Behaviour Research and Therapy 48 (2010) 203–209

Contents lists available at ScienceDirect

Behaviour Research and Therapy

journal homepage: www.elsevier.com/locate/brat

The effects of verbal instruction on affective and expectancy learning

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ARTICLE INFO

Article history:
Received 30 October 2008
Received in revised form
9 November 2009
Accepted 10 November 2009

Keywords:
Conditioning
Verbal instruction
Affective learning
Expectancy learning

ABSTRACT

The current research assessed the effects of verbal instruction on affective and expectancy learning during repeated contingency reversals (Experiment 1) and during extinction (Experiment 2) in a picture–picture paradigm. Affective and expectancy learning displayed contingency reversal and extinction, but changes were slower for affective learning. Instructions facilitated reversal and extinction of expectancy learning but did not impact on affective learning. These findings suggest a differential susceptibility of affective and expectancy learning to verbal instruction and question previous reports that verbal instructions can accelerate the extinction of non-prepared fear learning in humans.

Learning based accounts are widely accepted as explanations for the acquisition, maintenance and alteration of emotional phenomena as diverse as attitudes (Cacioppo, Marshall-Goodell, Tassinary, & Petty, 1992), likes and dislikes (De Houwer, Thomas, & Baeyens, 2001), and clinical and non-clinical fear (Mineka & Zinbarg, 2006). Contemporary learning theory can account for a number of clinical phenomena previously thought outside the scope of a learning based framework (Bouton, Mineka, & Barlow, 2001; Mineka & Zinbarg, 2006) and provides novel approaches to highly relevant phenomena such as relapse (Bouton, 2002). However, the learning based analysis of emotional phenomena also continues to generate controversies such as the question of whether acquisition of likes and dislikes (De Houwer et al., 2001) or fear (Hamm & Weike, 2005) can occur in the absence of explicit knowledge of the stimulus contingencies or whether such knowledge is required (Lovibond & Shanks, 2002). Whereas such questions seem, at first sight, only relevant to students of the theory of human learning, they nevertheless carry considerable practical implications. If we want to design efficient methods to alter emotional responses such as fear, then an understanding of their mediation and susceptibility to interventions on different levels, physiological, behavioural, or cognitive, is essential.

Current dual-process theories of evaluative learning (De Houwer et al., 2001) or fear learning (Hamm & Weike, 2005) distinguish between expectancy learning, the learning of predictive relationships among stimuli, and affective learning, the acquisition of emotional responses such as dislikes or fear. In the current paper, the term 'affective learning' is used to refer to any change in conditional stimulus pleasantness as a result of associative learning. The term 'fear learning' is used if the conditioning procedure involves the use of aversive unconditional stimuli that were designed to be 'unpleasant, but not painful'. Theories of evaluative and fear learning share the assumption that affective learning can be mediated by subcortical networks that are not under the control of higher cognitive processes (for a review see LeDoux, 2000). This view is reminiscent of the notion of encapsulation from cognitive influences as espoused in Seligman's preparedness theory of phobic learning (Seligman, 1971) or in more recent theories of fears and phobia (Öhman & Mineka, 2001). The proposal of affective learning and responding in absence of cognitive processes raises the question as to the role of cognitively based interventions in altering affective responding or the facilitation of new learning that provides alternatives to the predominant emotional response.

Previous research suggests that cognitively based interventions, operationalised as verbal instructions about the stimulus contingencies, are highly effective in modifying human fear learning. Using the classic analogue of human fear learning, aversive differential Pavlovian conditioning, Grings, Schell, and Carey (1973) demonstrated an immediate reversal of previously trained differential electrodermal responding after verbal instruction. This reversal was evident before the first presentation of the US in the new contingency. Hugdahl and Öhman qualified this observation by demonstrating that the effects of verbal instruction on fear conditioning are moderated by conditional stimulus fear-relevance (Hugdahl, 1978; Hugdahl & Öhman, 1977). After acquisition of differential electrodermal responding, Hugdahl and Öhman informed participants that no more unconditional stimuli were to

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doi:10.1016/j.brat.2009.11.002

be presented. Differential electrodermal responding to non fear-relevant conditional stimuli, pictures of flowers and mushrooms, was abolished after instruction whereas differential responding to fear-relevant conditional stimuli, pictures of snakes and spiders, was not affected. These results were interpreted as consistent with the notion that prepared learning is not affected by cognition (Seligman, 1971).

Lipp and Edwards (2002) replicated the procedure used by Hugdahl and Öhman (1977) in order to assess whether differences in electrodermal responding indeed index the effects of instruction on fear learning. The electrodermal measures replicated the findings of previous research, showing susceptibility to verbal instruction only for conditioning with non fear-relevant stimuli. However, regardless of conditional stimulus fear-relevance and instruction condition, the conditional stimuli paired with the aversive event were rated as more unpleasant than were the conditional stimuli presented alone after completion of the experiment. Thus, the post-experimental assessment of affective learning failed to reflect the difference in extinction between the not instructed groups or the selective effect of the instructions, both of which had been evident in the electrodermal measure during extinction. These findings may suggest that effects of verbal instruction on electrodermal responses during extinction are not caused by changes in emotional responding, but by changes in arousal (Bradley, 2000) or expectancy learning (Lipp & Vaitl, 1990) to which electrodermal responses are sensitive as well. Further research in learning paradigms that can assess affective and expectancy learning simultaneously seems required to clarify the effects of instruction on affective learning.

Lipp and Purkis (2006) developed a procedure based on the picture–picture paradigm (Martin & Levey, 1978) that permits the concurrent assessment of affective and expectancy learning as well as the assessment of post-experimental stimulus evaluations. In brief, participants are presented with two conditional stimuli, simple geometric shapes, one followed by a pleasant and the second followed by an unpleasant unconditional stimulus, pictures of happy and angry faces. Verbal evaluations of the conditional stimuli and an assessment of the stimulus contingencies are made after each block of 10 trials. Long term effects on affective learning beyond the immediate learning context are assessed with a post-experimental paper/pencil scale that differs in format from the computerised assessments collected during the experiment. Using this procedure, Lipp and Purkis found that reversal and extinction were slower for affective than for expectancy learning. Moreover, post-experimental assessments of stimulus evaluation were inconsistent with the most recently trained stimulus contingency, revealing significant differential affective learning after extinction and neutral evaluations after reversal. Thus, the assessments outside the immediate learning context seem to reflect an integration of affective learning across all phases of the experiment. One major disadvantage of this paradigm is that it relies entirely on verbal reports which can be subject to demand characteristics. On the other hand, findings of dissociations between self report measures of affective and expectancy learning and of differential stimulus evaluations after extinction, but not after reversal training, render it unlikely that the results reflect merely on demand characteristics.

The present study assessed the effects of verbal instructions about the stimulus contingencies on contingency reversal (Experiment 1) and extinction (Experiment 2) of affective and expectancy learning in a picture–picture paradigm. Using reversal and extinction paradigms provides the opportunity of a conceptual replication which strengthens the overall conclusions. Verbal instruction about the occurrence of the unconditional stimulus has been shown to facilitate the extinction (Hugdahl, 1978; Hugdahl & Öhman, 1977) and reversal (Grings et al., 1973) of human Pavlovian fear conditioning as indexed by electrodermal responses. The current study will clarify whether these findings index affective or expectancy learning. The present experiments were designed to permit the separation of the effects of the manipulation per se from effects of the manipulation on subsequent learning. Thus, the effects of the experimental manipulation were assessed prior to explicit training in the new contingencies, reversal or extinction. In both experiments a third group was employed that was exposed to context change rather than to verbal instructions. Context change had no significant effects on either affective or expectancy learning and the results are not included in the present report. They are available from the first author on request.

Experiment 1

Method

Participants

Forty-eight undergraduate students (36 females), aged 17–41 years (mean 19.4 years), volunteered participation in exchange for course credit and provided informed consent. Participants were assigned to one of two groups upon arrival at the laboratory with the restriction of an approximately equal percentage of males and females in each group (Control: 5:19; Instruction: 7:17).

Apparatus and materials

The experiment was conducted using DMDX (Forster & Forster, 2003) on an IBM compatible computer running Windows XP. The experiment was controlled by the experimenter on a primary monitor and experimental trials were presented to participants via a secondary 17″ CRT monitor which participants viewed at a distance of 70 cm in the participant room. All experimental trials, ratings, judgments, and task specific experimental instructions were presented on the secondary monitor and responses were recorded via a USB keyboard. Pictures were presented at a size of 600×450 pixels (screen resolution: 1280×1024) on a background that was either yellow (RGB code: 255204000) or green (RGB code: 000102000) for half the participants in each group. Four line drawings of irregular geometric shapes served as conditional and control stimuli during practice. The unconditional stimuli used during the main experiment were a happy and an angry female face sourced from the Matsumoto and Ekman data base (Matsumoto & Ekman, 1988).

Procedure

Participants attended individual experimental sessions in a sound attenuated experimental room adjacent to the experiment control room. Participants received an initial briefing and read an instruction sheet for an overview of the experiment, before providing informed consent. Prior to the main experiment, participants completed a practice experiment which contained detailed instructions, as well as examples of conditioning trials and pleasantness and expectancy ratings. The stimuli presented during practice, two line drawings used as conditional stimuli and a male and a female face with a neutral facial expression used as unconditional stimuli, were not used during the main experiment. Pleasantness ratings were collected on a 9 point Likert scale that required participants to enter a number from 1 to 9 in response to the instruction 'Please rate [CS] on a scale of 1–9 where 1 = unpleasant and 9 = pleasant; then press spacebar to continue' while viewing the conditional stimuli. Assessment of expectancy learning required participants to give a percentage for the extent to which a shape conditional stimulus caused the appearance of a particular unconditional stimulus, the angry or the happy face.