

UNM05

2023-07-03

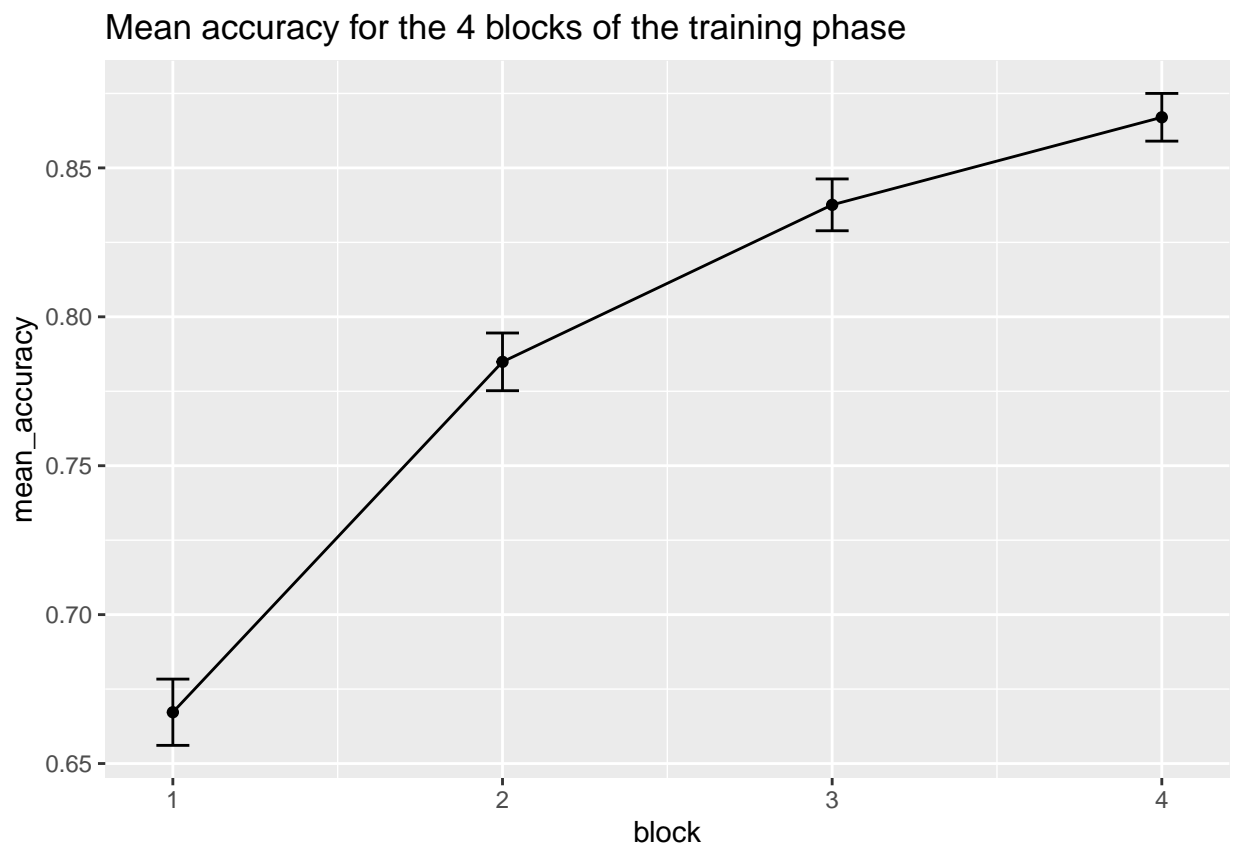
Design

This was a pilot experiment in which we aimed to find the most appropriate memory test to be used after 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. Two tests were used, one followed by the other in all cases. Test 1 consisted in presenting one of the cues saw in the training phase and a distractor cue that was similar to this cue. The similarity of the distractor was manipulated between-subjects, with 3 possible conditions: very subtle (only one pair of balls swapped colors), subtle (two pairs of balls swapped colors) and no subtle (the distractor is a palette-swap of the target). In test 2, the target is presented with the distractors similar to the rest of the targets, one per trial.

Training	Test1	Test2
AX - O1	A vs a	A vs b
		A vs x
		A vs y
AY - O1	B vs b	B vs a
		B vs x
		B vs y
BX - O2	X vs x	X vs a
		X vs b
		X vs y
BY - O2	Y vs y	Y vs a
		Y vs b
		Y vs x

All Data

Training phase



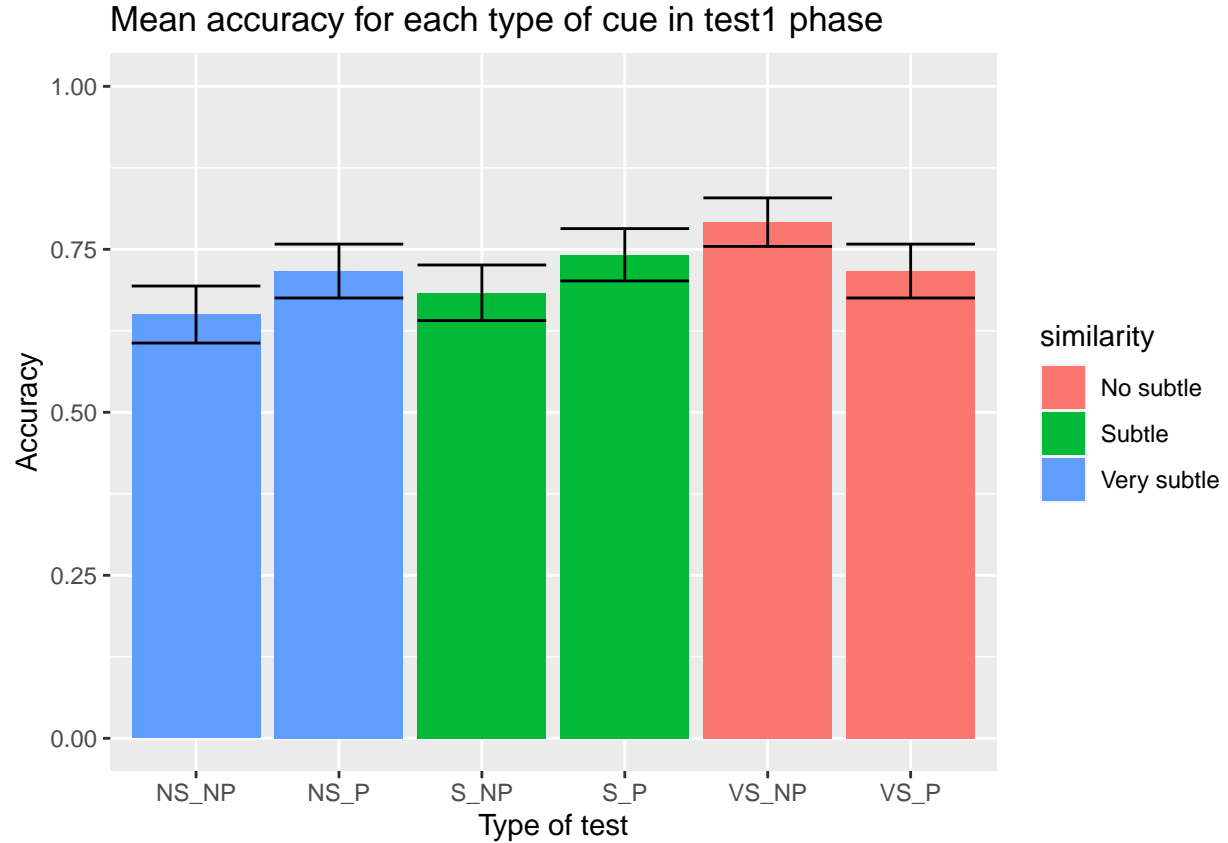
One-sample t-test indicates that mean responding in the training phase was significantly higher than 0.5, that is, chance level, .

As expected, subjects showed rapid learning, reaching an accuracy of around .875 at the end of the training phase. This was confirmed by a repeated measures ANOVA that found a significant effect of the block ($F(2.32, 206.48) = 57.60, p < .001, \eta_p^2 = .39$) and moderate bayesian evidence towards the alternative hypothesis ($BF_{10} = 3.1 \times 10^{25} \pm 0.9\%$).

Test1

Accuracy

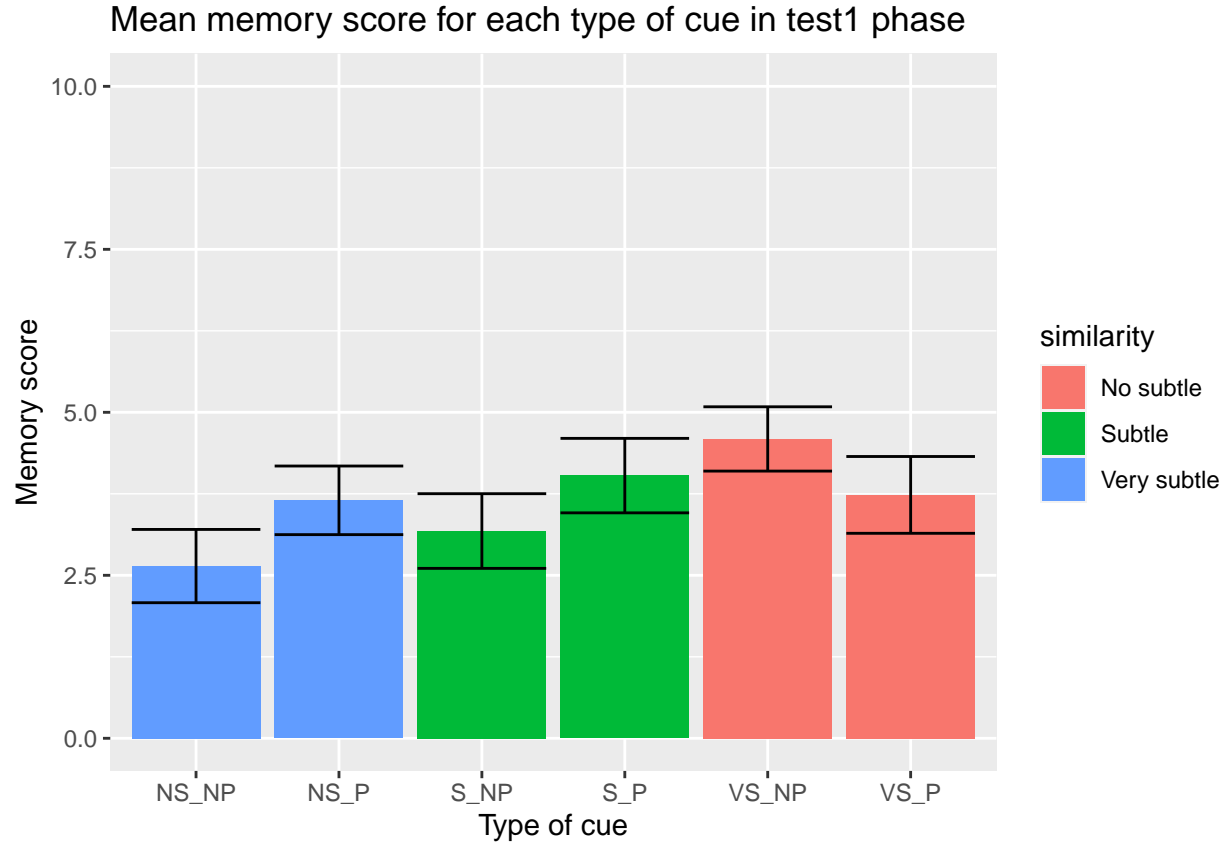
```
## `summarise()` has grouped output by 'cue_type'. You can override using the
## `.groups` argument.
```



Except for those that did the very subtle test, all subjects had lower accuracy for the non predictive vs the predictive targets. However, there were no significant differences due to the type of test ($F(2, 87) = 0.87$, $p = .425$, $\eta_p^2 = .02$), the predictiveness of the target ($F(1, 87) = 0.23$, $p = .635$, $\eta_p^2 < .01$) nor the interaction between them ($F(2, 87) = 1.72$, $p = .185$, $\eta_p^2 = .04$). In all cases, bayesian evidence for the null hypothesis was either anecdotal or moderate ($BF_{10} = 1.8 \times 10^{-1} \pm 5.87\%$, $BF_{10} = 1.8 \times 10^{-1} \pm 1.4\%$, $BF_{10} = 4.1 \times 10^{-1} \pm 2.13\%$, respectively).

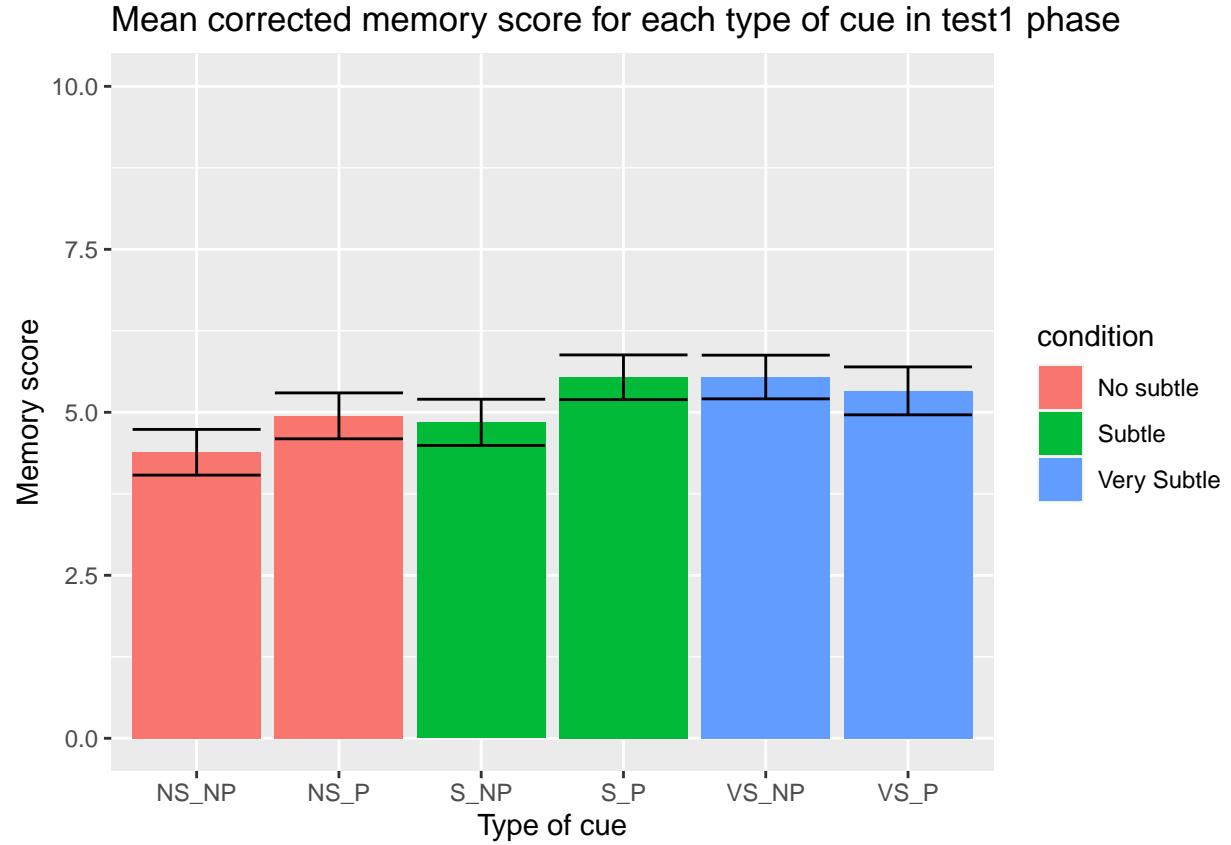
Memory score

```
## `summarise()` has grouped output by 'cue_type'. You can override using the
## `.groups` argument.
```



Again, except for those that did the very subtle test, all subjects had lower accuracy for the non predictive vs the predictive targets. However, there are no significant differences (Type of test: $F(2, 87) = 0.75$, $p = .477$, $\eta_p^2 = .02$, Predictiveness: $F(1, 87) = 0.44$, $p = .510$, $\eta_p^2 < .01$, interaction; $F(2, 87) = 1.41$, $p = .251$, $\eta_p^2 = .03$) and the bayesian evidence is mild ($BF_{10} = 1.7 \times 10^{-1} \pm 1\%$, $BF_{10} = 2 \times 10^{-1} \pm 1.61\%$, $BF_{10} = 3.3 \times 10^{-1} \pm 3.75\%$, respectively).

###Corrected memory score (hits x1, errors x0)



No significant effects were found, and the bayesian evidence was moderate in favor of the null hypothesis in all cases (Certainty: $F(2, 87) = 0.88$, $p = .417$, $\eta_p^2 = .02$, $BF_{10} = 2.3 \times 10^{-1} \pm 0.54\%$; Predictiveness: $F(1, 87) = 1.31$, $p = .255$, $\eta_p^2 = .01$, $BF_{10} = 3 \times 10^{-1} \pm 2.1\%$; interaction: $F(2, 87) = 0.87$, $p = .422$, $\eta_p^2 = .02$, $BF_{10} = 2 \times 10^{-1} \pm 2.03\%$)

Corrected memory score (errors out)

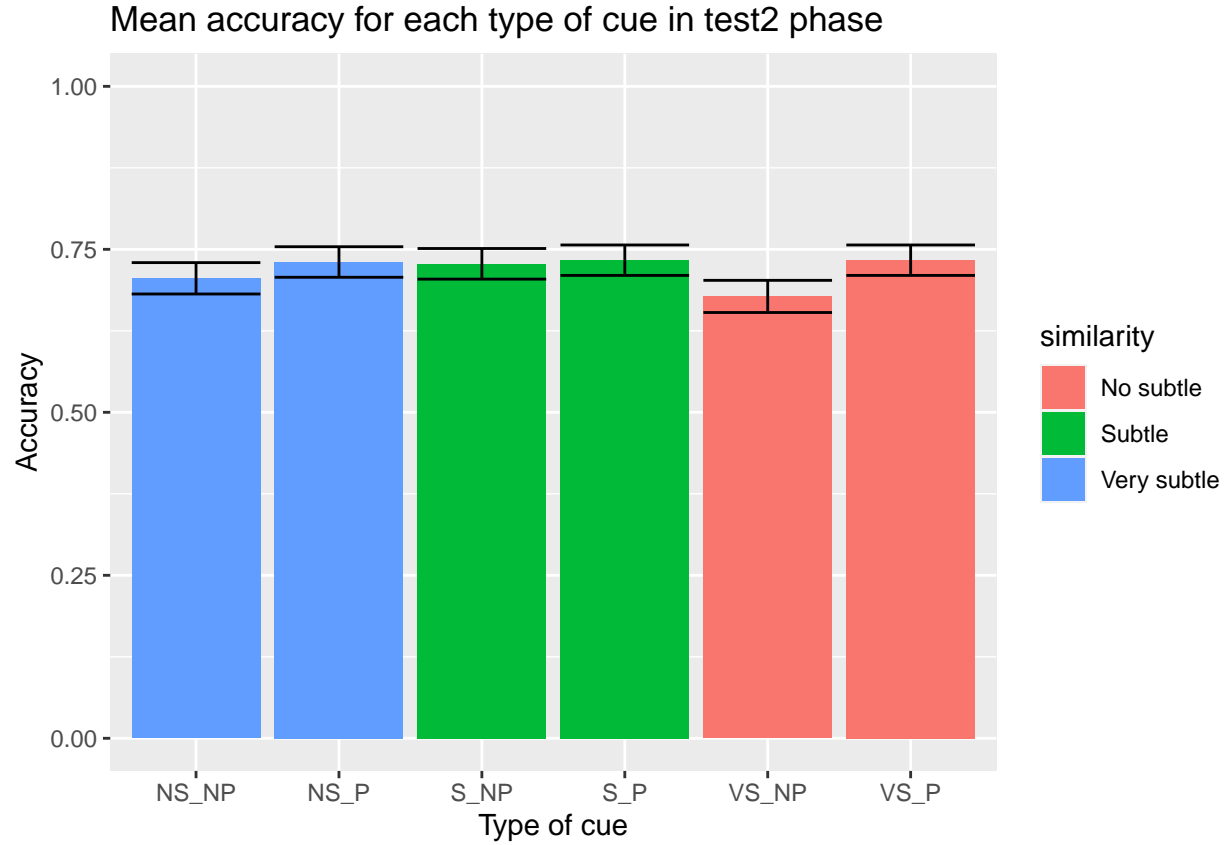


When only hits are taken into account in test 1, there is a significant effect of predictiveness ($F(1, 82) = 4.70$, $p = .033$, $\eta_p^2 = .05$), but the bayesian evidence is anecdotal ($BF_{10} = 1.2 \times 10^0 \pm 1.39\%$). However, there were no significant effects of the type of test ($F(2, 82) = 0.86$, $p = .428$, $\eta_p^2 = .02$, $BF_{10} = 2.5 \times 10^{-1} \pm 0.52\%$) nor the interaction ($F(2, 82) = 0.43$, $p = .653$, $\eta_p^2 = .01$, $BF_{10} = 1.3 \times 10^{-1} \pm 2.18\%$).

Test2

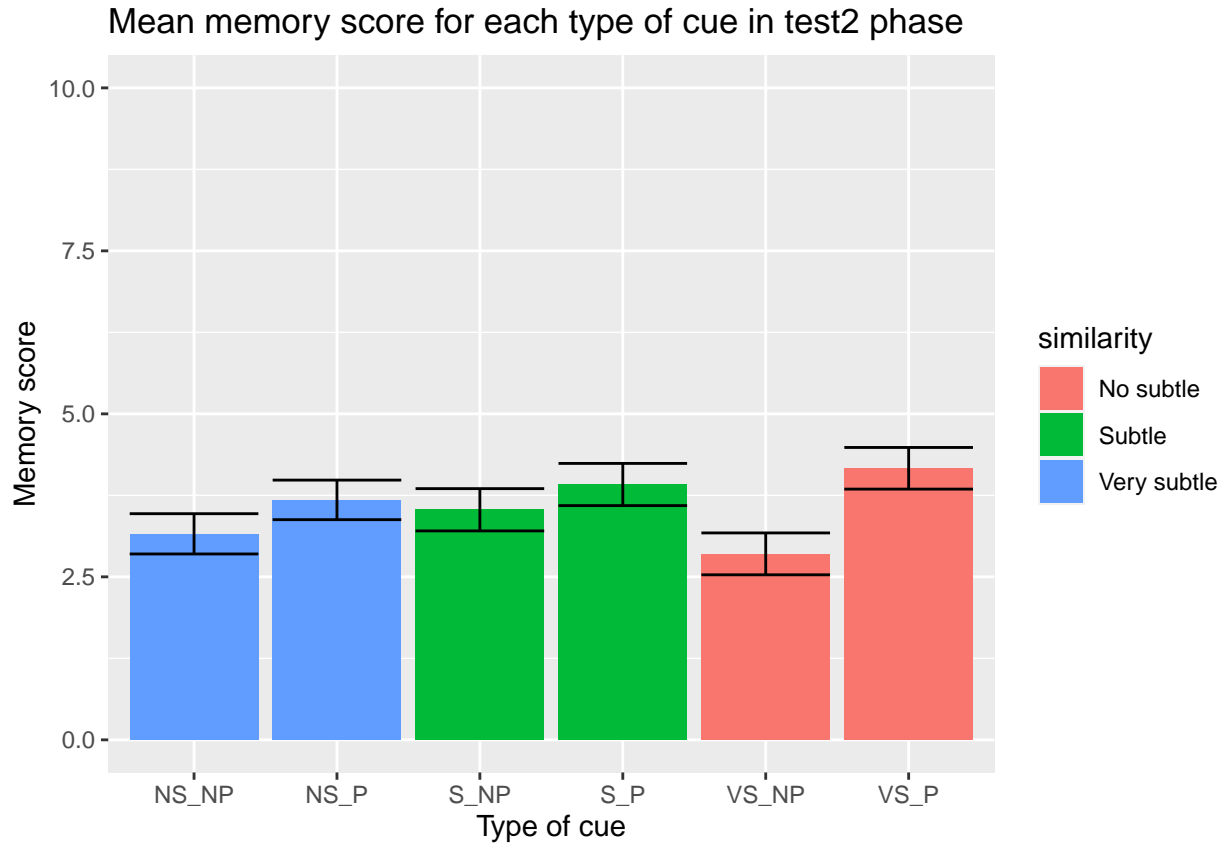
Accuracy

#plot test accuracy



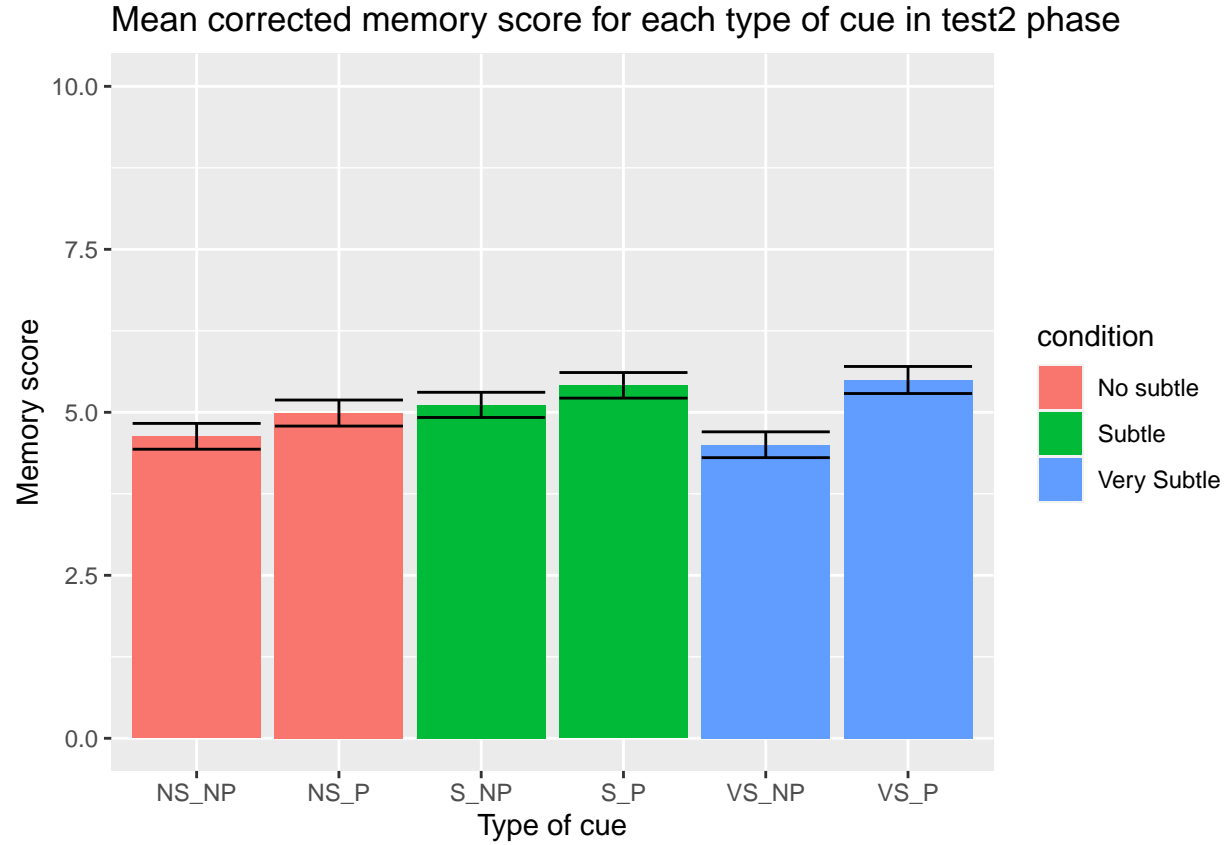
There are no differences in accuracy in the second test, confirmed by the ANOVA (Type of test: $F(2, 87) = 0.13$, $p = .875$, $\eta_p^2 < .01$, Predictiveness: $F(1, 87) = 1.27$, $p = .262$, $\eta_p^2 = .01$, interaction; $F(2, 87) = 0.33$, $p = .722$, $\eta_p^2 < .01$) and the bayesian evidence is anecdotal null ($BF_{10} = 1.3 \times 10^{-1} \pm 0.78\%$, $BF_{10} = 2.9 \times 10^{-1} \pm 1\%$, $BF_{10} = 1.3 \times 10^{-1} \pm 2.67\%$, respectively).

Memory Score



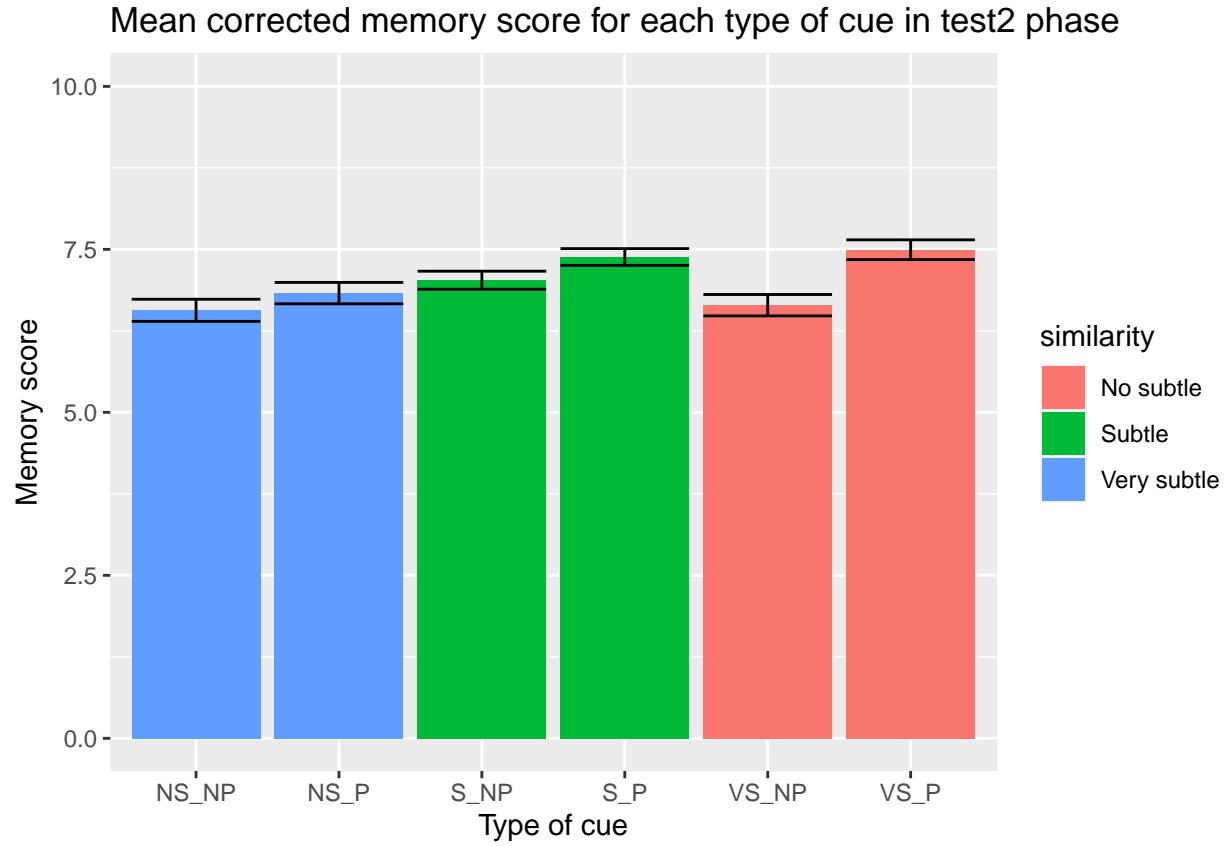
In test two, the memory score is always lower for the non-predictive targets, and the difference is bigger the more difficult the test is. However, there is only a significant effect of predictiveness, but the bayesian evidence is anecdotal ($F(1, 87) = 4.09, p = .046, \eta_p^2 = .04, BF_{10} = 1 \times 10^0 \pm 1.14\%$). There was not a significant effect of the session ($F(2, 87) = 0.07, p = .929, \eta_p^2 < .01, BF_{10} = 1.5 \times 10^{-1} \pm 2.64\%$) nor the SessionxPredictiveness interaction ($F(2, 87) = 0.62, p = .539, \eta_p^2 = .01, BF_{10} = 1.6 \times 10^{-1} \pm 5.76\%$).

###Corrected memory score (hits x1, errors x0)



The analyses indicate that there is a significant effect of predictiveness, although bayesian evidence is anecdotal in favor of the alternative hypothesis ($F(1, 87) = 6.10$, $p = .016$, $\eta_p^2 = .07$, $BF_{10} = 2.5 \times 10^0 \pm 1.45\%$). However, there was not a significant effect of the Similarity nor the interaction, both with moderate bayesian evidence in favor of the null hypothesis ($F(2, 87) = 0.29$, $p = .751$, $\eta_p^2 < .01$, $BF_{10} = 2.2 \times 10^{-1} \pm 2.76\%$; $F(2, 87) = 0.99$, $p = .374$, $\eta_p^2 = .02$, $BF_{10} = 2.2 \times 10^{-1} \pm 5.71\%$; respectively).

Corrected memory score (errors out)

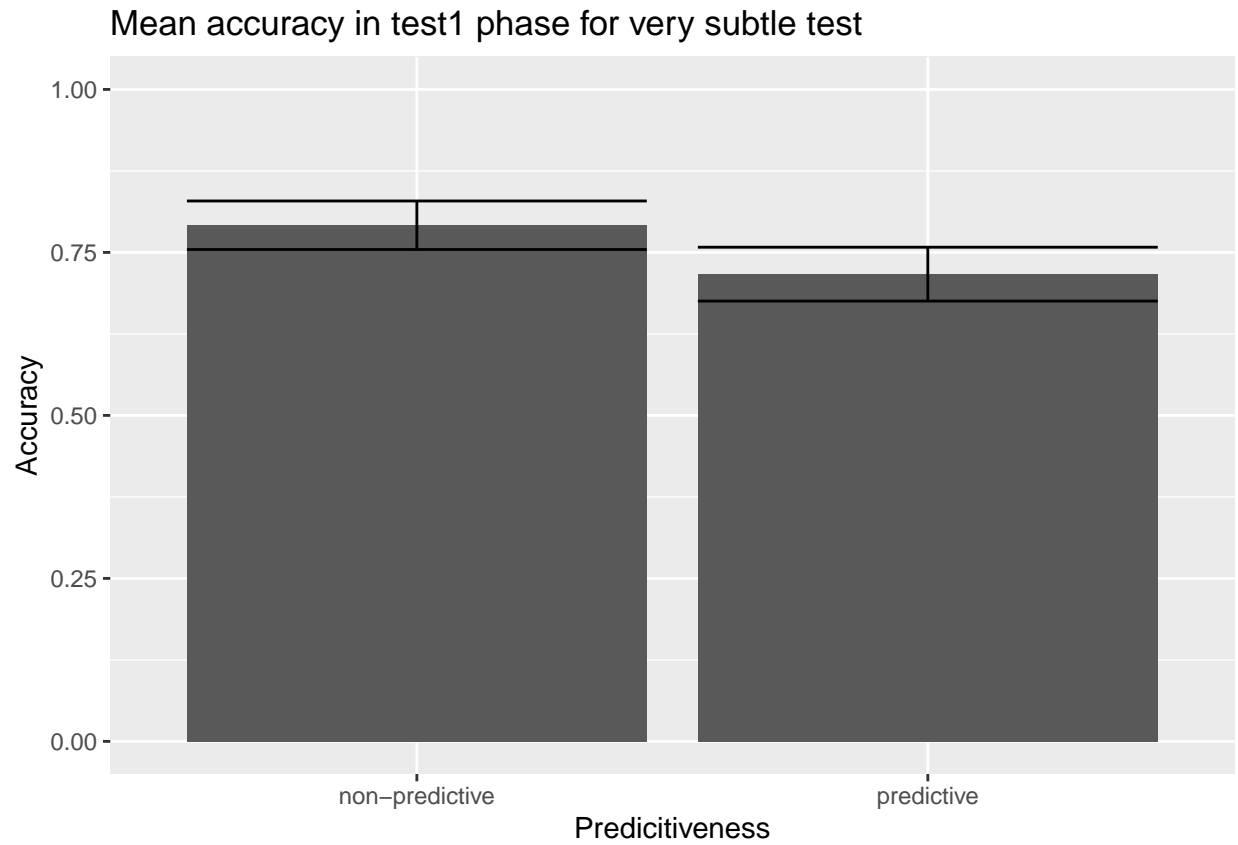


In this case, there's a clear effect of predictiveness, being the corrected memory score always lower in the non-predictive targets ($F(1, 87) = 15.32$, $p < .001$, $\eta_p^2 = .15$, $BF_{10} = 1 \times 10^2 \pm 1.02\%$). Again, nor the session nor the interaction were significant ($F(2, 87) = 0.56$, $p = .572$, $\eta_p^2 = .01$, $BF_{10} = 3.5 \times 10^{-1} \pm 3.04\%$; $F(2, 87) = 2.00$, $p = .141$, $\eta_p^2 = .04$, $BF_{10} = 4.6 \times 10^{-1} \pm 5.79\%$).

Very subtle test

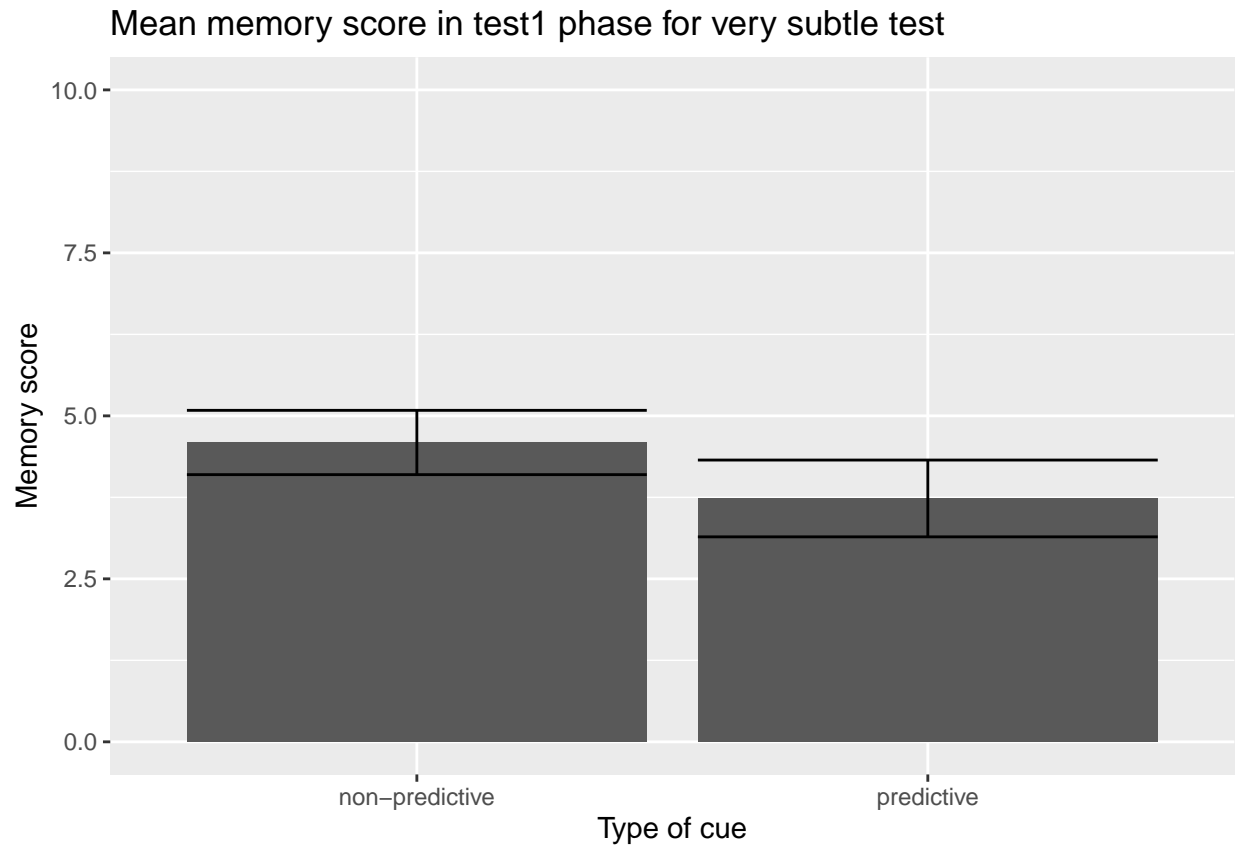
Test1

Accuracy



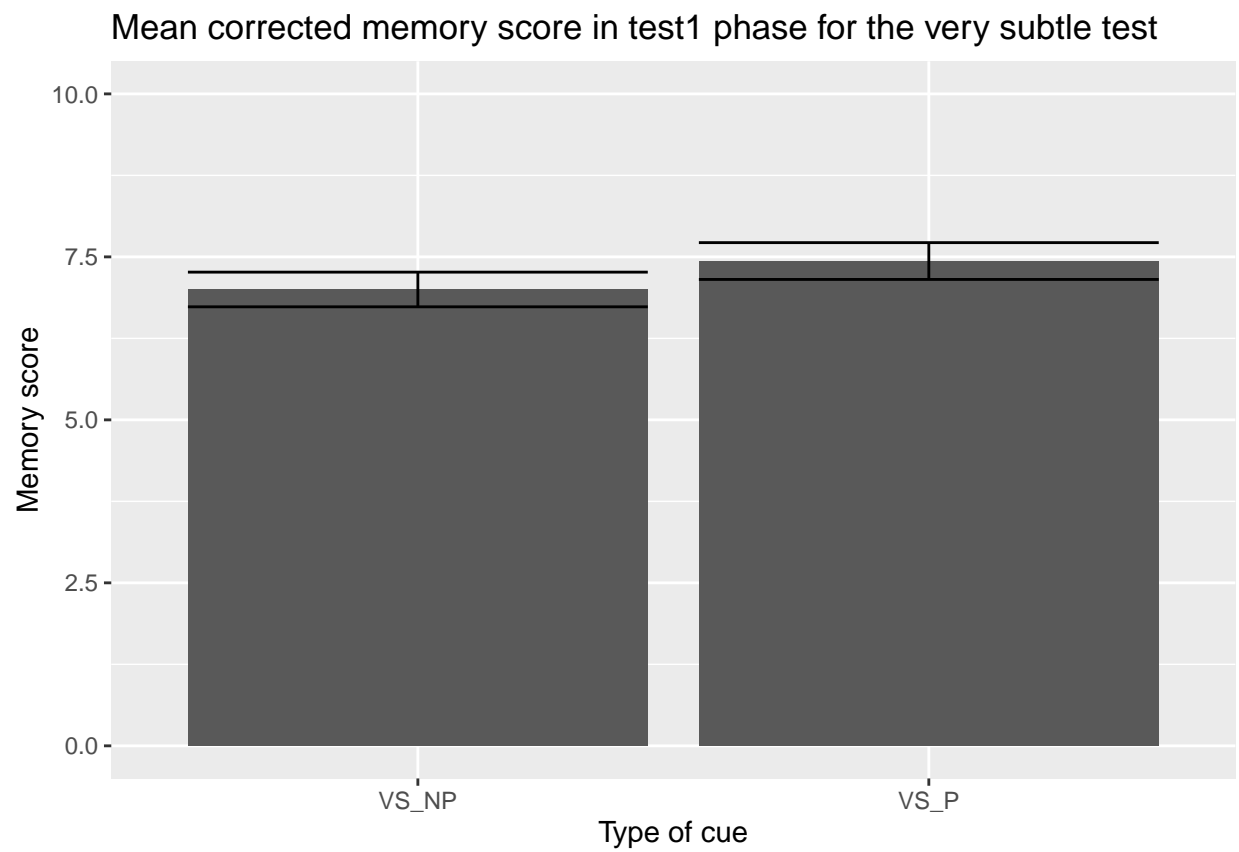
Accuracy is higher in the non-predictive, but is not significant ($t(29) = 1.12$, $p = .271$, $d = 0.20$) and the bayesian evidence is not conclusive ($BF_{10} = 3.4 \times 10^{-1} \pm 0.03\%$).

Memory score



Memory score is higher in the non-predictive, but is not significant ($t(29) = 0.89$, $p = .381$, $d = 0.16$) and the bayesian evidence is not conclusive ($BF_{10} = 2.8 \times 10^{-1} \pm 0.03\%$).

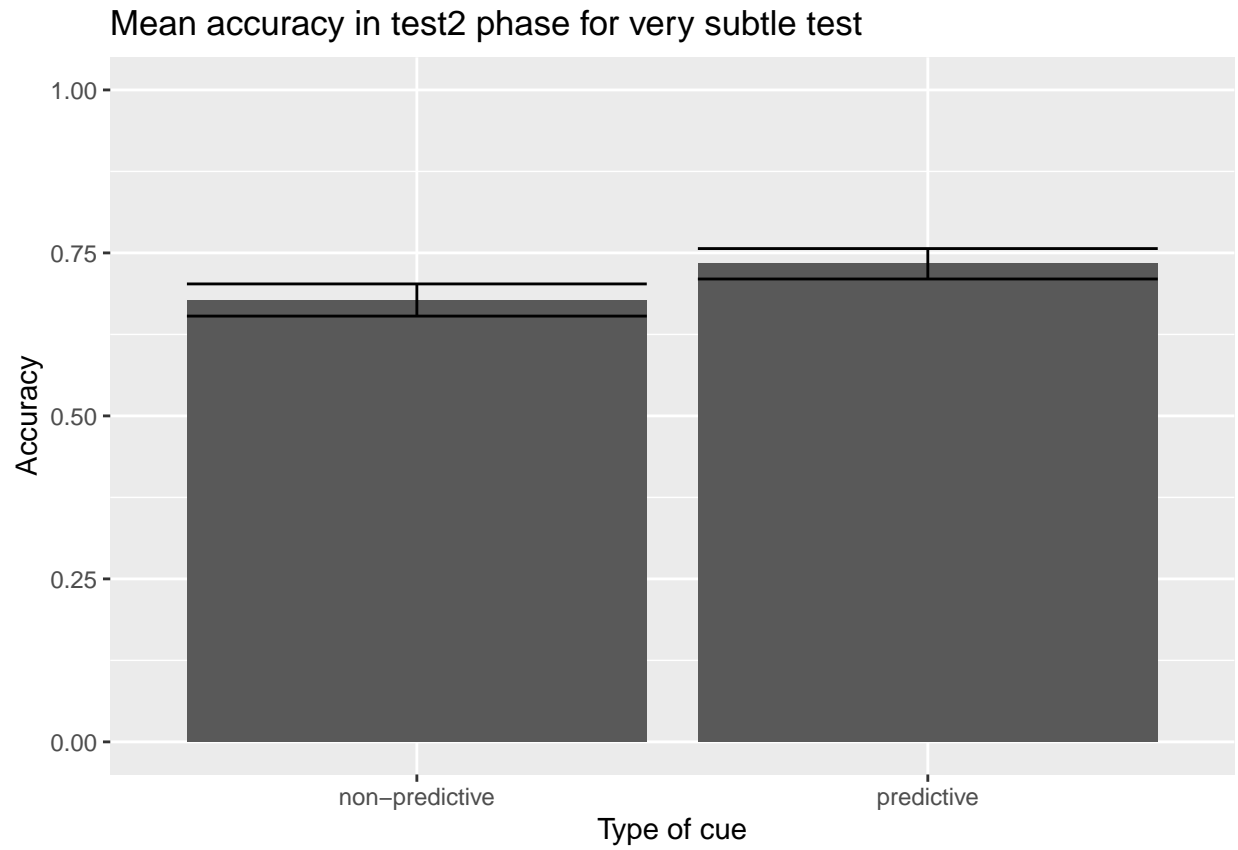
Corrected memory score



There are no significant differences in test 1 very subtle when the memory score is corrected ($t(27) = -1.57$, $p = .127$, $d = -0.30$, $BF_{10} = 6 \times 10^{-1} \pm 0.03\%$).

Test2

Accuracy



In this case, accuracy is lower for the non-predictive targets, but the difference is not significant and the bayesian evidence is very mild ($t(29) = -1.44$, $p = .161$, $d = -0.26$, $BF_{10} = 4.9 \times 10^{-1} \pm 0.03\%$).

Memory score

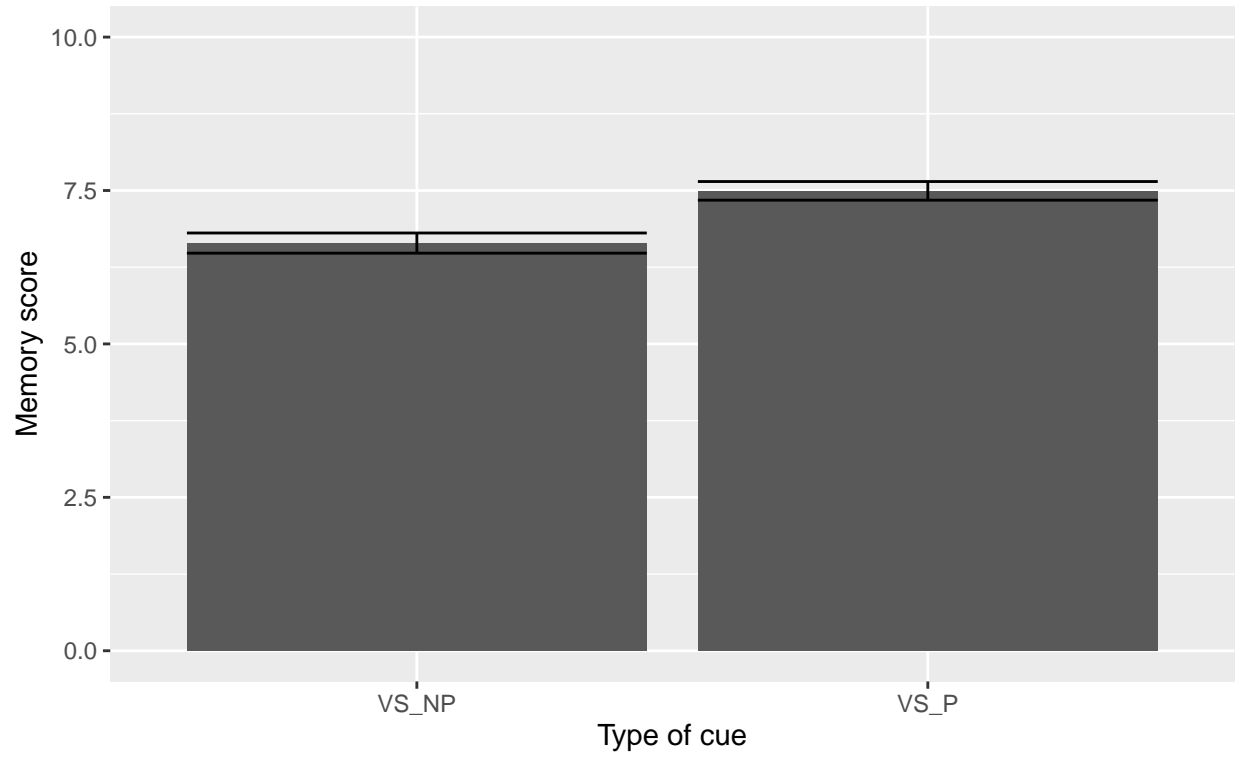


Again, memory score is lower in the non-predictive group. In this case, there are significant differences ($t(29) = -2.21$, $p = .035$, $d = -0.40$) and anecdotal positive bayesian evidence ($BF_{10} = 1.6 \times 10^0 \pm 0.02\%$).

Corrected memory score

Figure 3

Mean corrected memory score in test2 phase for very subtle test

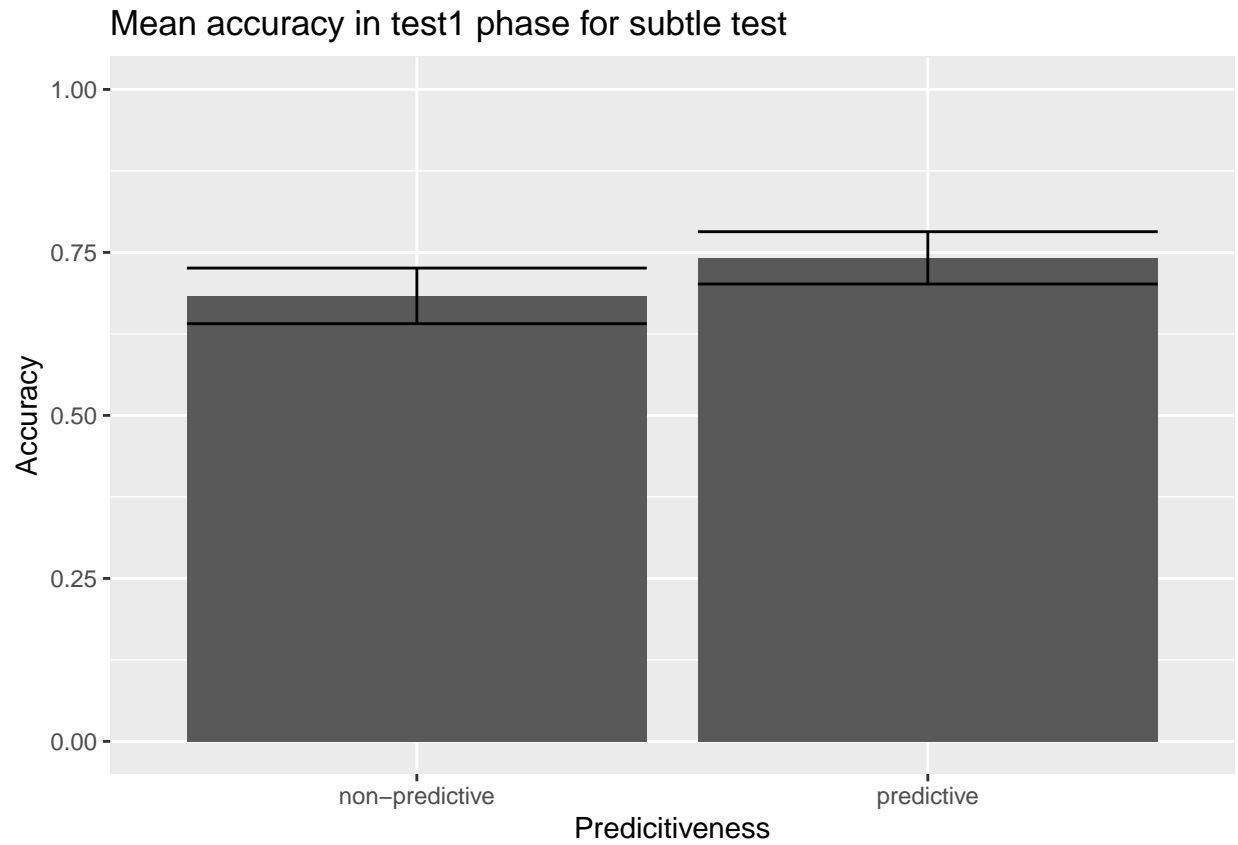


In this case, there's a clear effect of predictiveness, being the corrected memory score lower in the non-predictive targets ($V = 43$, $p = 2.8118731 \times 10^{-4}$, $\text{BF}_{10} = 1.6 \times 10^2 \pm 0\%$).

Subtle test

Test1

Accuracy



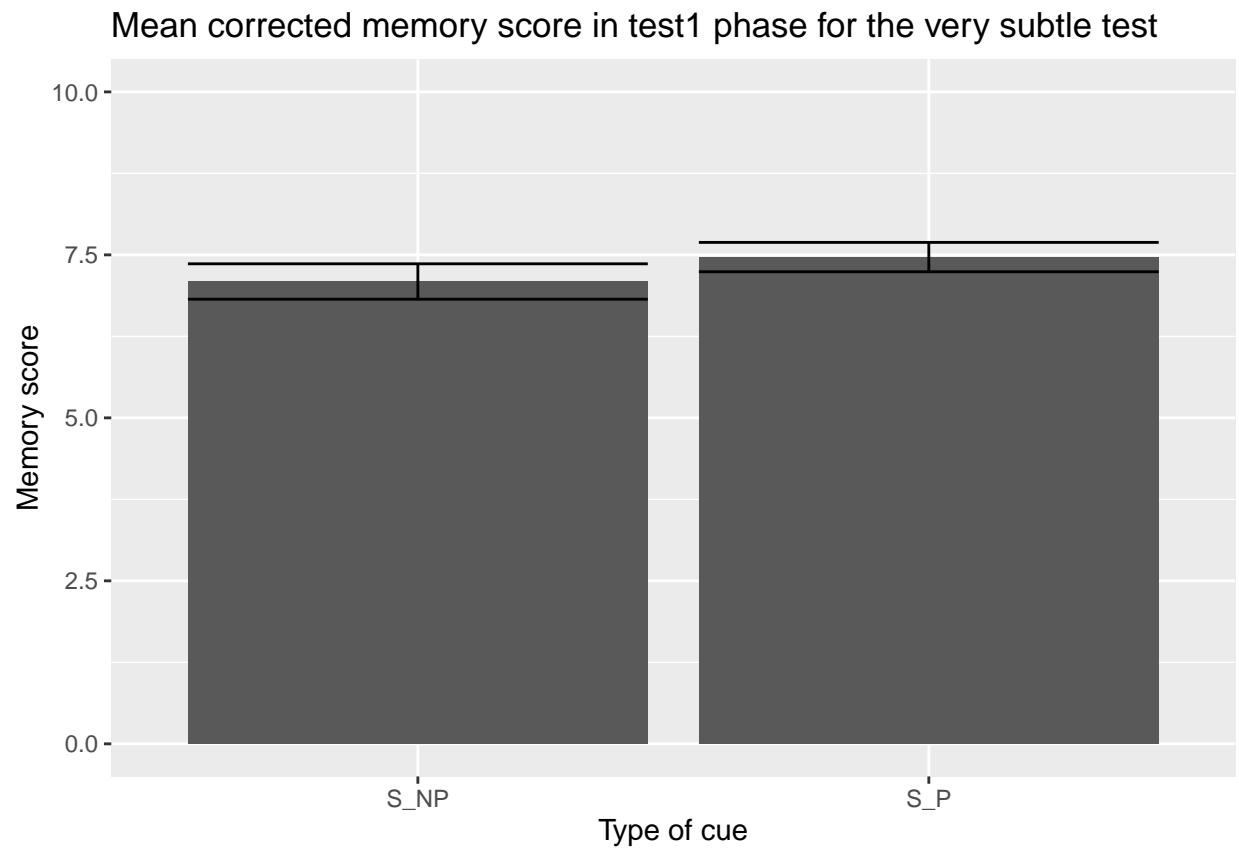
There's lower accuracy for the non-predictive, but there is no significant difference ($V = 49.5$, $p = 0.3403388$, $BF_{10} = 3.1 \times 10^{-1} \pm 0.03\%$).

Memory score



There's lower memory score for the non-predictive, but there is no significant difference ($t(29) = -0.96$, $p = .347$, $d = -0.17$, $BF_{10} = 3 \times 10^{-1} \pm 0.03\%$).

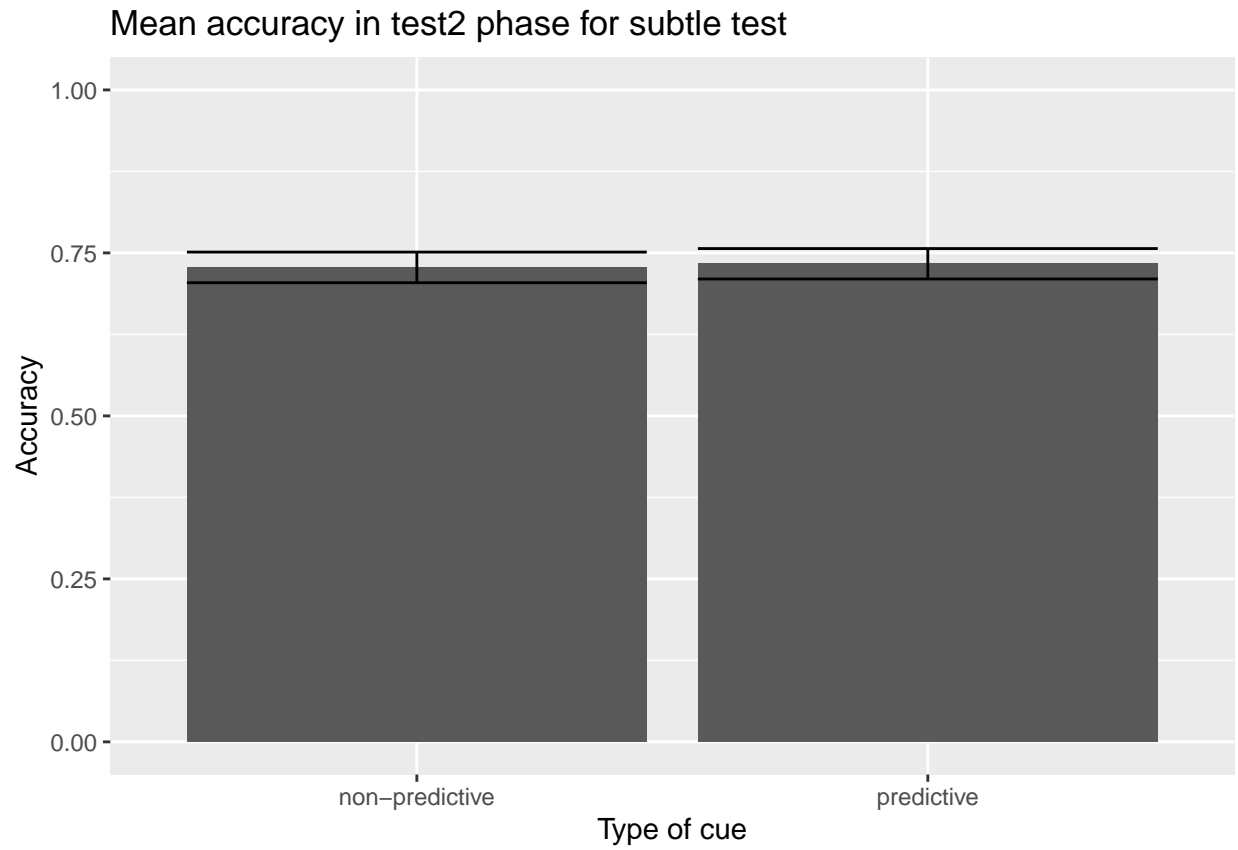
Corrected memory score



Responding is lower for the non-predictive targets, there are nearly significant differences but the bayesian test indicates anecdotal evidence for the alternative hypothesis ($t(28) = -1.98$, $p = .057$, $d = -0.37$, $BF_{10} = 1.1 \times 10^0 \pm 0.02\%$).

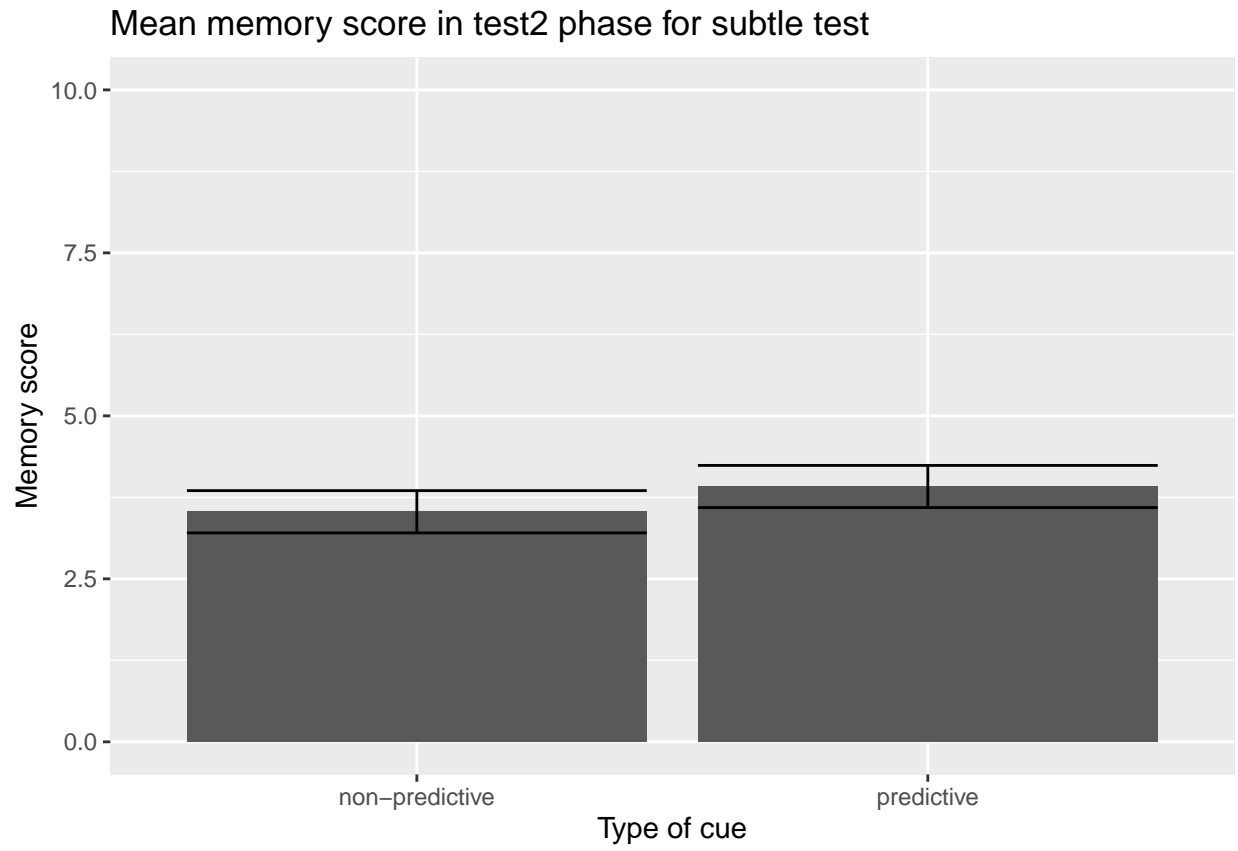
Test2

Accuracy



There is no significant difference ($t(29) = -0.12$, $p = .905$, $d = -0.02$, $\text{BF}_{10} = 2 \times 10^{-1} \pm 0.03\%$).

Memory score

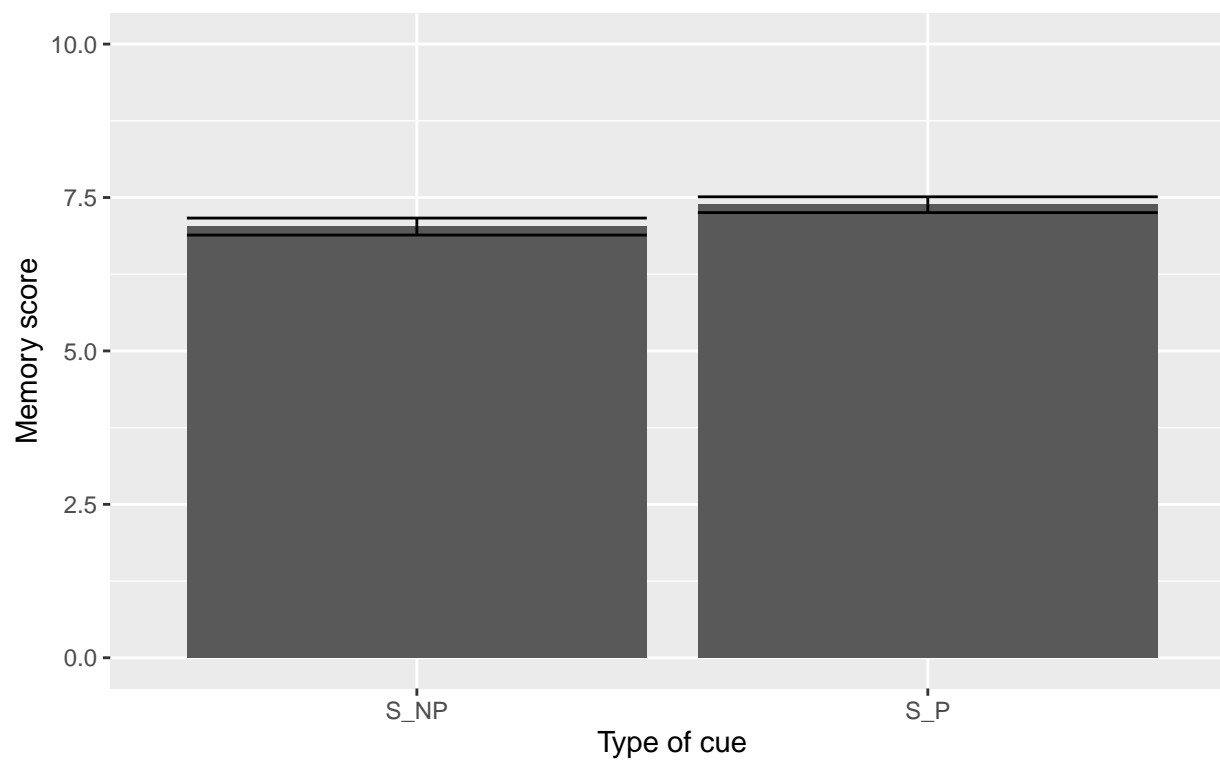


There is no significant difference ($V = 218$, $p = 1$, $\text{BF}_{10} = 2.3 \times 10^{-1} \pm 0.03\%$).

Corrected memory score

Figure 3

Mean corrected memory score in test2 phase for very subtle test

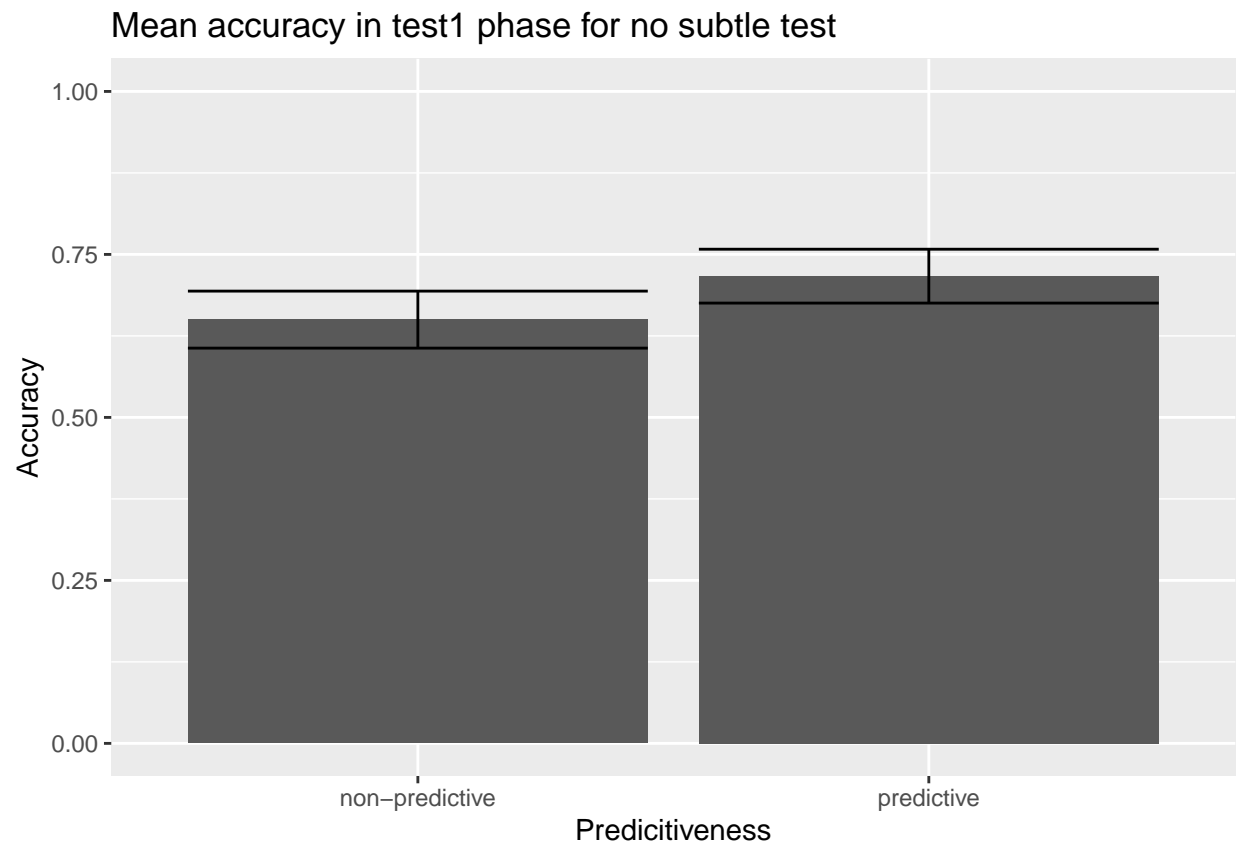


There's lower memory score for the non-predictive, but there is no significant difference ($t(29) = -1.40$, $p = .171$, $d = -0.26$, $BF_{10} = 4.7 \times 10^{-1} \pm 0.03\%$).

No subtle test

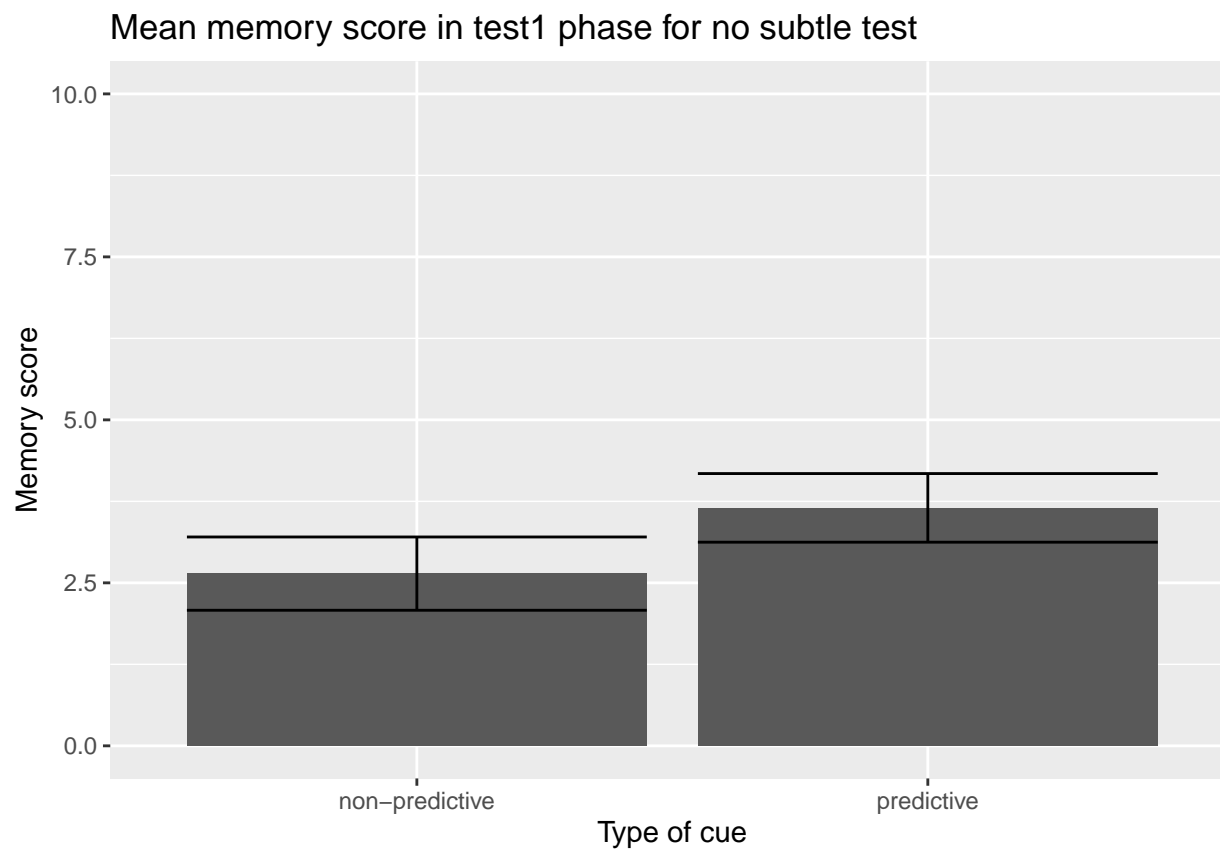
Test1

Accuracy



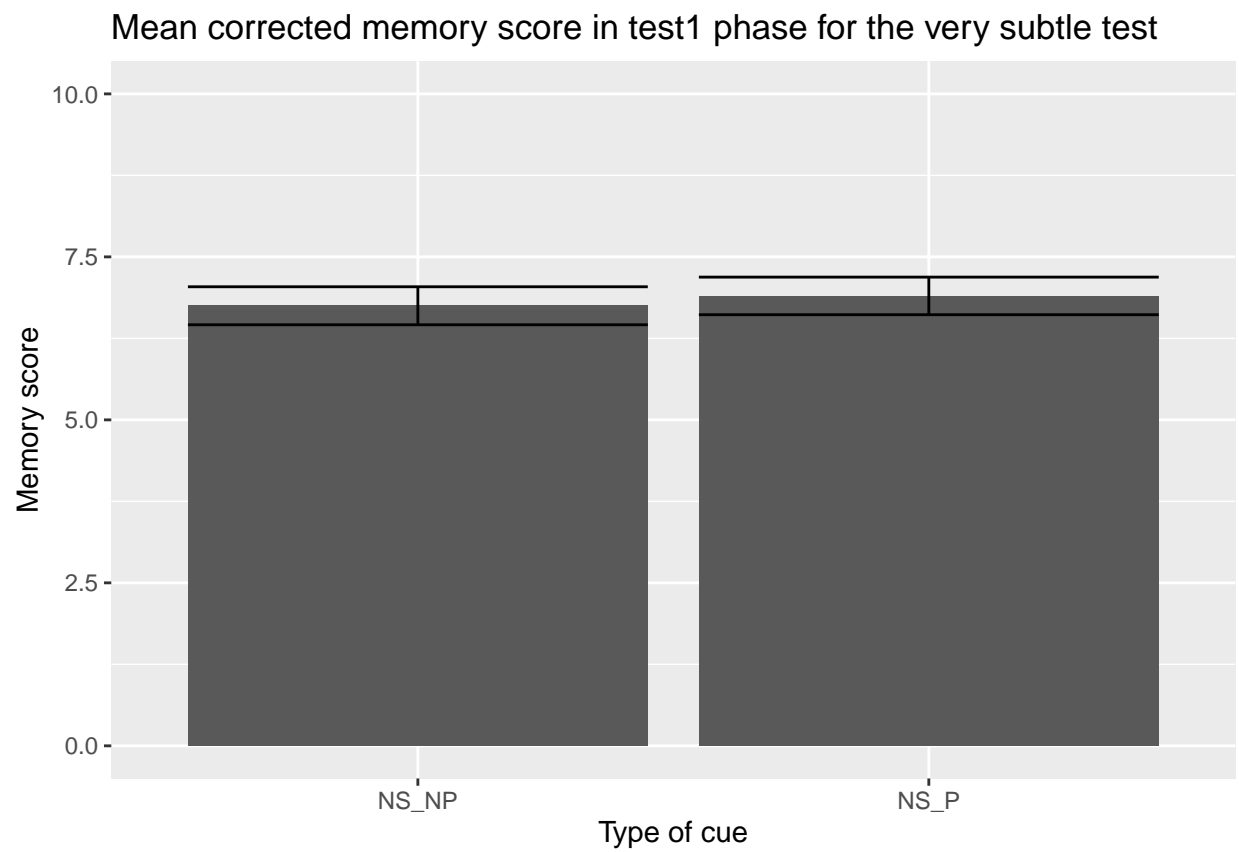
There is no significant difference ($V = 58.5$, $p = 0.2307725$, $\text{BF}_{10} = 3.6 \times 10^{-1} \pm 0.03\%$).

Memory score



There is no significant difference ($V = 177$, $p = 0.3869534$, $\text{BF}_{10} = 4.4 \times 10^{-1} \pm 0.03\%$).

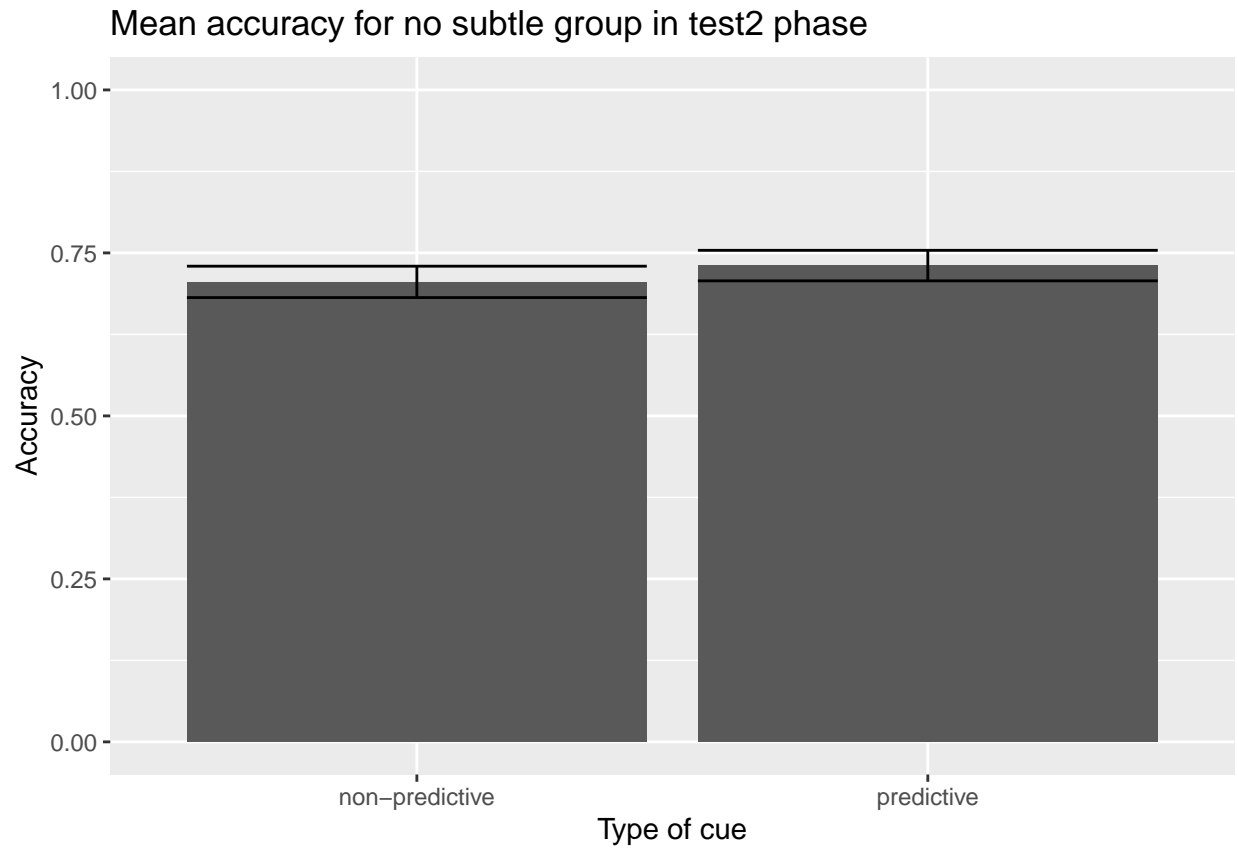
Corrected memory score



There are no significant differences in responding ($t(27) = -0.44$, $p = .663$, $d = -0.08$, $BF_{10} = 2.2 \times 10^{-1} \pm 0.03\%$).

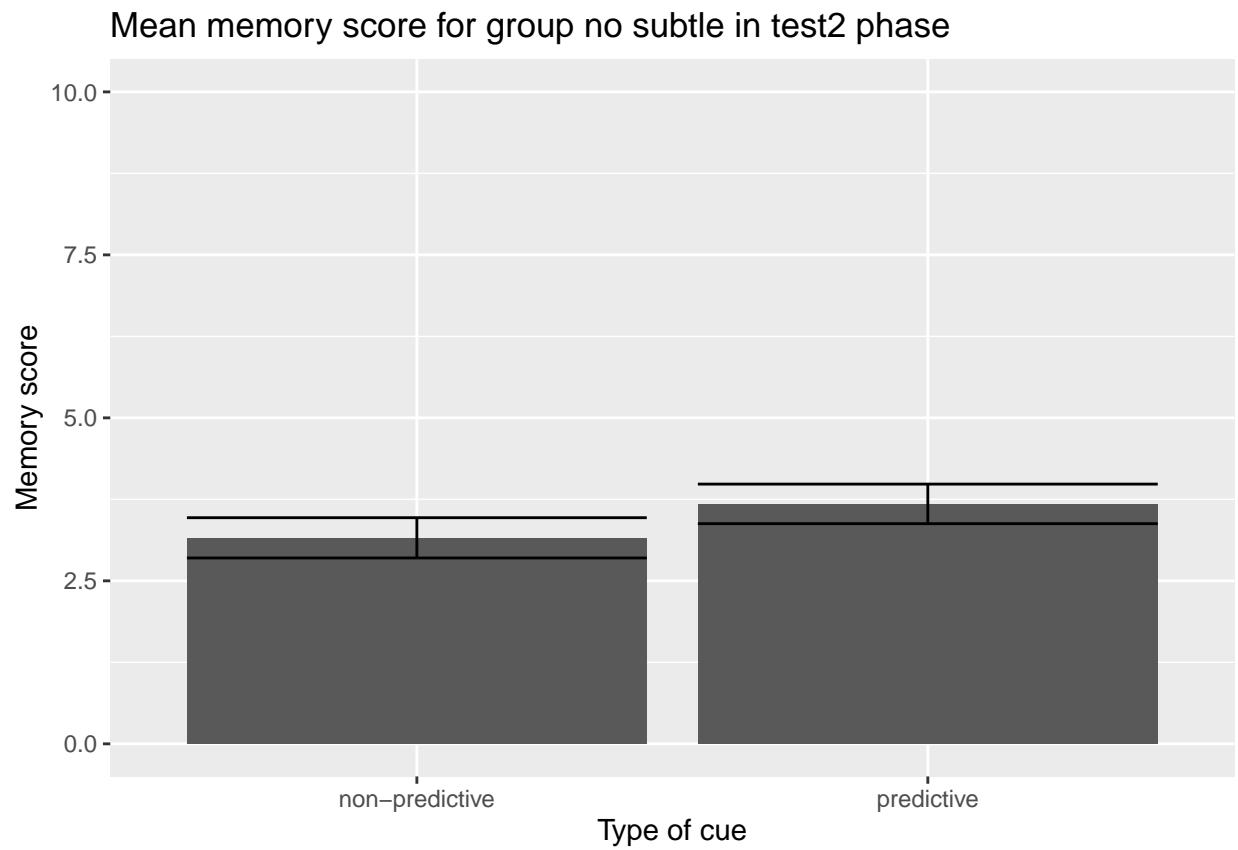
Test2

Accuracy



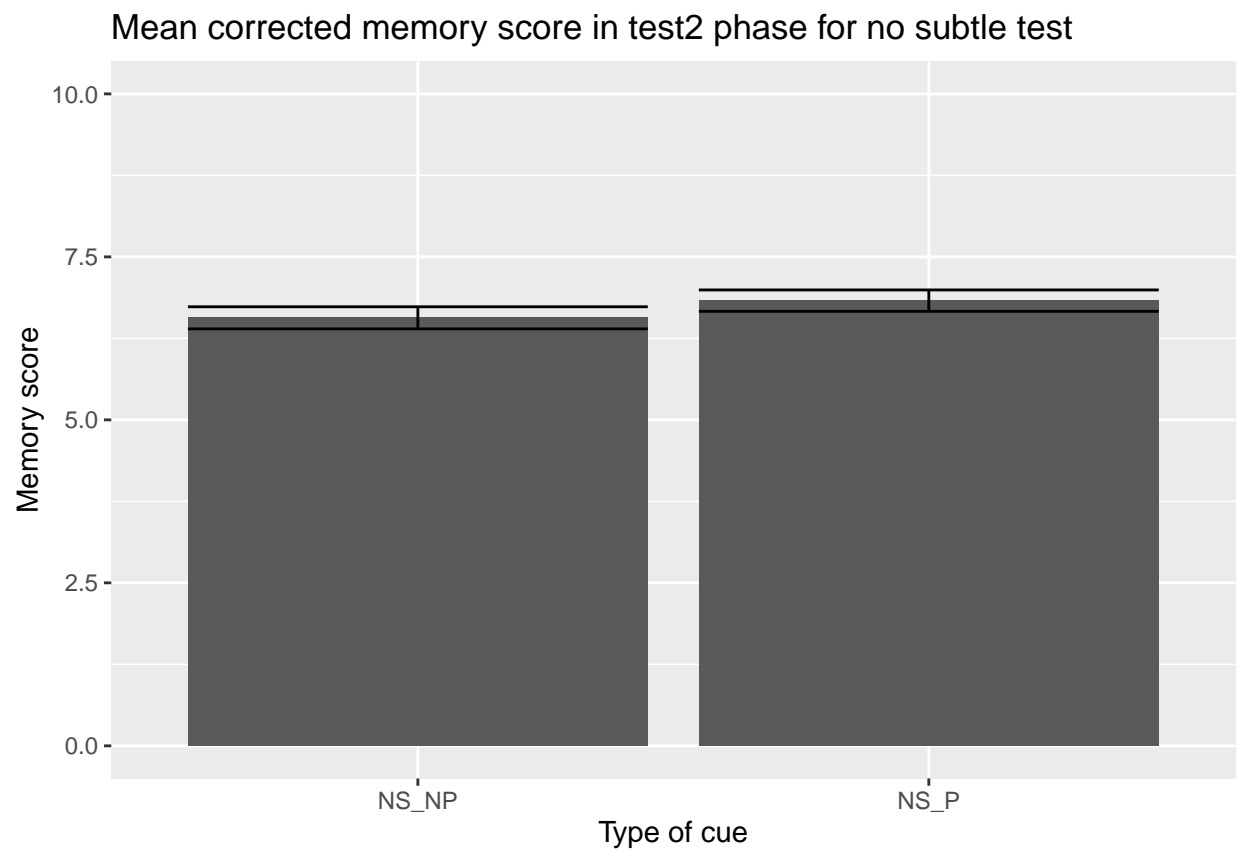
There are no differences in responding depending on the predictiveness of the target ($t(29) = -0.53$, $p = .597$, $d = -0.10$, $BF_{10} = 2.2 \times 10^{-1} \pm 0.03\%$).

Memory score



There's lower memory score for the non-predictive, but there is no significant difference ($t(29) = -0.83$, $p = .415$, $d = -0.15$, $BF_{10} = 2.7 \times 10^{-1} \pm 0.03\%$).

Corrected memory score



There's lower memory score for the non-predictive, but there is no significant difference ($t(29) = -1.39$, $p = .176$, $d = -0.25$, $\text{BF}_{10} = 4.6 \times 10^{-1} \pm 0.03\%$).