Are our preferences and evaluations conditioned by the language context?

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Abstract:

Our preferences and evaluations are often affected by contextual factors. One unavoidable context is language. We used an evaluative conditioning (EC) paradigm (pairing neutral stimuli with emotional or neutral stimuli) to investigate whether our evaluations are equally conditioned in a native (NL) and in a foreign language (FL). An EC effect was observed in both languages, however, if in NL it occurred independently of recollection of the pairing of the stimuli, in foreign language memory seemed to play a larger role. These results were confirmed using a more implicit measure (memory confusion paradigm). Overall, the results suggest that conditioning occurs both in NL and FL, but is weaker and more sensitive to memory of the emotional stimuli in FL. The study is the first demonstration that EC is modulated by language, and converges with recent findings showing that linguistic context can modulate our behaviours.

Keywords: Second language, Evaluative conditioning, Emotion

Our preferences and evaluations are often affected by contextual factors. A glass of champagne may taste better if enjoyed in front of the Eiffel tower than in your living room; a wine may seem more tasteful if expensive, and our preference for a car may depend on the other cars available in the dealership. These contextual effects are very pervasive and can work in subtle ways, as when we associate a neutral object (e.g., washing liquid brand) with another object that has a positive value (e.g., a teddy bear). This mere contextual association may condition our preference or evaluation of that object (or specific brand). Thus, humans are very sensitive to contextual factors when evaluating a wide range of instances, from multisensory experiences to objects.

One unavoidable context is language; most of our experiences involve language (from conversations to self-reflective inner speech). One may ask then whether the linguistic context in which we are set affects our preferences and evaluations. Recent research gives an insight on this issue, showing that when confronted to the same situation our choices vary depending on whether they are made in a native language (NL) or in a foreign language (FL). Most of this research used complex decision making scenarios (e.g., assessing risk or moral preferences), and has shown, among other things, that FL use may reduce the impact of various biases (e.g., loss aversion) in our decisions (Corey et al., 2017; Costa, Foucart, Hayakawa, et al., 2014; Costa, Foucart, Arnon, Aparici, & Apesteguia, 2014; Geipel, Hadjichristidis, & Surian, 2015; Hadjichristidis, Geipel, & Savadori, 2015; Hayakawa, Costa, Foucart, & Keysar, 2016; Ivaz, Costa, & Duñabeitia, 2016; Ivaz, Griffin, & Duñabeitia, 2018; Keysar, Hayakawa, & An, 2012).

Here, we take a different avenue and explore how language may affect a more fundamental contextual effect, the unconscious association we make between a neutral and an emotional object. To follow on the example of the washing liquid, would our evaluation of the product be similarly conditioned if it was associated with a positive word in our NL or in our FL? This issue is important not only to better understand the contextual effects of language and their pervasiveness, but also because it may have applied implications in our globalised world (e.g. advertisement).

As described above, our evaluation of an originally neutral object can be conditioned by associating it with an emotional stimulus. However, for this conditioning to work, the positive or negative stimuli should elicit an emotional reaction. Although there are discrepancies in the literature, it is often claimed that emotional reaction triggered by a FL is reduced compared to a NL (Altarriba, 2008; Dewaele, 2004; Pavlenko, 2012), and

that, unlike in NL, memory for emotional words in FL is not always better than for neutral words (Baumeister, Foroni, Conrad, Rumiati, & Winkielman, 2017; but see, Ferré, García, Fraga, Sánchez-Casas, & Molero, 2010). The difference in emotional reaction in NL and FL may have many causes such as age and context of learning (class-room context for a FL vs. everyday experience for a NL), proficiency, language dominance, familiarity, and degree of similarity between FL and NL. The important issue here is not to find the origin of this difference but to examine how it affects conditioning. Recent findings in clinical contexts have shown that fear conditioning is reduced using a FL (García-Palacios et al., 2018). Here, we investigate whether our preferences and evaluations are equally conditioned in an NL and in an FL.

To address this question, we used the evaluative conditioning effect. 'Evaluative conditioning' (EC) is a type of conditioning used in social psychology which consists in modifying the valence of a neutral stimulus (conditioned stimulus, CS) by pairing it with a positive or negative stimulus (unconditioned stimulus, US). Results show that a CS is evaluated as more positive/negative after being paired with a positive/negative US (Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010). Evaluative conditioning is sometimes seen as a procedure, an effect or a process that can be based on unconscious formation of associations or on other processes such as conscious propositional reasoning (Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010). There is some disagreement in the field about whether conditioning requires awareness, attention and whether it is resistant to extinction, but researchers all agree on the existence of the EC effect that the liking of a stimulus can be modified by pairing it with another stimulus; and this is relevant for our purpose. Indeed, independently of its origin, if we observe differences in EC effect in NL and FL, it would suggest that conditioning is affected by the language we use. In a Learning phase, we presented participants with neutral signs (CS) paired with neutral and emotional words (US) in NL and FL. We then explicitly asked them to rate their perception of the signs. To check for effects of conditioning in a more implicit manner, we used the memory confusion paradigm (Taylor, Fiske, Etcoff, & Ruderman, 1978).

Method

Participants

Ninety-one (males: 37) Spanish native speakers took part in the experiment (mean age: 21.9 years, range: 19-30 years). See Supplementary Materials for details.

Materials

Seventy-two Asian characters (Chinese and Japanese) were selected (thereafter, 'signs'). Asian characters are non-sensical verbal stimuli, hence, they are linguistic stimuli but were meaningless for participants. Thirty-six were used as CS, and 36 were used as 'new' characters in a following Memory test. One hundred and eight words (54 in Spanish, 54 in English) were used as US and divided in 3 different valence categories: 36 positive, 36 neutral and 36 negative. Each category contained low and high arousal words. Words were matched across languages and conditions for frequency, number of letters, valence and arousal based on the Affective Norms for English Words (Bradley & Lang, 1999) and its Spanish adaptation (Redondo, Fraga, Padrón, & Comesaña, 2007) (see Table 1). One hundred and eight sign-word pairs were created by associating each 36 CS (signs) with 3 US (words) of same language and same valence category (semantically unrelated). Words and signs were counterbalanced across lists.. The experiment lasted about one hour.

Table 1. Details of the words used as US for each category (valence: positive, neutral, negative; arousal: low and high) in Spanish and English. Means are given for valence, arousal, frequency and number of letters.

Condition		Valence	Arousal	Frequency	Nb letters
Positive	**Spanish**	7.47	5.35	58.46	6.36
	English	7.43	5.27	64.46	6.08
Negative	**Spanish**	5.32	5.15	67.40	6.08
	English	5.24	5.12	67.94	6.19
Neutral	**Spanish**	2.50	5.51	52.37	5.89
	English	2.49	5.42	55.02	5.97
Low arousal	**Spanish**	5.04	4.63	54.64	5.95
	English	5.11	4.60	57.06	5.91
High arousal	**Spanish**	5.14	6.05	64.18	6.28
	English	5.00	5.94	67.89	6.26

Learning phase

Procedure

Participants were instructed to simply look at the 108 sign-word pairs very carefully (no data were collected in this phase). Pairs were presented in blocks starting either in NL or

in FL (counterbalanced across participants). The same block was repeated twice. Participants saw a word in only one language. Overall, each CS was equally associated with either an NL or an FL US, and with a positive, neutral or negative US (high or low arousal). Each pair was presented for 3000 ms with 1500 ms ISI. A pair was presented only once within the same block, in a random order, resulting in the CS being seen 6 times during the overall learning part (see Figure 1). To ensure participants paid attention to the sign-word pairs during the Learning phase we conducted and 'old/new' memory test in which they indicated whether they had seen a sign in the Learning phase or not. Participants who had a score below chance were excluded from the experiment (N=16). Based on the calculation of the *d* prime, on average, participants remembered 77% of the signs, and were more accurate to identify 'old' signs (hits: 86.0%) than 'new' signs (correct rejection: 67.9%) (*V*=2052, *p*<.001).

Figure 1. Representation of the sign-word pairs in the Learning phase.

Evaluative conditioning

Procedure.

Participants were presented with the 36 Asian characters they had seen in the Learning phase and rated them on a 7-level scale by clicking on the smiley that best corresponded to their feelings towards the sign displayed on the screen. Signs were presented one by one, with the rating scale underneath (see Figure 2).

Figure 2. Representation of a trial of the evaluative conditioning task.

Data analyses

We conducted analyses of variance (ANOVAs, Scheirer-Ray-Hare and Kruskal Wallis) with the factors Language, Valence and Arousal. Correlations were run to verify the effect of Valence on the ratings and to compare its effect on sign paired with either NL or FL words. Beta weights were extracted from the linear regressions.

Results and discussion

In a first version of the experiment[1], participants (N= 26) were given no time limit to rate the signs. Analyses revealed a significant effect of Valence on the ratings (H=33.7, p<.001). The correlation between ratings and valence were not significantly different in NL and FL (p=.36) (see Figure 3).

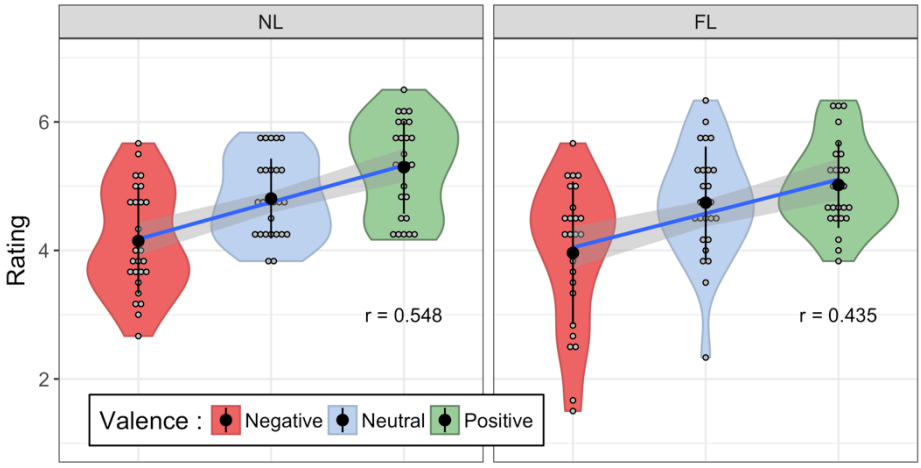

Figure 3. Distribution of the CS ratings by Valence in NL and FL, from the first version of the experiment. Each dot represents a participant. Blue lines correspond to the linear regressions of the Valence on the Ratings and the grey areas represent their 95% confident interval. Finally, *r* values represent their standardised regression coefficients (beta weights).

These results suggest that emotional words condition neutral contexts, independently of the language used. One possible explanation behind the EC effect may be identity

[1] In a first version of the experiment, participants (N= 26) were tested individually in the laboratory; in a second version, they (N=41) were tested as a group in a large experimental room. The results of the two versions were combined and are reported together unless tasks slightly differed.

memory; i.e., the fact that participants sometimes remembered the US paired with the signs and rated them according to the word(s) and not to their feeling towards the signs themselves. To test this explanation, in a second version of the experiment, we ran the same task but participants had a time-limit (2000 ms) to assess the sign (thereafter, 'Fast rating'). We hypothesised that participants (N=46) would answer more spontaneously, without recalling the US paired with the sign in the Learning phase. Secondly, we ran the same task again with no time limit (thereafter, 'Slow rating') but we asked participants to write down the words associated with the signs (if they remembered them).

Overall (see Supplementary Materials for the detailed results), the pattern of results of the evaluative conditioning tasks was similar independently of identity memory (whether participants remembered the US or not) (Figure 4). In the absence of identity memory, the rating of NL signs tended to be more strongly correlated with Valence ($p<.01$) than the ratings of FL signs ($p=.078$) under time pressure. Importantly when participants remembered the US (Figure 4. dashed lines), the NL signs were not rated differently with or without time-limit ($p=.29$), whereas it was the case for FL signs ($p<.001$). The fact the EC occurred independently of time-pressure in NL may be explained by stronger conditioning; if signs are more strongly conditioned in NL (than in FL), then identity memory is not required for EC to occur. This hypothesis is also supported by looking at the rating with unlimited time, which was not significantly different whether participants remembered the US or not in NL ($p=.11$) but was in FL ($p=.001$) (Figure 4. Green lines). This finding suggests that the absence of difference across languages without time-limit, when participants remembered at least one word, may be explained by the conscious recall of FL words allowed by the absence of time-limit. In other word, this result suggests that identity memory does not seem to be essential for conditioning to happen in NL, but is necessary in FL. We tested this hypothesis with the memory confusion paradigm.

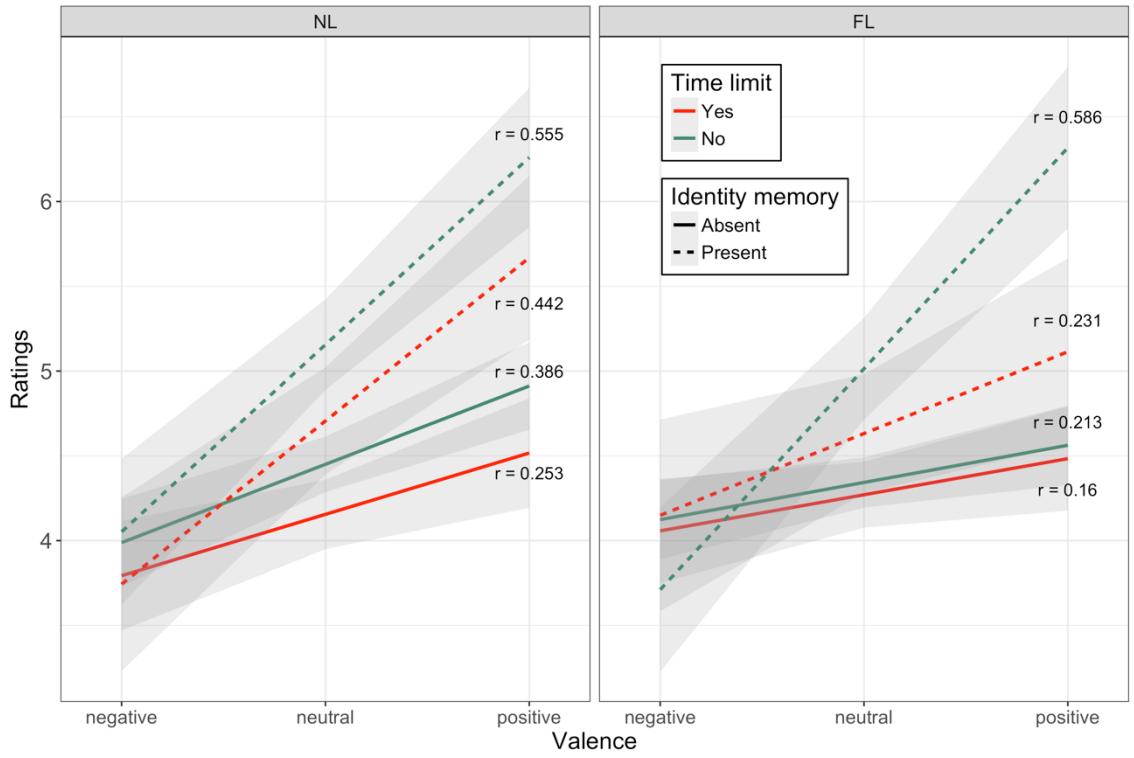

Figure 4. CS ratings as a function of US Valence depending on the presence of a time limit (2000 ms or unlimited) and identity memory (whether participants remembered at least one the 3 words paired with the CS or not). Grey areas represent the 95% confident interval of each linear regression and *r* their standardised regression coefficients (beta weights).

Memory confusion paradigm

This test was designed to examine effects of conditioning in a more implicit manner than with a scale, and to disentangle the impact of valence and language on memory. It allowed checking for identity memory (i.e., whether participants remembered the US paired with the signs in the Learning phase) and valence memory (i.e., whether participants remembered the valence of the US). We expected that when participants made an error they would select a word of similar valence as the correct one, independently of the language.

Procedure

All the 24 CS were presented surrounded by 8 words (all of them presented during the Learning phase). Participants had 5000 ms to click on the word paired with the CS during the Learning phase. One character was presented with 8 words, 4 in each language (NL or FL): the correct word (positive or negative), one word of same valence, 2 words of the other valence; 4 words in the other language (NL or FL): 2 of the same valence as the correct word, 2 of opposite valence (see Figure 5.A). This task included

32 trials with 24 signs each appearing one or two times (their frequency of presentation was counterbalanced across participants). This task was followed by a similar one but reverse, in other words, participants had to recall which CS (among 8) was paired with the sign presented (see Figure 5.B). As these tasks used similar manipulations, their results were analysed together, and in order to make it more easily understandable, both the CS (the Asian character in the first task) and the US (the word in the second task) will be referred to as "target". Therefore, the target's language will refer to both the language of the words associated with the CS in the learning phase (in the first task) and the language of the US (the word in the second task). The same will apply to the target's valence.

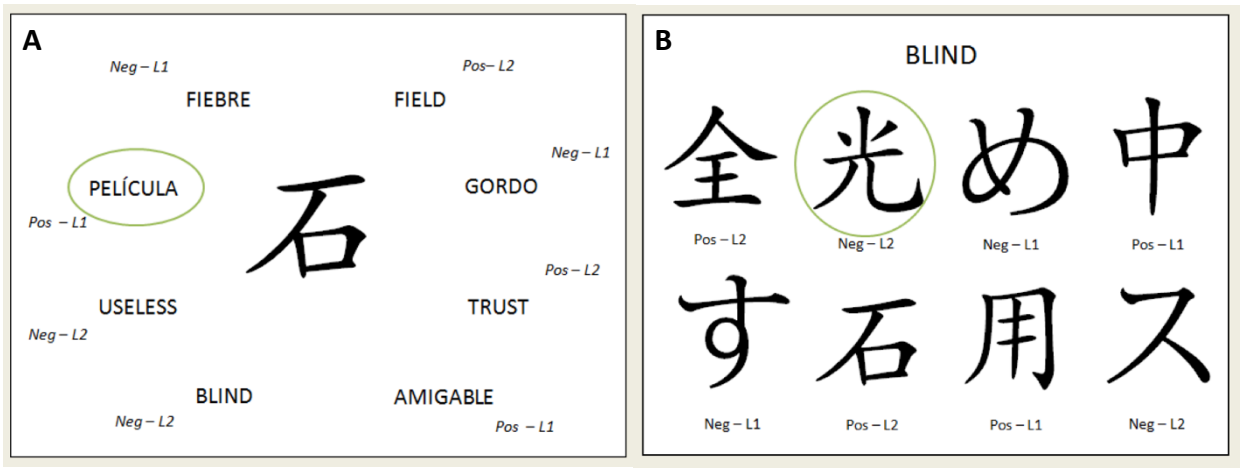

Figure 5. Representation of an experimental trial of the first (panel A) and second (panel B) memory confusion paradigm. In the first task, the target (here, the CS) was presented surrounded by 8 words (all seen during the learning phase), participants had to click on the word that was paired with the CS in the learning phase. Among the 8 words, 2 words of each emotional Language category are presented (positive – NL, positive – FL, negative – NL, negative – FL). In the second task, participants had to click on the CS (sign) which was paired with the target (here, the US word) in the learning phase. Once again, 2 CS of each emotional Language category were presented (positive – NL, positive – FL, negative – NL, negative – FL).

Data analyses

ANOVAs were conducted with factors Language, Valence and Arousal. Post-hoc analyses were performed using Dunn tests. Accuracy was calculated with correction according to the proportion of distribution of responses. We compared the proportions of "same valence errors" observed with the ones expected (3/7) using binomial tests and ones associated with either NL or FL signs/words using paired tests (*t*-tests, permutation *t-tests* or Wilcoxon tests). Effect size was calculated using Cohen's *d* for paired samples.

Results and discussion

Distribution of the responses.

Participants tended to choose more often negative than positive words/signs (p=.06), and chose more often FL than NL words/signs (p=.04). There was an interaction between Language and Valence (p<.001): participants chose significantly more often FL Negative words/signs than words/signs from any other category.

Accuracy.

Participants chose the correct word 39.5% of the time. There was no effect of Language, Valence or interaction Valence x Language.

Distribution of the errors.

Participants made significantly more errors of same valence than expected (3/7) in both languages (p<.001), though, this proportion was higher in NL (58.4%) than in FL (53.4%) (p=.009, *Cohen's d*=.32) (see Figure 6). Participants made also significantly more errors of same valence with high arousal words (60%) than with low arousal words (51.3%) (p<.001). There was no significant interaction Language x Arousal.

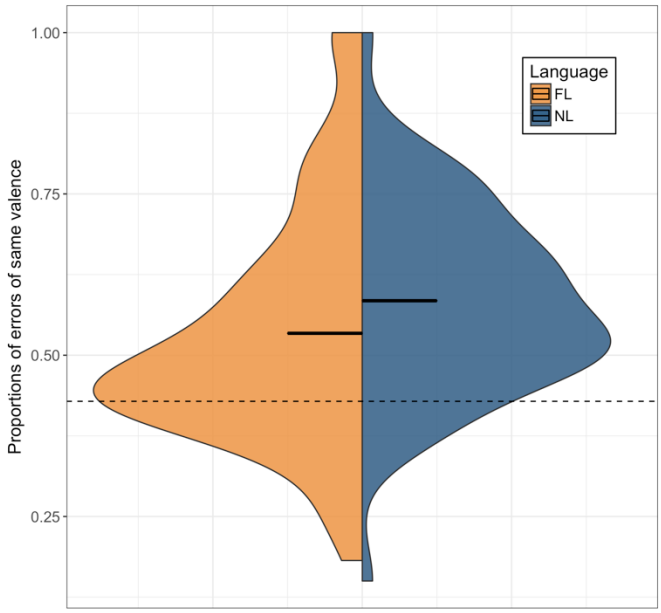

Figure 6. Distribution of proportions of errors of correct valence depending on the language of the target. The dashed line corresponds to the chance level (3/7) and the short black lines represent the mean of each distribution.

Participants made significantly more errors of same valence with negative words (58.8%) than with positive words (52.7%) (p=.007, *Cohen's d*=.36) (see Figure 7).

There was no interaction Valence x Language (H=2.36, p=.12) nor Valence x Arousal (p=.98).

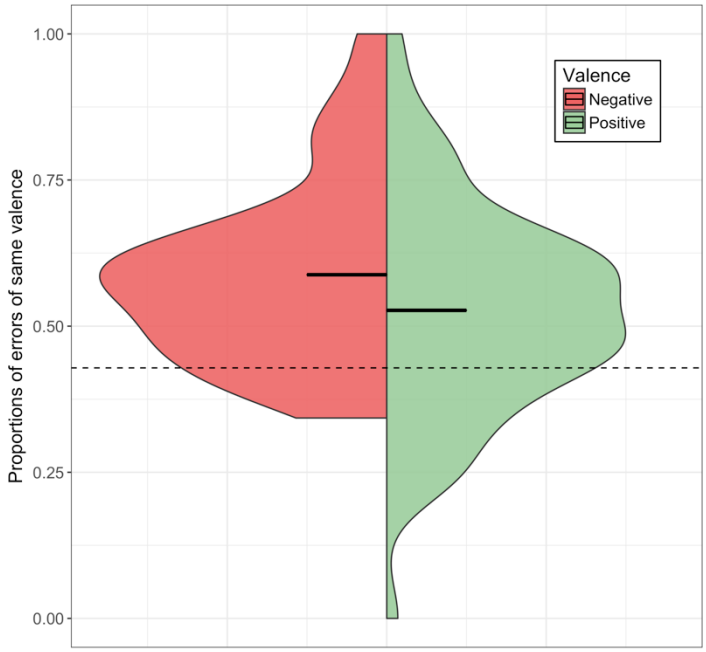

Figure 7. Distribution of proportions of errors of correct valence depending on the valence of the target. The dashed line corresponds to the chance level (3/7) and the short black lines represent the mean of each distribution.

To evaluate whether effects of conditioning was due to US identity memory, we looked at the results depending on whether participants remembered at least one of the 3 US paired with the sign presented in this task. Importantly, their memory could be of any of these 3 words and not necessary of the word presented among the 8 words (the correct response) as this memory could influence their choice towards a word of related language or valence. The following results were obtained in the second version of the experiment (N=41). The results were consistent with our hypothesis as participants made more errors of same valence in both NL and FL, and they did so independently of whether they remembered any of the 3 US or not (detailed results in Supplementary Materials). Therefore, once again, it seems that EC does not rely on the presence of identity memory. Though, importantly, this conditioning was stronger in NL than in FL as, in the absence of memory, participant made significantly more errors of same Valence in NL than in FL (t=3.13, p=.008, Cohen's d=.55) (see Figure 10A in Supplementary Materials).

General discussion

This study aimed to determine whether our preferences and evaluations are equally conditioned in an NL and in an FL. We used the EC effect as a measure of conditioning of neutral stimuli paired with emotional stimuli. Results demonstrated that conditioning occurred both in NL and FL but seemed to be stronger in NL than in FL since the EC effect was significantly correlated with valence in NL, but only tended to be so in FL. Moreover, it seems that identity memory (whether participants remembered the word(s) paired with a neutral stimulus) is not essential for conditioning to happen in NL, but may be in FL. The memory confusion paradigm (measuring effects of conditioning in a more implicit manner) confirmed our hypothesis that even if participants did not remember the exact words paired with a neutral stimulus, they recalled their valence, regardless the language words were presented in. This implicit valence recollection was significantly stronger in NL than in FL. Overall, the results suggest that conditioning occurs both in NL and FL, but is weaker and more sensitive to memory of the emotional stimuli in FL. The study is an important contribution to research in (psycho-)linguistics and social psychology, as it is the first demonstration that EC is modulated by language.

To account for the reduction of conditioning in FL, several, non-exclusive, hypotheses are possible. Research in second language acquisition has pointed out the idea that NL words carry greater emotional weight than FL words due to their more naturalistic, emotionally rich, environment of acquisition (Altarriba, 2008; Dewaele, 2004, 2008; Pavlenko, 2012), and indeed, people often report experiencing less emotional resonance while using an FL (Caldwell-Harris, 2015; Dewaele & Salomidou, 2017; Pavlenko, 2014). Therefore, if the emotional intensity of the US is reduced in FL, the conditioning of the CS may consequently not be as strong as in NL context. Secondly, our results suggest that memory may also modulate the strength of conditioning, and unlike in NL, memory for emotional words in FL is not always better than for neutral words (Baumeister, Foroni, Conrad, Rumiati, & Winkielman, 2017; but see, Ferré, García, Fraga, Sánchez-Casas, & Molero, 2010). It is not clear whether an FL affects word encoding or retrieval, but both could impact conditioning. Indeed, cognition depletion has been shown to affect memory encoding (Mierop, Hütter, & Corneille, 2017), and the amount of cognitive resources required to process language is higher in FL than in NL (Hasegawa, Carpenter, & Just, 2002; Miller & Keenan, 2011). Thus, the reduction of conditioning in FL could be due to weaker memory of emotional words in FL. More research is needed to determine the mechanisms underlying the FL effects.

Importantly, the results show that the language we use can modulate the strength of the unconscious association we make between a neutral and an emotional stimulus. They extend previous findings that language can induce fear conditioning (García-Palacios et al., 2018), and more importantly, that the degree of permeability of the cognitive system varies with the language context. Here, we show that language is a vehicle for conditioning at even lower levels of cognition, since it can affect more fundamental contextual effects, such as our preferences and evaluations. The findings are consistent with previous ones showing that using a FL can lead to a reduction of the contribution of heuristic intuitive processes driven by emotional reactivity on decision making (Corey et al., 2017; Costa, Foucart, Hayakawa, et al., 2014; Costa, Foucart, Arnon, et al., 2014; Geipel et al., 2015; Hadjichristidis et al., 2015; Hayakawa et al., 2016; Ivaz et al., 2016, 2018; Keysar et al., 2012).

To conclude, we report experimental evidence that language context modulates our preferences and evaluations. The findings show that evaluative conditioning is reduced when using a foreign language, which implies that language affects even lower levels of cognition than what had been previously reported. Additional research is needed to understand how and at which stages language context affects evaluative conditioning mechanisms. The findings may have important applied implications in our globalised world (e.g. advertisement).

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