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E
Doutora Ana Patrícia Pinheiro

Setembro de 2020

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

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Este estudo integra-se no âmbito do projeto "Reconhecimento visual de palavras do Português Europeu" coordenado pela professora Ana Paula Soares.

Efeitos de Autorreferência no Reconhecimento de Palavras Visuais Emocionais e Não Emocionais: Evidência de uma Tarefa de Decisão Lexical com Priming Mascarado

Resumo

Informação autorreferenciada tem sido demonstrada como tendo vantagem de processamento em relação a informação sobre outras pessoas. Este efeito foi chamado de self-reference effect (SRE) e tem sido investigado em várias áreas do funcionamento cognitivo, tal como o processamento de palavras visuais. Alguns estudos tentaram identificar em que fase do acesso lexical acontece o SRE, mas os resultados têm sido mistos. Neste estudo procurámos observar se informação autorreferenciada afeta fases iniciais do reconhecimento de palavras visuais, através de uma tarefa de decisão lexical combinado com um paradigma de priming mascarado. Foi pedido às participantes para identificar se os estímulos apresentados eram palavras ou não palavras, com palavras alvo positivas (e.g., "atrativa"), negativas (e.g., "inútil") ou neutras (e.g., "regular"). Para explorar o efeito da autorreferencia, as palavras alvo foram precedidas por um prime breve (50 ms) que podia ser self-related ("Eu sou"), other-related ("Ela é") ou controlo ("%%%%%"). Os resultados mostraram uma vantagem de processamento de palavras precedidas por primes self-related em comparação com primes other-related, demonstrado o SRE. Contudo, comparações post-hoc revelaram que este efeito foi específico para palavras negativas. Palavras precedidas por primes de controlo resultaram em respostas mais rápidas do que primes other-related, o que sugere um custo de processamento para informação referente a outros. Isto foi particularmente evidente para palavras neutras. Estes resultados sugerem que informação autorreferenciada tem impacto em fases iniciais do reconhecimento de palavras visuais.

Palavras-Chave: Efeito de autorreferência, palavras emocionais, palavras neutras, processamento de palavras visuais, tarefa de decisão lexical

Self-reference Effects in Visual Word Recognition of Emotional and Non-emotional Words: Evidence From a Masked Priming Lexical Decision Task

Abstract

Self-referential information has been shown to have a processing advantage over information relating to others. This effect was termed the self-reference effect (SRE) and has been investigated across various fields of cognitive function, such as visual word processing. Some studies have attempted to identify at which stage of lexical access the SRE occurs, although findings have been mixed. In this study we aimed to observe if self-referential information affects early stages of visual word recognition, with the use of a lexical decision task combined with a priming paradigm. Participants were asked to identify whether the presented stimuli were words or non-words, with target words that could be either positive (e.g., "attractive"), negative (e.g., "useless") or neutral (e.g., "regular"). To explore the role of self-reference, target words were preceded by a brief prime (50 ms) that could be self-related ("Eu sou"[I am]), other-related ("Ela é"[She is]) or a control prime ("%%%%%"). Results showed a processing advantage of words preceded by self-related primes over other-related primes, demonstrating a SRE. However, post-hoc comparisons revealed that this effect was specific of negative words. Words preceded by control primes resulted in faster responses than other-related primes, suggesting a processing cost for other-referential information, which was especially true for neutral words. Our findings confirm that self-referential information has an impact on early stages of visual word recognition.

Keywords: Self-reference effect, visual word processing, lexical decision task, emotional words, neutral words

Contents

Introduction

The self-reference effect (SRE) refers to an advantage of recalling information when it relates to the self than to others. This effect was coined by Rogers, Kuiper, and Kirker (1997), in a seminal study in which the authors asked participants to rate adjectives on four different tasks: structural (i.e., "is the word written in capital letters?"), phonemic (i.e., "does the word rhyme with....?"), semantic (i.e., "does the word mean the same as ....?"), and self-reference (i.e., "does the word describe you?"). Without previous knowledge, participants were then confronted with a surprise recall task in which they were asked to write down in a piece of paper all the words they remembered from the previous task. Results showed that participants revealed a better performance for the words presented in the self-reference task when compared to all the other tasks, hence suggesting that information encoded in a self-related manner produces a memory advantage over information encoded in other ways.

Since then, the effect of self-referential information has been studied across different stimuli such as faces (e.g., Klein et al., 2015; Wang et al., 2011), subjects' handwriting (e.g., Chen et. al., 2008), subject's own voice (e.g., Pinheiro et al., 2016, 2017) and sentences (e.g., Fields & Kuperberg, 2012, 2015). Moreover, recent studies have used neuroimaging techniques to explore the neural correlates of the SRE. For instance, Craik et al. (1999) conducted a study using a self-reference paradigm with positron emission tomography (PET) in which participants were assigned to one of four judgement tasks about different personality trait adjectives (positive and negative). In one task, participants were asked how well they thought the trait adjective described them (self-related task); in a second task, participants were asked how well they thought the trait adjective described a former known prime-minister (other-related task); in a third task, participants judged how socially desirable the trait adjective was (semantic task); and, in a fourth task, participants were asked to judge the number of syllables in the trait adjective (syllable task). Each task was performed twice by every participant with an ABCDDCBA design (counterbalanced across participants), and ten minutes after the last task, participants were requested to perform an unexpected yes/no recognition test for each trait adjective shown during the experiment. Results showed that, adjectives in the self-reference task were better recognized than those in the other tasks, demonstrating a SRE in line with previous work. Furthermore, the results revealed frontal activations specific to self-reference condition. Succeeding studies have identified increased activity in the medial prefrontal cortex (mPFC), anterior and posterior cingulate in response to self- vs. other-referential information (e.g., Johnson et al., 2002; Kelley et al., 2002; Yoshimura et al, 2009). In order to determine which brain regions are associated with self-referential processing of emotional stimuli, and how the emotional valence of stimuli affects the self-referential processing, Yoshimura and colleagues (2009) selected 80 positive and 80 negative personality-trait words and presented participants with four judgment tasks: self-reference (i.e. "does the word describe you?"), other-reference (i.e., "does the word describe the Prime Minister?"), semantic (i.e. "is it difficult to define the word?") and letter-processing (i.e., "does the word contain the letter 'a'?"). Participants' brain activity was measured using functional magnetic resonance imaging (fMRI) while they performed the judgment tasks. After completing all the trials, participants were given an unexpected recognition task where all the previously presented words were shown in random order, along with some words which were not presented during the experiment. Behavioral results showed better recognition accuracy for words judged in the self-reference task than in the other tasks, which the authors attributed to the SRE. In addition, the fMRI results suggest that during self-referential processing of emotional stimuli, different brain regions are involved depending on stimulus valence. While self-referential processing of positive words was associated with activity in the left amygdala, self-referential processing of negative words was associated with activity in the right amygdala and the right ventral anterior cingulate gyrus.

As in previous studies, the self-referential task in Yoshimura's experiment had participants engage in conscious self-reflections. Because participants were explicitly asked to focus their attention on the self during those tasks, the degree to which the self-referential information is automatically activated remained unclear. In order to explore this question, Herbert, Pauli, and Herbert (2011) designed an experiment with a more implicit mode of self-reference processing, while measuring electrophysiological brain responses to determine the stage at which emotional word processing is affected by self-referential information. For this, event-related potentials (ERPs) were registered during the task, in which participants were asked to silently read short sentences consisting of either the pronoun "my" (self-reference condition) or the article "the" (control condition) followed by pleasant, unpleasant or neutral nouns. After performing the task, participants were unexpectedly asked to write down as many sentences as they remembered. Results from the free-recall task showed that emotional (pleasant and unpleasant) nouns were better recalled than neutral nouns. More importantly, participants recalled more nouns in the self-reference condition than in the control condition, in line with previous studies using explicit instructions for self-referential processing. However, ERP data showed self-reference modulations only in the N400 (~300-450 ms after noun onset) and in the late positive potential (LPP, ~450-600 ms after noun onset) components, suggesting that the SRE emerges only at later stages of processing. Subsequent research has presented mixed results, with some studies showing modulations of the SRE reflected in ERP components usually associated with primary sensory/perceptual processing. For instance, the study by Fields and Kuperberg (2012) independently manipulated self-relevance and emotion, by using two-sentence social vignettes with pleasant, unpleasant, or neutral critical words referring to either the participants or to a third person (e.g., A man knocks on Sandra's/your hotel room door. She/You see(s) that he has a gift/tray/gun in his hand.). Participants were asked to read the sentences and verbally produce a sentence to continue the narrative, to ensure that they were reading for comprehension. The analysis of ERPs time-locked to the critical words showed effects of self-reference on the early P1 (peaking at approximately 80 ms), N1 (peaking at approximately 130 ms), and P2 (peaking at approximately 250 ms) components. The authors noted the differences in results compared to previous research and attributed them to the self-referential information being established in the first sentence, prior to the sentence containing the critical word.

Most SRE studies have utilized emotional stimuli exclusively, although some studies in memory have also used neutral stimuli and found SRE across all stimulus types (e.g., Durbin et al., 2017; Yang et al., 2012). Nonetheless, it is unclear whether the same could be found in different cognitive processes, such as visual word processing. In an experiment conducted by Weis and Herbert (2017), participants were asked to spontaneously judge short sentences as quickly as possible, according to the subjective pleasure/displeasure (i.e., "is this word eliciting a positive, negative, or neutral feeling?"), followed by ratings of intensity of the experienced feeling (i.e., "how intense is the feeling elicited by the word?"). The short sentences included a pronoun ("my" for self-reference condition, "his" for other-reference condition, and "no" for control condition) and a noun that could be negative (e.g., "fear"), neutral (e.g., "book"), or positive (e.g., "happiness"). Behavioural results showed that participants responded faster and more accurately to self-related positive words than to all other conditions. Importantly, reaction times were significantly shorter for positive and negative words than for neutral words, and there were no significant differences between self-related neutral words and other-related neutral words. Although in this experiment the positive and negative nouns were controlled for in arousal, arousal of neutral words differed significantly compared to emotional words, which might help explain the apparent inconsistency in results. Therefore, control of arousal levels for all types of words must be ensured when studying the SRE.

Chen and colleagues (2014) used an affective priming paradigm while ERPs were registered to explore if the self-positivity bias could be found at implicit levels of self-processing. The self-positivity bias refers to the tendency of individuals to evaluate positive traits as being more self-related than negative traits (e.g., Watson et al., 2007; Weis & Herbert, 2017). Participants were asked to judge the emotional content of personality-trait adjectives ("positive" or "negative"). The adjectives were preceded by 150 ms primes that could be either self-related ("I") or other-related ("He"/"She"). Results showed faster responses to self-positive word pairs than self-negative word pairs, consistent with the self-positivity bias. Furthermore, the ERP data showed interaction of prime and emotion in the P300 ERP component, with larger amplitudes for self-related positive words and other-related negative words. The N400 also revealed an interaction effect, with larger amplitudes for self-related negative words and other-related positive words.

Although this study used a priming paradigm to examine how the processing of self-referential information affects the affective judgment of positive and negative words, the use of 150 ms primes does not prevent the processing to be influenced by other strategic factors. To address this issue, Soares et al. (2019) conducted a study using an affective categorization task combined with a masked prime paradigm. Only female participants were tested to account for differences in emotional processing (see Soares et al., 2012, 2015). In this paradigm, 51 positive and 51 negative valenced trait-adjectives selected from the female norms of the Portuguese adaptation of the Affective Norms for English Words (ANEW-PT, Soares et al., 2012) were preceded by briefly (50 ms) presented primes that could be either self-related ("*Eu sou*" [I am]), other-related ("*Ela é*" [She is]) or a control (%%%%). The use of this 'extra' control condition was implemented to allow the researchers to further examine if the effects of self-related information and of other-related information was facilitative or inhibitory relative to the baseline (control) condition. Results indicated that participants were faster at categorizing positive words than negative words, and faster at categorizing positive words in the self-related condition than in the other-related condition, in line with previous studies showing a self-positivity bias in emotional word processing (e.g., Chen et al., 2014; Watson et al., 2007; Weis & Herbert, 2017). For negative words, significant differences were only observed between the other-related condition and the control condition, with faster responses for negative words preceded by control primes than other-related primes. The authors interpreted these results as evidence that, at early stages of processing, taking the 'other' perspective entails a processing cost both for positive and negative words. Moreover, the absence of statistically significant differences between the self-reference condition and the control condition both for positive and negative words, led the authors to suggest that the processing of self-related primes does not entail any processing cost on emotional word processing. That is, that the cognitive system might assume a self-referential or self-centred processing perspective by default.

Although this study brought interesting results with a careful control of stimuli and gender differences, it opens venues of inquire such as knowing to what extent similar findings can be observed using non-emotional (neutral) words, and if the SRE can be observed in tasks that do not require participants to focus their attention on the emotional content (valence) of the words, which are shown to boost both affective (e.g., Ferré, 2003; Ferré et al., 2015) and SRE effects (see Soares et al., 2019). The present study aimed to directly address these questions by testing the effect of self-referential information on visual word recognition using a task aimed to test lexical access without focusing on the emotional content of the words, i.e. a lexical decision task combined with a masked priming paradigm as in Soares et al. (2019) study. The use of this task allowed us both to use non emotional words, hence contributing to further examine if the effects observed by Soares et al. (2019) can be extended to neutral words, and also to determine if SRE effects can be observed at early stages of lexical access, which might have important implications for current computational models of visual word recognition that do not attribute any role to this variable (e.g., Coltheart et al., 2001; Davis, 2010; Norris, 2006; Rumelhart & McClelland, 1982). If self-referential information does indeed affect lexical access at early processing stages, we expect that words in the self-reference condition will be recognized faster and with higher accuracy than words in the other-reference, especially for positive words, reflecting the positivity bias previously mentioned in the SRE literature. Importantly, we also expect to find the self-reference effect in neutral words. If our cognitive system naturally assumes a self-referential perspective by default, as Soares et. al (2019) claims, and if that effect can be seen with not only emotional but also neutral words, it will indicate that words preceded by self-referential information (i.e., "I am") have a processing advantage regardless of stimulus valence, which will require amendments in current models of visual word recognition.

Method

Participants

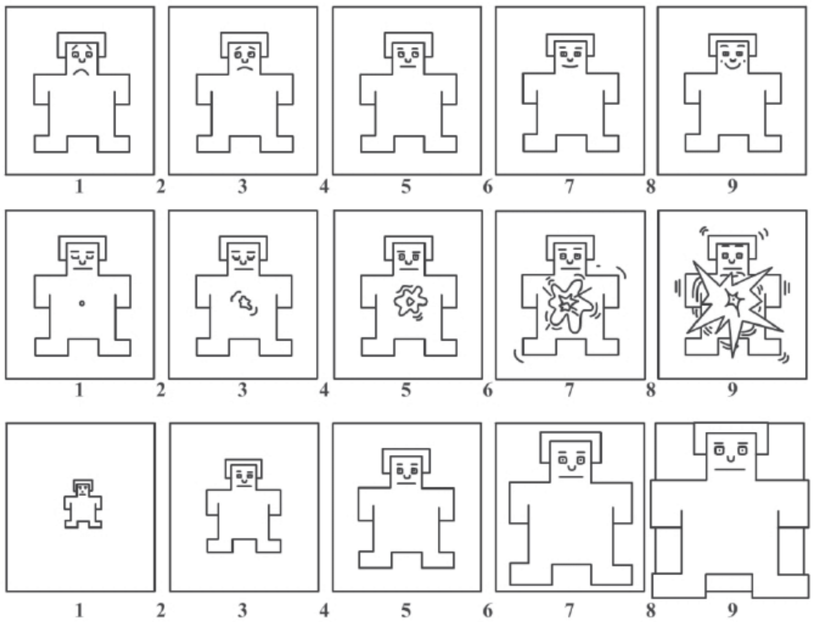
Forty-five participants were recruited from the University of Minho (M_{age} = 20.8, *SD* = 3.37). Participants were native speakers of European Portuguese (EP) and reported normal or corrected-to-normal vision. Only female participants were included in the experiment to control for gender differences in the processing of emotional stimuli as in previous studies (e.g., Kret & De Gelder, 2012; Lithari et al., 2009; Pinheiro et al 2017; Soares et al., 2012, 2013, 2015, 2019). Online informed consent was obtained from all the participants prior to the participation in the study (SECSH 057/2016).

Materials

One hundred and sixty-two target words (adjectives) were selected from the female norms of the Portuguese adaptation of the Affective Norms for English Word database (ANEW-PT; Soares et al., 2012) and also from another study (Soares et al., in prep.) conducted to enlarge the number of adjectives with emotional ratings in the ANEW-PT database. The ANEW is a dataset developed by Bradley and Lang (1999) that provides normative ratings of valence, arousal, and dominance for 1,034 words emotional evocative words. These ratings were obtained with a nonverbal pictographic self-report measure, the Self-Assessment Manikin (SAM – see Fig. 1), that assesses each word using a 9-point Likert scale on the valence (i.e., how pleasant a word is, ranging from unpleasant to pleasant), arousal (i.e., the degree of excitement or activation a given word evokes, ranging from calm to exciting) and dominance (i.e., the degree of control a subject feels over a specific word, ranging from "out of control" to "in control") affective scales (see Soares et al., 2012, 2014 or 2015 for further details).

Figure 1

Self-Assessment Manikin (SAM; Bradley & Lang, 1994)



Fifty-four of the targets had negative valence ($M_{valence}$ = 2.87, *SD* = 1.31; range: 1.47 – 3.93), 54 had neutral valence ($M_{valence}$ = 5.07, *SD* = 1.24; range: 4. 35 – 5.74), and 54 had positive valence ($M_{valence}$ = 7.21, *SD* = 1.24; range: 6.20 – 8.23). Negative, neutral, and positive words were matched for arousal as well as on several psycholinguistic variables known to affect word processing (see Soares et al., 2015, 2019) as per million word frequency, word length both in number of letters, and number of syllables, neighbourhood size, and Normalized Levenshtein Distance as obtained from the Procura-PALavras (P-PAL) lexical database (Soares et al., 2014, 2018). The psycholinguistic characteristics of the negative, neutral, and positive words selected as targets are presented in Table 1.

Table 1

Mean and Standard Deviations (in Brackets) for the Psycholinguistic Characteristics of the Negative, Neutral, and Positive Words Selected as Targets

Psycholinguistic Characteristics	Negative	Neutral	Positive	*p*-value
Valence	2.9 (1.31)	5.1 (1.24)	7.2 (1.24)	.001
Arousal	5.4 (.75)	5 (.83)	5.2 (1.18)	.132
Per Million Word Frequency	5.4 (8.99)	4.9 (6.33)	6.4 (6.87)	.590
Number of Letters	9.1 (2.28)	9.5 (2.13)	8.7 (2.27)	.203
Number of Syllables	3.9 (1.04)	4.1 (.95)	3.8 (.95)	.172
Neighborhood Size	4 (.84)	37 (.9)	.7 (.91)	.196
Normalized Levenshtein Distance	2.7 (.52)	2.7 (.57)	2.6 (.62)	.362

Additionally, as in Soares et al. (2019) study, three types of primes were used for the self-reference manipulation: *Eu sou* [I am] (self-reference condition); *Ela é* [She is] (other-related condition); and %%%% (control condition). This control condition was chosen as in Soares et al. (2019) because in EP there is no personal pronoun that refers specifically to inanimate objects as it occurs in English with "it".

One hundred and sixty-two pseudowords were also generated for the purposes of lexical decision task. These pseudowords were generated on the basis of other negative, neutral, and positive words with similar psycholinguistic characteristics as the ones used as target words. This was done by changing all the vowels in the base words to another vowel, except in initial and final letter positions, to turn pseudowords more words-like. For instance, from the word "*cruel*" [cruel], the pseudoword "*criel*" was created, and from the word "*adaptável*" [adaptable], the pseudoword "*adoptúvel*" was created.

Three lists of materials were constructed to counterbalance the targets (words and pseudowords) across prime conditions. Participants were randomly assigned to the lists, while assuring the same number of participants per list (n = 15). Additionally, a set of three emotional words (one negative, one neutral, and one positive) were selected and three pseudowords were generated for the practice trials.

Procedure

Participants were individually tested in the soundproof booths at the Human Cognition Laboratory, School of Psychology, University of Minho. Stimulus presentation and response recording were controlled with DMDX software (Forster & Forster, 2003).

Participants were presented with a lexical decision task combined with a masked priming paradigm. In this task, participants were asked to decide as rapidly and as accurately as possible, if each of the letter strings presented at the centre of a computer screen was or not a real EP word by clicking either the 'Z' key from the computer keyboard for a word response or the 'M' key from the computer keyboard for a non-word response.

The task comprised 324 trials that were randomly presented to the participants. Each trial included a sequence of four visual events presented at the centre of the computer screen: (i) a forward mask (######) presented for 500ms; (ii) the prime presented in lowercase (Courier New, font size 14) for 50 ms; (iii) a second mask (######) presented for 16.67 ms; and, (iv) the target presented in uppercase (Courier New, font size 14). The target remained on the screen until the participant responded or until 2,500 ms had elapsed. An intertrial interval of 500 ms was used. Participants were not informed about the presence of the primes. Prior to the experimental trials, a set of practice trials was presented to familiarize participants with the task.

After the experiment, participants were asked to rate each of the target words used in the experiment on the valence and arousal affective dimensions using the SAM scales (affective rating task). This procedure was implemented to ensure that the valence manipulation used in the experiment worked for all the participants, by verifying if participant's valence ratings of words matched the ANEW-PT valence ratings (e.g., to verify that a word such as "ineficaz" [ineffective], which has a negative valence rating according to the ANEW-PT female affective norms, was rated as negative by all participants). During this phase, participants were also asked to identify the words they did not know the meaning of. The experimental session lasted for about 45 minutes per participant.

Results

Latency (RTs in ms) and accuracy (proportion of correct responses) data for word targets were analysed with linear mixed effects (lme) models using R software (Bates et al., 2011). Data from unknown words (2.39%), and from incorrect and non-responses (6.27%) were excluded from the latency analyses. Additionally, response times slower than 200 ms and 2.5 *SD*s below or above the average of each participant per experimental condition were also eliminated (2.29%). The lme on RTs were conducted with participants and items as crossed random factors with a random intercept and the two repeated-measure factors (Valence: positive|neutral|negative; and Reference: self|other|control), with a random slope per subject but not per item (see Barr et al., 2013; for further discussion, see Matuschek et al., 2017). For accuracy data, a generalized lme with logistic link function and binomial variance was used. The models were fit using the lme4 R library (Bates et al, 2011) and the lmerTest R library in order to contrast simple effects with differences of least squares means. For the effects that reached statistical significance, the second degree of freedom of the *F* statistic was approximated using the Satterthwaite's method (see Satterthwaite, 1941, and Khuri et al., 1998). The *p* values were adjusted with Hochberg's method for all post-hoc comparisons equal or below .05 (see Benjamini & Hochberg, 1995, and Hochberg, 1988 for details). The means and standard deviations of RTs and accuracy rates for positive, neutral, and negative words in each prime condition (self-related, other-related, and control) are displayed in Table 2.

Table 2

Means (SDs) of RTs and Accuracy (Acc) for Positive, Neutral, and Negative Words per Prime Condition

Type of word	Negative		Neutral		Positive	
Prime condition	RT	Acc	RT	Acc	RT	Acc
Self-Related	770.1 (245.02)	.92 (.28)	817.8 (277.80)	.92 (.28)	706.9 (197.35)	.96 (.19)
Other-Related	792.6 (268.97)	.94 (.24)	838.7 (300.43)	.92 (.27)	721.6 (213.09)	.96 (.20)
Control	784.1 (254.51)	.95 (.22)	808.6 (279.08)	.92 (.27)	724.8 (215.76)	.96 (.20)

On RT data, the model revealed a main effect of valence, $F(2, 156) = 13.0877$, $p < .001$ indicating that participants were faster at recognizing positive (717.8 ms) than negative words (782.4 ms, $p = .004$), and negative words faster than neutral words (821.7 ms, $p = .045$). A significant main effect of reference was also observed, $F(2, 6283.3) = 4.5702$, $p = .010$. This effect showed that, regardless of target valence, participants were faster at recognizing words preceded by self-related primes

(763.4 ms) than other-related primes (782.9 ms, *p* = .008), but not control primes (771.5 ms, *p* = .251). Additionally, although words preceded by control primes resulted in faster reaction times than words preceded by other-related primes, the difference did not reach statistical significance (*p* = .126). The twofold valence x reference interaction reached a marginal significance level, $F(4, 6283.2) = 2.1136$, $p = .076$. Post-hoc planned comparisons indicated that participants were significantly faster responding to neutral words preceded by control primes than by other-related primes (808.6 ms vs. 838.7 ms, *p* = .005), but not by self-related primes (808.6 ms vs. 817.8 ms, *p* = .258), and self-related primes were responded to faster than other-related primes, with a marginal statistical difference (817.8 ms vs. 838.7, *p* = .091). For negative and positive words, no statistically significant differences were observed across prime conditions. Post-hoc comparisons also revealed significant differences in each prime condition. For all prime conditions, participants were faster at recognizing positive words than negative and neutral words. In the self-related condition, participants were faster at recognizing positive words (706.9 ms) than negative words (770.1 ms, *p* = .004), and negative words faster than neutral words (817.8 ms, *p* = .035). In the other-related condition, participants were faster at recognizing positive words (721.6 ms) than negative words (792.6 ms, *p* = .006), and negative words faster than neutral words (838.7 ms, *p* = .019). In the control condition, participants were faster at recognizing positive words (724.8 ms) than negative words (792.6 ms, *p* = .015), and positive words faster than neutral words (808.6 ms, $p < .001$).

Regarding accuracy data, the results revealed a main effect of valence, χ^2 (2) = 11.8985, *p* = .003, indicating that, although accuracy rates were high for all conditions, participants were nevertheless more accurate at recognizing positive than neutral words (.96 vs. .92, *p* = .004), and positive words than negative words (.96 vs. .94, *p* = .033), though no differences were found between negative and neutral words (.94 vs. .92, *p* = .415). A main effect of reference also reached statistical significance, χ^2 (2) = 7.9737, *p* = .019, although post-hoc comparisons failed to show any significant difference across prime conditions. Nonetheless, accuracy rates were found to be lower in negative words when the presented prime was self-related, compared to other-related and control primes. The interaction effect did not reach statistical significance (*p* = .287).

In short, analyses of RTs showed main effects of valence and reference. Positive words were associated with faster responses than negative words, and negative words faster than neutral words, thus illustrating, on one hand, the advantage of emotional words over neutral words, and, on the other hand, the advantage of positive words over negative words as found in previous studies (e.g., Kousta, Vinson, & Vigliocco, 2009; Kuchinke et al., 2005). Positive words also resulted in more accurate results than both negative and neutral words, with no accuracy difference between negative and neutral words. Words preceded by self-related primes were also responded faster than words preceded by other-related primes, with no differences observed between self-related and control conditions, and control conditions with slightly faster responses than other-related conditions. These differences suggest that there is a higher processing cost for other-related primes when compared to self-related and control primes. The two-fold valence x reference interaction reached only marginal significance, indicating that for all prime conditions, positive words were responded to faster than negative and neutral words. Furthermore, the data showed that while the presentation of different primes did not have an effect in the recognition of positive or negative words, it did influence the recognition of neutral words. For neutral words, the presentation of other-related primes resulted in slower responses when compared to control primes and self-related primes, although the difference between other and self-related primes was only marginal.

Table 3.

Means (SDs) of RTs and Accuracy for the Positive, Neutral, and Negative Words Whose Scores on the Affective Rating Task Corresponded to the Valence Manipulation per Prime Condition

Type of word	Negative		Neutral		Positive	
Prime condition	RT	Acc	RT	Acc	RT	Acc
Self-Related	778.0 (272.73)	.92 (.28)	856.0 (354.7)	.91 (.29)	709.6 (200.71)	.97 (.18)
Other-Related	800.8 (286.37)	.94 (.23)	943.5 (384.46)	.93 (.26)	717.5 (212.4)	.97 (.17)
Control	775.5 (253.76)	.96 (.20)	773.9 (267.21)	.92 (.27)	718.4 (207.46)	.96 (.20)

Due to the variability of emotional ratings (e.g., a word such as "ineficaz" [ineffective], which has a negative valence rating according to the ANEW-PT female affective norms, was rated with neutral valence by some participants), we conducted a second set of lme analyses based exactly on the same factorial design, but including only participants' responses whose scores on the affective rating task performed after the LDT corresponded to the same valence as used in our target manipulation. Thus, if a given positive-valenced target word in the experiment was rated as negative or neutral by participants, these data was excluded for the second set of analyses. Responses for 956 negative, 508 neutral and 973 positive words were eliminated for this analysis. In total, 37.5% of the data was excluded for this second set of lme analyses. Table 3 displays the means and standard deviations of RTs and accuracy for positive, neutral and negative words, including only responses which corresponded in valence to the *a priori* classification.

The model revealed a main effect of valence, $F(2, 152.4) = 12.4205$, $p < .001$, with participants being faster at recognizing positive (715.2 ms) than negative words (784.6 ms, $p = .003$), and negative words faster than neutral words (860.2 ms, $p = .037$), as in the previous analysis. A significant main effect of reference was also observed, $F(2, 3341.9) = 5.6533$, $p = .004$, showing that participants were faster at recognizing words preceded by self-related primes (744.8 ms) than other-related primes (764.7 ms, $p = .018$), but not control primes (745 ms, $p = .697$). However, as in the first analysis, control primes produced faster reaction times when compared to other-related primes, this time reaching statistical significance ($p = .006$). The twofold valence x reference interaction also reached statistical significance, $F(4, 3294.4) = 2.4268$, $p = .046$. Planned post-hoc comparisons indicated that for neutral words, participants were faster when words were preceded by control primes than by other-related primes (773.9 ms vs. 943.5 ms, $p = .013$), with no differences between self-related and control primes (856.0 ms vs. 773.9 ms, $p = .283$). Unlike in the previous analysis, neutral words preceded by self-related primes were not responded to faster than words preceded by other-related primes (856.0 ms vs. 943.5 ms, $p = 0.190$). For negative words, only a marginal difference was found between self-related and other-related primes (778 ms vs. 800.8 ms, $p = .053$). For positive words, no differences were found between prime conditions as observed in the previous analysis. Post-hoc comparisons also showed significant differences in each prime condition. In the self-related condition, participants were faster at recognizing positive words (709.6 ms) than negative words (778 ms, $p = .011$), and positive words faster than neutral words (856 ms, $p < .000$). In the other-related condition, participants were faster at recognizing positive words (717.5 ms) than negative words (800.8 ms, $p < .000$), and negative words faster than neutral words (943.5 ms, $p = .009$). In the control condition, participants were faster at recognizing positive words (718.4 ms) than negative words (775.5 ms, $p = .033$), and positive words faster than neutral words (773.9 ms, $p = .033$) mimicking the pattern of results observed when all data was considered.

The analysis of response accuracy showed a main effect of valence, χ^2 (2) = 9.6377, *p* = .008, indicating significant differences between positive and negative words (.97 vs. .94, *p* = .043), and differences between positive and neutral words (.97 vs. .92, *p* = .043), with positive words producing more accurate responses. A main effect of reference was also found, χ^2 (2) = 7.1337, *p* = .028, although post-hoc comparisons failed to show any statistically significant difference across prime conditions. Even though no statistical differences were found, negative words preceded by self-related primes resulted in lower accuracy when compared to other-related and control primes. The twofold interaction did not reach statistical significance (*p* = .153).

To sum up, from this second set of analyses two main differences were found when compared to the primary analyses. Firstly, even though differences between the control condition and other-related condition were found in both analysis, this difference only reached statistical significance in the second analysis with words in the control condition eliciting faster responses than words in the other-related condition, suggesting an inhibitory effect of other-related information. Secondly, the two-fold valence x reference interaction for RTs reached statistical significance only in the second set of analysis. Post-hoc comparisons of this interaction effect revealed that in both analysis, significant differences of prime conditions were only found for neutral words, with control primes resulting in faster responses than other-related primes. Although in the first analysis, neutral words preceded by self-related primes had faster reaction times when compared to other-related primes, this was not observed in the second set of analysis. Additionally, a marginal difference was found for negative words only in the secondary analysis, with words preceded by self-related primes resulting in faster reaction times than other-related primes.

Discussion

In this study we used a lexical decision task combined with a masked priming paradigm to observe if self-referential information would affect early stages of visual word recognition. Specifically, following Soares' et al. (2019) study, we aimed to examine if similar results were found with neutral stimuli, and using a task that does not focus on the emotional content of the words, such as a lexical decision task. Careful stimulus control was ensured in order to avoid interference from nuisance variables, with special attention to arousal, since previous SRE studies have not matched emotional and neutral stimuli in arousal levels. Furthermore, only female participants were recruited to control for sex differences in emotional stimuli processing, and all adjectives were selected from Portuguese female affective norms. Although all these variables were considered, a significant portion of participant's affective ratings did not match in valence when compared to the data from the affective norms, which could potentially interfere with results. To circumvent this, a secondary set of analyses was conducted including only participants' responses whose scores on the affective rating task matched our target manipulation in valence.

The results showed that regardless of words' valence, words in the self-reference condition produced faster responses than words in the other-related condition, supporting our hypothesis that self-referential information affects early stages of visual word processing. As in Soares' et al. (2019) study, no differences were found between the self-related and the control conditions, while the other-related condition resulted in significantly slower responses than the control condition. This represents additional evidence suggesting that our cognitive system seems to take a self-referential perspective as default for processing verbal information. Although this was only found in the more rigorous analysis, words preceded by other-related primes resulted in significantly slower responses when compared to both self-related and control conditions, demonstrating the inhibitory effect of other-referential information in early stages of processing.

Surprisingly, when the impact of prime type was analysed across the types of target words, no effects were seen in emotional words (positive and negative). Although in the secondary analysis, marginal differences were found between negative words preceded by self-related and other-related primes, significant differences between prime types were only observed in neutral words, with control primes resulting in faster responses than other-related primes. A marginal difference was also found only in the first analysis, with self-related primes resulting in faster responses than other-related primes. The processing advantage of control primes over other-related primes found for neutral words further demonstrates the presence of an inhibitory effect for other-referential information. Moreover, the lack of differences between self-related and control primes also seems to suggest that for non-emotional words the cognitive system seems to assume a self-referential by default. Interestingly, the results which suggest a default self-referential perspective, previously found for emotional words in the study of Soares et al. (2019), were found only for neutral words in the present study. To explain the lack of significant prime differences for emotional (positive and negative) words, we discuss two possible explanations. Firstly, in tasks which do not require participants to focus on the emotional content of words, such as LDT, implicit self-reference effects as obtained from the masked priming paradigm might be weaker. Secondly, it is important to consider that since emotional words are processed faster than non-emotional words, it is possible that the processing of emotional words is too fast for primes to have any noticeable impact. This idea is supported by the fact that marginal differences between self-related and other-related primes emerged in negative words only in the secondary analysis, where the exclusion of answers incongruent with the stimuli manipulation caused reaction times to be slower for negative words.

The effects of emotional valence were clear in this experiment, with emotional words resulting in faster responses than neutral words. Between emotional words, positive words were responded faster and more accurately than negative words. Contrary to our expectations, no significant differences were found between positive words preceded by self-related primes and other-related primes. In fact, the difference between self-related and other-related primes was only marginally found for negative words. Although this result was unexpected, it is not new, since the study by Herbert et al. (2011) reported better memory performance for self-related than other-related unpleasant words in their study, which the authors suggested could be caused by using nouns instead of adjectives, typically used in SRE studies. Our findings contradict this explanation, since adjectives were used as stimuli. Furthermore, it was suggested that participants' depression scores and mood could also have led to such results. The authors found that participants with higher depression scores had better memory performance for self-related negative words. As such, an important limitation of the present study was the lack of control of participant's moods, depression and anxiety scores. Mood-congruency effects have been demonstrated in previous research, revealing that individuals preferentially process emotional information that is consistent with their current mood state (e.g., Fiedler et al., 2001; Mayer et al., 1995; Rusting, 1998). Depression and anxiety levels have also been shown to affect the processing of emotional words (e.g., Laeger et al. 2012; Sass et al., 2014). As such, future studies should account for these variables. It is also relevant to investigate whether a more heterogenous sample would produce different results, considering that all participants were students from the same university and mostly of the same age group. Moreover, future studies of the SRE in visual words recognition should be conducted with male participants to clarify whether these effects are independent of gender.

Current computational models of visual word recognition, such as the Dual Route Model (Coltheart et al., 2001), the Bayesian reader (Norris, 2006) or the Spatial Coding Model (Davis, 2010), do not account for the role of self-referential information, which seems to affect early stages of visual word processing. Alongside the inhibitory effect of other-referential information, the present results ask for amendments in models of visual word recognition to include the referential aspect of information as a relevant factor in visual word recognition and reading. We suggest that visual word recognition is affected by some mechanism that quickly assesses the self-relevance of the information, which in turn inhibits the visual word recognition system if the information is other-related or stimulates it if the information is self-related. Importantly, according to our data, this mechanism would only have a strong impact in visual word recognition of neutral words, and not emotional words, although it is unclear why. Further studies should be conducted to explore this proposed mechanism and clarify its effects on visual word recognition.

References

Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language, 68*(3), 255-278. https://doi.org/10.1016/j.jml.2012.11.001

Bates, D., Maechler, M., & Bolker, B. (2011). lme4: Linear mixed-effects models using S4 classes [Computer software]. (R package version 0.999375-42). http://CRAN.Rproject.org/package=lme4

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: The self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry, 25*(1), 49-59. https://doi.org/10.1016/0005-7916(94)90063-9

Chen, A., Weng, X., Yuan, J., Lei, X., Qiu, J., Yao, D., & Li, H. (2008). The temporal features of self-referential processing evoked by chinese handwriting. *Journal of Cognitive Neuroscience, 20*(5), 816-827. https://doi.org/10.1162/jocn.2008.20505

Chen, Y., Chen, Y., Zhong, Y., Zhong, Y., Zhou, H., Zhou, H., Zhang, S., Zhang, S., Tan, Q., Tan, Q., Fan, W., & Fan, W. (2014). Evidence for implicit self-positivity bias: An event-related brain potential study. *Experimental Brain Research, 232*(3), 985-994. https://doi.org/10.1007/s00221-013-3810-z

Coltheart, M., Rastle, K., Perry, C., Langdon, R., & Ziegler, J. (2001). DRC: A dual route cascaded model of visual word recognition and reading aloud. *Psychological Review, 108*(1), 204-256. https://doi.org/10.1037//0033-295X.108.1.204

Davis, C. J. (2010). The spatial coding model of visual word identification. *Psychological Review, 117*(3), 713-758. https://doi.org/10.1037/a0019738

Durbin, K. A., Mitchell, K. J., & Johnson, M. K. (2017). Source memory that encoding was self-referential: The influence of stimulus characteristics. *Memory, 25*(9), 1191-1200. https://doi.org/10.1080/09658211.2017.1282517

Craik, F. I. M., Moroz, T. M., Moscovitch, M., Stuss, D. T., Winocur, G., Tulving, E., & Kapur, S. (1999). In search of the self: A positron emission tomography study. *Psychological Science, 10*(1), 26-34. https://doi.org/10.1111/1467-9280.00102

Ferré, P. (2003). Effects of level of processing on memory for affectively valenced words. *Cognition & Emotion, 17*(6), 859-880. https://doi.org/10.1080/02699930302309

Ferré, P., Fraga, I., Comesaña, M., & Sánchez-Casas, R. (2015). Memory for emotional words: The role of semantic relatedness, encoding task and affective valence. *Cognition and Emotion, 29*(8), 1401-1410. https://doi.org/10.1080/02699931.2014.982515

Fiedler, K., Nickel, S., Muehlfriedel, T., & Unkelbach, C. (2001). Is mood congruency an effect of genuine memory or response bias? *Journal of Experimental Social Psychology, 37*(3), 201-214. https://doi.org/10.1006/jesp.2000.1442

Fields, E. C., & Kuperberg, G. R. (2012). It's all about you: An ERP study of emotion and self-relevance in discourse. *NeuroImage, 62*(1), 562-574. https://doi.org/10.1016/j.neuroimage.2012.05.003

Fields, E. C., & Kuperberg, G. R. (2015). Dynamic effects of self-relevance and task on the neural processing of emotional words in context. *Frontiers in Psychology, 6*, 2003. https://doi.org/10.3389/fpsyg.2015.02003

Forster, K., & Forster, J. (2003). DMDX: A windows display program with millisecond accuracy. *Behavior Research Methods, Instruments, & Computers, 35*(1), 116-124. https://doi.org/10.3758/BF03195503

Herbert, C., Herbert, B. M., & Pauli, P. (2011). Emotional self-reference: Brain structures involved in the processing of words describing one's own emotions. *Neuropsychologia, 49*(10), 2947-2956. https://doi.org/10.1016/j.neuropsychologia.2011.06.026

Johnson, S. C., Baxter, L. C., Wilder, L. S., Pipe, J. G., Heiserman, J. E., & Prigatano, G. P. (2002). Neural correlates of self-reflection. *Brain: A Journal of Neurology, 125*(Pt 8), 1808-1814. https://doi.org/10.1093/brain/awf181

Kelley, W. M., Macrae, C. N., Wyland, C. L., Caglar, S., Inati, S., & Heatherton, T. F. (2002). Finding the self? an event-related fMRI study. *Journal of Cognitive Neuroscience, 14*(5), 785-794. https://doi.org/10.1162/08989290260138672

Klein, F., Iffland, B., Schindler, S., Wabnitz, P., & Neuner, F. (2015). This person is saying bad things about you: The influence of physically and socially threatening context information on the processing of inherently neutral faces. *Cognitive, Affective, & Behavioral Neuroscience, 15*(4), 736-748. https://doi.org/10.3758/s13415-015-0361-8

Kousta, S. T., Vinson, D. P., & Vigliocco, G. (2009). Emotion words, regardless of polarity, have a processing advantage over neutral words. *Cognition*, *112*(3), 473-481. https://doi.org/10.1016/j.cognition.2009.06.007

Kret, M. E., & De Gelder, B. (2012). A review on sex differences in processing emotional signals. *Neuropsychologia, 50*(7), 1211-1221. https://doi.org/10.1016/j.neuropsychologia.2011.12.022

Kuchinke, L., Jacobs, A. M., Grubich, C., Vo, M. L. H., Conrad, M., & Herrmann, M. (2005). Incidental effects of emotional valence in single word processing: an fMRI study. *Neuroimage, 28*(4), 1022-1032. https://doi.org/10.1016/j.neuroimage.2005.06.050

Laeger, I., Dobel, C., Dannlowski, U., Kugel, H., Grotegerd, D., Kissler, J., Keuper, K., Eden, A., Zwitserlood, P., & Zwanzger, P. (2012). Amygdala responsiveness to emotional words is modulated by subclinical anxiety and depression. *Behavioural Brain Research, 233*(2), 508-516. https://doi.org/10.1016/j.bbr.2012.05.036

Lithari, C., Lithari, C., Frantzidis, C., Frantzidis, C., Papadelis, C., Papadelis, C., Vivas, A., Vivas, A., Klados, M., Klados, M., Kourtidou-Papadeli, C., Kourtidou-Papadeli, C., Pappas, C., Pappas, C., Ioannides, A., Ioannides, A., Bamidis, P., & Bamidis, P. (2010). Are females more responsive to emotional stimuli? A neurophysiological study across arousal and valence dimensions. *Brain Topography, 23*(1), 27-40. https://doi.org/10.1007/s10548-009-0130-5

Mayer, J. D., McCormick, L. J., & Strong, S. E. (1995). Mood-congruent memory and natural mood: New evidence. *Personality and Social Psychology Bulletin, 21*(7), 736-746. https://doi.org/10.1177/0146167295217008

Norris, D. (2006). The bayesian reader: Explaining word recognition as an optimal bayesian decision process. *Psychological Review, 113*(2), 327-357. https://search.proquest.com/docview/67908041

Pinheiro, A. P., Rezaii, N., Nestor, P. G., Rauber, A., Spencer, K. M., & Niznikiewicz, M. (2016). Did you or I say pretty, rude or brief? an ERP study of the effects of speaker's identity on emotional word processing. *Brain and Language, 153-154*, 38-49. https://doi.org/10.1016/j.bandl.2015.12.003

Pinheiro, A. P., Rezaii, N., Rauber, A., Nestor, P. G., Spencer, K. M., & Niznikiewicz, M. (2017). Emotional self–other voice processing in schizophrenia and its relationship with hallucinations: ERP evidence. *Psychophysiology, 54*(9), 1252-1265. https://doi.org/10.1111/psyp.12880

Rumelhart, D. E., & McClelland, J. L. (1982). An interactive activation model of context effects in letter perception: II. the contextual enhancement effect and some tests and extensions of the model. *Psychological Review, 89*(1), 60-94. https://doi.org/10.1037/0033-295X.89.1.60

Rusting, C. L. (1998). Personality, mood, and cognitive processing of emotional information. *Psychological Bulletin, 124*(2), 165-196. https://doi.org/10.1037/0033-2909.124.2.165

Sass, K., Habel, U., Kellermann, T., Mathiak, K., Gauggel, S., & Kircher, T. (2014). The influence of positive and negative emotional associations on semantic processing in depression: An fMRI study. *Human Brain Mapping, 35*(2), 471-482. https://doi.org/10.1002/hbm.22186

Soares, A. P., Macedo, J., Oliveira, H. M., Lages, A., Hernández-Cabrera, J., & Pinheiro, A. P. (2019). Self-reference is a fast-acting automatic mechanism on emotional word processing: Evidence from a masked priming affective categorisation task. *Journal of Cognitive Psychology, 31*(3), 317-325. https://doi.org/10.1080/20445911.2019.1599003

Soares, A. P., Iriarte, A., Almeida, J. J., Simões, A., Costa, A., França, P., Machado, J., & Comesaña, M. (2014). *Procura-PALavras (P-pal): Uma nova medida de frequência lexical do português europeu contemporâneo*. Curso de Pós-Graduação em Psicologia da Universidade Federal do Rio Grande do Sul. https://doi.org/10.1590/S0102-79722014000100013

Soares, A., Iriarte, Á, de Almeida, J., Simões, A., Costa, A., Machado, J., França, P., Comesaña, M., Rauber, A., Rato, A., & Perea, M. (2018). Procura-PALavras (P-PAL): A web-based interface for a new european portuguese lexical database. *Behavior Research Methods, 50*(4), 1461-1481. https://doi.org/10.3758/s13428-018-1058-z

Soares, A., Pinheiro, A., Costa, A., Frade, C., Comesaña, M., & Pureza, R. (2013). Affective auditory stimuli: Adaptation of the international affective digitized sounds (IADS-2) for european portuguese. *Behavior Research Methods, 45*(4), 1168-1181. https://doi.org/10.3758/s13428-012-0310-1

Soares, A., Soares, A., Comesaña, M., Comesaña, M., Pinheiro, A., Pinheiro, A., Simões, A., Simões, A., Frade, C., & Frade, C. (2012). The adaptation of the affective norms for english words (ANEW) for european portuguese. *Behavior Research Methods, 44*(1), 256-269. https://doi.org/10.3758/s13428-011-0131-7

Soares, A., Soares, A., Pinheiro, A., Pinheiro, A., Costa, A., Costa, A., Frade, C., Frade, C., Comesaña, M., Comesaña, M., Pureza, R., & Pureza, R. (2015). Adaptation of the international affective picture system (IAPS) for european portuguese. *Behavior Research Methods, 47*(4), 1159-1177. https://doi.org/10.3758/s13428-014-0535-2

Wang, L. Y., Zhang, M., & Sui, J. (2011). Self-face advantage benefits from a visual self-reference frame. *Acta Psychologica Sinica*, *43*(05), 494-499.

Watson, L. A., Dritschel, B., Obonsawin, M. C., & Jentzsch, I. (2007). Seeing yourself in a positive light: Brain correlates of the self-positivity bias. *Brain Research, 1152*, 106-110. https://doi.org/10.1016/j.brainres.2007.03.049

Weis, P. P., & Herbert, C. (2017). Bodily reactions to emotional words referring to own versus other people's emotions. *Frontiers in Psychology, 8*, 1277. https://doi.org/10.3389/fpsyg.2017.01277

Yang, L., Truong, L., Fuss, S., & Bislimovic, S. (2012). The effects of ageing and divided attention on the self-reference effect in emotional memory: Spontaneous or effortful mnemonic benefits? *Memory, 20*(6), 596-607. https://doi.org/10.1080/09658211.2012.690040

Yoshimura, S., Ueda, K., Suzuki, S., Onoda, K., Okamoto, Y., & Yamawaki, S. (2009). Self-referential processing of negative stimuli within the ventral anterior cingulate gyrus and right amygdala. *Brain and Cognition, 69*(1), 218-225. https://doi.org/10.1016/j.bandc.2008.07.010

Universidade do Minho

SECSH

Subcomissão de Ética para as Ciências Sociais e Humanas

Identificação do documento: SECSH – 003/2014

Título do projeto: *Reconhecimento visual de palavras do Português Europeu*

Investigador(a) responsável: Doutora Ana Paula de Carvalho Soares, Escola de Psicologia, Universidade do Minho

Outros Investigadores: Doutora Montserrat Comesaña Vila, Centro de Investigação em Psicologia (CIPsi), Universidade do Minho; Ana Costa, Centro de Investigação em Psicologia (CIPsi), Universidade do Minho

Subunidade orgânica: Escola de Psicologia

PARECER

A Subcomissão de Ética para as Ciências Sociais e Humanas (SECSH) analisou o processo relativo ao projeto intitulado *"Reconhecimento visual de palavras do Português Europeu"*.

Os documentos apresentados revelam que o projeto obedece aos requisitos exigidos para as boas práticas na experimentação com humanos, em conformidade com o guião para submissão de processos a apreciar pela Subcomissão de Ética para as Ciências Sociais e Humanas da Universidade do Minho.

Face ao exposto, a SECSH nada tem a opor à realização do projeto.

Braga, 30 de julho de 2014.

O Presidente

(Paulo Manuel Pinto Pereira Almeida Machado)