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A novel smartphone application for habit induction and manipulation

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Introduction

When first learned, instrumental behavior is considered goal-directed, as it is intentional and outcome-dependent, and when repeated it becomes more habitual and stimulus-response oriented. Such change of behavior was shown by rodents in appetitive instrumental learning studies. Nonetheless, with human subjects this paradigm was not as successful and no valid experimental method have been established yet[i].

Research Aim

Establish a valid method to induce and manipulate habits, that will allow the differentiation between goal-directed and habitual behaviors in an experimental settings using a user-friendly and accessible smartphone application.

Methods

The game will be downloaded to participants' smartphones. The goal is to respond quickly and correctly to red or blue cars, and correct button presses will be rewarded (fig. 1). Participants will be randomly assigned to short/extensive training groups. The training will be followed by different tests for habitual behavior[ii] (fig. 2).
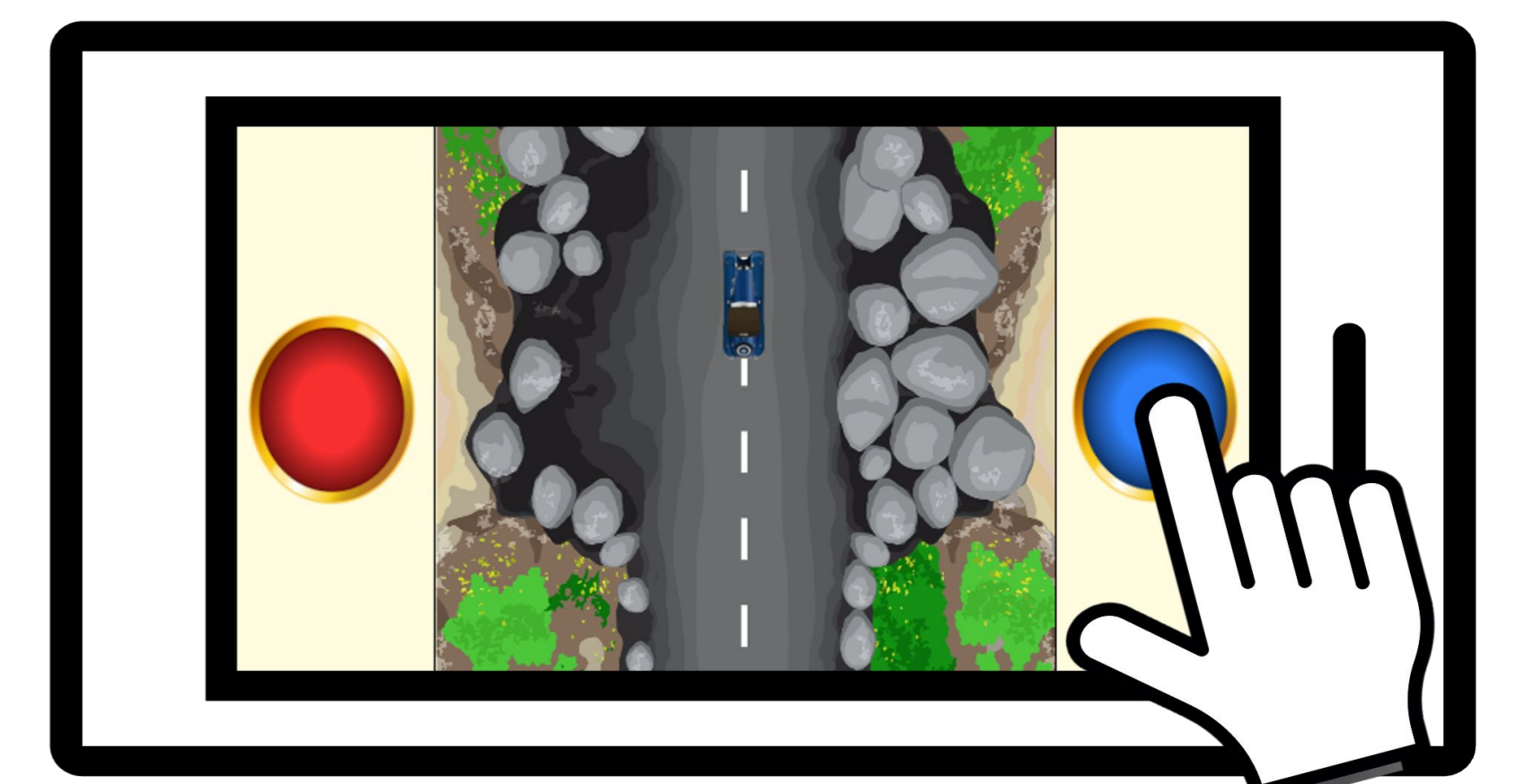

Figure 1. Training phase. A blue or red car is presented, and the participant needs to respond quickly with a button press.
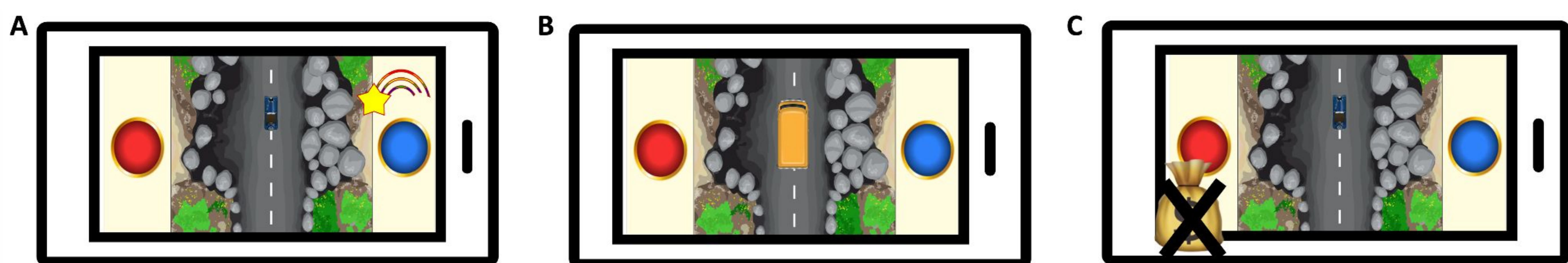

Figure 2. Testing habit formation: A. Automatic: participants will continue pressing the buttons for the blue and red cars but will be asked to count how many stars they saw. B. Inflexible: In addition to the red and blue cars, yellow cars will also be combined in the game, and participants will continue pressing the blue and red buttons and will be instructed to count how many cars passed. C. Insensitive to reinforcement devaluation: participants will be notified that from now on they will only get points for pressing either for the blue or red car.

Preliminary Results

In a pilot run, participants in the ST group were more accurate in counting the yellow cars. The results indicate a trend similar to our hypothesis for the devaluation test (fig. 3)

Figure 3: Bars: Training: training percentage of correct responses. Dev: percentage of correct presses on the devalued button. Nondev: percentage of correct presses on the non-devalued button. Yellow: percentage of correct presses on both buttons in the yellow-car-counting test. Yellow_accu: participants' count relative to the actual number of cars. N=10.
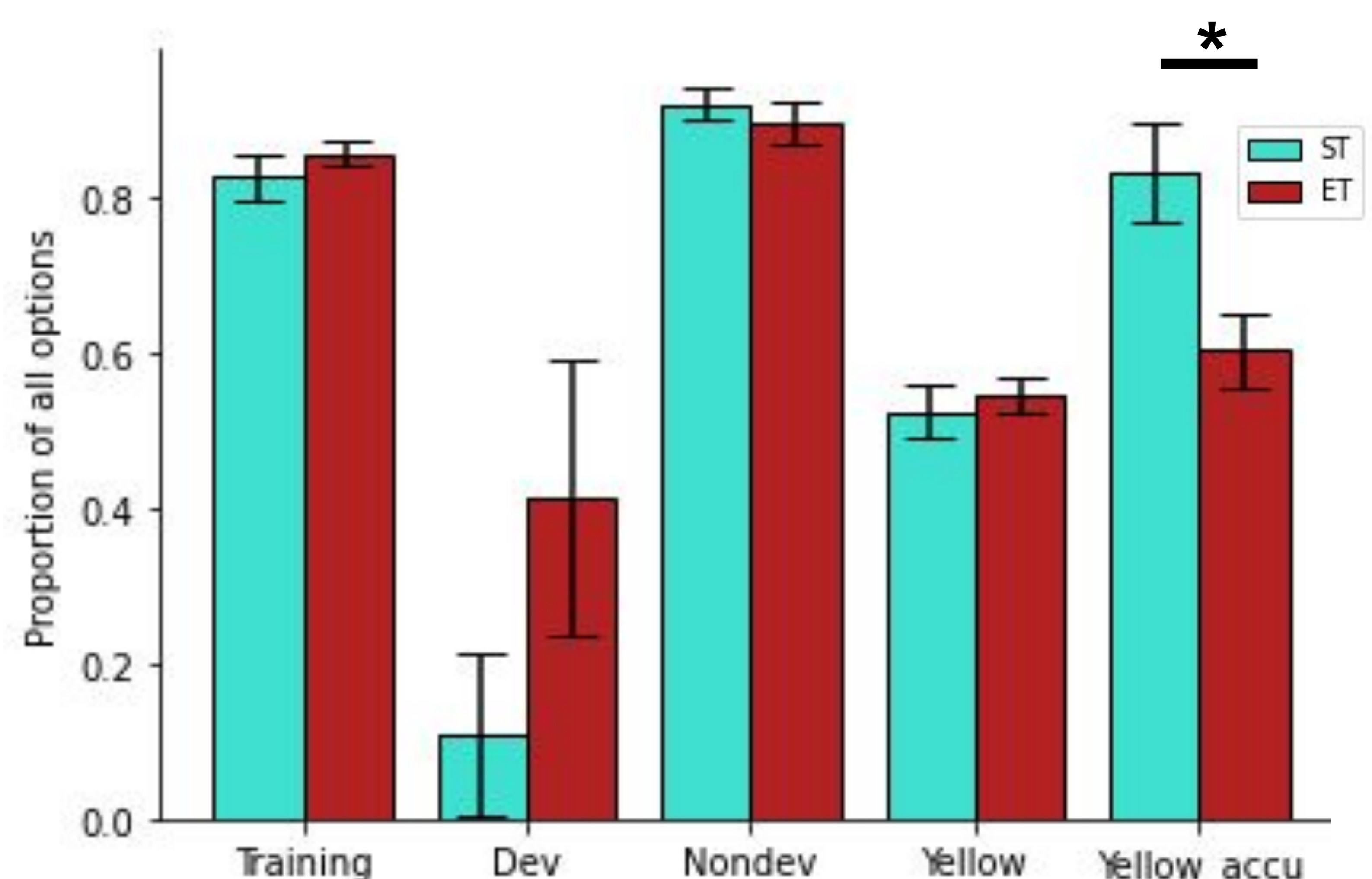
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