Lower sensitivity to absent cues in schizotypy

Santiago Castiello¹, Michael Browning², Ralph R. Miller³ & Robin A. Murphy¹

¹Department of Experimental Psychology, University of Oxford; ²Department of Psychiatry, University of Oxford; ³State University of New York at Binghamton

Highlights

• By increasing the frequency, but not the duration, of trials with absent stimuli learning was enhanced.
• Schizotypy is correlated with lower sensitivity to absent stimuli in contingency assessment.
• Lower sensitivity may be due to lower learning rates to the absent stimulus.

Introduction

The contingency between two stimuli (S1 and S2) can be calculated as the difference between p(S2|S1) minus p(S2|~S1), which equals delta P (ΔP) (Allan, 1980; Murphy et al., 2011). An implication is that increasing experience with stimulus absence, increases ΔP. Schizotypy is a latent personality trait related with psychotic-like experience (Lenzenweger, 2018) and schizotypal individuals show aberrant salience attribution (Corlett, et al., 2007). We tested whether schizotypy was related to reduced learning from low salient (absent) events.

Methods

Participants saw a rapid presentation of trials (Crump, et al., 2007) with a specific contingency between two stimuli and rated their relatedness. Experiment 1 was a 3 (contingency) x 4 (frequency) factorial design. We manipulated the frequency of co-absent trials (or D trials). Experiment 2 was a 3 (contingency) x 4 (frequency) factorial design. We manipulated the D trial frequency for half the conditions (unadjusted), and inversely adjusted the D trials duration for the other half (adjusted).

• Exp. 1: n=45; F 24; age: 19–38; M 20.4, SD 2.8; short OLIFE: 4–43, M 16.5, SD 8.7.
• Exp. 2: n=60; F 27; age: 18–55, M 27.4, SD 8.8; short OLIFE: 2–28, M 12.6, SD 7.3.

The frequency of absent stimuli increases ratings

Figure 2. Scatter plots (left) represents ratings for Experiment 1 (upper) and Experiment 2 (lower). We present ratings as a function of frequency of trials without absent stimulus (D trials), for Negative, Zero, and Positive contingencies (in column panels), and color represents high and low schizotypy median split. Horizontal bar plots (right) represents the standardized estimates obtained from a Linear Mixed Model run to predict ratings for each experiment. In both experiments schizotypy shows a reduced D trial frequency effect.

Learning and rating model

Learning: We calculated the associative strength (V_i) between S1-S2 and ~S1-S2:
• S1: V_{S1} = V_{S1} + a^→ (S_2 - V_{S1})
• ~S1: V_{~S1} = V_{~S1} + a^→ (S_2 - V_{~S1})

Ratings (r_i):
Ratings were modelled as: r_i = N(μ_i, σ), where μ_2 = b * (V_{S1} - V_{~S1}); and a^→ is a learning rate (LR; a) for S1; a^→ is a LR for ~S1; and b is a scaling factor.

Results and discussion

In both experiments, schizotypy interacted with co-absent stimulus trial frequency when predicting ratings (Figure 2). Model parameters and schizotypy correlations were not consistent across experiments. However, the negative correlation between learning to absent stimuli and schizotypy (Experiment 2), suggest that schizotypal participants make less use of the absent information.

Acknowledgements and references

We thank the University of Guadalajara for the PhD grant (IV/2018/1476); and all the TM-OBE team.