age of acquisition: Participants had an empty field to write at which age they learnt each word (then, their responses were converted to a 7-point scale, composed of age intervals)	– Frequency data extracted from CORLEX (Nascimento, 2003) – Correlation with Marques's (2004, 2005; Marques et al., 2007) data	Appendix of the article
Marques (2004)	459	320 concrete nouns (rated by the 1st sample) and 139 concrete and abstract nouns (plus 80 words already rated by the 1st sample were rated by the 2nd sample)	(2 samples were tested) 1st sample: 79 undergraduate students (Males=23%); 2nd sample: 34 undergraduate students (Males=21%)	N/A	1st sample: *M*=18.3; 2nd sample: *M*=18.6	– Familiarity (regarding the word's meaning and referent) (Note: Not all words were rated in both these measures)	5-point scale 1=*very familiar*; 5=*not familiar*	– Inverse scale (higher scores reveal ower familiarity rates) – Familiarity ratings regarding the word's meaning and referent (Larochelle & Saumier, 1993)	Appendix of the article

Appendix 2 (cont.)

Citation [Database name]	*N* (Words)	Type of words	*N* (Subjects)	*N* (ratings per word)	Participants' age: *M* (Age range or *SD*)	Variables	Measurement scales	Comments / Observations	Data availability
Marques (2005)	250	Nouns	103 under-graduate students (Males=19%)	N/A (the article implies that each word received imagery and concreteness ratings by 53 and 50 participants, respectively)	19.2	– Imagery – Concreteness	7-point scales 1=*high abstractness / low imageability*; 7=*high concreteness / high imageability*	–	Appendix of the article
Marques et al. (2007)	834	Nouns	110 under-graduate students (Males=13%)	*M*=22 (range: 21-23)	18.5 (range: 17-26)	– Age of acquisition (Data extracted from other studies regarding the following variables are also included: Imageability, Familiarity, Frequency, Concreteness)	7-point scale (+1 point); The points of the AoA scale correspond to the ages (in years): 0-2; 3-4; 5-6; 7-8; 9-10; 11-12; +13; I don't know the word	– Words selected from Marques (1997, 2004) – Correlation with AoA obtained in foreign studies	doi: 10.3758/BF03193013
Pimentel & Albuquerque (2014)	12	Nouns (almost all)	90 students (Males=27%)	N/A (the article implies that all participants provided ratings of all variables for all words)	21.9 (4.7; range: 18-38)	– Concreteness – Emotional valence – Familiarity	7-point scales 1=*high abstractness / negative / low familiarity;* 7=*high concreteness / positive / high familiarity*	– 12 critical items of semantically associated word lists (DRM paradigm)	Tables 1 to 3 of the article
Prada & Silva (2008)	400	Adjectives	173 students (Males=17%)	N/A	28.9 (3.9; range: 17-51)	– Emotional / Affective valence – Familiarity	7-point scales 1=*negative / not familiar*; 7=*positive / very familiar*	–	Table 1 of the article
Santi et al. (2015) [Study 1]	280	Nouns	110 students (Males=25%)	N/A	3 rating groups – Domain typicality (*n*=24): *M*=19.4; – Familiarity (*n*=29): *M*=18.7; – Super-ordinate tipicality (*n*=57): *M*=19.9	– Domain typicality – Familiarity – Superordinate typicality	7-point rating scales 1=*very good exemplar / item never perceived* or *produced;* 7=*very bad exemplar / item perceived or produced very frequently*	The word "cavalo" [horse] appears twice, in different categories.	Appendix A of the article

Appendix 2 (cont.)

Citation [Database name]	*N* (Words)	Type of words	*N* (Subjects)	*N* (ratings per word)	Participants' age: *M* (Age range or *SD*)	Variables	Measurement scales	Comments / Observations	Data availability
Soares et al. (2012) **[ANEW]**	1034	Nouns, verbs, adjectives, adverb, interjection	958 under-graduate and graduate students (Males=65%)	N/A	22.82 (5.41)	– Arousal – Dominance – Emotional valence (Data extracted from other studies regarding the following variables are also included: Frequency and Orthographic neighbors)	9-point SAM scales 1=*calm / in control / unpleasant*; 9=*excited / out of control pleasant*	–	doi: 10.3758/s13428-011-0131-7
Soares et al. (2017) **[MWP – Minho Word Pool]**	3800	Nouns, adjectives, adverbs, verbs	2357 under-graduate students (Males=36%)	$M_{Imageability}$ =60.8 (range: 35-68); $M_{Concreteness}$ =57.0 (range: 32-62); $M_{Frequency}$ =56.7 (range: 42-77)	22.4 (5.0)	– Imageability – Concreteness – Subjective frequency (Data extracted from other studies regarding the following variables are also included: Part of speech / morpho-syntactic information, Objective frequency, Orthographic neighborhood and Orthographic Levenshtein distance)	7-point scales 1=*low imageability / low concreteness / never encountered that word*; 7=*high imageability / high concreteness / encountered that word several times a day* – Correlation with norming data obtained in other studies (e.g., Balota et al., 2001; Marques, 2005)	– Words retrieved from P-PAL (Soares, Iriarte et al., 2014)	doi: 10.3758/s13428-016-0767-4

Notes. *M*=Mean; *n*=Number of participants in each rating group; *N*=Number of… (words, subjects, ratings per word); N/A=Not available; *SD*=Standard Deviation. [a]Cameirão and Vicente (2010) report presenting AoA ratings for 1749 words, although we found that 31 of those words appear twice. *The authors did not specify the age of their participants. However, in all of the cases, participants were described as being university students.

Appendix 3

Extended information of the studies reporting free association norms for European Portuguese words

Citation	*N* (Words)	*N* (ratings per word)	Type of words	*N* (Subjects)	Participants' age: *M* (Age range or *SD*)	Variables measured	Instructions	Comments	Data availability
Carneiro et al. (2004)	16	N/A	Nouns	300 children; 100 in each age group (Males=43%); 100 under-graduate students (M=48%)	4 age-groups of participants: 3-4 YO (*M*=3.5; *SD*=0.5); 7-8 YO (*M*=7.5; *SD*=0.5); 11-12 YO (*M*=11.6; *SD*=0.5); Undergraduates (*M*=24; range: 18-38)	– Set size – First associate – RSA – IDIO	Say, or write, 3 words related with the presented cue-word	–	Appendix of the article

Appendix 3 (cont.)

Citation	*N* (Words)	*N* (ratings per word)	Type of words	*N* (Subjects)	Participants' age: *M* (Age range or *SD*)	Variables measured	Instructions	Comments	Data availability
Carneiro et al. (2011)	790 (79 lists of words, of 10 words each)	(Range: 98-108)	Nouns and adjectives	526 undergraduate students (Males=15%)	26.0	– Backward associative strength	– The 79 lists of words were presented and participants were asked to retrieve the critical item (backward association)	– Words retrieved from Albuquerque (2010)	Table 1 of the article
Comesaña et al. (2014)	139	N/A	Nouns (almost all; some can also be adjectives)	325 children (Males=48%)	3 age-groups of participants: 7-8 YO (*M*=8.1; *SD*=0.3); 9-10 YO (*M*=10.2; *SD*=0.4); 11-12 YO (*M*=12.0; *SD*=0.1)	– Set size – First associate – RSA – IDIO – Non-responses – Distance between the first and the second associate	After reading the cue-word, participants wrote the first word that came to their minds	–	doi: 10.3758/s13428-013-0388-0
Félix et al. (2019) [Study 2]	100	*M*=68.2 (range: 63.70)	Nouns and adjectives	70 undergraduate students (Males=50%)	21.0 (2.2)	– Set size – First associate – RSA – IDIO	After reading the cue-word, participants wrote the first word that came to their minds, related to the cue-word	– The rated words include concrete, abstract and emotional words, varying also on emotional valence (positive, negative, and neutral)	Data available by request to the corresponding author: [sara.felix@ua.pt
Marques (2002a)	278[#]	(Range: 120-125)	Nouns (almost all)	129 undergraduate students (Males=15%)	18.0	– Set size – First associate – RSA – IDIO – Non-responses	After reading the cue-word, participants wrote the first word that came to their minds	–	(Marques, 2002b)
Marques et al. (2013a)	200	N/A	Nouns (almost all)	106 undergraduate students (Males=15%)	19.5	– Set size – First associate – RSA – IDIO – Non-responses	After reading the cue-word, participants wrote the first word that came to their minds	– The rated words vary in terms of concreteness	(Marques et al., 2013b)
Valchev et al. (2005)	38	N/A	Nouns	91 undergraduate students	*	– Set size – First associate – RSA	After reading the cue-word, partici-pants wrote the six first words that came to their minds	–	Appendix of the article

Notes. *M*=Mean; *N*=Number of… (words, subjects, ratings per word); N/A=Not available; *SD*=Standard Deviation; YO=Years old; IDIO=Idiosyncratic responses; RSA=Relative strength of association. [#]Although the author describes having collected data for 302 words, we only find information for 278 on the corresponding available datafile. [*]The author did not specify the age of the participants but described them as being university students.

Appendix 4

Definitions of the lexicosemantic and affective variables found and databases that report related data

Variable	Description	Databases citation
Age of acquisition (AoA)	Can be broadly defined as the "age at which words are acquired" or learnt (Marques et al., 2007, p. 439). This definition is valid even if one could not use, write or read the word at the indicated age (Leitão et al., 2010). Although different AoA assessment scales were used across studies, they all adopted this definition. Only two studies allowed participants to state that they did not know the word (Leitão et al., 2010; Marques et al., 2007). To date, all Portuguese studies have presented *subjective AoA* ratings, that is, adult estimates of the age of acquisition of words[1].	– Cameirão & Vicente (2010); – Leitão et al. (2010); – Marques et al. (2007)
Animacy	Animacy refers to the characteristic of a living being. All things can be rated between being *totally living* (animate) and *totally nonliving* (inanimate) entities (Félix et al., 2020; Nairne et al., 2013). Some words are ambiguous in terms of animacy (e.g., plants and body parts).	– Félix et al. (2020)
Arousal	"The degree of excitement or activation a subject can feel towards a given stimulus, varying from *calm* to *exciting*" (Soares et al., 2012, p. 257).	– Soares et al. (2012)
Concreteness	"The degree to which words refer to objects, persons, places, or things that can be experienced by the senses" (Soares et al., 2017, p. 1066). Such variable varies from *low concreteness* (or *high abstractness*) to *high concreteness*. All studies adopted this definition of concreteness[2].	– Félix et al. (2019); – Marques (2005); – Pimentel & Albuquerque (2014); – Soares et al. (2017)
Dominance	"The degree of control a subject feels over a specific stimulus, varying from *in control* to *out of control*" (Soares et al., 2012, p. 257).	– Soares et al. (2012)
Emotional intensity (Emotionality)	Is defined as the emotional content conveyed by a stimulus, varying from *not very intense* to *very intense*. Emotional intensity differs from emotional valence. For example, two words may share a high emotional intensity level while being of opposite valence (e.g., love and death; Garrido & Prada, 2018).	– Garrido & Prada (2018)
Emotional valence	Refers to the subjective emotional or affective ratings towards a word. Garrido and Prada (2018), and Gaspar (2009) focus on the participants' feelings towards a specific word; however, whereas the scale used by Garrido and Prada ranged from *very negative* to *very positive*, the one used by Gaspar varied from *very unpleasant* to *very pleasant*. Also, in Soares and coworkers (2012), participants' assessments of the words varied from *unpleasant* to *pleasant*. Other authors define emotional valence as the subjective rating of how *positive* or *negative* a word's meaning may be (Garcia-Marques, 2003; Garrido et al., 2010, 2011; Pimentel & Albuquerque, 2014; Prada & Silva, 2008).	– Garcia-Marques (2003); – Garrido et al. (2010, 2011); – Garrido & Prada (2018); – Gaspar (2009); – Pimentel & Albuquerque (2014); – Prada & Silva (2008); – Soares et al. (2012)
Familiarity	Familiarity is an estimation of how frequently a person meets a specific word in reading, speaking and listening, varying from *not very familiar* to *very familiar* (Félix et al., 2019, 2020; Garrido & Prada, 2018; Leitão et al., 2010; Nairne et al., 2013; Prada & Silva, 2008). According to Gaspar (2009), a word is considered familiar if one knows its meaning. In Marques (2004), two measures of familiarity were used: one regarding the word's meaning and the other regarding its referent (as proposed by Larochelle & Saumier, 1993)[3].	– Félix et al. (2019); – Garcia-Marques (2003); – Garrido & Prada (2018); – Gaspar (2009); – Leitão et al. (2010); – Marques (2004); – Pimentel & Albuquerque (2014); – Prada & Silva (2008); – Santi et al. (2015)
Imageability	Can be defined as "the ease and speed with which a word evokes a mental image" (Soares et al., 2017, p. 1066), a mental sound (Leitão et al., 2010), or other mental representation of a sensorial experience (Marques, 2005). Words can be rated between *low* to *high-imageability*.	– Leitão et al. (2010); – Marques (2005); – Soares et al. (2017)
Political connotation	Consists on the word classification in terms of its political connotation, ranging from the *left* –to the *right-wing* (Garrido et al., 2010).	– Garrido et al. (2010)
Spatial content	Refers to the spatial representation of a word, ranging from *down* to *up*. For example, the word *basement* would receive a rating of *down*, while *attic* would be rated more as *up*. Also, some mood expressions (e.g., *feeling down*) seem to possess spatial content, which relates this variable with emotional valence (Garrido et al., 2011).	– Garrido et al. (2011)
Subjective frequency	This variable reflects a subjective estimation of how frequently (how many times in a given period of time) individuals meet a word in its written form (Jerónimo, 2003), or written and spoken form (Soares et al., 2017). The latter authors also define subjective frequency as "the degree to which individuals know and use words in their everyday life", ranging from *words never encountered before*, to *words encountered several times a day* (p. 1070)[4].	– Jerónimo (2003); – Soares et al. (2017)
Synonymy	This variable assesses to what extent two words mean the same. This variable ranges between *these two words have completely different meanings* to *these two words have exactly the same meaning* (Jerónimo, 2003).	– Jerónimo (2003)

Appendix 4 (cont.)

Variable	Description	Databases citation
Typicality	Santi et al. (2015) collected data for superordinate typicality, and domain typicality. Those are defined as how well a word represents a given category (superordinate typicality; examples of categories: birds, music instruments) or a more general domain (examples of domains: living and nonliving things; domain typicality). For example, to represent the category of "birds", an eagle is a better example than a penguin).	– Santi et al. (2015)

Notes. [1]Objective AoA ratings are obtained through children performance in naming tasks; [2]In Garcia-Marques (2003) words were divided into concrete and abstract words. However, no data were actually collected and / or presented on this dimension; [3]In Marques (2004), participants performed one of two rating tasks: They were presented a list of words, and were asked to rate how familiar they would be with each word (or how easily they would recognize the word) if they were presented with (1) a definition of that word (or, its meaning), or (2) a picture of it (that is, its referent; for example, if a word is rated with a low familiarity to the referent value, that means that it is very difficult to identify that word's concept through a picture); [4]Written / Objective frequency measures are also available for EP words. This variable expresses the frequency of a word in a given corpora / database and is usually expressed per million words. Objective frequency is considered a *distributional variable*; that is why we did not include such variable in this review.

Appendix 5

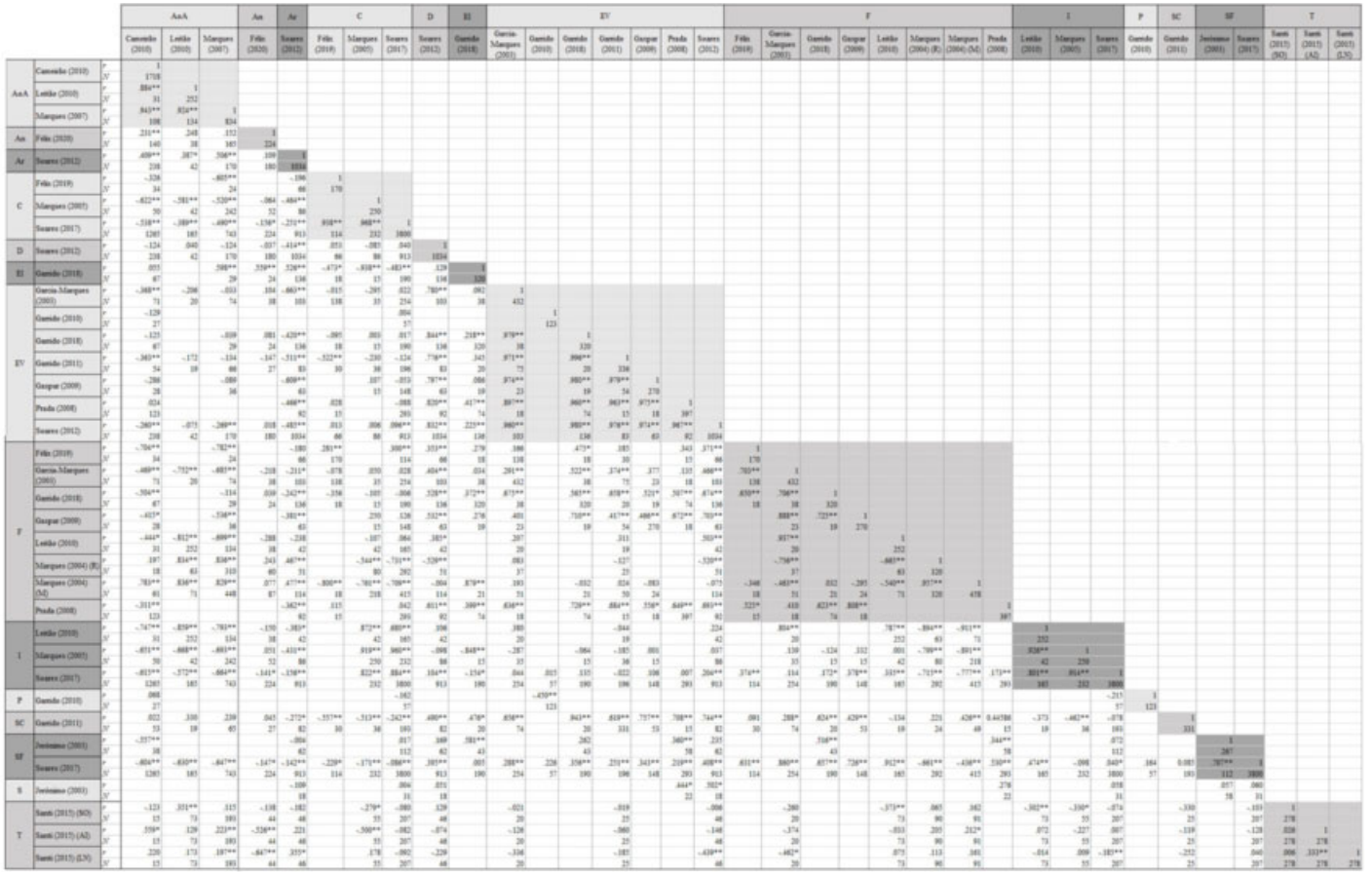
Description of the variables reported in the studies of free association norms

Variable	Description	Databases citation
Set size (SS)	Number of different associates (words) produced for a single cue-word (Marques, 2002a; Nelson et al., 2000).	– Carneiro et al. (2004); – Comesaña et al. (2014); – Félix et al. (2019); – Marques (2002a); – Marques et al. (2013a); – Valchev et al. (2005)
First associate	The associate (target-word) produced by the largest number of participants.	– Carneiro et al. (2004); – Comesaña et al. (2014); – Félix et al. (2019); – Marques (2002a); – Marques et al. (2013a); – Valchev et al. (2005)
Relative strength of association (RSA) (or Forward associative strength)	Proportion of participants who produced the same associate for a single cue-word (Marques, 2002a; Nelson et al., 2000). This is a forward measure, that is, assesses the cue-to-target strength (cf. below, the opposite *backward associative strength*). For example, the RSA for the first associate represents the quotient between the number of participants who produced the first associate and the total responses / associates obtained for a specific cue-word, that is Set size (Nelson et al., 2000). In Félix et al. (2019), RSA was presented as a proportion. The remaining studies presented RSA as a percentage.	– Carneiro et al. (2004); – Comesaña et al. (2014); – Félix et al. (2019); – Marques (2002a); – Marques et al. (2013a); – Valchev et al. (2005)
Distance between the first and the second associates	Corresponds to the difference between the RSA of the first and the second associates (Comesaña et al., 2014).	– Comesaña et al. (2014)
Backward associative strength (BAS)	Can be defined as the probability of a target-word to elicit the cue-word. So, this is a measure of the target-to-cue strength. It is calculated by dividing the number of participants who produced the "cue" word (or the critical item) as a response to the presented "target" word, by the total number of responses / targets (Carneiro et al., 2011; Nelson et al., 1998). In Carneiro et al. (2011), BAS was reported as a percentage.	– Carneiro et al. (2011)
Idiosyncratic responses (IDIO)	Number of generated associates with frequency equal to one (Marques, 2002a; Nelson et al., 2000). In Félix et al. (2019), IDIO was presented as an absolute frequency measure. The remaining studies presented IDIO as a percentage[1].	– Carneiro et al. (2004); – Comesaña et al. (2014); – Félix et al. (2019); – Marques (2002a); – Marques et al. (2013a)
Non-responses	Percentage of non-responses (e.g., omissions, repetitions of the cue-word, blank responses) (Marques, 2002a).	– Marques (2002a); – Marques et al. (2013a)

Note. [1]The comparison between idiosyncratic responses and the first associate, for example, allows the understanding of the strength and the nature of the semantic association between the cue and the target (or the generated associate) words (Marques, 2002a).

Appendix 6

Pearson correlation matrix among the scores obtained for the same words across lexicosemantic and affective norming studies



Notes. Acquisition; An=Animacy; Ar=Arousal; C=Concreteness; D=Dominance; EI=Emotional Intensity; EV=Emotional Valence; F=Familiarity; I=Imageability; P=Political Connotation; SC=Spatial Content; SF=Subjective Frequency; S=Synonymy; T=Typicality; (ST)=Superordinate typicality; (AI) / (LN)=Domain typicality: animate-inanimate / living-nonliving; Marques, 2004 (R) / (M)=Familiarity with the referent / meaning; *r*=Pearson Correlation; *N*=Number of datapoints (words) commonly present in both databases; *Significance level <.05; **Significance level <.01. The empty cells correspond to cases in which the number of words included in the analysis was lower than 15.

Appendix 7

Pearson correlation matrix among the scores obtained for the same words across studies reporting free association norms

			Set Size						Relative Strength of Association (First Associate)					Idiosyncratic Responses				Distance between the 1st and the 2nd associate	Non-Response	Backwards Association Strength
			Carneiro (2004)	Comesaña (2014)	Félix (2019)	Marques (2002)	Marques (2013)	Valchev (2005)	Carneiro (2004)	Comesaña (2014)	Félix (2019)	Marques (2002)	Marques (2013)	Carneiro (2004)	Comesaña (2014)	Marques (2002)	Marques (2013)	Comesaña (2014)	Marques (2013)	Carneiro (2011)
Set Size	Carneiro (2004)	*r*	1																	
		N	16																	
	Comesaña (2014)	*r*	.628**	1																
		N	16	139																
	Marques (2002)	*r*		.624**		1														
		N		25		278														
	Marques (2013)	*r*		0.305			1													
		N		25			199													
Relative Strength of Association (First Associate)	Carneiro (2004)	*r*	-.588*	-.576*					1											
		N	16	16					16											
	Comesaña (2014)	*r*	-.522*	-.779**		-.505**	-.420*		.807**	1										
		N	16	139		25	25		16	139										
	Félix (2019)	*r*			-.707**						1									
		N			100						100									
	Marques (2002)	*r*		-.679**		-.744**				.727**		1								
		N		25		278				25		278								
	Marques (2013)	*r*		-.446*			-.661**			.576**			1							
		N		25			199			25			200							
	Valchev (2005)	*r*						-.425**												
		N						38												
Idiosyncratic Responses	Carneiro (2004)	*r*	.187	.355					-.524*	-.500*				1						
		N	16	16					16	16				16						
	Comesaña (2014)	*r*	.362	.427**		.462*	.090		-.582*	-.565**		-.421*	-.167	.645**	1					
		N	16	139		25	25		16	139		25	25	16	139					
	Félix (2019)	*r*			.935**						-.516**									
		N			100						100									
	Marques (2002)	*r*		.503*		.236**				-.564**		-.348**			.425*	1				
		N		25		278				25		278			25	278				
	Marques (2013)	*r*		.292			.108			-.287			-.566**		.286		1			
		N		25			199			25			200		25		200			
Distance between the 1st and the 2nd associate	Comesaña (2014)	*r*	-.400	-.657**		-.384	-.484*		.792**	.956**		.664**	.605**	-.521*	-.456**	-.474*	-.264	1		
		N	16	139		25	25		16	139		25	25	16	139	25	25	139		
Non-Response	Marques (2002)	*r*		.166		.175**				-.174		-.217**			.183	.290**		-.141		
		N		25		278				25		278			25	278		25		
	Marques (2013)	*r*		-.020			.015			.058			-.146*		.106		.141*	.028	1	
		N		25			199			25			200		25		200	25	200	
Backwards Association Strength	Carneiro (2011)	*r*		.323			.254			-.364			-.138		.257		.230	-.291	.002	1
		N		27			16			27			16		27		16	27	16	79

Notes. *r*=Pearson correlation; *N*=Number of datapoints (words) commonly presented in both databases; *Significance level <.05; **Significance level <.01 The empty cells correspond to cases in which the number of words in the analysis was lower than 15.

Estudos normativos de características lexicossemânticas e afetivas para palavras do Português Europeu: Uma revisão da literatura

Palavras são estímulos amplamente utilizados em trabalhos sobre a cognição e a linguística. Estes estímulos podem variar em diversos aspetos (e.g., lexicosemânticos e afetivos), passíveis de influenciar o desempenho de múltiplas formas, pelo que é essencial selecioná-los cuidadosamente. No entanto, as bases de dados de palavras do Português Europeu ainda são relativamente escassas, estando difundidas em fontes diversas. Assim, os objetivos deste trabalho foram: (1) fornecer uma revisão das bases de dados contendo dados normativos em termos lexicosemânticos, afetivos e de associação livre para palavras do Português Europeu publicadas desde o ano 2000; (2) resumir as definições destas diferentes variáveis; e (3) combinar, numa única base de dados, os dados normativos disponíveis à data. A nossa revisão de literatura identificou 25 bases de dados, 18 delas contendo dados normativos lexicosemânticos e / ou afetivos, e sete contendo normas de associação livre de palavras. Tais bases de dados incluem palavras de várias categorias (e.g., substantivos e adjetivos), caracterizadas em diferentes variáveis (e.g., familiaridade, imageabilidade, valência emocional, idade de aquisição e animacidade). Esta revisão constitui uma ferramenta útil para investigadores que utilizem recursos relacionados com palavras portuguesas. Apresentamos uma revisão minuciosa das bases de dados, incluindo alguns detalhes sobre cada uma. A base de dados combinada está disponível através do Open Science Framework: https://osf.io/9ta3y/.

Palavras-chave: Estudos normativos para palavras, Variáveis lexicossemânticas, Variáveis afetivas, Associação livre, Português Europeu.

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