Emotion and concreteness effects when learning novel concepts in the native language

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The aim of the present study was to test the proposal of Kousta et al. (2011), according to which abstract words are more affectively loaded than concrete words. To this end, we focused on the acquisition of novel concepts by means of an intentional learning experiment in which participants had to learn a set of 40 novel concepts in Spanish (definitions) associated with novel word forms (pseudowords). Concreteness (concrete vs. abstract concepts) and emotionality (neutral vs. negative concepts) were orthogonally manipulated. Acquisition was assessed through a recognition task in which participants were asked to match the novel word forms with their definitions. Results showed that concrete concepts were acquired better than abstract concepts. Importantly, the concreteness advantage disappeared when the content of the concept was negative. Hence, emotional (negative) content facilitated the acquisition of abstract concepts, but not of concrete concepts, giving support to the proposal of Kousta et al. (2011).

Concrete words are those that have a referent in the external world we can directly perceive with our senses. By contrast, abstract words lack any such external referent. Psycholinguistic research has consistently shown differences in the processing of these two types of words (e.g., Binder et al., 2005). Several theoretical frameworks have sought to account for such differences (Paivio, 1971; Schwanenflugel, 1991). Our principal interest here focuses on a proposal put forward by Kousta et al. (2011), who argue that the main difference between these two types of words relates to the type of information that receives more weight in their respective representations.

Whereas sensory-motor information is central to the representation of concrete words, affective information has more weight in the representation of abstract words.

Plenty of evidence in favor of this proposal has surfaced in recent years. For instance, Kousta et al. (2011) and Vigliocco et al. (2014) reported a strong relation between concreteness ratings and affective ratings, suggesting that abstract words are more affectively loaded than concrete words. Other authors have tested one specific prediction from Kousta et al.'s proposal, namely that emotional content would modulate the processing of abstract words to a greater extent than the processing of concrete words. In the same vein, emotional content has been shown to affect the processing of concrete and abstract words differently, and in different tasks, such as naming (e.g., Moffat et al., 2015), semantic categorization (e.g., Newcombe et al., 2012), and lexical decision tasks (e.g., Ferré et al., 2018). Such modulation has been demonstrated not only at a behavioral level, but also at a neural level, both with electrophysiological recordings (event related potentials, ERPs; e.g., Hinojosa et al., 2014) and spatial neuroimaging techniques (Vigliocco et al., 2014). It should be noted, however, that research in this area has yielded mixed findings and that not all studies have found an interaction between emotional content and concreteness. Also, among those studies that have found such an interaction, some have observed that, contrary to Kousta et al.'s proposal, emotional content modulates the processing of concrete words to a greater extent than the processing of abstract words (see Palazova, 2014, for a review).

Another aspect of Kousta et al.'s proposal, however, has received far less attention. These authors also posited that sensory-motor information and emotional information have a differential role during the acquisition of concrete and abstract words. That is, while words referring to concrete concepts are acquired by the association of the word form with the sensory-motor experience, abstract word forms are instead associated to emotional experiences. A prediction that can be derived from such an account, then, is that emotional content would play a more significant role during the acquisition of novel abstract concepts than in the acquisition of concrete concepts.

In this study, we aimed to test this very prediction. Only a few studies have thus far examined the modulation of the effects of concreteness on emotional content during vocabulary learning, and all of these have focused on the acquisition of words in a foreign language. Altarriba and Basnight-Brown (2011), for instance, asked native speakers of English to learn the Spanish translations of concrete, abstract, and emotion words (i.e., those referring to an emotional state). However, the effects of emotional content

and concreteness were not completely disentangled in this study, given that some of the words included in the abstract set were also affectively charged. This limitation was overcome by Ferré et al. (2015), who manipulated orthogonally concreteness and emotional content in a novel vocabulary acquisition experiment. In that study, native speakers of Spanish learnt a set of Basque words which varied in their degree of concreteness as well as in their emotional content. The authors found an interaction between both variables, which indicated that the facilitative effect of emotional (mainly negative) content on vocabulary acquisition was restricted to abstract words, in agreement with Kousta et al.'s proposal. To our knowledge, this issue has never been investigated in relation to the acquisition of new concepts in a native language.

Arguably, the processes involved in learning new words in a foreign language are not the same as in one's native language. Indeed, in the former case, speakers can rely on the lexical associations between a novel foreign word (i.e., the word form) and its equivalent in the first language, which would in turn be associated to existing concepts (Kroll & Stewart, 1994). In contrast, learning new words in a native language does not entail an association between novel word forms and existing concepts, but rather the creation of new concepts themselves. Investigating the variables that modulate new vocabulary acquisition in the native language is a relevant issue, in that speakers continue to learn new words throughout their lives. The studies in this field have used distinct approaches. Some of them have relied on intentional learning, where participants are asked to learn new word forms that are associated to particular meanings, provided in the form of definitions (e.g., Palmer et al., 2013; Tamminen & Gaskell, 2013). Others have relied on implicit learning, where the meanings of the presented words are derived from the context and with no explicit intention to learn them (e.g., Lazaridou et al., 2017). Although some of these studies have examined the role of some lexico-semantic variables in novel word learning (e.g., concreteness, Palmer et al., 2013), the possible interaction between concreteness and emotional content has not yet been addressed.

The aim of the present study was to test whether emotional content facilitates the acquisition of abstract concepts in one's native language to a greater extent than that of concrete concepts. To this end, we taught a set of novel concepts to Spanish speakers by asking them to associate novel word forms (pseudowords) to specific definitions for each. Concreteness and emotional content were manipulated, so that half of the concepts had a concrete meaning and the other half an abstract meaning. For both concrete and abstract concepts, half had negative content and the other half a neutral content. The reason we decided to focus on negative words, to the exclusion

of positive words, was twofold: 1) we did not want to overload participants' memory with a large set of words, and 2) negative words showed a clearer effect in Ferré et al. (2015) than did positive words.

As a first task, participants rated the emotional content (valence) of the novel word forms (i.e., the pseudowords). At this stage, they were only able to rely on the form of the pseudowords themselves and the intended meanings were not presented yet. Participants then performed a novel word learning task in which pseudowords were associated to their intended meaning. After this, participants repeated the valence rating task. This task was included in order to probe whether participants had acquired the affective meaning of the novel concepts. If this were the case, ratings would be expected to change in comparison to a participant's initial rating of the pseudowords. Finally, participants carried out a recognition task in which they were asked to match the novel words to their definitions. If emotional content acts as a bootstrapping mechanism to help learners in the acquisition of abstract words, we would expect a learning advantage for emotional words in comparison to neutral words. Such an advantage would either be restricted to abstract words or it would have a greater magnitude for abstract words than for concrete words (i.e., an interaction between emotional content and concreteness should be observed).

METHOD

Participants. Forty-four (39 females) undergraduate psychology students (M_{age} = 19.93, *SD* = 1.87, range: 18-26 years) from the Universitat Rovira i Virgili (Tarragona, Spain) took part in the experiment voluntarily and received academic credits for their participation. All gave their written informed consent before beginning the experiment.

Design and Materials. The study used a 2x2 design. The factors involved were *concreteness* (concrete words and abstract words) and *emotionality* (negative words and neutral words).

As part of a larger study, 400 concepts were collected. Some of these were extremely rare Spanish and English words taken from a number of dictionaries; others were very technical words drawn from a range of disciplines; other words existed in languages other than Spanish; and finally, some words were invented. Definitions for all these concepts were established either by adapting the existing definitions or by creating novel ones (for the invented words). All definitions were established by the first author as a means of maintaining the length and wording style as uniform as possible. The overall pool of concepts included definitions conveying

negative, neutral, and positive meanings. However, and as mentioned, in the present study we focused on negative and neutral concepts.

Several rating tasks were carried out in order to obtain the concreteness, valence, arousal, and plausibility/surprise values for the definitions of the 400 concepts. Ratings of concreteness and emotionality (i.e., valence and arousal) were required due to the aims of the study. Plausibility/surprise was assessed because of the different sources for the concepts we included in the study. After all, the existing but uncommon concepts may have appeared to be more plausible than the invented words/concepts precisely because they were already part of the language. Hence, we needed to be sure that all concepts were considered equally plausible and/or surprising by speakers.

To obtain these ratings, a series of questionnaires were made for each variable (concreteness, valence, arousal, and surprise). Valence and arousal were assessed with the Self-Assessment Manikin (SAM; Bradley & Lang, 1994), where we included verbal labels. For valence, values ranged from 1 (completely sad) to 9 (completely happy). For arousal, values ranged from 1 (completely relaxed) to 9 (completely excited). Concreteness was assessed with a 1 (very abstract) to 7 (very concrete) Likert scale, as was surprise (1 = not surprised at all, 7 = very surprised). The 400 definitions in the pool were distributed in several versions of each questionnaire. The number of definitions included in each version ranged from 44 to 55. Some of these versions were administered online using TestMaker (Haro, 2012) and others on paper. Participants who performed the rating tasks came from the same population as the ones who did the experiment, although none of them participated in the experiment. Overall, we collected 534 ratings from 32 questionnaires (some participants took more than one questionnaire, but always assessing different variables and different items). Participants were between 18 and 56 years old (M_{age} = 21.55, SD = 5.83) and there were 85.12% of females. On average, each questionnaire was completed by 16.69 participants (*SD* = 1.51; range [15-20]). The full set of definitions, together with their values in the relevant variables, is available at the following URL: https://figshare.com/s/1ccb5cfbf9cdd4e44fb6. In this file, the experimental stimuli selected for the present study are highlighted in bold. The final stimulus set for the study consisted of 40 concept definitions (see Table 1 for examples).

Table 1. Examples of concept definitions for each experimental condition

Valence	Concreteness	Example
Neutral	Concrete	Land devoted to the growth of corn and sometimes other similar seeds.
Negative	Concrete	A fissure in the flesh made by certain insects to incubate their eggs in it.
Neutral	Abstract	Field of research seeking to apply physical theories to economic theory.
Negative	Abstract	Tendency to despise a person's opinions because that person is younger.

Half of the concepts were concrete concepts according to the ratings obtained from the questionnaires (they had a concreteness rating equal to or higher than 5), and the other half were abstract concepts (concreteness rating equal to or lower than 3). Furthermore, half of the concepts in the concrete and abstract conditions had a negative affective value (they had a valence value lower than 4 and an arousal value higher than 6) and the other half had a neutral affective value (their valence value ranged from 4 to 6 and they had an arousal value equal or lower than 6; see Table 2 for the characteristics of the concept definitions).

Table 2. Characteristics of the concept definitions (standard deviations in parentheses)

	Neutral Concrete	Negative Concrete	Neutral Abstract	Negative Abstract
Valence	5.02 (0.41)	2.90 (0.84)	4.89 (0.39)	2.62 (0.75)
Arousal	4.08 (0.60)	6.82 (0.63)	4.23 (0.85)	6.93 (0.41)
Concreteness	5.77 (0.59)	5.67 (0.49)	2.73 (0.29)	2.57 (0.33)
Surprise	3.79 (0.57)	4.09 (0.65)	3.88 (0.66)	4.09 (0.40)
Length (in words)	12.00 (1.49)	12.10 (2.23)	12.00 (1.76)	12.70 (1.57)
Length (in letters)	60.10 (6.97)	63.00 (8.82)	64.70 (7.15)	62.90 (7.31)

To check that conditions differed only in the manipulated variables we ran several ANOVAs with concreteness (concrete vs. abstract) and emotionality (neutral vs. negative) as between-group factors. The dependent variables were the following: valence, arousal, concreteness, surprise, and length of the definitions (number of words and number of letters). A significant emotionality effect was observed for valence ratings, $F(1, 36) = 121.99$, p < .001, and arousal ratings, $F(1, 36) = 178.26$, p < .001.

Furthermore, a main effect of concreteness was observed in the analysis of concreteness ratings, $F(1, 36) = 485.24$, p < .001. No other main effects or interactions were significant (all *p*s > .178).

Finally, we created the word forms of the concepts to be learned (i.e., the novel words). To this end, we generated 40 pseudowords with Wuggy (Keuleers & Brysbaert, 2010). All of these were legal sequences of letters in Spanish. They were divided into four sets of 10 words, maintaining the same length across sets exactly. Each set was paired with the 10 definitions of an experimental condition. We created four experimental files to counterbalance the experimental condition to which each set of novel words was paired.

Procedure. Participants were randomly assigned to one of the four experimental files. They were asked to learn 40 existing rare words in Spanish. The experiment included five tasks (see Figure 1). All of them were self-administered and were presented using SR Research Ltd's Experiment Builder software in a 1680x1050 resolution display. The five tasks were carried out one immediately after the other.
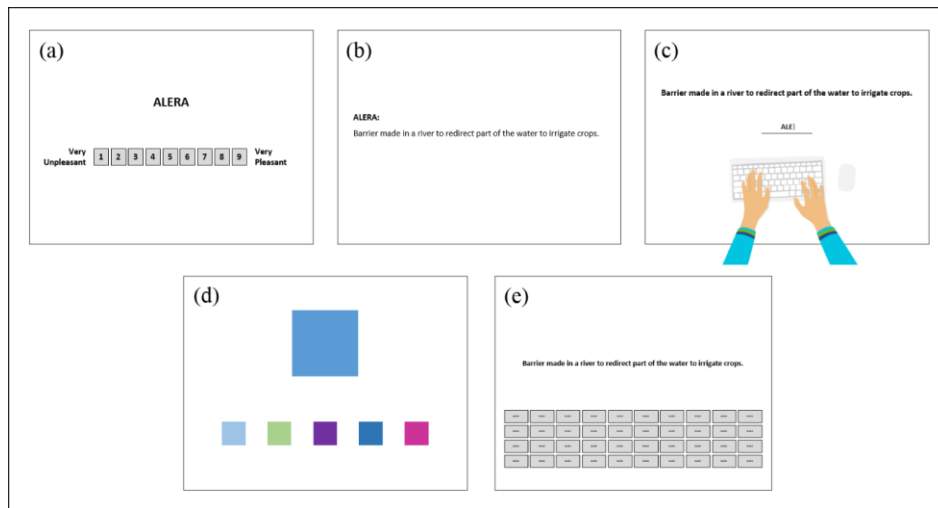

Figure 1. Layout of the different tasks in the experimental procedure (see text for details).

The order was as follows:

1. Pre-acquisition assessment of the valence of the novel words. Participants were asked to rate the valence of the 40 novel words on a 9-point Likert scale, ranging from 1 (very unpleasant) to 9 (very pleasant). The novel words were presented randomly to each participant, one per screen. Participants were encouraged to rate the novel words according to their

sound. Ratings were made by clicking one of the nine buttons that appeared below the novel word (Figure 1a).

2. Acquisition task. The acquisition task had two phases:

Phase 1: Participants were presented with the 40 novel words and their corresponding definitions. The experimental items were divided into five sets of eight items. There were two items of each experimental condition in each set. The task was divided into two parts. In the first part, the novel word appeared in uppercase on one line, with its definition in lowercase on the line below (Figure 1b). The screen was white and the font black. Participants were instructed to try to remember both the word and its definition. The item remained on the screen for ten seconds. This sequence was repeated until the eight words of that set had been presented. In the second part of this phase a definition appeared in the middle of the screen (lowercase in black font, white background) and participants were asked to type the associated novel word (Figure 1c). After typing the word and pressing the 'enter' key, participants were given feedback about what the expected word was. When all eight items in the set had been completed, the same procedure was repeated for the four remaining sets.

Phase 2: Participants were presented with the 40 words and their corresponding definitions again, one after another, in random order. The procedure was very similar to the one followed in the first part of Acquisition Phase 1, although in this case the word first appeared alone, and the definition appeared five seconds later (Figure 1b). Participants were asked to use those five seconds to try to mentally remember the definition associated to the word. When the definition appeared, the whole item remained on the screen for five additional seconds. There was a 1,500 millisecond interval between stimuli.

3. Distracting task. Participants performed a non-verbal distracting task. Each trial consisted of selecting the figure, from a set of five figures, that best matched the color of a large target figure. Trials followed one another until three minutes had elapsed (Figure 1d).

4. Post-acquisition assessment of the valence of the novel words. This task was broadly the same as Task 1, the only difference being that participants were encouraged to rate the novel words according to their meanings (Figure 1a).

5. Recognition task. Participants were presented with the 40 definitions of the acquisition phase. Each definition was presented in the middle of the screen. Forty response buttons, each containing one of the 40 novel words, were evenly spread out in four rows of ten buttons at the bottom of the screen (Figure 1e). Participants were asked to select the word that best

matched each definition. After each response, a new definition appeared until all 40 definitions had been presented. The definitions appeared randomly, with the restriction that no more than two definitions of the same condition were presented successively. If participants were not sure about the response, they were encouraged to guess.

RESULTS

Valence ratings. In this analysis we only considered, for each participant, the novel words that had been correctly paired with their definitions in the recognition task, as they were the only ones whose meaning had been learned.

A within-participants ANOVA on pre-acquisition valence ratings (see Table 3) did not reveal any main significant effect either of concreteness, $F(1,40) = 0.70$, $p = .408$, $\eta_p^2 = 0.02$, $MSE = 0.94$, or of emotionality, $F(1,40) = 0.10$, $p = .759$, $\eta_p^2 = 0.002$, $MSE = 0.57$. The interaction was also non-significant: $F(1,40) = 0.10$, $p = .758$, $\eta_p^2 = 0.002$, $MSE = 0.47$. However, post-acquisition valence ratings revealed a significant effect of emotionality, $F(1,40) = 45.87$, $p < .001$, $\eta_p^2 = 0.53$, $MSE = 1.60$, where neutral words were rated as more positive (M = 5.65, $SD = 0.87$) than negative words (M = 4.31, $SD = 1.03$). Neither the effect of concreteness, $F(1,40) = 0.20$, $p = .658$, $\eta_p^2 = 0.005$, $MSE = 1.16$, nor the interaction between both factors, $F(1,40) = 0.85$, $p = .363$, $\eta_p^2 = 0.02$, $MSE = 0.81$, reached statistical significance. Furthermore, the comparison between pre-acquisition ratings and post-acquisition ratings yielded significant differences only for emotionality, $F(1,40) = 31.58$, $p < .001$, $\eta_p^2 = 0.44$, $MSE = 2.45$, (all other $ps > .334$), showing that neutral words were considered as more positive in the second assessment (M = 0.78, $SD = 0.93$) than in the first, and that negative words were considered as more negative in the second assessment (M = -0.59, $SD = 1.38$) than in the first.

Table 3. Mean valence ratings of the words correctly recognized (standard deviations in parentheses).

Condition	Pre-acquisition	Post-acquisition	Post-Pre Difference
Neutral concrete	4.79 (0.95)	5.68 (0.97)	0.89
Negative concrete	4.86 (0.95)	4.21 (1.19)	-0.65
Neutral abstract	4.95 (1.19)	5.62 (1.15)	0.67
Negative abstract	4.95 (1.03)	4.41 (1.37)	-0.54

Recognition task. The results of this task are displayed in Table 4 (see also Figure 2). The mean global percentage of recognition was 50.06% (*SD* = 21.00, range [17.50-90.00]). A within-participants ANOVA revealed a concreteness effect, $F(1,43) = 24.62$, $p < .001$, $\eta_p^2 = 0.36$, $MSE = 166.74$, showing that concrete novel words (M = 54.89, *SD* = 21.95) were better recognized (i.e., better matched with their definitions) than abstract ones (M = 45.23, *SD* = 21.99). On the other hand, the effect of emotionality was not significant, $F(1,43) = 3.04$, $p = .088$, $\eta_p^2 = 0.07$, $MSE = 116.74$. However, the interaction between the two factors reached statistical significance: $F(1,43) = 18.94$, $p < .001$, $\eta_p^2 = 0.31$, $MSE = 119.07$. Paired *t*-tests showed that, in the concrete domain, there were no differences between negative words and neutral words, $t(43) = 1.72$, $p = .092$. By contrast, abstract negative novel words were better recognized than neutral ones, $t(43) = 4.75$, $p < .001$. On the other hand, while neutral concrete words were better recognized than neutral abstract words, $t(43) = 6.93$, $p < .001$, there were no significant differences between negative concrete words and their abstract counterparts, $t(43) = 0.94$, $p = .353$.

Table 4. Mean percentage of correct recognition per condition (standard deviations in parentheses).

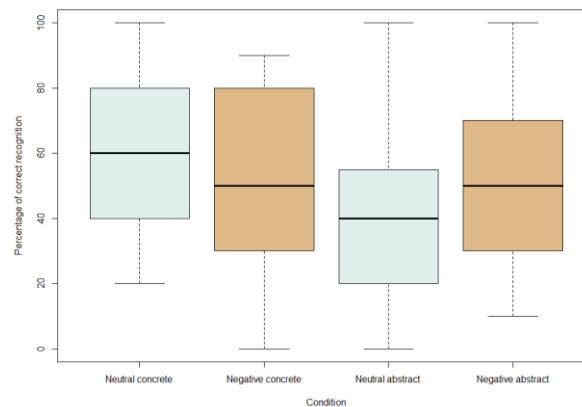| Condition	% recognition
Neutral concrete	57.05 (22.47)
Negative concrete	52.73 (24.43)
Neutral abstract	40.23 (21.73)
Negative abstract	50.23 (24.35)

Figure 2. Box-plot showing the percentage of correct recognition per condition.

DISCUSSION

This study has sought to test one specific prediction that arises from the account presented in Kousta et al. (2011), according to which emotional content would facilitate the acquisition of abstract concepts to a greater extent than it would facilitate the acquisition of concrete concepts. To this end, Spanish speakers learnt a set of 40 novel concepts whose meanings differed in concreteness and emotional content. Furthermore, two valence rating tasks were included, one before acquisition and one after. A comparison of the two valence rating tasks showed a change in valence values, suggesting that the affective meaning of the novel word forms had been acquired. Moreover, the results of the learning task revealed an advantage for emotional (negative) abstract concepts in comparison to their neutral counterparts. Such an advantage was not found for emotional concrete concepts.

Concrete words have been shown to be easier to learn than abstract words in several novel vocabulary acquisition studies (e.g., Kaushanskaya & Rechtzigel, 2012). A possible reason for this is the association of the former with sensory-motor experiences, as the lack of such experiences might hinder the learning of abstract words. However, according to the prediction arising from the proposal of Kousta and co-workers (2011), the acquisition of abstract words might take advantage of their higher emotional content. In this way, emotional content would be associated with novel word forms during learning, diminishing or even nullifying the traditional disadvantage of abstract words (e.g., de Groot & Keijzer, 2000; Kaushanskaya & Rechtzigel, 2012; Palmer et al., 2013). This is in line with the results observed in the present study. Abstract negative words were not only learned better than abstract neutral words, but importantly, they were learned to the same extent that concrete negative words are learned. Hence, the concreteness advantage disappeared in emotional words.

Kousta and co-workers (Kousta et al., 2011; Vigliocco et al., 2014) argued that the essential difference between concrete and abstract words lies on the kind of information that has more weight in their respective representations: Sensory-motor information would be central to the representation of concrete words while affective information would have more weight in the representation of abstract words. Evidence in favor of this proposal has come from distinct lines of research: correlational studies have demonstrated a strong relation between concreteness ratings and affective ratings (Kousta et al., 2011; Vigliocco et al., 2014) and word comprehension studies have shown that emotional content can affect the processing of concrete and abstract words differently (Ferré et al., 2018; Hinojosa et al., 2014; Moffat et al., 2015; Newcombe et al., 2012). This is the first time that

Kousta et al.'s (2011) proposal has been tested in the context of a novel word learning paradigm in the native language of participants, and this has allowed us to test a prediction that has received far less attention. The findings obtained here are relevant because they show that the facilitative effect of emotional content is observed not only with well-known and consolidated abstract words, but also during the acquisition of new words. Furthermore, a practical application of the present findings is that the learning of abstract words might be facilitated by attaching emotional content to them, even when their meaning is not emotional.

The present results were obtained with an intentional learning experiment conducted in the laboratory, where the acquisition of new words was assessed through a recognition task performed shortly after acquisition had taken place. Since this is a very specific situation, the study has some limitations that need to be addressed in future research. First, the average performance of the participants in the recognition task was not very high (around 50% of the novel words). In fact, performance was quite variable across participants, with some of them recognizing around 90% of the words while others only recognized 20% of the words[1]. Future studies should be conducted with a more extended acquisition phase that lead to a higher and probably more uniform level of performance. Second, the proposal of Kousta et al. (2011) should be tested in more natural situations, such as when speakers learn new words implicitly by extracting their meaning from context (e.g., when reading a book). Third, the strength of the acquired knowledge needs to be assessed with other tasks. In this study, acquisition was assessed with a recognition task (i.e., participants were asked to recognize the words among several options), which can be performed even when the speakers have only a shallow lexical knowledge of the novel words. In contrast, recalling a word requires a deeper lexical knowledge (Laufer et al., 2004; Laufer & Goldstein, 2004). Therefore, in order to know the extent to which the new words and their meanings have been actually incorporated to the mental lexicon, speakers should be presented with the definitions and asked to produce the words (i.e., a recall task). The use of such a task immediately after learning and after a period of time would allow researchers to draw

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[1]It should be noted that, although the level of performance of some participants was quite low, we did not exclude any of them for that reason, as our aim was not to study if the novel words behave as familiar words and if they are integrated in the mental lexicon (in which case it would have been necessary to establish a minimum performance threshold, to be sure that the words had been already acquired). Rather, our aim was to examine whether affective content enhances novel word acquisition *per se*. Therefore, as our dependent variable was the percentage of correctly recognized words, the comparison between conditions within the same participant's responses can be made regardless of the level of performance achieved.

stronger conclusions regarding the modulation of abstract word acquisition by emotional content. Fourth, it should be noted that only negative words were compared to neutral ones in this study. These two types of words differ in both valence and arousal values and thus further research is needed in order to disentangle the effects of each one of these variables. For instance, an experiment comparing positive, negative, and neutral words would have to be performed to test if the advantage observed here is related to emotional content in general or is instead explained by negative valence. Kousta et al. (2011) did not make specific predictions about valence and arousal, but considering that emotional content is the result of the combination of these two variables, we might predict a similar advantage for positive and negative abstract words if they are matched in arousal. Finally, the effect of other sources of emotionality apart from word content (e.g., participants' mood) is worth being explored too. Hopefully, new studies can shed light on all these issues.

To conclude, emotional content facilitates the acquisition of novel abstract words in the native language of the speakers, while it does not have any effect in the acquisition of concrete words. These findings confirm the prediction of Kousta and co-workers (2011) and suggest that the traditional disadvantage of abstract words in comparison to concrete words, due to their lack of sensory-motor referents, can be overruled by their higher attachment to affect. Further research is needed to examine if these beneficial effects on word acquisition are due to valence, to arousal, or to the combination of both factors. New studies should also be carried out with other vocabulary acquisition paradigms and tasks, to test the generalizability of these findings.

RESUMEN

Efectos de emocionalidad y concreción en el aprendizaje de nuevos conceptos en la lengua materna. El objetivo del presente estudio fue el de poner a prueba la propuesta de Kousta et al. (2011), según la cual las palabras abstractas tendrían una mayor carga afectiva que las concretas. Para ello, nos centramos en la adquisición de nuevos conceptos mediante un experimento de aprendizaje intencional en el que los participantes debían aprender un conjunto de 40 nuevos conceptos en español (definiciones) asociados a formas de palabras nuevas (pseudopalabras). Se manipuló ortogonalmente la concreción (conceptos concretos frente a abstractos) y la emocionalidad (conceptos neutros frente a negativos). La adquisición se evaluó mediante una tarea de reconocimiento en la que se pedía a los participantes que emparejaran las formas de las palabras nuevas con sus definiciones. Los resultados mostraron que los conceptos concretos se adquirieron mejor que

los abstractos, pero es importante destacar que la ventaja de la concreción desapareció cuando el contenido del concepto era negativo. Por lo tanto, el contenido emocional (negativo) facilitó la adquisición de los conceptos abstractos, pero no de los conceptos concretos, apoyando la propuesta de Kousta et al. (2011).

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