UNM08

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Design

In this experiment, the differences in recognition memory of predictive and non-predictive cues was examined under both a certain and an uncertain training. Both groups received a training in which two cues are presented in each trial followed by an outcome. Only one of the cues is predictive of the outcome, whereas the other appears the same amount of times with each of the two possible outcomes. In one of this groups, the contingency between the predictive cues and their respective outcomes is of 1, so in each trial that the predictive cue is presented its corresponding outcome follows. For the other group, this contingency is of 0.8, so the predictive cue is followed by the outcome on 80% of the trials. After the training phase, all subjects were presented two cues on each trial, one that was presented on training and one that wasn't, but that was similar to the other cues presented on the training phase (a pair of balls swapped colours in the fouls). Subjects had to choose which one they had seen before and rate how confident they were of their choice.

Group	Stage 1	Stage 2	Test2
Certain	AX - O1	AX - O1	A vs *b*
			A vs *x*
			A vs *y*
	AY - O1	AY - O1	B vs *a*
			B vs *x*
			B vs *y*
	BX - O2	BX - O2	X vs *a*
			X vs *b*
			X vs *y*
	BY - O2	BY - O2	Y vs *a*
			Y vs *b*
			Y vs *x*
Uncertain	AX - O1	0.8 AX - O1 / 0.2 AX - O2	A vs *b*
			A vs *x*
			A vs *y*
	AY - O1	0.8 AY - O1 / 0.2 AY - O2	B vs *a*
			B vs *x*
			B vs *y*
	BX - O2	0.8 BX - O1 / 0.2 BX - O2	X vs *a*
			X vs *b*
			X vs *y*
	BY - O2	0.8 BY - O1 / 0.2 BY - O2	Y vs *a*
			Y vs *b*
			Y vs *x*

Results

Training

Stage 1

One-sample t-test indicates that mean responding of the certain group in stage 1 was significantly higher than 0.5, that is, chance level ($t(59) = 5.96$, $p < .001$, $d = 0.77$, $BF_{10} = 6x10^{8} \pm 0\%$). Same was true for the uncertain group ($t(59) = 6.14$, $p < .001$, $d = 0.79$, $BF_{10} = 2.4x10^{6} \pm 0\%$).

In stage 1, both groups showed a similar increase in accuracy as blocks progressed. A mixed methods ANOVA confirmed a significant effect of the Block ($F(3.46, 200.43) = 29.60$, $p < .001$, $\eta_p^2 = .34$, $BF_{10} = 1.6x10^{21} \pm 0.75\%$), and the non-significant effect of the Condition ($F(1, 58) = 0.98$, $p = .325$, $\eta_p^2 = .02$, $BF_{10} = 4.5x10^{-1} \pm 0.62\%$) and the interaction ($F(3.46, 200.43) = 1.02$, $p = .392$, $\eta_p^2 = .02$, $BF_{10} = 7.1x10^{-2} \pm 1.15\%$). Extreme evidence in favor of the alternative hypothesis was found for the effect of the Block, anecdotal evidence in favor of the null for the Condition and strong evidence for the null hypothesis in the case of the interaction.

Stage 2

One-sample t-test indicates that mean responding of the certain group in stage 1 was significantly higher than 0.5, that is, chance level ($t(59) = 5.99$, $p < .001$, $d = 0.77$, $BF_{10} = 1.3x10^{14} \pm 0\%$). Same was true for the uncertain group ($t(59) = 6.13$, $p < .001$, $d = 0.79$, $BF_{10} = 4.3x10^{6} \pm 0\%$).

In stage 2, both groups showed stable accuracy on the 4 blocks, but the uncertain group was consistently less accurate than the certain group . A mixed methods ANOVA confirmed a significant effect of the Condition ($F(1, 58) = 14.24$, $p < .001$, $\eta_p^2 = .20$, $BF_{10} = 5.4x10^{1} \pm 1.55\%$), and the non-significant effect of the Block ($F(2.58, 149.83) = 0.61$, $p = .583$, $\eta_p^2 = .01$, $BF_{10} = 4.3x10^{-2} \pm 0.62\%$) and the interaction ($F(2.58, 149.83) = 0.14$, $p = .916$, $\eta_p^2 < .01$, $BF_{10} = 5.3x10^{-2} \pm 2.38\%$). Very strong evidence in favor of the alternative

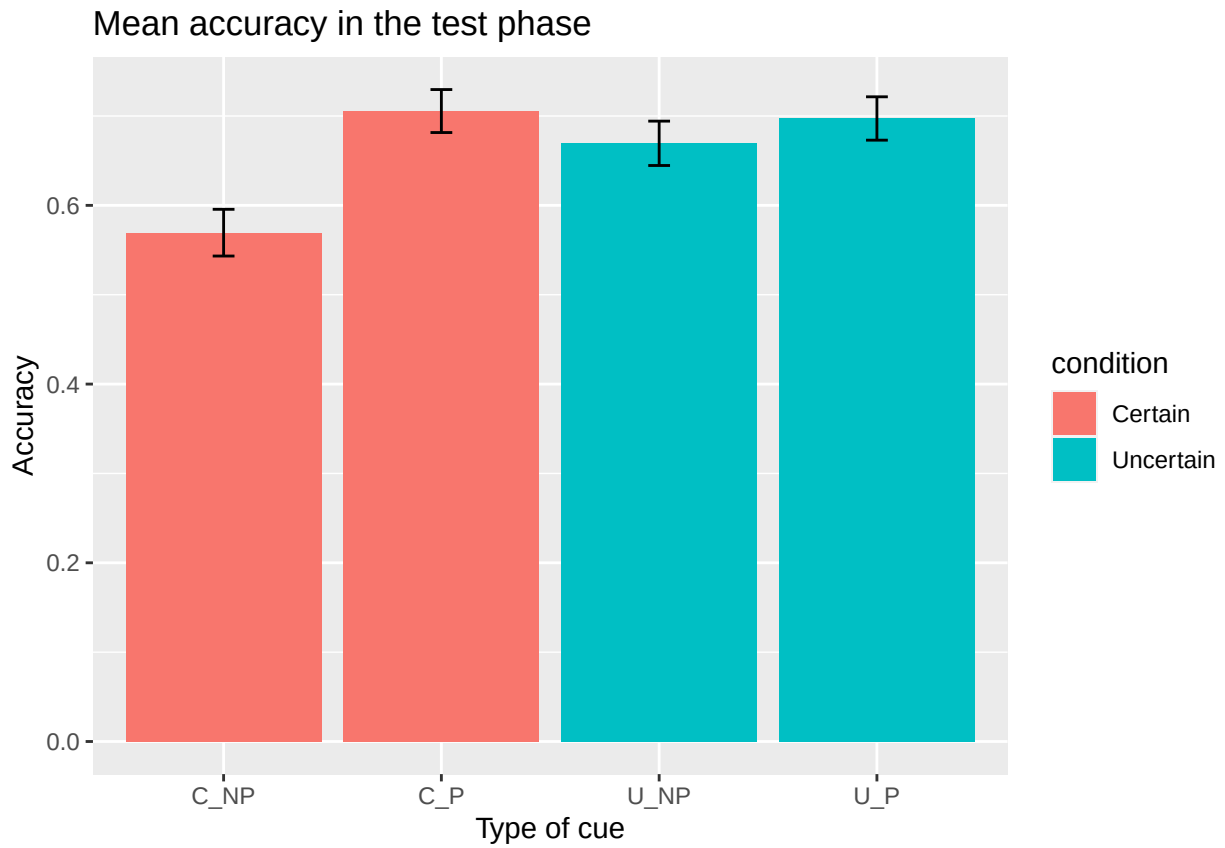
hypothesis was found for the effect of the Condition and strong evidence in favor of the null for the Block and the interaction.

All training phase

When both stages where analysed together, there was a significant effect of the Condition ($F(1, 58) = 4.51$, $p = .038$, $\eta_p^2 = .07$, $BF_{10} = 1.8x10^{0} \pm 1.19\%$), the Block ($F(4.43, 256.86) = 21.49$, $p < .001$, $\eta_p^2 = .27$, $BF_{10} = 2x10^{26} \pm 0.32\%$) and the interaction ($F(4.43, 256.86) = 4.34$, $p = .001$, $\eta_p^2 = .07$, $BF_{10} = 8.2x10^{2} \pm 2.91\%$). Anecdotal evidence in favor of the alternative hypothesis was found for the effect of the Condition and extreme evidence in favor of the null for the Block and the interaction. Bonferroni corrected pairwise comparisons showed that there were only significant differences between the certain and the uncertain condition in stage 2 blocks ($t(58) > 3.135$, $p < .003$).

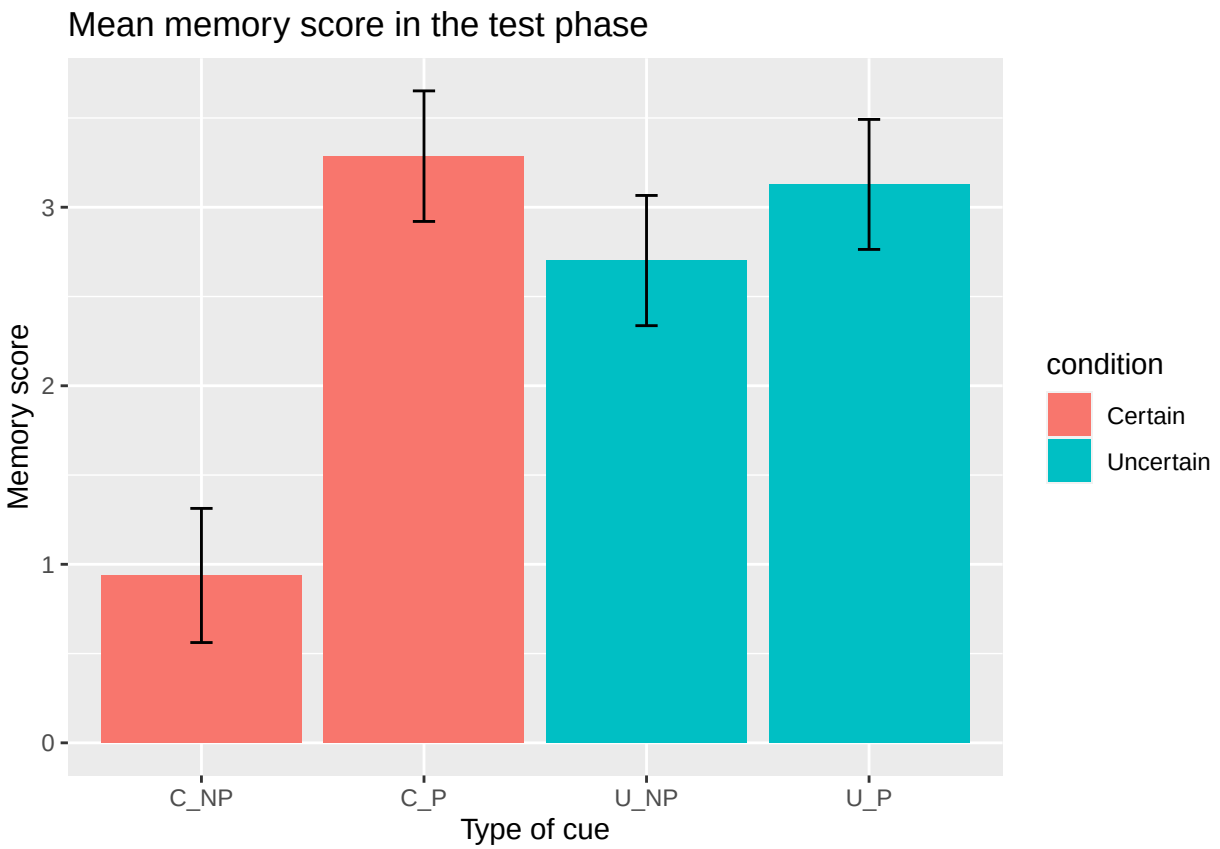
Test

Accuracy



In both the certain and the uncertain group, accuracy was lower for non-predictive than predictive cues, with this difference bieng bigger in the certain than the uncertain go. However, a mixed model ANOVA found significant only the effect of the Predictiveness (Condition: $F(1, 58) = 0.84$, $p = .364$, $\eta_p^2 = .01$, $BF_{10} = 4.1x10^{-1} \pm 1.31\%$; Predictiveness: $F(1, 58) = 8.17$, $p = .006$, $\eta_p^2 = .12$, $BF_{10} = 5.4x10^{0} \pm 0.86\%$; ConditionxPredictiveness: $F(1, 58) = 3.57$, $p = .064$, $\eta_p^2 = .06$, $BF_{10} = 1.1x10^{0} \pm 7.42\%$). Bayesian evidence was anecdotal for the null hypothesis for Condition, moderate for the alternative in the case of Predictiveness and anecdotal for the interaction.

Memory score



There were no significant differences in memory due to the condition, with the bayesian anova indicating anecdotal evidence for the null hypothesis ($F(1, 58) = 1.04$, $p = .312$, $\eta_p^2 = .02$, $\text{BF}_{10} = 4.3\text{x}10^{-1} \pm 1.18\%$). However, there was a significant effect of both the predictiveness and the interaction, the former showing moderate evidence for the alternative and the latter, anecdotal evidence ($F(1, 58) = 8.70$, $p = .005$, $\eta_p^2 = .13$, $\text{BF}_{10} = 6.6\text{x}10^{0} \pm 1.17\%$; $F(1, 58) = 3.57$, $p = .064$, $\eta_p^2 = .06$, $\text{BF}_{10} = 1.1\text{x}10^{0} \pm 7.42\%$). Bonferroni corrected pairwise comparisons indicated that there the memory was higher for the predictive cues in the certain condition ($T(58) = -3.531$, $p < 0.001$) but there were no differences in the uncertain condition ($T(58) = -0.641$, $p = 0.524$).

Corrected memory score (hits x1, errors x0)

There were no significant differences in memory due to the condition, and the bayesian analysis indicated anecdotal evidence for the null hypothesis ($F(1, 58) = 1.09$, $p = .300$, $\eta_p^2 = .02$, $\text{BF}_{10} = 4.5\text{x}10^{-1} \pm 0.81\%$;). However, both the effect of predictiveness and the interaction was found significant, being the bayesian evidence strong for the alternative in the case of predictiveness and anecdotal for the interaction ($F(1, 58) = 11.33$, $p = .001$, $\eta_p^2 = .16$, $\text{BF}_{10} = 1.6\text{x}10^{1} \pm 0.93\%$; $F(1, 58) = 5.38$, $p = .024$, $\eta_p^2 = .08$, $\text{BF}_{10} = 2.1\text{x}10^{0} \pm 5.9\%$). Bonferroni corrected pairwise comparisons indicated that there the accuracy was higher for the predictive cues in the certain condition ($T(58) = -4.021$, $p < 0.001$) but there were no differences in the uncertain condition ($T(58) = -0.74$, $p = 0.463$).