

# ASSOCIATIVE PROCESSES IN HUMAN CONTINGENCY LEARNING: EVIDENCE FROM A CUED RESPONSE TASK



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## Abstract

The involvement of associative-automatic processes in human learning of contingencies has been questioned by authors who advocate that human learn only using high-level reasoning processes. This research analyze if there are circumstances where the involvement of these processes may be revealed. For example, when learning is measured when there is little time available for cues processing. In this paper we present two experiments using a cued response task with two learning phases. Participants in phase 1 have to learn cue-outcome relationships. In phase 2 half of these relations are modified. Participants were informed (using instructions) about some of these changes before starting phase 2. The effect of these instructions was measured during phase 2 in two groups that differed in the time (250 or 1500 ms) they had to process the cue. The results showed that the effect of the instructions was different depending on the time of signal processing. Only in the group of 1500 ms verbal instructions were able to update what is learned during Phase 1. These results are interpreted as consistent with the hypothesis that a brief presentation of the signal during Phase 2 facilitates the activation of associative-automatic processes.

## Introduction

Theoretical debate in Human Contingency Learning (with clinic implications):

Propositional models have two core assumptions: 1) Humans learn by forming and evaluating propositions, 2) The induction and evaluation of propositions is carried out by non-automatic processes.

Dual-System theories: In addition to propositional processes humans can learn using automatic processes. These processes are fast acting, working memory independent, unconscious and goal independent.

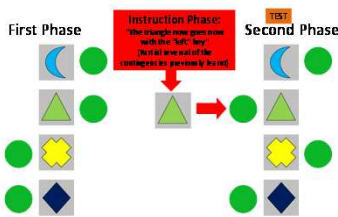
Propositional approach predicts that learning will be affected by verbal instructions. The output of the automatic link-formation mechanism cannot deal with propositional content. It cannot, therefore, be affected directly by verbal instructions (Mitchell, De Hower and Lovibond, 2009).

The use of a SOA <300 ms has shown to raise difficulties for the operation of propositional processes (Neely, 1977).

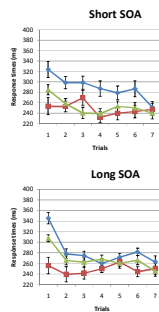
### Objective

To evaluate whether a verbal instruction indicating a partial reversal of the cue-outcome contingencies previously learned would affect performance depending on the SOA.

## Experiment 1



## Phase 2 Results



- Short SOA:
  - No change < Uninformed
  - Informed = No change

Cue x SOA:  $F(2,166)=5.686; p=.004$

- Long SOA:
  - No change = Uninformed
  - Informed < No change/Uninformed

## Discussion

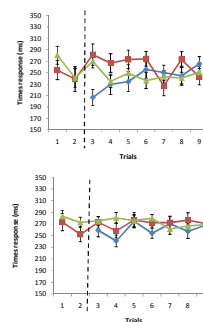
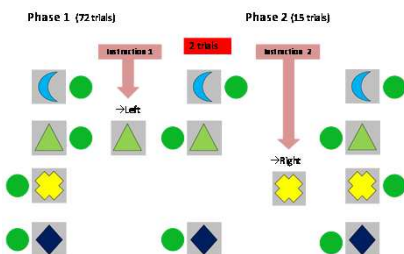
Does this sensitive performance to a verbal instruction mean learning or, alternatively, fast responses to a verbal instruction that is active in working memory (as shown in e.g., speeded tasks)?

## Experiment 2

This alternative hypothesis was evaluated in Experiment 2: after the partial reversal of the contingencies, a new verbal instruction was provided concerning a further change in another cue-outcome relationship.

This new instruction should substitute the first one in working memory and so, what RTs will be obtained for Informed stimulus?

## Phase 2 Results



- Inform. 1 > No-chg.
- Inform. 2 < No-chg.

Cue x SOA x Trial:  $F(12, 972,707) = 2,067, p = .017$

- Inform. 1 = No-chg.
- Inform. 2 < No-chg.

## Conclusions

RT's to Informed 1 stimulus increased from Phase 2 to Phase 3 suggesting that Experiment 1's results were not reflecting a genuine re-learning of this stimulus contingency, but simply, participants followed the instruction while active in working memory.

It is difficult to explain the results from a propositional proposal.

The dismissal of associative processes in contingency learning tasks may be regarded as premature.