

Animacy norms for 224 European Portuguese concrete words

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Words are frequently used, for example, as stimuli in cognitive and linguistic research. Considering that there are various psycholinguistic variables known to influence word processing (e.g., frequency, concreteness), it is important to control for those variables. Recently, it has been reported that animacy (the characteristic of being a living/animate or a non-living/inanimate entity) also affects various cognitive and linguistic processes. In fact, animacy has been found to be one of the best predictors of free recall. However, animacy is still an uncontrolled variable in most studies and information about this variable is still, for the most part, absent. In this study, we provide animacy norms for a set of 224 European Portuguese concrete words. Such data should provide Portuguese researchers a helpful tool to start considering this dimension in a systematic way in their research.

Key words: Animacy, Word norms, European Portuguese.

Introduction

Words are stimuli widely used in cognitive and linguistic research. To guarantee the methodological quality of such research one needs to control the word characteristics that are known to affect the processes under scrutiny. Some databases of European Portuguese (EP) words have been developed in recent years covering a wide range of psycholinguistic variables such as imageability, valence, concreteness, age of acquisition and arousal (e.g., Cameirão & Vicente, 2010; Gomes & Castro, 2003; Soares, Comesaña, Pinheiro, Simões, & Frade, 2012; Soares, Costa, Machado, Comesaña, & Oliveira, 2017; Soares et al., 2014). However, none has yet considered animacy, a dimension that is implicated in various aspects of our daily life and is of central importance to our survival; as noted by Opfer and Gelman (2011) “a creature incapable of distinguishing animates from inanimates would be severely impaired” (p. 213). Nairne, VanArsdall and Cogdill (2017) further specified their evolutionary importance by noting that animate entities can be, for example, preys, predators or potential mates.

This work was conducted in the context of the Master’s dissertation by Sara B. Félix and some overlap exists with her thesis. The data here reported were collected from an expanded sample of participants which includes the data reported in Sara’s dissertation.

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In simple terms, animacy is the characteristic of a living being. Indeed, everything that surrounds us can be a living (animate) or a nonliving (inanimate) entity. For example, an animal would be considered a living/animate entity, whereas an object would be considered nonliving/inanimate. Some authors have noted that animacy is not a discrete variable, since entities are not just animate or inanimate but rather vary in a spectrum ranging from totally inanimate to totally animate (Sha et al., 2015). There are also various definitions of animacy; whereas some refer to living/nonliving characteristics, others focus on agency and patterns of movement (Kuzmanovic et al., 2014) or even humanity (Soares, Fraga, Comesaña, & Piñeiro, 2010). Other authors, such as Gelman and Spelke (1981) or Opfer and Gelman (2011), present more complex definitions of animacy pointing to specific cues, such as feature structure, goal-directedness, motion patterns, agency, livingness and biological processes. As Nairne and collaborators (2017) noted in a recent work: “The concept of animacy itself needs some finetuning as well. Although the distinction between living and nonliving things seems simple enough, a number of stimuli fall into a gray area” (p. 26).

In spite of the vagaries surrounding the precise definition of this dimension, it has gained importance more recently in various domains. For example, animates capture faster attention and hold it longer than inanimate items (Bugaiska et al., 2019; Calvillo & Hawkins, 2016; New, Cosmides, & Tooby, 2007; Yang et al., 2012). The animate-inanimate distinction can also be observed early in development (Barrett & Behne, 2005; Mandler & McDonough, 1993) and affects many aspects of cognitive development (e.g., word meanings and classifications, and various forms of reasoning; for an overview of this topic, see Opfer & Gelman, 2011).

People also remember animate items more effectively than inanimate items, a finding described in the memory literature as the animacy effect (Nairne, VanArsdall, Pandeirada, Cogdill, & LeBreton, 2013). Using regression analyses, those authors found that animacy is one of the best predictors of free recall, even when variables well-known to affect memory performance are considered (e.g., concreteness, frequency and imagery). Further empirical data have confirmed the robustness of this effect under various encoding conditions, types of stimuli (e.g., words, pictures and nonwords), and memory tests (e.g., Nairne et al., 2017). Félix, Pandeirada and Nairne (2019) reported that this effect remains significant even 48 hours after encoding, and that it is independent of the intentionality of learning (that is, it occurs in incidental as well as in intentional learning; see also Gelin, Bugaiska, Méot, & Bonin, 2017). Some potential applications of this mnemonic tuning have also recently been noted, such as in the teaching-learning process (Prokop & Fančovičová, 2014), and others await to be explored.

Animacy also plays an important role in linguistics. Researchers have reported the importance of animacy in grammar rules (Soares et al., 2010) and verbal comprehension (Hung & Schumacher, 2014) across various languages (Gennari, Mirković, & Macdonald, 2012). Furthermore, faster decision times have been reported for animates in a task that involves deciding whether a presented word corresponds to a living or to a non-living item (Räling, Hanne, Schröder, Keßler, & Wartenburger, 2017). Hagen and Laeng (2017) have shown that animates have an advantage over artifacts in rapid serial visual presentation tasks.

The animacy variable has also been considered in related literature. Some authors have proposed that living/nonliving (animate/inanimate) categories may be crucial for the structure of semantic memory, that is, to the way our general knowledge is organized. Data from neurological patients support the existence of category-specific deficits for animates and artifacts (Capitani, Laiacona, Mahon, & Caramazza, 2003), and cases of double dissociations in the capacity to name or provide semantic knowledge about these two categories have been reported (Hillis & Caramazza, 1991). There are several accounts for such deficits. For example, some argue for the existence of brain specialization for these categories (e.g., Caramazza & Shelton, 1998), and others focus on multidimensional feature-related factors (e.g., Taylor, Devereux, & Tyler, 2011). Overall, though,

the demonstration that these categories “operate” in different ways is unequivocal. Even the experience of animacy seems to involve specific brain areas commonly involved in social interactions (Santos et al., 2010).

Despite all the relevant domains in which animacy appears to have a great influence, this variable is still uncontrolled, for the most part, in cognitive research (Nairne et al., 2013, 2017). Developing databases that include animacy is therefore of major importance to allow researchers to consider it in their studies. To the best of our knowledge, there is only one unpublished American English animacy norm database collected by VanArsdall (2016). The main aim of his work was to establish the underlying factors of the animacy construct. The author collected ratings for 1200 concrete words using six scales, one per each possible underlying factor of animacy: movement likelihood, ability to reproduce, goal-directedness, ability to think, similarity to a person, and living/nonliving. He reported that many of these underlying constructs help to explain the animacy norms variation, with ability to think (98%), ability to reproduce (89%) and similarity to a person (88%) as the three main variables.

Considering the growing relevance of animacy, and the lack of Portuguese data, the aim of this work was to collect animacy ratings for a set of concrete words from European Portuguese participants. To this end, we adopted the definition of animacy that relies simply on the living/nonliving distinction. This broad definition explains a great part of the animacy ratings variance according to the data reported by VanArsdall (2016). Furthermore, this definition has been used in a variety of other studies (e.g., Bonin, Gelin, Laroche, Méot, & Bugaiska, 2015; Nairne et al., 2017; Popp & Serra, 2018). To this end, using an online questionnaire, participants were asked to rate a set of words on a 7-point animacy scale, ranging from *totally nonliving/inanimate* to *totally living/animate* (labels for the values of 1 and 7, respectively). Finally, considering that some of our words were words also rated in VanArsdall’s study (2016), we present the correlations between our data and those he reported in his study.

Method

Participants

Two hundred and eighty-six participants answered to an online animacy rating survey. From those, 38 were excluded because they were not EP native speakers ($n=3$) or failed the attention check items ($n=35$; five and 30 participants failed the first and the second attention check, respectively); no participants were excluded for giving a “no” answer to the final honesty question (see procedure details below). In total, 248 participants (78.6% female) contributed to the data here reported ($M_{\text{age}}=33.27$; $SD=14.05$; $M_{\text{education years}}=16.53$; $SD=3.74$). Most of the participants were from the academic field (48.0% were students and 26.2% were teachers or researchers). This number of participants ensures a minimum number of 20 ratings per word (a typical measure in similar studies, cf. Clark & Paivio, 2004).

Materials

We started by collecting information from norming studies that contained information on other psycholinguistic variables of relevance. This resulted in an initial set of 406 words that were covered by several European Portuguese word databases (Cameirão & Vicente, 2010; Marques, Fonseca, Morais, & Pinto, 2007; Soares et al., 2012, 2017). Those databases were chosen because they contained a greater number of words than other EP databases and included variables that are

typically controlled for in memory studies on animacy, such as concreteness, age of acquisition and frequency (e.g., Bonin et al., 2015; Nairne et al., 2013; VanArsdall, Nairne, Pandeirada & Cogdill, 2016). From this initial set, we selected 224 concrete words from the Minho Word Pool database (Soares et al., 2017) which were simultaneously present in at least two other databases from the above identified; we considered as concrete all words rated above five on a 7-point concreteness scale on this database. Two researchers then independently pre-classified those words as animate (e.g., animals and professions), inanimate (e.g., manmade objects and vehicles) or ambiguous (e.g., body parts and plants). Based on their classification, the set of 224 words was distributed as follows: 64 animates, 139 inanimates, and 21 ambiguous. These were used in the online rating study to collect animacy ratings. Each participant rated a set of 112 words, ensuring that each participant would always rate the same number of animates ($n=32$), inanimates ($n=70$), and ambiguous ($n=10$) words (this distribution corresponded roughly to the overall distribution of each type in the initial pool of 224 words). The to-be-rated words, as well as their order of presentation, were randomly selected by the program for each participant from the initial pool of 224 words. This method ensured a more diverse mode of presentation of the words and prevented effects of ordering of the stimuli on the collected ratings. As a consequence of this sampling method, words received between 97 and 148 ratings, as presented in Appendix 1, a number that surpasses that usually collected in previous norming studies (e.g., Clark & Paivio, 2004).

Procedure

Participants were contacted in person (students from the University of Aveiro) or via social networks and invited to participate in the online survey. The survey was run using the Limesurvey platform housed at the University of Aveiro. After providing informed consent, participants were asked to rate 112 words (from a pool of 224 concrete nouns). Similar to the rating instructions adopted by VanArsdall (2016) for his living/nonliving scale, and by VanArsdall, Nairne, Pandeirada and Blunt (2013), participants were asked to rate each word using a 7-point scale ranging from *totally nonliving/inanimate* (label for value of 1) to *totally living/animate* (label for value of 7) (see Appendix 2 for the complete instructions). Words were presented in four groups of 28 while ensuring that a similar number of animates, inanimates and ambiguous words were presented in each of these groups. Participants were required to provide a rating for each word before moving on to the next page, as done by VanArsdall (2016); even though the task was self-paced, participants were asked to respond rapidly and based on their intuition. To ensure the reliability of the online collected data, as suggested by Rouse (2015), two attention checks were presented during the questionnaire as well as a final honesty question. The first attention check was presented at the halfway point, that is, after two sets of 28 items (“Have you ever walked on the surface of Mars?”; participants could respond Yes or No). The second attention check was presented after the next two sets of 28 items (“What is the second word in this question: How many colors are there in the Portuguese flag?”; participants typed down the word into a textbox). Only the rating data from those participants who responded correctly to these attention check questions were considered valid. At the end of the study, participants were asked if they paid attention and answered honestly; here, they were presented with a forced choice between “Yes, keep my data”, and “No, delete my data”; if a “no” response occurred, their data were not scored. Finally, sociodemographic data (age, gender, occupation, native language and education level) were also collected. At the end, they were thanked for their participation. Each participant took approximately 32 minutes to complete the online survey.

Results

Each word received, on average, 125 ratings ($SD=8.70$; $range=97-148$). The normative results per word (mean and standard deviations) are available in the Appendix 1¹. All 224 words are listed in ascending order of the obtained animacy ratings along with their English translation.

Considering our rating scale, we considered as animates those words that received classifications equal or above five (on a 7-point scale); words receiving ratings equal or lower than three were considered inanimates; words rated between three and five (excluding these values) were not considered in our analysis as these would be ambiguous with respect to animacy. Assuming these classification rules, we obtained a set of 82 animates ($M=6.35$; $SD=0.58$) which includes all of our previously classified animates plus 18 of our previously classified ambiguous words. A set of 138 inanimates was obtained ($M=1.80$; $SD=0.31$), including all of our previously considered inanimates (one word considered by us as inanimate was, on average, classified as ambiguous by our participants; $M=3.02$; $SD=2.27$). Participants scored four other words from our 224-word pool as ambiguous ($M=4.18$; $SD=0.84$); three of these had been previously classified as ambiguous and one other as inanimate. As expected, the ratings of animates and inanimates differed significantly on an independent samples *t*-test, $t(110.06)=-65.87$, $p<.001$, $d=-9.19$. In sum, we observed some discrepancy between our initial animacy classification and the data collected, particularly with respect to the ambiguous words. These ambiguous words corresponded mostly to plants and body parts which had been classified in such manner in previous studies (Nairne et al., 2013; VanArsdall, 2016); however, our participants tended to consider them more often as animates. Such results are consistent with the idea that, the animate-inanimate distinction is far from trivial (Nairne et al., 2017). Some participants reported finding the task complex and the rating of some of the ambiguous words [e.g., *sorriso* (smile)] difficult to make.

We also found other elements that introduced variability in our data and that relate to language regionalisms, as in the word *correio*, which can be taken as *posto do correio* ([post office], an inanimate word) or *carteiro* ([postman], an animate word).

In order to explore the consistency between our animacy ratings and the living/nonliving ratings obtained by VanArsdall (2016) we conducted further analyses. From the 224 words rated in our study, we were able to find 177 in his database. As shown in Table 1, Pearson correlations revealed that the animacy ratings obtained from our participants were significant and positively correlated with those reported by VanArsdall. This correlation is particularly high with the ratings on the living-nonliving scale he reported. The correlations between our animacy ratings and the data reported by VanArsdall on the remaining five scales considered in his work follow a pattern quite similar to the one he reported.

Table 1

Pearson correlations between our animacy ratings and those reported by VanArsdall (2016) in each of the six dimensions considered in his work

	Living	Repro	Thought	Move	Person	Goals
Animacy rating ^a	0.98**	0.90**	0.84**	0.76**	0.75**	0.71**
VanArsdall ^b	-	0.93	0.83	0.73	0.74	0.70

Note. Living=Living-Nonliving scale; Repro=Ability to reproduce scale; Thought=Ability to think scale; Move=Movement likelihood scale; Person=Similarity to a person scale; Goals=Goal-directedness scale; all of these scales were used in VanArsdall's study (2016). ^aPearson correlations between the animacy ratings collected in the present study and the ratings reported by VanArsdall (2016) in each of the six scales considered in his work; ^bPearson correlations reported as statistically significant by VanArsdall (2016) between the living-nonliving scale and the remaining five scales considered in his work; ** $p<.001$.

The norming data are freely available at our lab webpage (evo.psych.purdue.edu), as well as in our OSF project (<https://osf.io/9ta3y/>).

Discussion

The animacy effect in memory was reported for the first time in 2013 (Nairne et al., 2013). Research projects on this topic are currently under development in Portugal which creates the need to validate Portuguese stimuli on the animacy dimension. Furthermore, we aimed to collect animacy ratings for a set of stimuli that have already been characterized in the Portuguese population on other dimensions of potential relevance in various areas of research (e.g., concreteness, familiarity).

As far as we know, there is only one unpublished database reporting animacy values for North America (VanArsdall, 2016); we were able to find 177 of our 224 normed words in this database. The analysis of the obtained results in the two populations revealed a very high consistency, a result that is in agreement with the idea of the universality of the animacy conception across cultures (Atran, 1999). This idea is commonly supported by studies using other types of procedure. For example, Barrett and Behne (2005) asked German and Shuar children (the latter living in an Amazonian hunter-horticulturalist society) to decide whether animate items from photos were living, dead, or sleeping and results from both groups of children were quite alike. The data and analysis here presented provide another form of evidence of this cross-cultural agreement.

Animacy has been shown to be a dimension of importance across various domains such as attention, language and, more recently, memory (Nairne et al., 2017). For example, it has been shown to be a significant predictor of free recall (Nairne et al., 2013). Still, most memory studies continue not to consider it possibly due to the lack of normative information on this dimension.

This is the first database presenting EP data on the animacy dimension, containing ratings for 224 EP words. This is a relatively small number of words considering that our lexicon includes thousands of concrete words and further research should expand the normative data collection of animacy to more words. Still, the present database already represents an important resource, as it provides researchers a useful tool to consider and/or manipulate animacy in their experiments. Furthermore, information on the variables of age of acquisition (Cameirão & Vicente, 2010; Marques et al., 2007), emotional valence, arousal, dominance, written frequency (Soares et al., 2012), subjective frequency, imageability and concreteness (Soares et al., 2017) for these same words can be obtained in other already existing EP word databases allowing researchers a higher control over their stimuli.

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Appendix 1

European Portuguese normative data for animacy

European Portuguese word	English translation*	<i>M</i>	<i>SD</i>	95% CI	<i>N</i> ratings per word	Other databases
<i>Caneca</i>	Mug	1.22	0.64	(1.11; 1.33)	134	a,c,d
<i>Mesa</i>	Table	1.30	0.85	(1.15; 1.46)	119	a,b,c,d
<i>Candeieiro</i>	Lamp	1.32	0.83	(1.18; 1.46)	134	a,c,d
<i>Porta</i>	Door	1.38	1.07	(1.20; 1.57)	130	a,b,c,d
<i>Cadeira</i>	Chair	1.40	1.07	(1.21; 1.59)	120	a,b,c,d
<i>Navalha</i>	Razor	1.40	1.04	(1.23; 1.58)	137	a,c,d
<i>Vestido</i>	Dress	1.42	1.07	(1.23; 1.60)	125	a,c,d
<i>Garrafa</i>	Bottle	1.43	1.28	(1.21; 1.64)	136	a,b,c,d
<i>Barril</i>	Barrel	1.44	1.16	(1.24; 1.63)	133	a,c,d
<i>Arma</i>	Weapon	1.47	1.06	(1.28; 1.66)	122	b,c,d
<i>Chave</i>	Key	1.47	1.27	(1.25; 1.70)	121	a,c,d
<i>Lápis</i>	Pencil	1.47	1.32	(1.25; 1.70)	133	a,c,d
<i>Camisa</i>	Shirt	1.48	1.15	(1.28; 1.68)	128	a,b,d
<i>Chapéu</i>	Hat	1.48	1.11	(1.28; 1.68)	119	a,c,d
<i>Banco</i>	Bank	1.48	1.15	(1.28; 1.68)	129	a,b,c,d
<i>Tesoura</i>	Scissors	1.48	1.07	(1.28; 1.69)	104	a,c,d
<i>Dinheiro</i>	Money	1.50	1.26	(1.28; 1.72)	127	a,c,d
<i>Canhão</i>	Cannon	1.51	1.18	(1.30; 1.72)	121	a,c,d
<i>Cesto</i>	Basket	1.51	1.38	(1.26; 1.76)	117	a,c,d
<i>Armário</i>	Closet	1.52	1.20	(1.29; 1.74)	108	a,b,c,d
<i>Agulha</i>	Needle	1.52	1.25	(1.30; 1.74)	127	a,c,d
<i>Tarte</i>	Pie	1.53	1.15	(1.33; 1.73)	129	a,c,d
<i>Ouro</i>	Gold	1.53	1.20	(1.32; 1.75)	116	b,c,d
<i>Rebuçado</i>	Candy	1.54	1.29	(1.32; 1.76)	133	a,c,d
<i>Martelo</i>	Hammer	1.54	1.37	(1.31; 1.78)	131	a,c,d
<i>Colete</i>	Vest	1.55	1.34	(1.31; 1.78)	128	a,c,d
<i>Prateleira</i>	Shelf	1.56	1.33	(1.34; 1.78)	143	a,c,d
<i>Laço</i>	Bow	1.57	1.36	(1.34; 1.81)	129	a,c,d
<i>Punhal</i>	Dagger	1.57	1.20	(1.38; 1.77)	148	a,c,d
<i>Pistola</i>	Pistol	1.58	1.24	(1.36; 1.80)	121	a,c,d
<i>Bebida</i>	Drink	1.58	1.22	(1.37; 1.79)	124	a,c,d
<i>Iate</i>	Yatch	1.59	1.33	(1.35; 1.82)	121	a,c,d
<i>Janela</i>	Window	1.59	1.26	(1.37; 1.81)	124	b,c,d
<i>Roupa</i>	Clothing	1.59	1.25	(1.36; 1.82)	117	b,c,d
<i>Carta</i>	Letter	1.60	1.28	(1.37; 1.83)	117	b,c,d
<i>Granada</i>	Grenade	1.60	1.32	(1.37; 1.83)	130	a,c,d
<i>Sopa</i>	Soup	1.60	1.31	(1.38; 1.83)	134	a,b,d
<i>Ferramenta</i>	Tool	1.61	1.40	(1.36; 1.85)	122	a,b,c,d
<i>Cama</i>	Bed	1.61	1.36	(1.36; 1.85)	117	a,b,c,d
<i>Revólver</i>	Revolver	1.61	1.43	(1.36; 1.86)	128	a,c,d
<i>Almofada</i>	Pillow	1.61	1.36	(1.37; 1.85)	121	a,c,d
<i>Ferro</i>	Iron	1.62	1.38	(1.36; 1.88)	110	b,c,d
<i>Telefone</i>	Phone	1.62	1.32	(1.37; 1.86)	110	a,b,d
<i>Papel</i>	Paper	1.63	1.33	(1.40; 1.85)	136	b,c,d
<i>Sapato</i>	Shoe	1.63	1.29	(1.41; 1.85)	135	a,b,d
<i>Avião</i>	Airplane	1.63	1.36	(1.39; 1.87)	122	a,c,d
<i>Vidro</i>	Glass	1.64	1.25	(1.41; 1.87)	117	b,c,d
<i>Correio</i>	Mail	1.65	1.35	(1.41; 1.88)	127	b,c,d
<i>Tigela</i>	Bowl	1.66	1.46	(1.41; 1.91)	132	a,c,d
<i>Livro</i>	Book	1.66	1.37	(1.42; 1.90)	127	a,b,c,d
<i>Lenço</i>	Handkerchief	1.67	1.36	(1.42; 1.91)	118	a,c,d
<i>Computador</i>	Computer	1.67	1.28	(1.45; 1.90)	122	b,c,d
<i>Revista</i>	Magazine	1.68	1.46	(1.43; 1.93)	134	a,b,c,d

Appendix 1 (cont.)

European Portuguese word	English translation*	<i>M</i>	<i>SD</i>	95% CI	<i>N</i> ratings per word	Other databases
<i>Metal</i>	Metal	1.68	1.50	(1.42; 1.94)	128	b,c,d,
<i>Pintura</i>	Painting	1.68	1.38	(1.44; 1.92)	125	b,c,d,
<i>Camioneta</i>	Bus	1.69	1.31	(1.45; 1.92)	118	a,b,d
<i>Cadáver</i>	Corpse	1.69	1.40	(1.43; 1.94)	115	b,c,d,
<i>Chocolate</i>	Chocolate	1.69	1.37	(1.46; 1.91)	141	a,b,c,d
<i>Diamante</i>	Diamond	1.69	1.53	(1.44; 1.95)	139	b,c,d,
<i>Perfume</i>	Perfume	1.70	1.42	(1.43; 1.96)	109	a,b,c,d
<i>Máquina</i>	Machine	1.70	1.31	(1.48; 1.92)	133	a,b,c,d
<i>Garfo</i>	Fork	1.71	1.56	(1.42; 1.99)	112	a,c,d
<i>Bandeira</i>	Flag	1.71	1.31	(1.47; 1.94)	116	a,c,d
<i>Camião</i>	Truck	1.71	1.28	(1.49; 1.93)	130	a,b,c,d
<i>Círculo</i>	Circle	1.71	1.44	(1.44; 1.97)	113	b,c,d,
<i>Ambulância</i>	Ambulance	1.71	1.32	(1.48; 1.94)	127	a,c,d
<i>Metro</i>	Metre	1.72	1.40	(1.47; 1.97)	118	a,b,d
<i>Hotel</i>	Hotel	1.72	1.36	(1.48; 1.96)	122	b,c,d,
<i>Cemitério</i>	Cemetery	1.72	1.39	(1.46; 1.99)	109	b,c,d,
<i>Tênis</i>	Tennis	1.73	1.51	(1.47; 1.98)	131	a,c,d
<i>Azeite</i>	Olive Oil	1.73	1.38	(1.48; 1.98)	119	a,b,d
<i>Ponte</i>	Bridge	1.73	1.35	(1.50; 1.97)	124	a,b,d
<i>Pão</i>	Bread	1.73	1.44	(1.50; 1.97)	143	a,b,d
<i>Queque</i>	Muffin	1.74	1.47	(1.48; 1.99)	126	a,c,d
<i>Jogo</i>	Game	1.74	1.45	(1.45; 2.03)	97	a,c,d
<i>Cadeia</i>	Jail	1.75	1.38	(1.52; 1.97)	146	b,c,d,
<i>Autocarro</i>	Bus	1.75	1.52	(1.49; 2.01)	128	a,c,d
<i>Faca</i>	Knife	1.75	1.50	(1.49; 2.01)	129	a,c,d
<i>Barco</i>	Boat	1.76	1.43	(1.51; 2.01)	126	a,b,d
<i>Cozinha</i>	Kitchen	1.76	1.48	(1.50; 2.03)	123	b,c,d,
<i>Rua</i>	Street	1.77	1.42	(1.50; 2.03)	112	b,c,d,
<i>Igreja</i>	Church	1.77	1.46	(1.53; 2.01)	142	b,c,d,
<i>Escritório</i>	Office	1.78	1.44	(1.54; 2.02)	135	a,b,c,d
<i>Carro</i>	Car	1.78	1.43	(1.52; 2.04)	113	a,c,d
<i>Açúcar</i>	Sugar	1.78	1.42	(1.53; 2.03)	123	a,c,d
<i>Violino</i>	Violin	1.78	1.43	(1.54; 2.03)	129	a,c,d
<i>Carruagem</i>	Wagon	1.79	1.50	(1.53; 2.04)	132	b,c,d,
<i>Chaleira</i>	Kettle	1.82	1.54	(1.53; 2.10)	114	a,c,d
<i>Navio</i>	Ship	1.82	1.50	(1.54; 2.09)	115	a,b,c,d
<i>Utensílio</i>	Utensil	1.82	1.57	(1.54; 2.11)	119	b,c,d,
<i>Massa</i>	Pasta	1.83	1.59	(1.55; 2.11)	123	a,c,d
<i>Natal</i>	Christmas	1.83	1.40	(1.59; 2.07)	129	a,c,d
<i>Veículo</i>	Vehicle	1.84	1.46	(1.58; 2.09)	128	b,c,d,
<i>Indústria</i>	Industry	1.84	1.43	(1.57; 2.11)	108	b,c,d,
<i>Casa</i>	House	1.85	1.42	(1.60; 2.11)	122	a,b,c,d
<i>Espingarda</i>	Rifle	1.86	1.61	(1.58; 2.13)	132	a,c,d
<i>Espelho</i>	Mirror	1.86	1.57	(1.60; 2.12)	139	a,b,d
<i>Hospital</i>	Hospital	1.87	1.48	(1.62; 2.12)	135	b,c,d,
<i>Avenida</i>	Avenue	1.87	1.58	(1.60; 2.14)	132	b,c,d,
<i>Prisão</i>	Prison	1.88	1.48	(1.61; 2.14)	121	a,b,c,d
<i>Elevador</i>	Elevator	1.88	1.64	(1.59; 2.17)	123	a,b,c,d
<i>Táxi</i>	Taxi	1.89	1.57	(1.60; 2.17)	117	a,c,d
<i>Manteiga</i>	Butter	1.90	1.64	(1.61; 2.18)	125	a,b,c,d
<i>Lâmpada</i>	Lightbulb	1.90	1.49	(1.64; 2.17)	121	a,c,d
<i>Relógio</i>	Clock	1.91	1.60	(1.62; 2.19)	118	a,b,c,d
<i>Forno</i>	Oven	1.93	1.68	(1.63; 2.24)	118	b,c,d,
<i>Neve</i>	Snow	1.96	1.56	(1.70; 2.23)	132	a,b,c,d
<i>Leite</i>	Milk	1.97	1.50	(1.70; 2.23)	122	a,b,c,d
<i>Almoço</i>	Lunch	1.98	1.55	(1.70; 2.25)	124	a,b,d
<i>Bolo</i>	Cake	1.98	1.70	(1.68; 2.27)	125	a,c,d
<i>Praia</i>	Beach	1.99	1.55	(1.73; 2.24)	138	b,c,d,
<i>Museu</i>	Museum	2.00	1.65	(1.71; 2.29)	124	b,c,d,
<i>Restaurante</i>	Restaurant	2.00	1.43	(1.75; 2.25)	126	b,c,d,
<i>Vinho</i>	Wine	2.00	1.72	(1.70; 2.30)	130	b,c,d,
<i>Jantar</i>	Dinner	2.01	1.47	(1.75; 2.26)	129	a,b,c,d

Appendix 1 (cont.)

European Portuguese word	English translation*	<i>M</i>	<i>SD</i>	95% CI	<i>N</i> ratings per word	Other databases
<i>Domicílio</i>	Dwelling	2.02	1.69	(1.74; 2.30)	137	b,d
<i>Filme</i>	Film	2.02	1.66	(1.73; 2.32)	122	b,c,d
<i>Bar</i>	Pub	2.03	1.79	(1.70; 2.35)	116	a,c,d
<i>Banho</i>	Bath	2.03	1.69	(1.75; 2.31)	136	b,c,d
<i>Rádio</i>	Radio	2.03	1.74	(1.72; 2.34)	122	a,b,c,d
<i>Comida</i>	Food	2.05	1.55	(1.77; 2.33)	120	b,c,d
<i>Corredor</i>	Aisle	2.07	2.04	(1.72; 2.41)	137	b,c,d
<i>Mercado</i>	Market	2.21	1.76	(1.91; 2.51)	134	b,c,d
<i>Pimenta</i>	Pepper	2.27	1.83	(1.94; 2.61)	114	a,b,d
<i>Salada</i>	Salad	2.27	1.84	(1.95; 2.60)	124	a,c,d
<i>Fogo</i>	Fire	2.33	1.91	(1.99; 2.68)	117	a,b,c,d
<i>Rio</i>	River	2.37	1.88	(2.04; 2.70)	125	a,c,d
<i>Estrela</i>	Star	2.37	2.01	(2.03; 2.71)	132	b,c,d
<i>Dente</i>	Tooth	2.40	1.81	(2.09; 2.72)	126	a,b,d
<i>Terra</i>	Earth	2.41	1.99	(2.07; 2.75)	133	b,c,d
<i>Água</i>	Water	2.45	1.91	(2.11; 2.78)	125	a,b,c,d
<i>Chuva</i>	Rain	2.47	1.92	(2.13; 2.80)	126	a,b,c,d
<i>Mar</i>	Sea	2.57	2.13	(2.19; 2.94)	125	a,b,c,d
<i>Dia</i>	Day	2.58	1.87	(2.26; 2.91)	130	a,b,c,d
<i>Batata</i>	Potato	2.66	2.19	(2.27; 3.05)	120	a,b,d
<i>Céu</i>	Sky	2.70	1.99	(2.35; 3.06)	121	a,c,d
<i>Campo</i>	Field	2.91	2.13	(2.52; 3.29)	117	b,c,d
<i>Relvado</i>	Lawn	2.92	2.32	(2.47; 3.36)	106	b,c,d
<i>Jardim</i>	Garden	3.02	2.27	(2.63; 3.42)	126	a,b,c,d
<i>Guerra</i>	War	4.20	2.32	(3.80; 4.60)	131	a,b,c,d
<i>Ovo</i>	Egg	4.52	2.22	(4.15; 4.90)	134	a,b,c,d
<i>Orelha</i>	Ear	4.98	1.98	(4.64; 5.32)	131	a,b,d
<i>Cotovelo</i>	Elbow	5.01	1.97	(4.68; 5.35)	136	a,c,d
<i>Sorriso</i>	Smile	5.07	2.06	(4.71; 5.43)	125	b,c,d
<i>Ombro</i>	Shoulder	5.09	2.07	(4.74; 5.44)	133	a,b,d
<i>Braço</i>	Arm	5.15	1.90	(4.83; 5.47)	137	a,c,d
<i>Pele</i>	Skin	5.20	1.89	(4.87; 5.54)	123	a,b,d
<i>Cabeça</i>	Head	5.22	1.99	(4.87; 5.57)	125	a,b,d
<i>Mão</i>	Hand	5.24	2.07	(4.87; 5.60)	122	a,c,d
<i>Pé</i>	Foot	5.30	1.87	(4.98; 5.62)	132	a,c,d
<i>Orquestra</i>	Orchestra	5.34	1.99	(4.99; 5.68)	127	b,c,d
<i>Corpo</i>	Body	5.34	1.87	(5.03; 5.66)	135	b,c,d
<i>Perna</i>	Leg	5.38	1.82	(5.07; 5.68)	133	a,b,d
<i>Face</i>	Face	5.41	1.87	(5.11; 5.72)	143	b,c,d
<i>Dedo</i>	Finger	5.44	1.83	(5.12; 5.77)	124	b,c,d
<i>Flor</i>	Flower	5.45	1.84	(5.13; 5.78)	121	b,c,d
<i>Cogumelo</i>	Mushroom	5.49	1.91	(5.16; 5.81)	133	a,b,c,d
<i>Coração</i>	Heart	5.50	1.91	(5.16; 5.83)	125	a,b,c,d
<i>Casal</i>	Couple	5.52	1.96	(5.16; 5.87)	118	b,c,d
<i>Dinossauro</i>	Dinosaur	5.56	2.24	(5.14; 5.99)	108	a,b,d
<i>Planta</i>	Plant	5.71	1.79	(5.41; 6.00)	140	a,c,d
<i>Família</i>	Family	6.33	1.51	(6.06; 6.59)	120	a,c,d
<i>Economista</i>	Economist	6.37	1.41	(6.12; 6.61)	128	a,b,d
<i>Escravo</i>	Slave	6.40	1.45	(6.14; 6.66)	119	a,b,c,d
<i>Juiz</i>	Judge	6.41	1.51	(6.16; 6.66)	137	a,b,d
<i>Jornalista</i>	Journalist	6.42	1.44	(6.16; 6.69)	114	a,b,d
<i>Porteiro</i>	Porter	6.45	1.33	(6.21; 6.68)	121	a,b,d
<i>Dentista</i>	Dentist	6.45	1.33	(6.22; 6.69)	124	a,c,d
<i>Político</i>	Politician	6.49	1.30	(6.25; 6.72)	117	a,b,d
<i>Motorista</i>	Motorist	6.51	1.22	(6.29; 6.73)	118	a,b,d
<i>Rapaz</i>	Boy	6.52	1.38	(6.29; 6.76)	130	a,c,d
<i>Arquiteto</i>	Architect	6.53	1.28	(6.32; 6.75)	131	a,b,d
<i>Rei</i>	King	6.53	1.25	(6.31; 6.76)	116	b,c,d
<i>Adulto</i>	Adult	6.55	1.33	(6.32; 6.79)	125	b,c,d
<i>Cientista</i>	Scientist	6.56	1.11	(6.36; 6.75)	122	a,b,d
<i>Engenheiro</i>	Engineer	6.57	1.20	(6.36; 6.77)	129	a,b,d
<i>Marido</i>	Husband	6.57	1.18	(6.36; 6.79)	117	a,b,d

Appendix 1 (cont.)

European Portuguese word	English translation*	<i>M</i>	<i>SD</i>	95% CI	<i>N</i> ratings per word	Other databases
<i>Gestor</i>	Manager	6.59	1.14	(6.39; 6.79)	122	a,b,d
<i>Farmacêutico</i>	Pharmacist	6.59	1.07	(6.41; 6.77)	137	a,b,d
<i>Carpinteiro</i>	Carpenter	6.61	1.10	(6.42; 6.80)	128	a,b,d
<i>Doutor</i>	Doctor	6.61	1.28	(6.38; 6.84)	121	a,b,d
<i>Freira</i>	Nun	6.61	1.13	(6.42; 6.81)	129	a,c,d
<i>Bombeiro</i>	Fireman	6.62	1.10	(6.42; 6.82)	115	a,b,d
<i>Peixe</i>	Fish	6.62	1.14	(6.41; 6.83)	113	a,c,d
<i>Rapariga</i>	Girl	6.62	1.25	(6.39; 6.85)	116	b,c,d
<i>Padre</i>	Priest	6.62	1.17	(6.42; 6.83)	124	a,c,d
<i>Professor</i>	Teacher	6.62	1.24	(6.41; 6.84)	125	a,b,c,d
<i>Atleta</i>	Athlete	6.63	1.02	(6.46; 6.81)	126	b,c,d
<i>Serpente</i>	Serpent	6.64	1.12	(6.44; 6.84)	125	a,c,d
<i>Assassino</i>	Killer	6.67	1.04	(6.48; 6.85)	126	b,c,d
<i>Agricultor</i>	Farmer	6.67	1.01	(6.50; 6.85)	125	a,b,d
<i>Criminoso</i>	Criminal	6.68	1.01	(6.49; 6.86)	120	b,c,d
<i>Falcão</i>	Hawk	6.68	0.99	(6.50; 6.85)	121	a,c,d
<i>Pássaro</i>	Bird	6.68	1.02	(6.52; 6.85)	148	b,c,d
<i>Cordeiro</i>	Lamb	6.69	1.09	(6.50; 6.89)	121	a,c,d
<i>Criança</i>	Child	6.69	1.06	(6.51; 6.88)	131	b,c,d
<i>Cozinheiro</i>	Cook	6.70	1.00	(6.52; 6.88)	123	a,c,d
<i>Barata</i>	Cockroach	6.70	0.99	(6.54; 6.87)	138	a,c,d
<i>Mulher</i>	Woman	6.71	0.99	(6.54; 6.88)	124	a,c,d
<i>Sapo</i>	Toad	6.71	0.97	(6.55; 6.88)	132	a,c,d
<i>Galinha</i>	Chicken	6.71	0.92	(6.54; 6.89)	112	a,b,d
<i>Vespa</i>	Wasp	6.72	0.93	(6.56; 6.87)	134	a,c,d
<i>Vaca</i>	Cow	6.72	1.09	(6.53; 6.91)	129	a,c,d
<i>Enfermeiro</i>	Nurse	6.72	0.96	(6.55; 6.90)	119	a,b,d
<i>Tubarão</i>	Shark	6.73	1.06	(6.54; 6.92)	121	a,c,d
<i>Elefante</i>	Elephant	6.75	0.97	(6.57; 6.92)	114	a,b,d
<i>Gato</i>	Cat	6.75	0.98	(6.56; 6.94)	104	a,c,d
<i>Leão</i>	Lion	6.75	0.92	(6.58; 6.92)	108	a,c,d
<i>Ator</i>	Actor	6.76	0.86	(6.61; 6.90)	140	a,b,d
<i>Cavalo</i>	Horse	6.76	0.91	(6.61; 6.91)	142	a,b,c,d
<i>Porco</i>	Pig	6.76	0.93	(6.60; 6.92)	131	a,c,d
<i>Árbitro</i>	Referee	6.77	0.77	(6.64; 6.91)	123	a,b,d
<i>Pomba</i>	Dove	6.78	0.77	(6.63; 6.92)	112	a,c,d
<i>Coelho</i>	Rabbit	6.78	0.84	(6.63; 6.93)	124	a,c,d
<i>Irmão</i>	Brother	6.79	0.66	(6.67; 6.90)	123	b,c,d
<i>Mosquito</i>	Mosquito	6.79	0.68	(6.67; 6.91)	120	a,c,d
<i>Homem</i>	Man	6.80	0.68	(6.68; 6.91)	134	a,c,d
<i>Pescador</i>	Fisherman	6.80	0.68	(6.68; 6.92)	121	a,b,d
<i>Escritor</i>	Writer	6.80	0.78	(6.67; 6.94)	128	a,b,c,d
<i>Borboleta</i>	Butterfly	6.81	0.66	(6.69; 6.93)	121	a,c,d
<i>Aranha</i>	Spider	6.82	0.77	(6.69; 6.95)	138	a,c,d
<i>Cão</i>	Dog	6.84	0.62	(6.73; 6.94)	129	a,c,d
<i>Pai</i>	Father	6.87	0.43	(6.79; 6.94)	122	a,c,d
<i>Coruja</i>	Owl	6.89	0.54	(6.80; 6.99)	121	a,c,d

Note. *M*=Mean; *SD*=Standard Deviation; 95% CI=Confidence interval; *N*=Number of ratings per word; *Other Databases*: indicates other databases in which rating information on additional word characteristics can be obtained. *a*=Marques et al. (2007); *b*=Cameirão and Vicente (2010); *c*=Soares et al. (2012); *d*=Soares et al. (2017). "Domicílio" was found twice at Cameirão and Vicente (2010). * The English translations presented in Appendix 1 correspond to the translation adopted by Soares et al. (2017), but some of the words may have other English translations. The correlations in Table 1 were calculated considering the matched words between our database and VanArsdall's database (considering the English translations presented in Appendix 1). In the calculation of the presented correlations we also included norming information for the following additional eight words for which we could not find the translated word provided in Soares et al but that have alternative translations found in VanArsdall's database (Portuguese word / Soares's translation / English word in VanArsdall's norms): Bebida / Drink / Beverage; Revólver / Revolver / Gun; Massa / Pasta / Dough; Filme / Film / Movie; Bar / Pub / Bar; Corredor / Aisle / Corridor; Motorista / Motorist / Driver; Assassino / Killer / Murderer. We also noticed the presence of a set of words in VanArsdall's that are also possible translations for our words (Portuguese word / Soares's translation / alternative English word in VanArsdall's norms): Arma / Weapon / Gun; Banco / Bank / Stool; Armário / Closet / Cabinet; Avião / Airplane / Plane; Carruagem / Wagon / Carriage; Céu / Sky / Heaven; Professor / Teacher / Professor; Atleta / Athlete / Runner; Serpente / Serpent / Snake; Sapo / Toad / Frog; Pomba / Dove / Pigeon. When the same correlations were calculated using the norming data from these 19 alternative translations the results (rounded to two decimal places) were the same as those reported in Table 1 with the exception of the correlation with Goals, which increased to .72.

Appendix 2

European Portuguese animacy rating instructions

Tudo o que está em nosso redor pode ser um ser vivo, ou uma entidade não-viva. Nesta tarefa, pedimos que avalie algumas palavras quanto ao facto de se referirem a entidades vivas (animadas) ou não-vivas (inanimadas). A avaliação será feita numa escala de 1 a 7, em que 1 indica *totalmente inanimado/não-vivo* e 7 indica *totalmente animado/vivo*. As palavras que considere definitivamente animadas/vivas devem receber uma avaliação mais elevada na escala, enquanto que palavras inanimadas/não-vivas devem receber avaliações mais baixas.

Por exemplo: *Canguru* deve receber uma elevada avaliação de animacidade, dado referir-se a um animal (ser vivo). No entanto, a palavra *caneta* deve receber uma baixa avaliação de animacidade, dado referir-se a um objeto (entidade não-viva). Caso a palavra indique algo que não considera ser totalmente animado nem totalmente inanimado, deverá atribuir uma pontuação que se situe entre os extremos da escala.

As palavras apresentadas podem variar em muitas outras características. É importante que avalie as palavras somente quanto à animacidade, e não relativamente a quaisquer outras características.

Pode utilizar todos os valores da escala; não se deve preocupar se está a utilizar um determinado valor com maior frequência desde que este corresponda ao seu julgamento verdadeiro.

Não existem respostas certas ou erradas e não existe limite de tempo para cada resposta; pedimos, contudo, que responda de forma intuitiva, rápida e honesta.

Normas de animacidade para 224 palavras concretas do Português Europeu

Palavras são estímulos frequentemente usados em investigação, como por exemplo, nas áreas da cognição e da linguagem. Considerando que existem numerosas variáveis psicolinguísticas conhecidas por influenciar o processamento de palavras (e.g., frequência, concreta), o controlo de tais variáveis em procedimentos experimentais é crucial. A variável animacidade (i.e., a característica que distingue seres animados, ou vivos, de entidades inanimadas, ou não-vivas), foi recentemente identificada como influenciadora de vários processos cognitivos e linguísticos. Inclusivamente, a animacidade foi considerada um dos melhores preditores da recordação livre. No entanto, a animacidade é ainda uma variável não controlada na maioria dos estudos, sendo que a informação sobre a mesma é ainda praticamente inexistente. Neste estudo, apresentamos normas de animacidade para um conjunto de 224 palavras concretas do Português Europeu. Estes dados constituem um recurso útil que permitirá aos investigadores portugueses considerar esta variável de forma sistemática nos seus estudos.

Palavras-chave: Animacidade, Normas, Português Europeu.

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