



Context specificity of taste aversion is boosted by pre-exposure and conditioning with a different taste



Rodolfo Bernal-Gamboa^a, Javier Nieto^a, Juan M. Rosas^{b,*}

^a Universidad Nacional Autónoma de México, Mexico

^b Universidad de Jaen, Spain

ARTICLE INFO

Article history:

Received 7 June 2015

Received in revised form

13 September 2015

Accepted 16 September 2015

Available online 25 September 2015

Keywords:

Context dependence

Pre-exposure

Rats

Taste aversion

ABSTRACT

Recent reports in the literature show that an extinction treatment makes subsequently learned information context-specific. An experiment in conditioned taste aversion evaluated whether pre-exposure and conditioning with a given flavor would make conditioning of a different flavor context specific as well. Rats received conditioning with taste Y in context A, before being tested in extinction either in context A or in a different but equally familiar context (context B). Half of the animals received a pre-exposure and conditioning treatment with a different flavor (X), while the other half only received conditioning. The context change at testing led to higher consumption of Y in the animals that had received previous pre-exposure and conditioning with X. The implications of these results for the mechanisms underlying context-switch effects are discussed.

© 2015 Elsevier B.V. All rights reserved.

1. Introduction

The role of contexts on controlling performance has been a topic of interest within psychology for many years (e.g., Mesquita et al., 2010). The field of associative learning and comparative psychology is not an exception (e.g., McConnell and Miller, 2014; Urcelay and Miller, 2014). The seminal article published by Bouton (1993), in which he developed his Retrieval Theory of Forgetting applied to associative learning, has been very influential, leading to a large amount of research trying to support or discard its principles (see for instance, Bouton, 1997, 2004; Rosas et al., 2013). According to Bouton (1993), contexts only affect retrieval of either inhibitory or the second-learned information about a cue (but see Nelson, 2002, 2009). When the information is neither inhibitory, nor second-learned, contexts are assumed to be ignored by the organism, so that switching the training context at testing should not affect performance after simple excitatory conditioning, starting to play a role when the meaning of the cue is changed afterwards by either extinction (e.g., Rosas and Bouton, 1997), counterconditioning (e.g., Peck and Bouton, 1990; but see Van Gucht et al., 2013), or other forms of retroactive interference (see for instance Nelson and Callejas-Aguilera, 2007).

The idea that only second-learned information is affected by context changes has been challenged by an increasing number of studies showing that retrieval of simple excitatory conditioning may become context-dependent in both, human and nonhuman animals. For instance, Hall and Honey (1990) found that transfer of a conditioned emotional response from the context where it was trained to a different context was weak after a single conditioning trial, while it was strong after multiple training trials (see also Hall and Honey, 1989). Similar results have been reported in human predictive and instrumental learning (León et al., 2010b, 2011). The effect of changing the context after simple acquisition has been also reported in conditioned taste aversion (e.g., Sjöden and Archer, 1989), although most of those reports may be explained either by generalization decrement, or by the novelty of the contexts used at testing (e.g., Holder, 1988). However, Bonardi et al. (1990) found context dependence of conditioned taste aversion when familiarity with the contexts before testing was equated. Along the same lines, León et al. (2012) found that contextual changes attenuated aversion to a flavor when contexts were new at the time of conditioning, but this attenuation disappeared when rats had experience with the contexts before conditioning.

More relevant for the present study, retrieval of simple cue-outcome associations has been found to be context-specific when such associations are learned in the context in which the meaning of other cues has been changed, or when contexts are made relevant for solving the task. For instance, León et al. (2010a) found that human instrumental conditioning about a discriminative

* Corresponding author at: Department of Psychology, Universidad de Jaen, 23071 Jaén, Spain.

E-mail addresses: janigu@unam.mx (J. Nieto), jmrosas@ujaen.es (J.M. Rosas).

stimulus became context specific when the stimulus was trained in a context that had been made relevant to solve a discrimination involving different discriminative stimuli (see also Lucke et al., 2013, 2014), a result that has been also reported in non-human animals (Preston et al., 1986). In similar lines, context specificity of simple conditioning has been found when acquisition is conducted either concurrently or subsequently to extinction of a different predictor (Rosas and Callejas-Aguilera, 2006, 2007). In the case of taste aversion, Rosas and Callejas-Aguilera (2007) found that conditioning and extinction of a flavor made context-specific the retrieval of the acquisition of a different flavor that was subsequently learned. Moreover, Bernal-Gamboa et al. (2014) found that conditioning and extinction of runway running made context-dependent subsequent learning of a taste aversion, and vice versa (see also Bernal-Gamboa et al., 2013).

Based on the results reported above showing that excitatory conditioning becomes context-specific when it is acquired either concurrently or after extinction of a different predictor, Rosas et al. (2006a) outlined the Attentional Theory of Context Processing (ATCP) as an extension of Bouton's Retrieval Theory of Forgetting (Bouton, 1993). According to these authors, context-dependence of the information is based on the attention contexts accrue during learning. If contexts are attended, any information learned within the attended context becomes context-specific, regardless of whether the information is ambiguous or not (c.f., Bouton, 1997). Attention to the contexts is assumed to be a byproduct of the ambiguity in the meaning of the cues produced by treatments such as extinction (e.g., Rosas and Callejas-Aguilera, 2006, 2007) or relative validity training (Callejas-Aguilera and Rosas, 2010), or directly manipulated by changing the informational value of the contexts (e.g., León et al., 2010a; Lucke et al., 2013; 2014; Preston et al., 1986). Note that Rosas et al. (2006a) suggested that attention to the contexts may be raised by three additional factors, besides the two pointed out above: Experience with contexts and cues, relative context salience, and instructions in human participants. However, both, experience with contexts and cues, and relative context salience may be considered different forms of modulating the ambiguity of the situation, while attentional instructions may be assumed to modulate the subjective relevance of the contexts for participants.

As stated in the previous paragraphs, ATCP predicts that any treatment that changes the meaning of the cues, leading to an ambiguous situation, should increase attention to the contexts, rendering context-specific all the information learned afterwards. This prediction has been tested mostly after retroactive interference treatments such as extinction (e.g., Nelson et al., 2013; Rosas and Callejas-Aguilera, 2006, 2007) or counterconditioning (e.g., Rosas et al., 2006b), or in situations in which the training involves concurrent conflicting or ambiguous information, such as partial reinforcement (Abad et al., 2009; Bouton and Sunsay, 2001), or the kind of training involved in relative stimulus validity designs (Callejas-Aguilera and Rosas, 2010). The goal of the present study was to extend the exploration of the influence of interference on context-specificity of the information to a situation of proactive interference by using a pre-exposure, rather than an extinction treatment, with the goal of raising attention to the contexts and thus, according to ATCP predictions, making context-specific all the information learned within that context.

The design of the study is presented in Table 1. Four groups of animals received training in which a flavor (Y) was followed by the outcome (+) in a given context (A), before being tested either in the same (Groups S) or in a different context (Groups D). Half of the animals tested in each context received a previous treatment in which they were exposed to a different flavor (X) in context A, before conditioning that flavor in the same context (Groups XE), while the other half were exposed to water before being conditioned with X

Table 1
Experimental design.

Groups	Exposure to X	Conditioning with X	Conditioning with Y	Test with Y
XE-S	A: 3X- B: 3W	A: 1X+ B: 1W	A: 1Y+ B: 1W	A: 3Y- B: 3W
XE-D	A: 3X- B: 3W	A: 1X+ B: 1W	A: 1Y+ B: 1W	A: 3W B: 3Y-
NE-S	A: 3W B: 3W	A: 1X+ B: 1W	A: 1Y+ B: 1W	A: 3Y- B: 3W
NE-D	A: 3W B: 3W	A: 1X+ B: 1W	A: 1Y+ B: 1W	A: 3W B: 3Y-

Note: A and B were two different contexts, counterbalanced; 15% sucrose and 0.5 salt solutions were counterbalanced as flavors X and Y. W stands for distilled water. "+" stands for a LiCl injection (0.3 molar, 0.5 % body weight). "-" stands for no outcome. Rats per group = 8.

in context A (Groups NE). Following the predictions of ATCP, the ambiguity in the meaning of cue X produced by exposing the animal to the flavor before pairing that flavor with the outcome should raise attention to the conditioning context so that subsequent conditioning of a different flavor (Y) should become context specific, and consumption of Y during the test should be higher in group XE-D than in group XE-S. That difference should not be observed when the meaning of X is consistent so that not attention to the contexts is expected to be raised, as it is the case in groups NE-S and NE-D.

2. Method

2.1. Animals

The experiment was conducted with thirty-two 4-month old experimentally naïve male Wistar rats with a mean weight of 416 g (8 rats per group). They were individually housed in methacrylate cages (21 × 24 × 46 cm, H × W × D) inside a room maintained on a 12–12 h light dark cycle (onset of lights at 07:00 am and offset of lights at 19:00). Temperature of the colony room was kept between 20 and 25 °C, while the humidity value was kept within the 45–60% range. All rats were kept with *ad libitum* access to food throughout the experiment. They were water deprived 24 h before the beginning of the experiment, and then kept on a water-deprivation schedule that included two daily 15-min sessions of free access to fluid. The first session took place at 9:00 h, and the second session began at 19:00 h.

2.2. Apparatus

Two sets of 4 methacrylate cages (22 × 20 × 43 cm, H × W × D) were combined with the daily sessions (morning or evening) to be used as experimental contexts A and B, counterbalanced between subjects. In the "green" set, walls were externally covered with dark green paper, and the floor of the cage was covered with standard two-and-a-half-dozen recycled fiber paper egg-trays adapted to the floor of the cage; a cotton wool scented with 10 ml of white vinegar (Clemente Jaques, Sabormex S.A. of C.V., México) was placed under the paper egg-tray of each cage. In the "red" set of cages, walls were covered with squared pattern paper (red and white squares, 7 mm side), and the floor was covered by perforated chipboard with a cotton wool scented with 10 ml of anise (McCormick & Company Inc., Maryland) below it. Odors have been consistently and regularly used as part of the contexts in the literature, and do not seem to produce other effects in our laboratories that increasing the context salience (see for instance, Bouton, 2003 for a review). Note that scented cotton wool and the covers of the floor were changed daily. For half of the rats in each group, the "green" cages in the morning were context A, and "red" cages in the evening were context B, while the opposite was true for the other half of the rats.

Two flavors (a solution of 3.94-molar sucrose (150 ml kg) and a solution of 1.85-molar salt (5 ml kg), both diluted in distilled water) were counterbalanced as conditioned stimuli X and Y. Counterbal-

Download English Version:

<https://daneshyari.com/en/article/2426501>

Download Persian Version:

<https://daneshyari.com/article/2426501>

[Daneshyari.com](https://daneshyari.com)