UNM05

2023-07-03

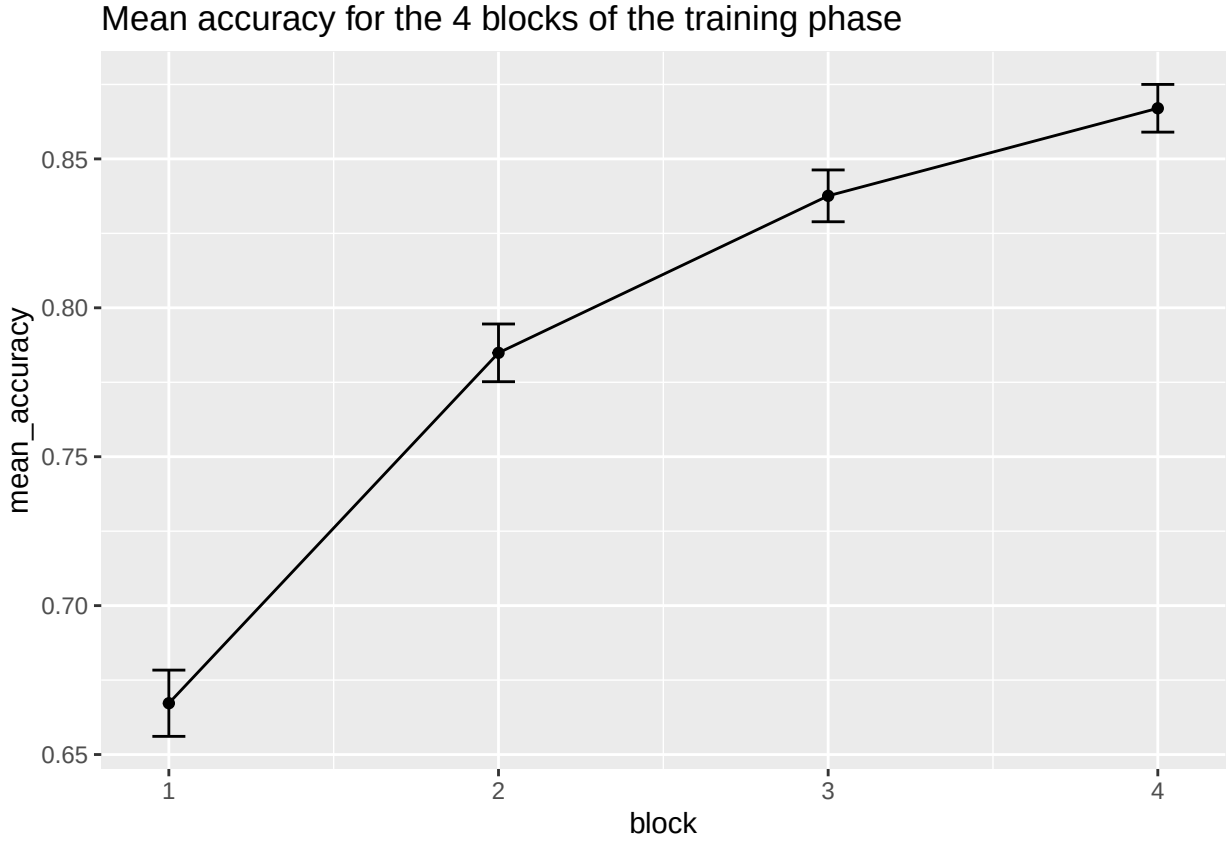
Design

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 where 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 dis tractor 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 - 02	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



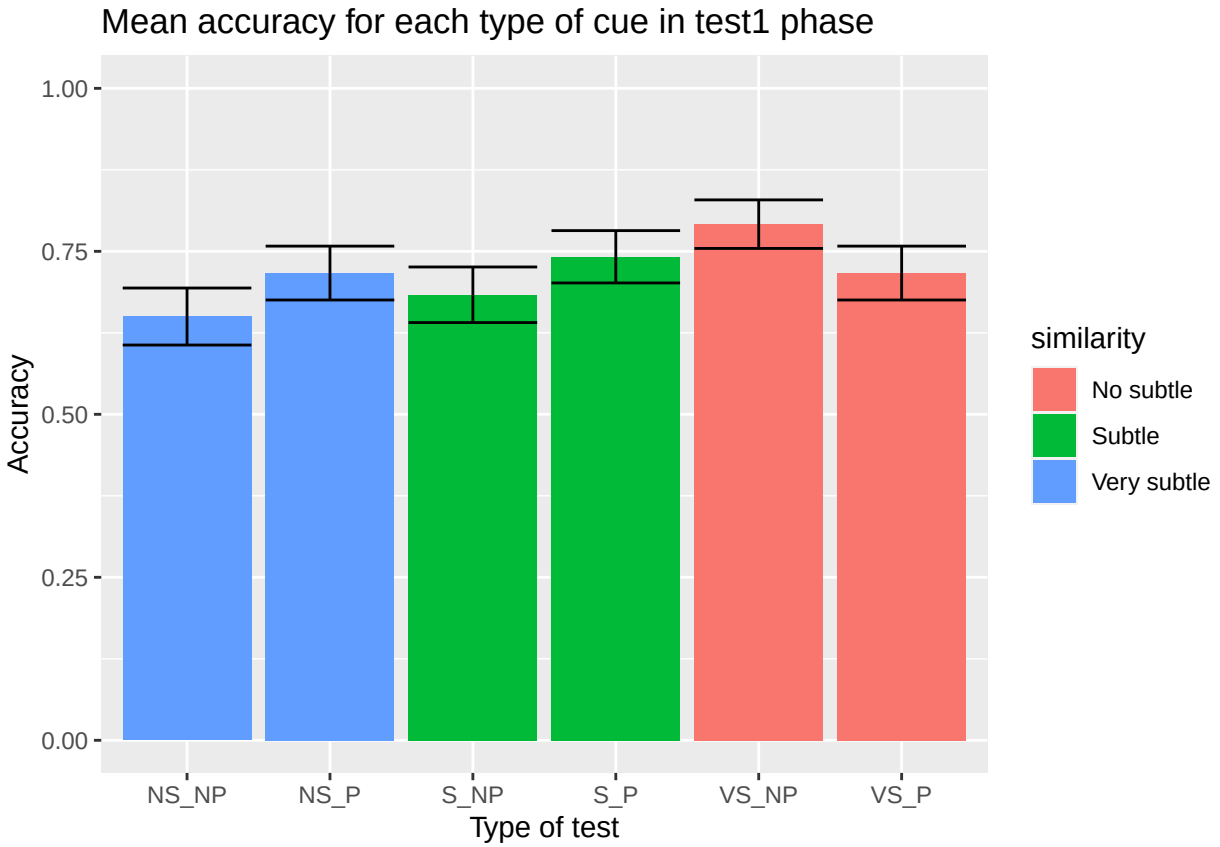
One-sample t-test indicates that mean responding in the training phase was significantly higher than 0.5, that is, chance level, .

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 ($BF_{10} = 3.1x10^{25} \pm 0.87\%$).

Test1

Accuracy

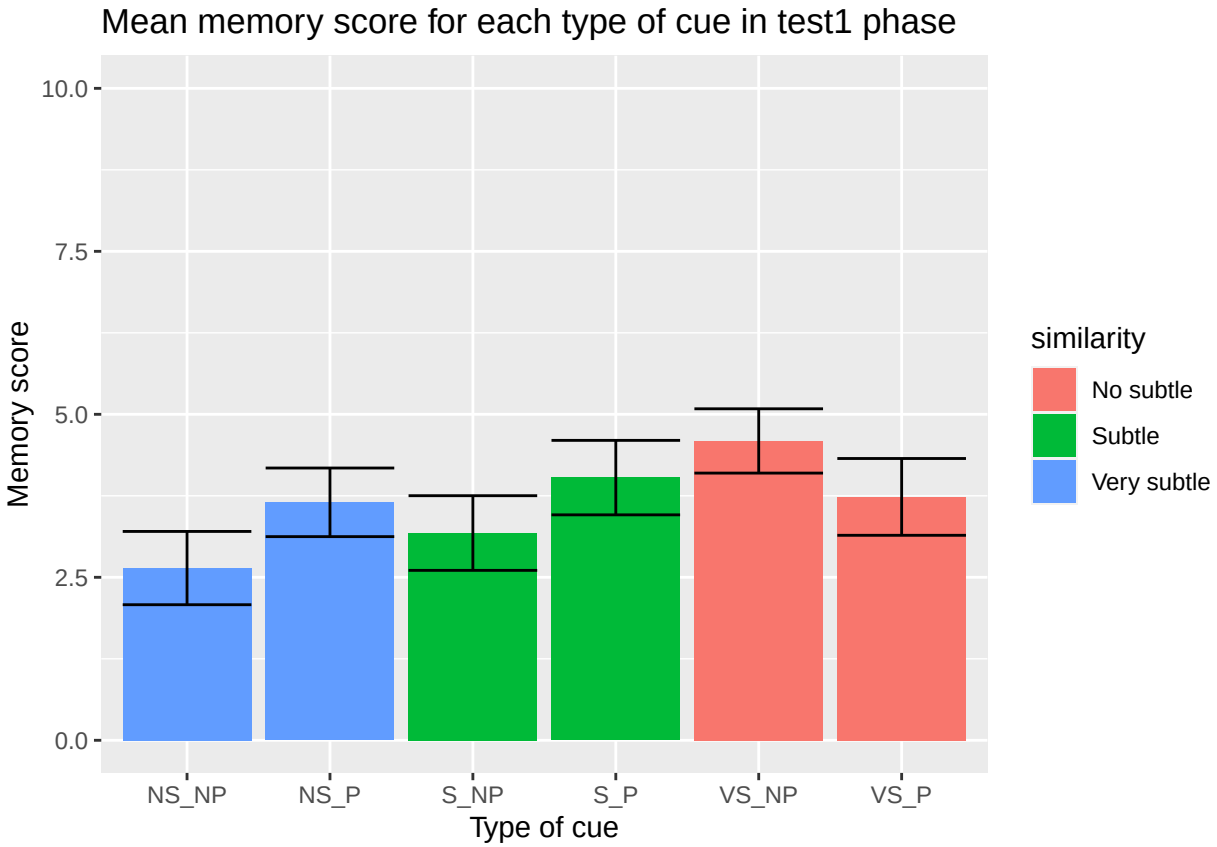
```
## `summarise()` has grouped output by 'cue_type'. You can override using the
## `.groups` argument.
```



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 hypotesis was either anecdotal or moderate ($BF_{10} = 1.7x10^{-1} \pm 0.9\%$, $BF_{10} = 1.8x10^{-1} \pm 2.22\%$, $BF_{10} = 4.2x10^{-1} \pm 2.59\%$, respectively).

Memory score

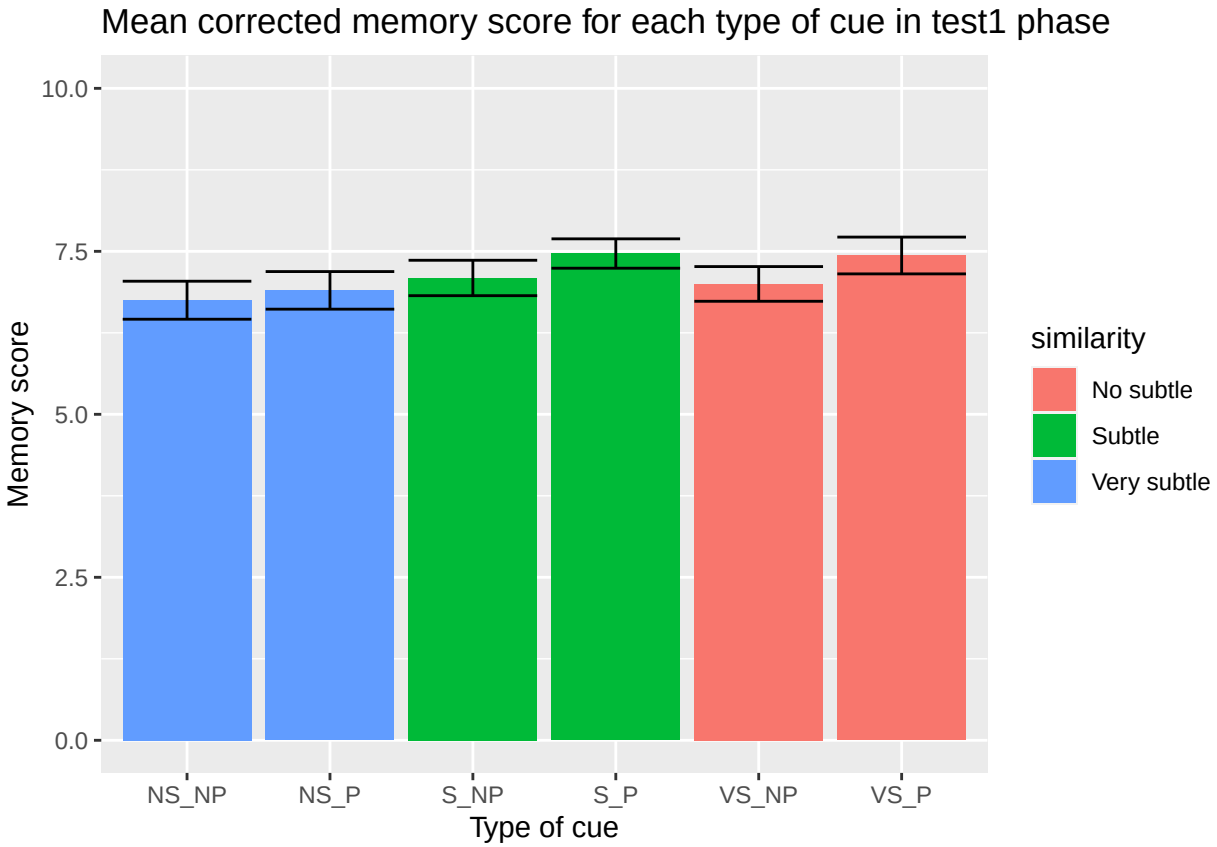
```
## `summarise()` has grouped output by 'cue_type'. You can override using the
## `.groups` argument.
```



Again, except for those that did the very subtle test, all subjects had lower accuracy for the non predictive vs the precitive 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 ($BF_{10} = 1.7x10^{-1} \pm 0.93\%$, $BF_{10} = 1.9x10^{-1} \pm 0.98\%$, $BF_{10} = 3.3x10^{-1} \pm 7.46\%$, respectively).

Corrected memory score

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

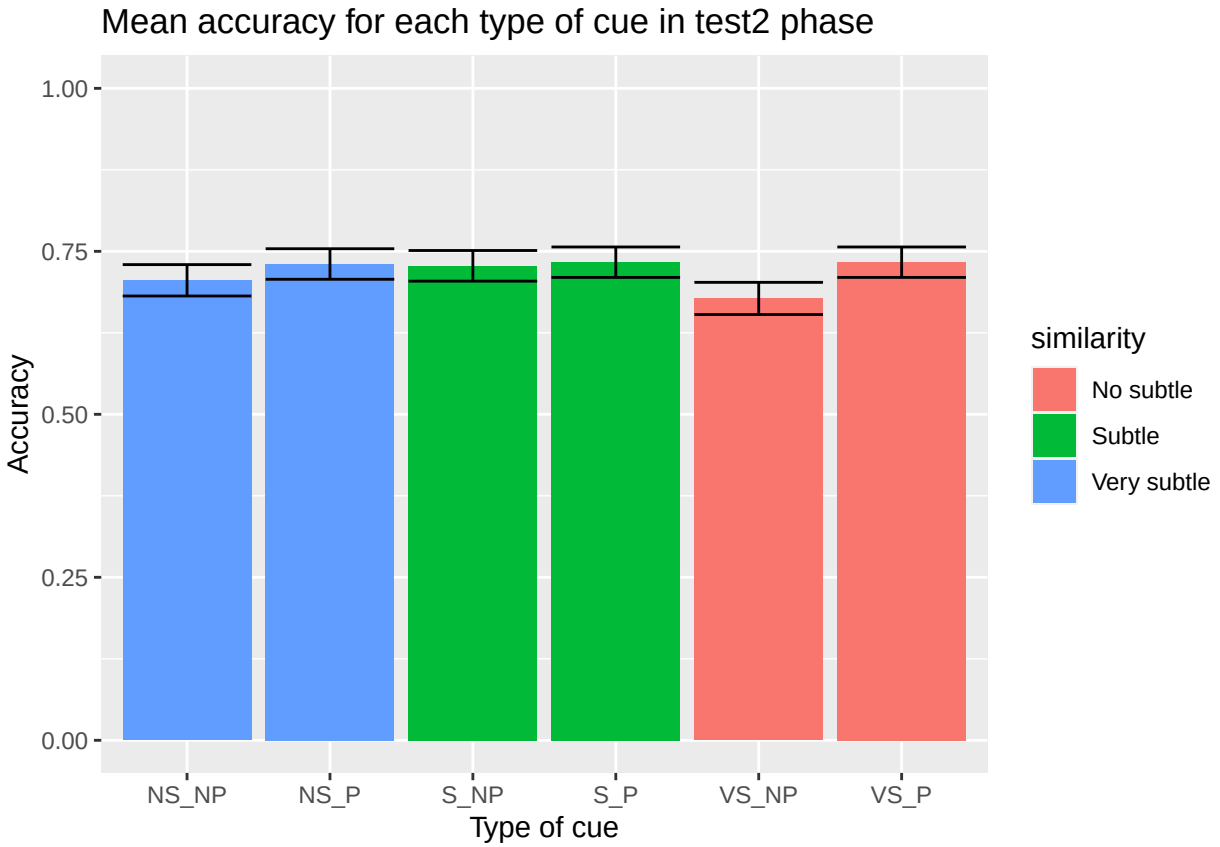


When only hits are taken into account in test 1, memory score is corrected in test 1, there is a significant effect of predictiveness ($F(1, 82) = 4.70$, $p = .033$, $\eta_p^2 = .05$), but the bayesian evidence is anecdotal ($BF_{10} = 1.2x10^{0} \pm 5.12\%$. However, there were no significant effects of the type of test ($F(2, 82) = 0.86$, $p = .428$, $\eta_p^2 = .02$, $BF_{10} = 2.5x10^{-1} \pm 0.47\%$) nor the interaction ($F(2, 82) = 0.43$, $p = .653$, $\eta_p^2 = .01$, $BF_{10} = 1.3x10^{-1} \pm 4.4\%$).

Test2

Accuracy

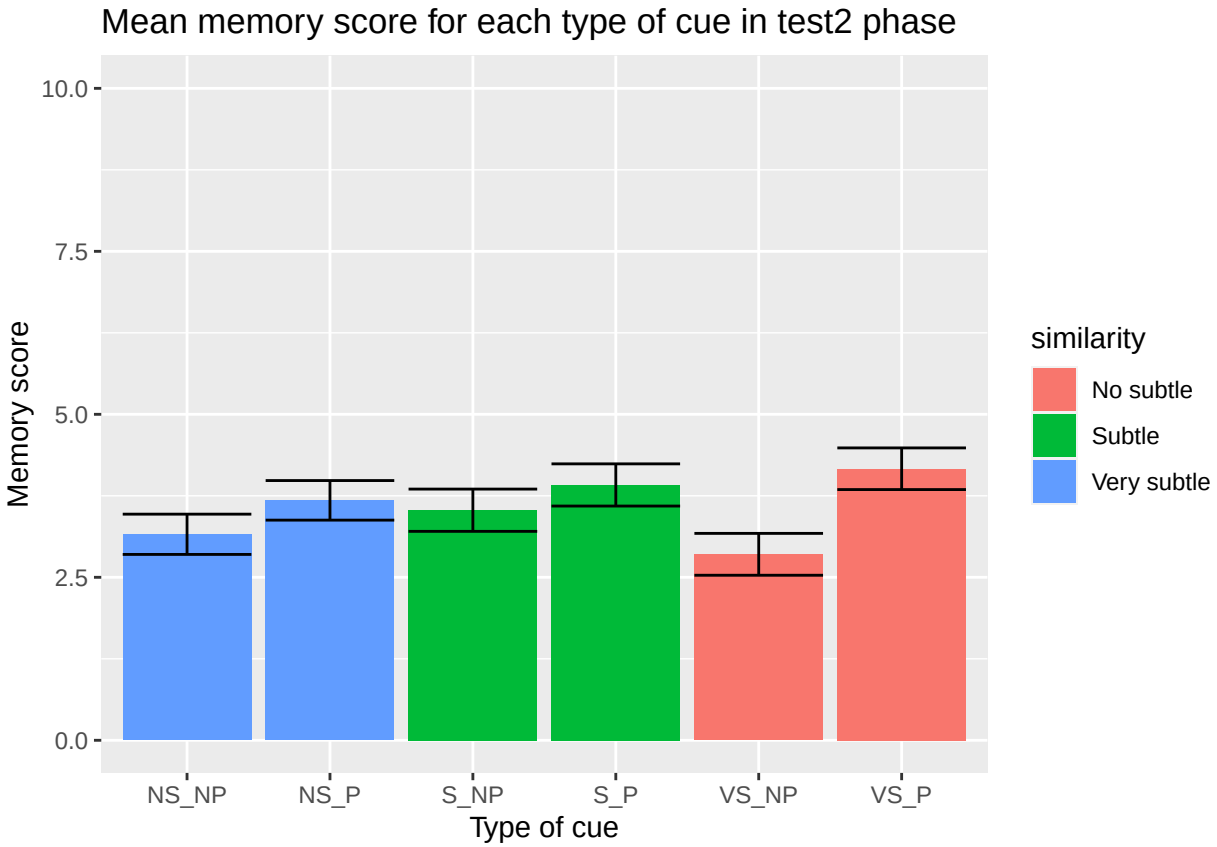
```
## `summarise()` has grouped output by 'cue_type'. You can override using the
## `.groups` argument.
```



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 ($BF_{10} = 1.3x10^{-1} \pm 0.63\%$, $BF_{10} = 2.9x10^{-1} \pm 1.43\%$, $BF_{10} = 1.3x10^{-1} \pm 2.8\%$, respectively).

Memory Score

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



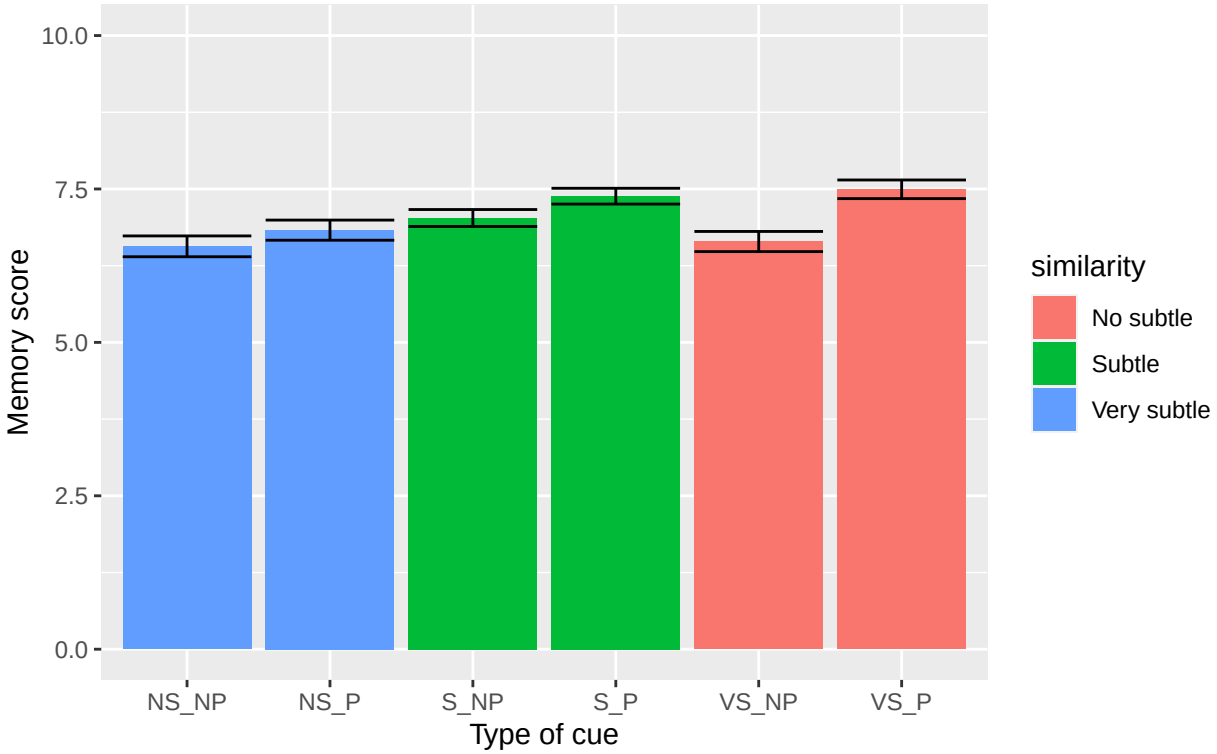
In test two, the memory score is always lower for the non-predictive targets, and the difference is bigger the more difficult the test is. However, there is only a significant effect of predictiveness, but the bayesian evidence is anecdotal ($F(1, 87) = 4.09$, $p = .046$, $\eta_p^2 = .04$, $\text{BF}_{10} = 1\text{x}10^{0} \pm 1.02\%$). There was not a significant effect of the session (($F(2, 87) = 0.07$, $p = .929$, $\eta_p^2 < .01$, $\text{BF}_{10} = 1.4\text{x}10^{-1} \pm 2.63\%$) nor the SessionxPredictiveness interaction (($F(2, 87) = 0.62$, $p = .539$, $\eta_p^2 = .01$, $\text{BF}_{10} = 1.6\text{x}10^{-1} \pm 5.37\%$).

Corrected memory score

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

Figure 3

Mean memory score for each type of cue in test2 phase

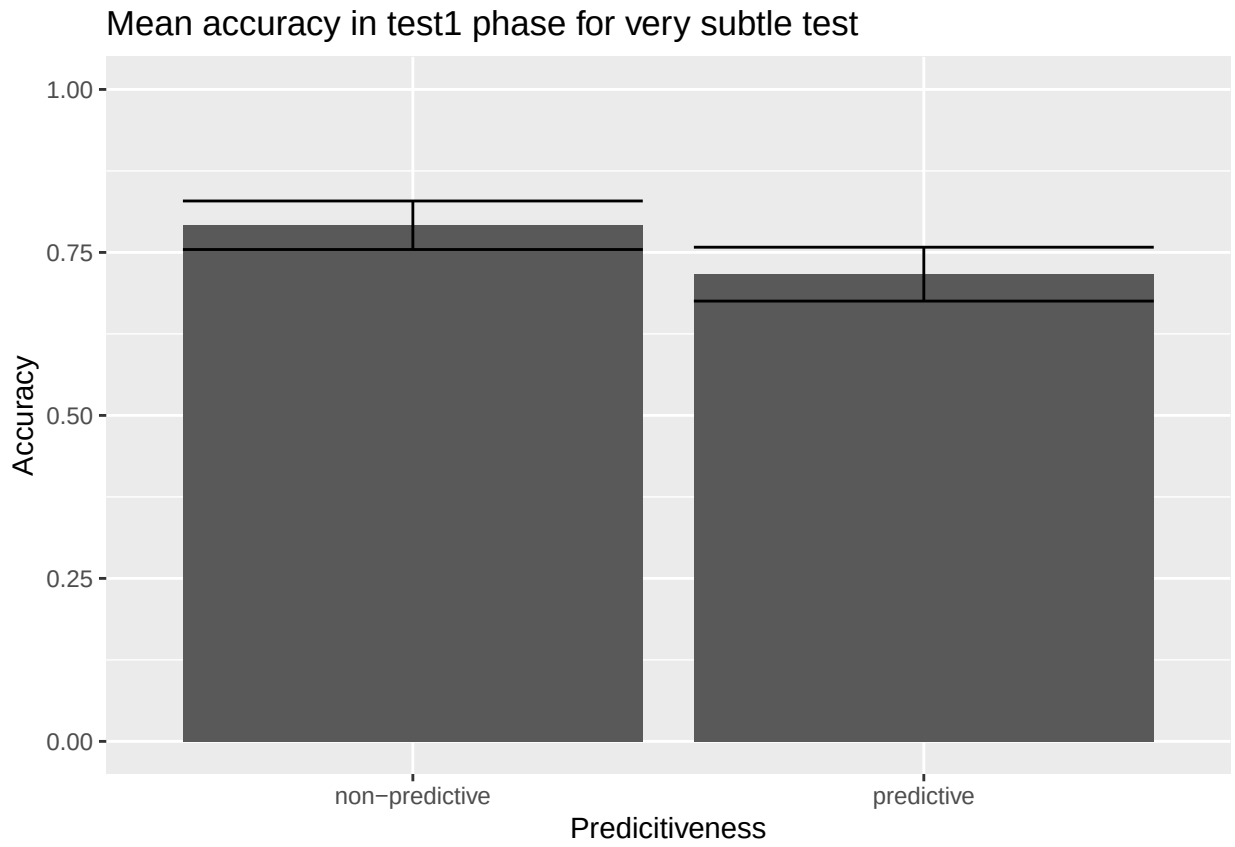


In this case, there´s a clear effect of predictiveness, being the corrected memory score always lower in the non-predicitve targets ($F(1, 87) = 15.32$, $p < .001$, $\eta_p^2 = .15$, $\text{BF}_{10} = 1\text{x}10^{2} \pm 1.29\%$). Again, nor the session nor the interaction were significant ($F(2, 87) = 0.56$, $p = .572$, $\eta_p^2 = .01$, $\text{BF}_{10} = 3.4\text{x}10^{-1} \pm 3.09\%$; $F(2, 87) = 2.00$, $p = .141$, $\eta_p^2 = .04$, $\text{BF}_{10} = 4.7\text{x}10^{-1} \pm 5.94\%$).

Very subtle test

Test1

Accuracy

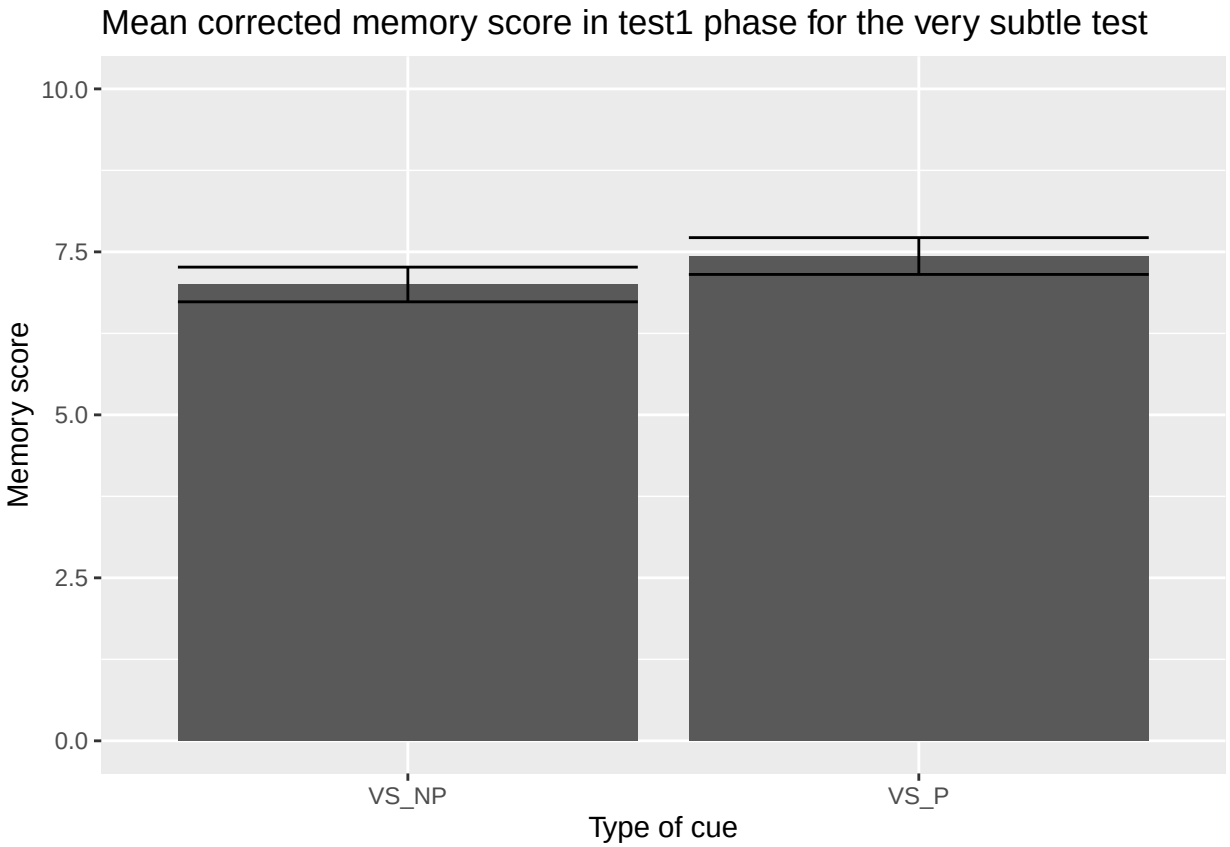


Accuracy is higher in the non-predicitve, but is not significant ($t(29) = 1.12$, $p = .271$, $d = 0.20$) and the bayesian evidence is not conclusive ($BF_{10} = 3.4x10^{-1} \pm 0.03\%$).

Memory score

Memory score is higher in the non-predicitve, but is not significant($t(29) = 0.89$, $p = .381$, $d = 0.16$) and the bayesian evidence is not conclusive ($BF_{10} = 2.8x10^{-1} \pm 0.03\%$).

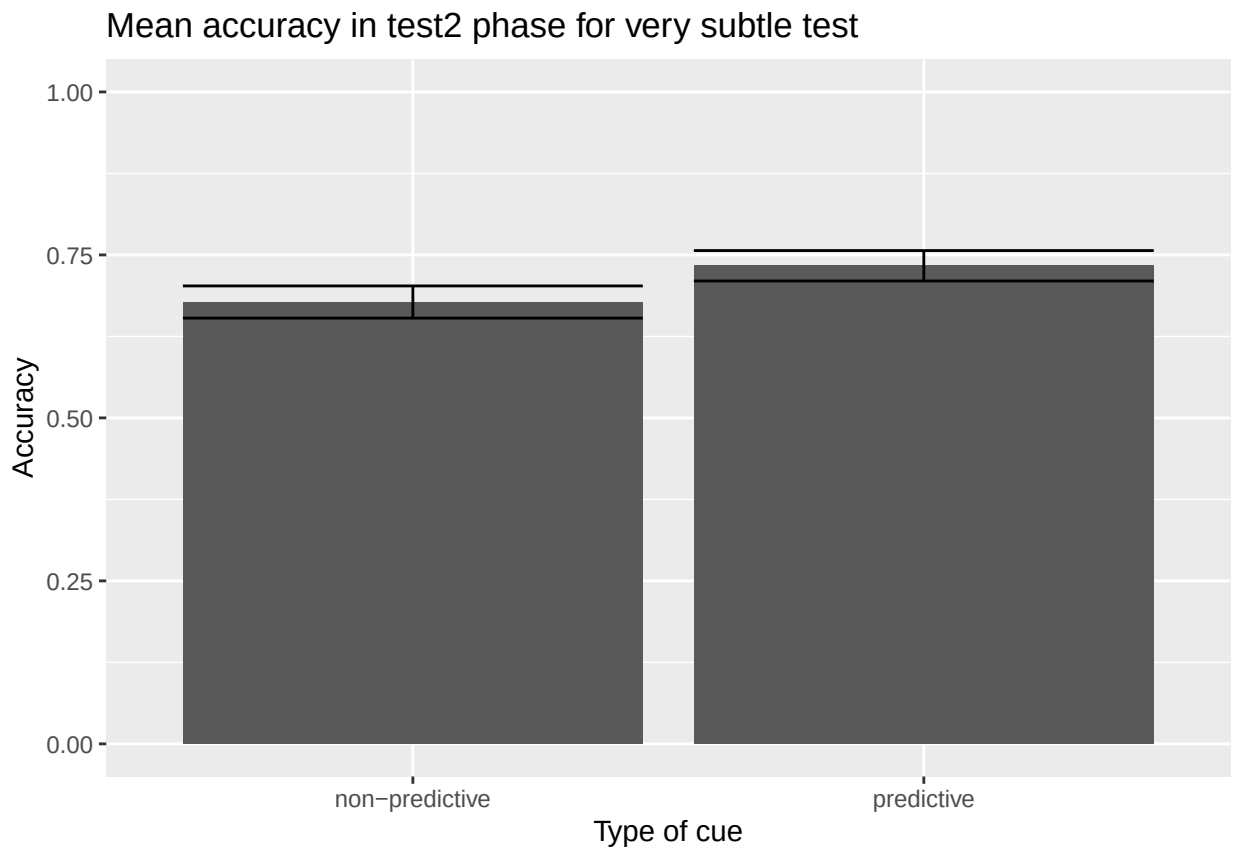
Corrected memory score



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} = 6x10^{-1} ± 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} = 4.9x10^{-1} $\pm$ 0.03%).

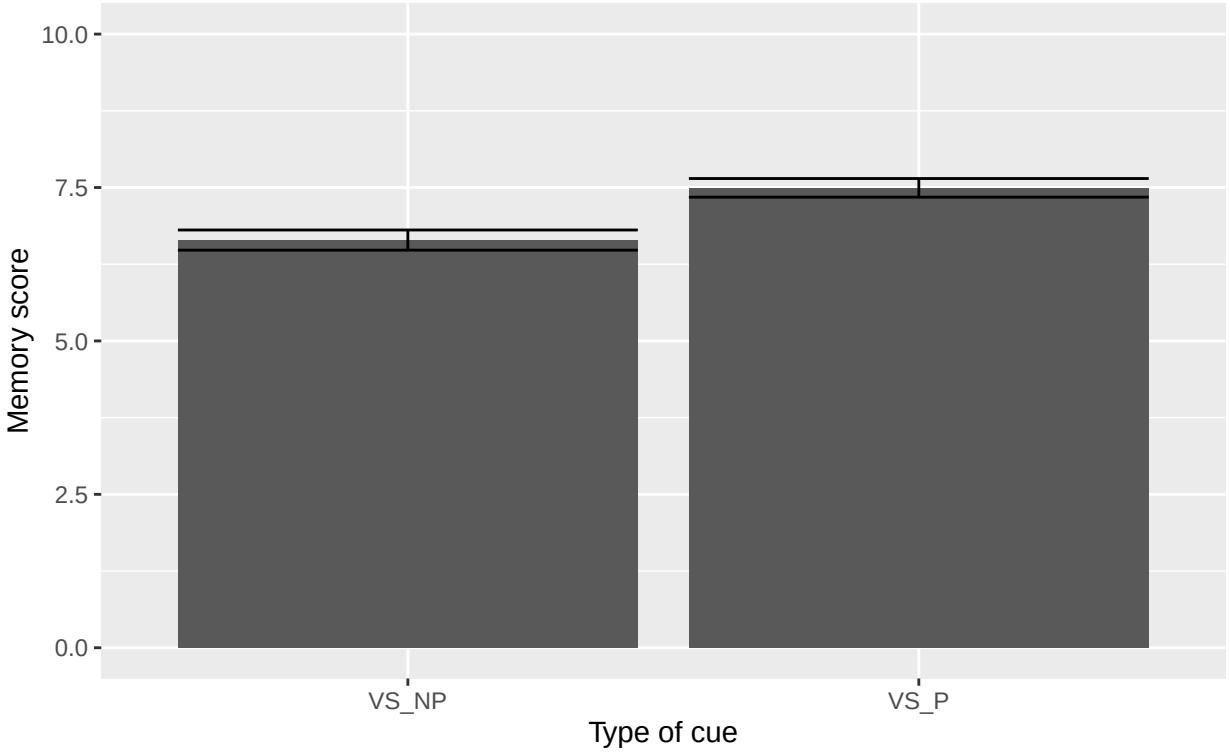
Memory score

Again, memory score is lower in the non-predicitive group. In this case, there are significant differences ($t(29)$ = -2.21, p = .035, d = -0.40) and anecdotal positive bayesian evidence (BF_{10} = 1.6x10^0 ± 0.02%).

Corrected memory score

Figure 3

Mean corrected memory score in test2 phase for very subtle test

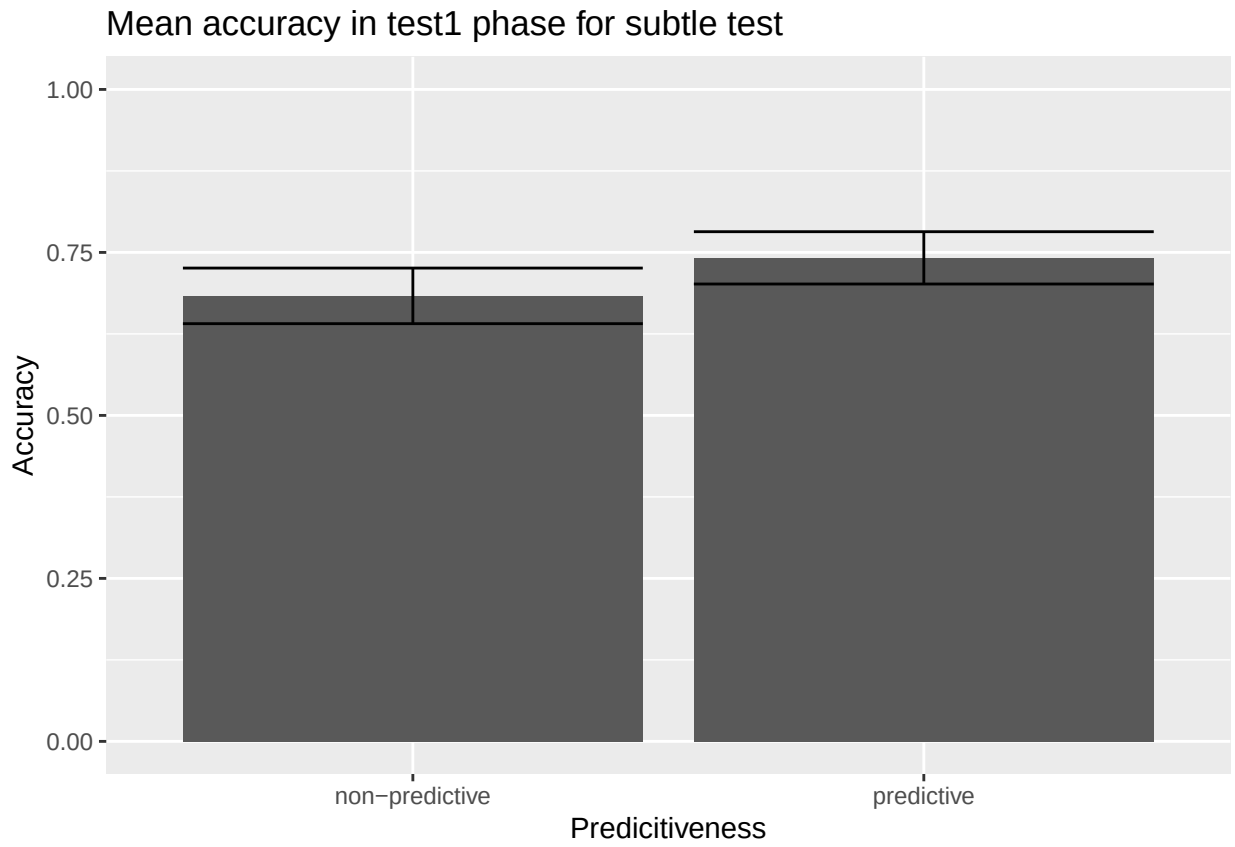


In this case, there´s a clear effect of predictiveness, being the corrected memory score lower in the non-predicitve targets ($V = 43$, $p = 2.8118731 \times 10^{-4}$, $\text{BF}_{10} = 1.6\text{x}10^{2} \pm 0\%$).

Subtle test

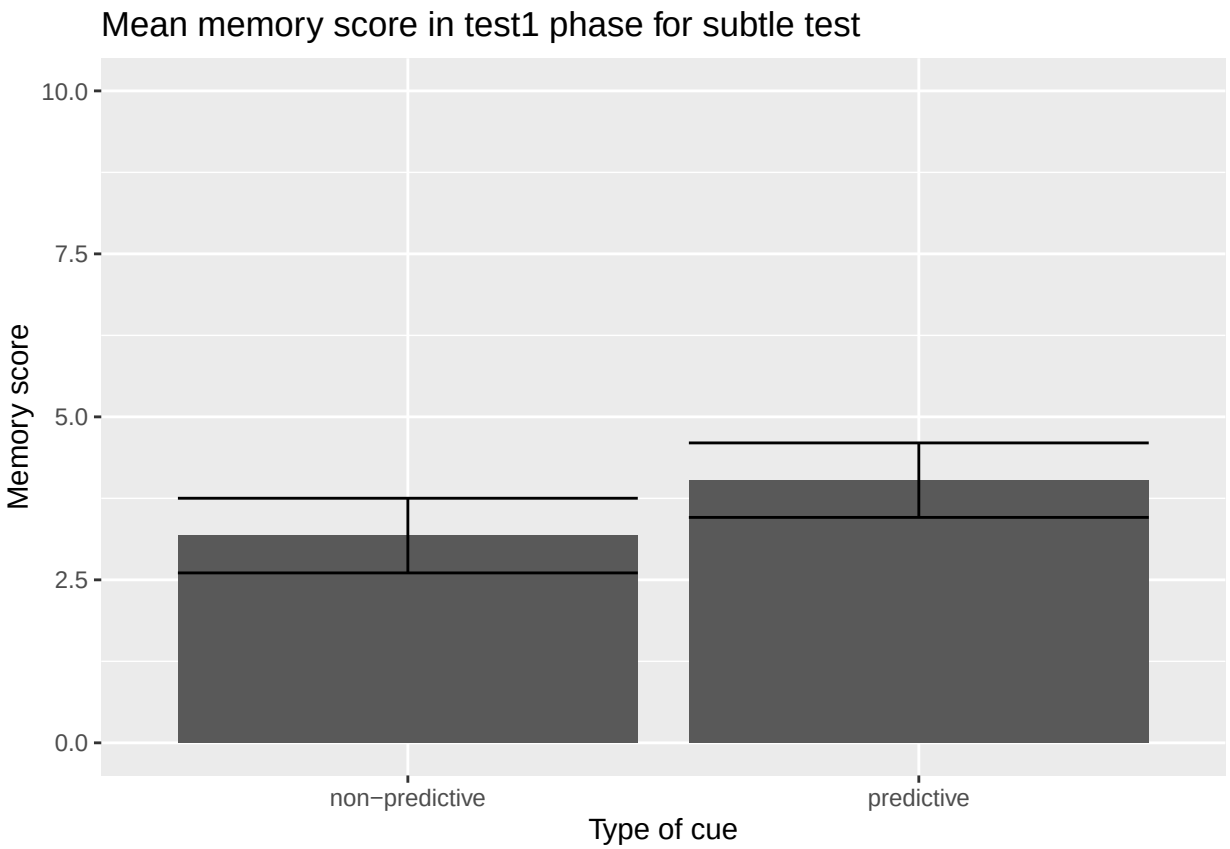
Test1

Accuracy



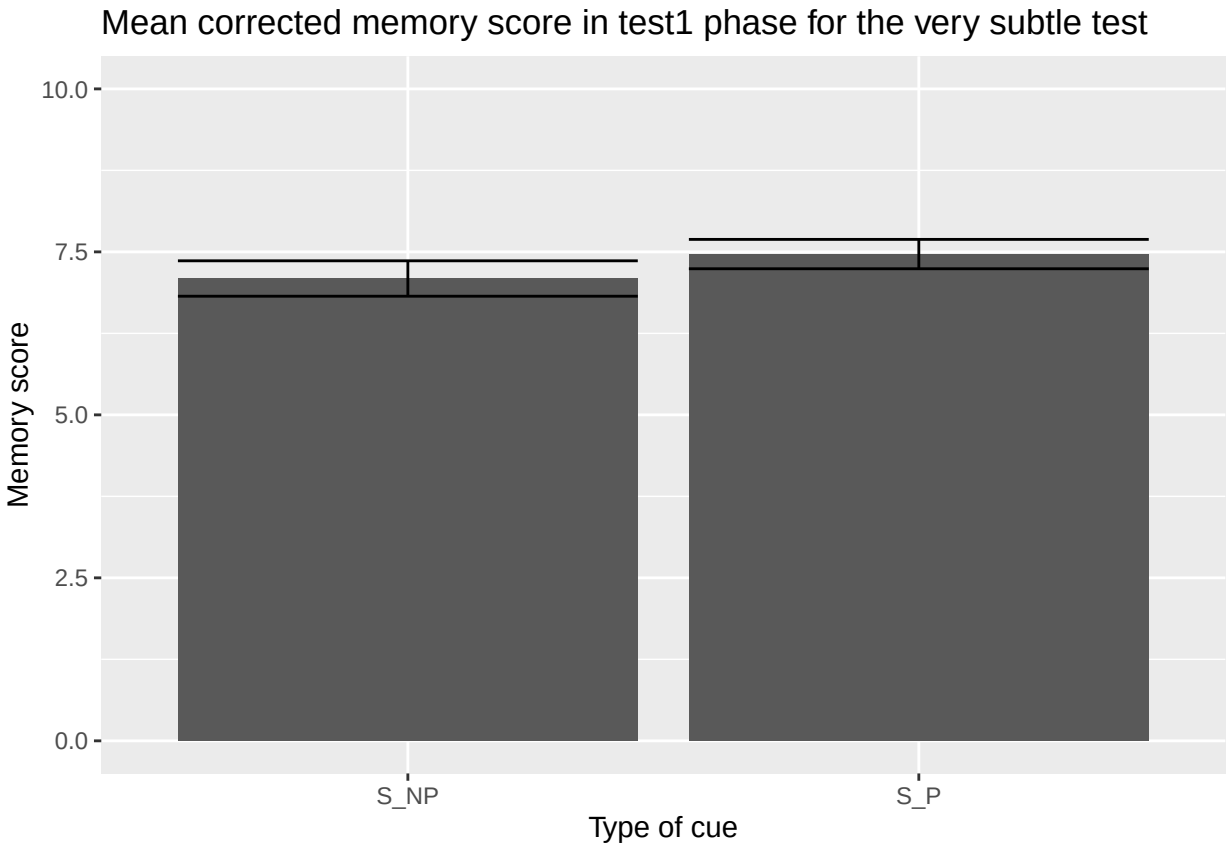
There´s lower accuracy for the non-predictive, but there is no significant difference (V =49.5, p = 0.3403388, BF_{10} = 3.1x10^{-1} ± 0.03%).

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} = 3x10^{-1} ± 0.03%).

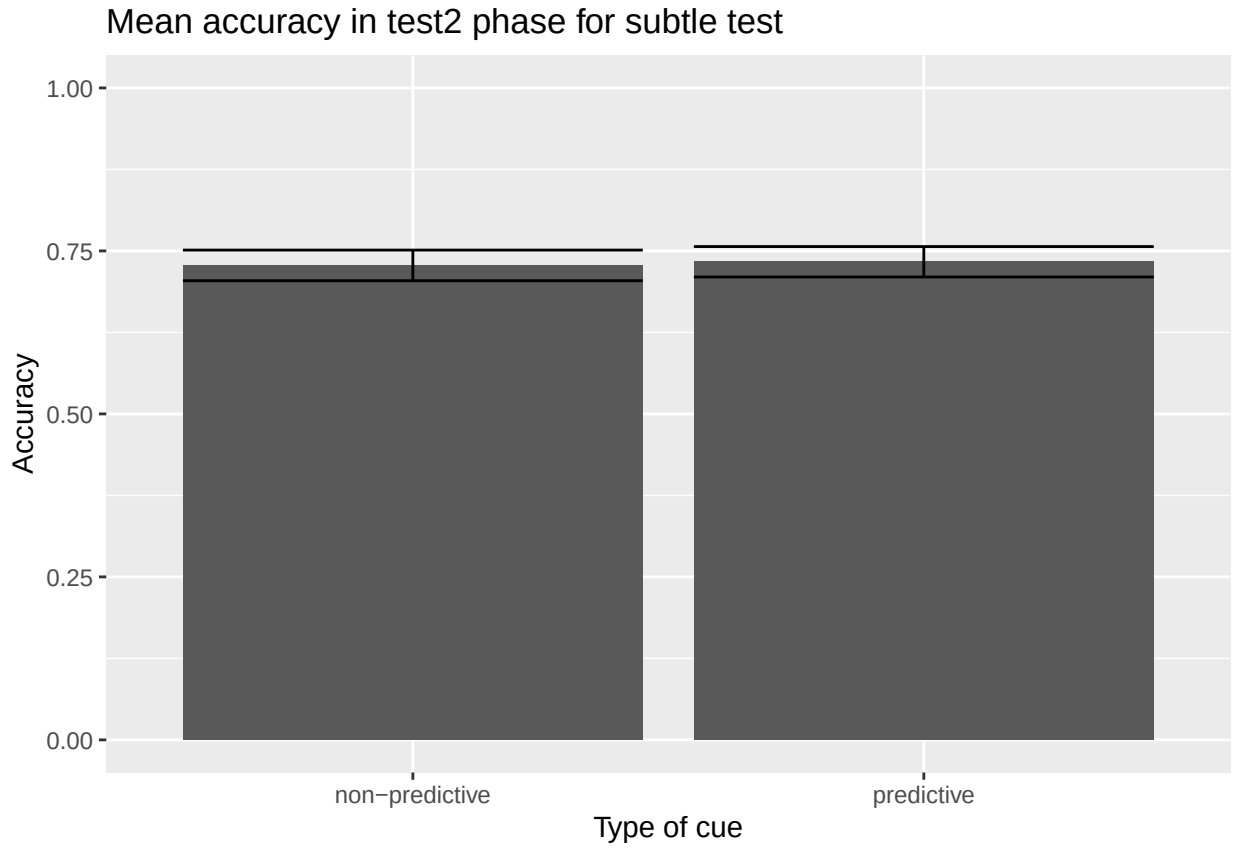
Corrected memory score



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} = $1.1x10^{0} \pm 0.02\%$).

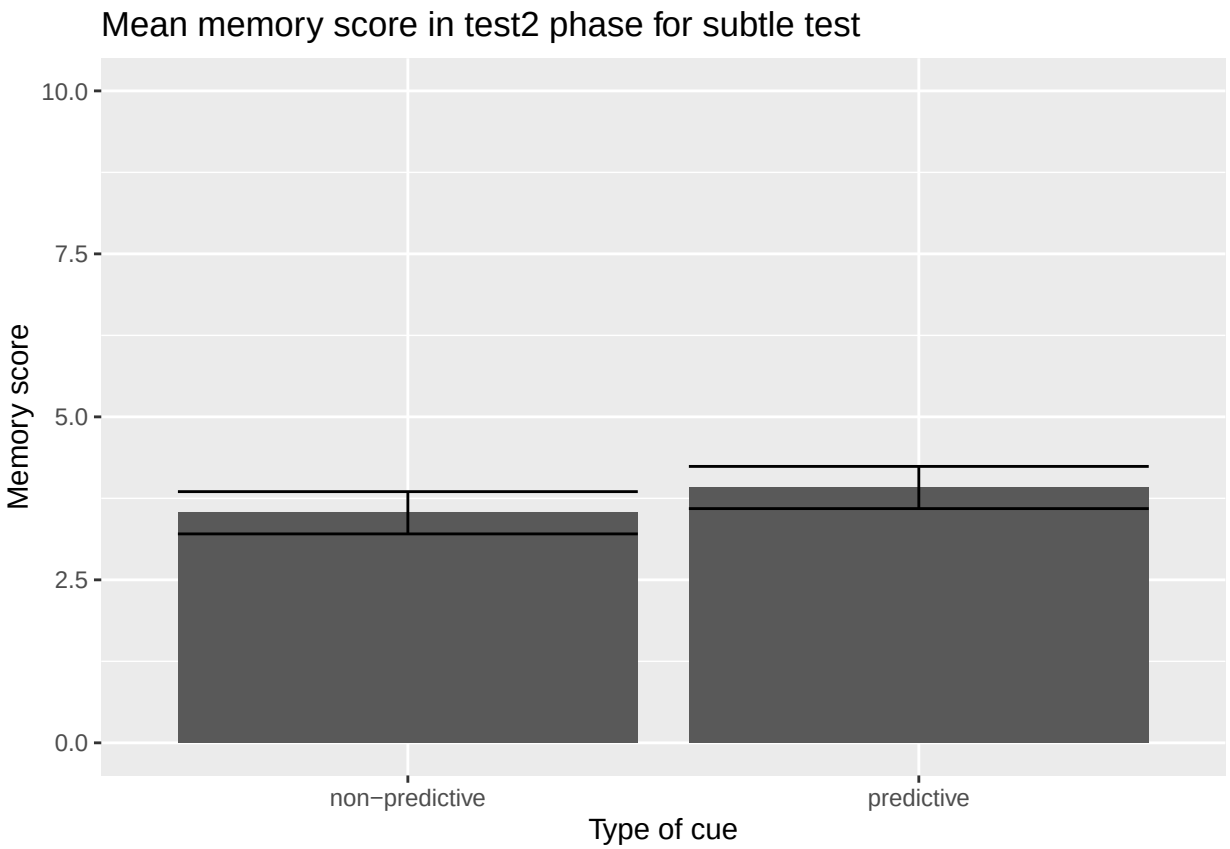
Test2

Accuracy



There is no significant difference ($t(29)$ = -0.12, p = .905, d = -0.02, BF_{10} = 2x10^{-1} ± 0.03%).

Memory score

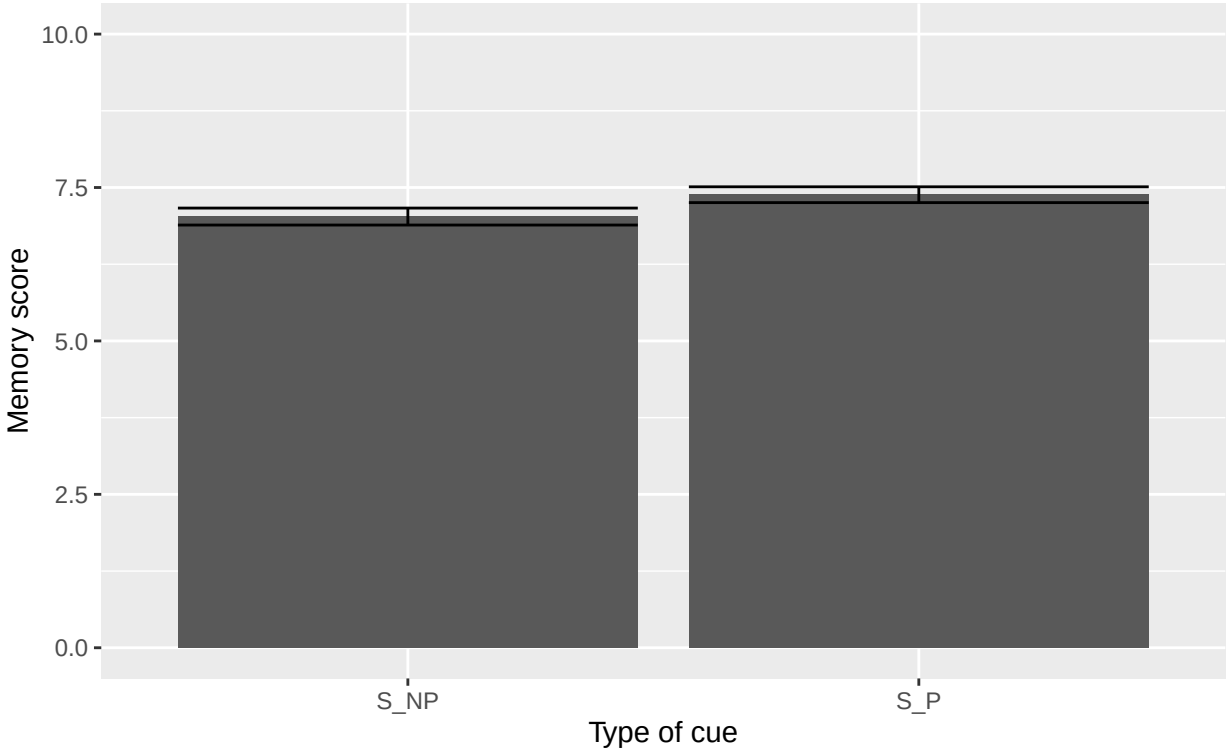


There is no significant difference ($V = 218$, $p = 1$, $\mathrm{BF}_{10} = 2.3\text{x}10^{-1} \pm 0.03\%$).

Corrected memory score

Figure 3

Mean corrected memory score in test2 phase for very subtle test

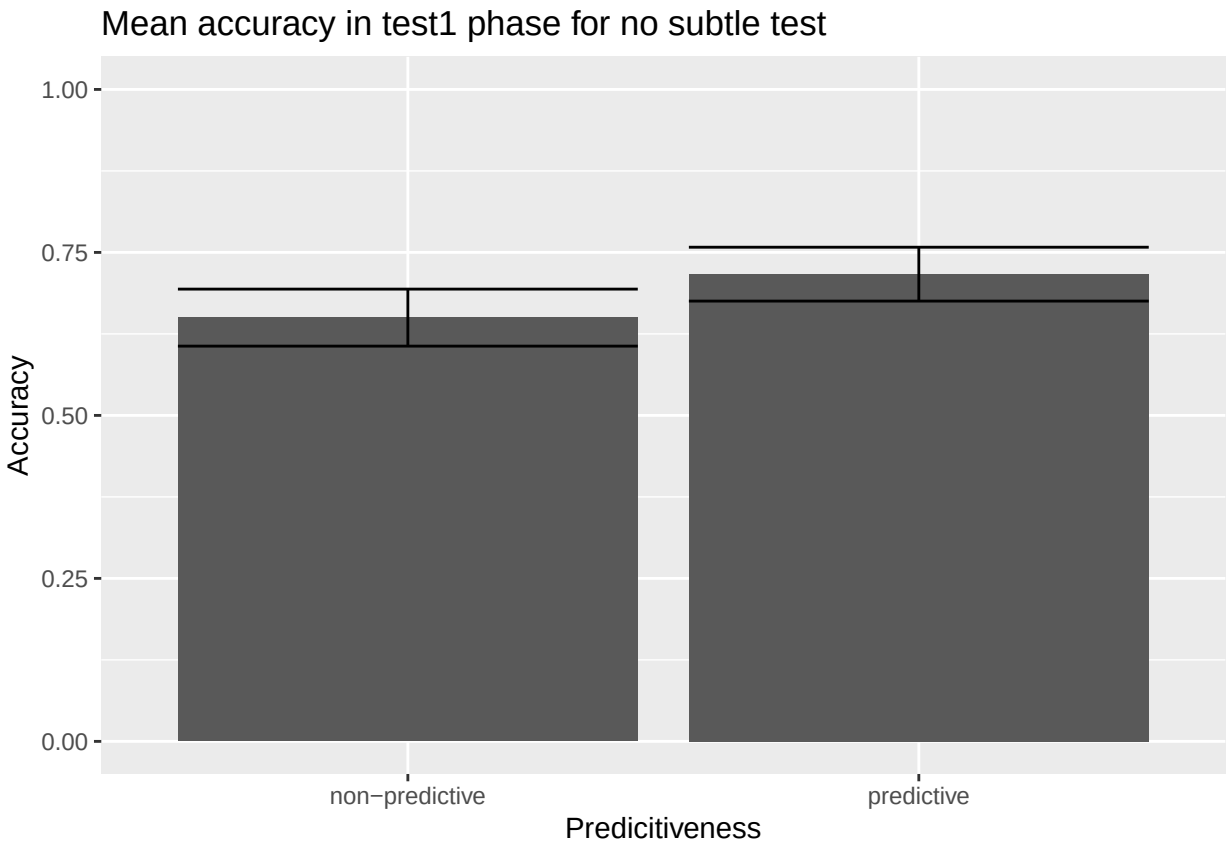


There´s lower memory score for the non-predictive, but there is no significant difference ($t(29)$ = -1.40, p = .171, d = -0.26, BF_{10} = 4.7x10^{-1} ± 0.03%).

No subtle test

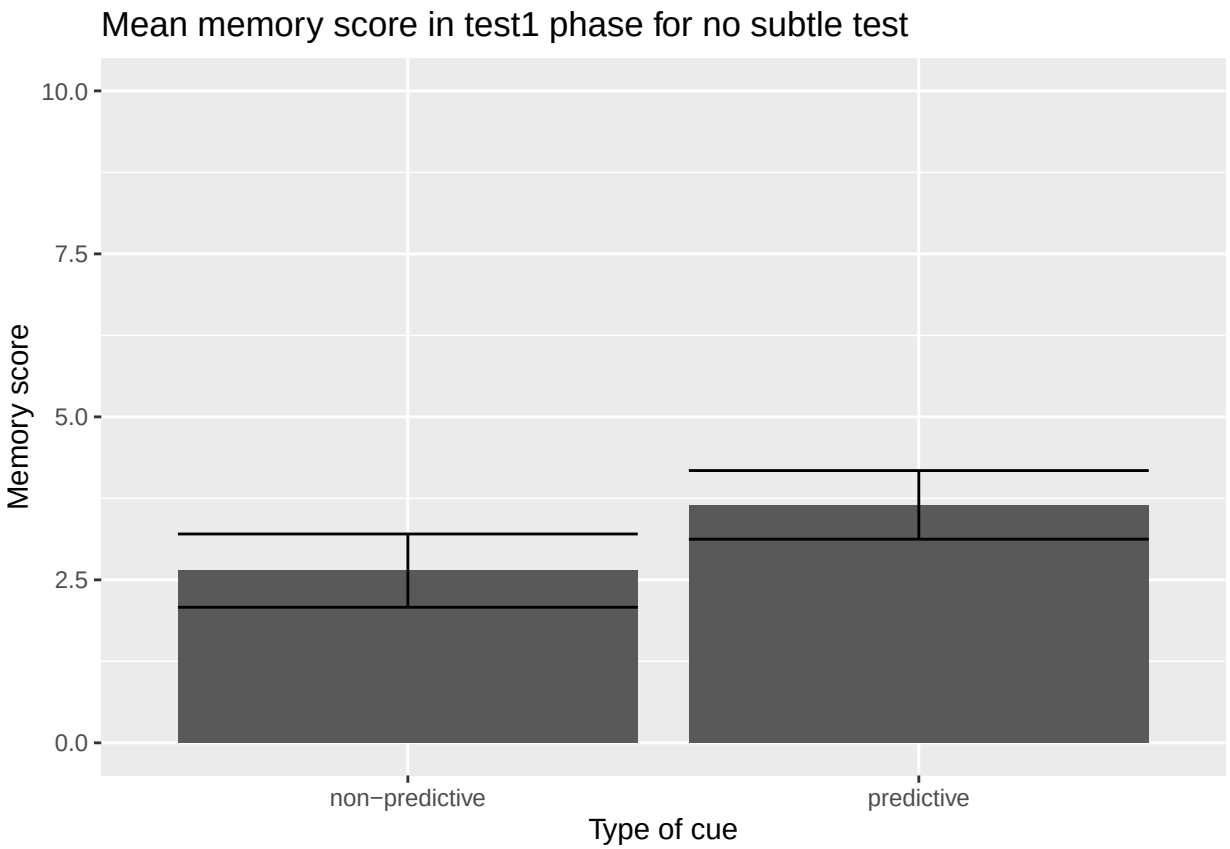
Test1

Accuracy



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

Memory score



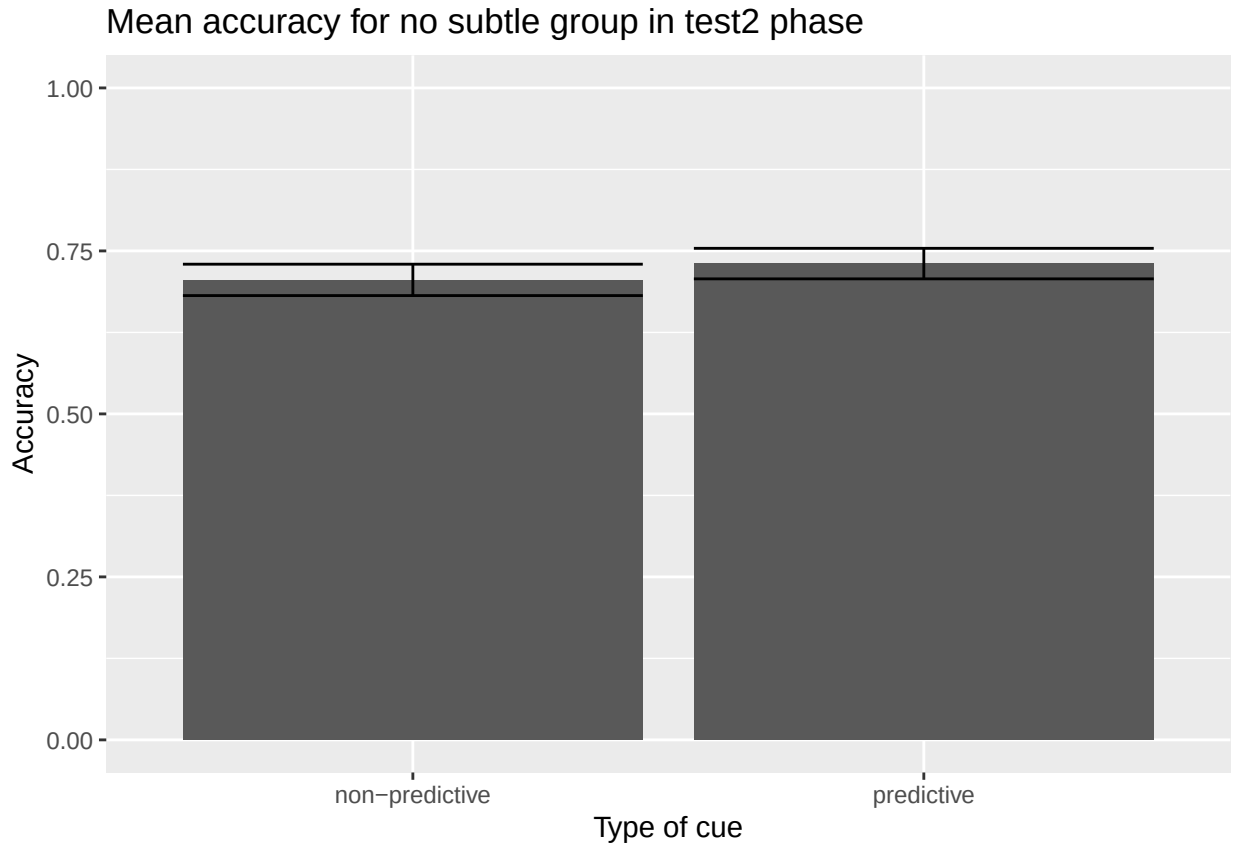
There is no significant difference ($V = 177$, $p = 0.3869534$, $\mathrm{BF}_{10} = 4.4\text{x}10^{-1} \pm 0.03\%$).

Corrected memory score

There are no significant differences in responding ($t(27)$ = -0.44, p = .663, d = -0.08, BF_{10} = 2.2x10^{-1} ± 0.03%).

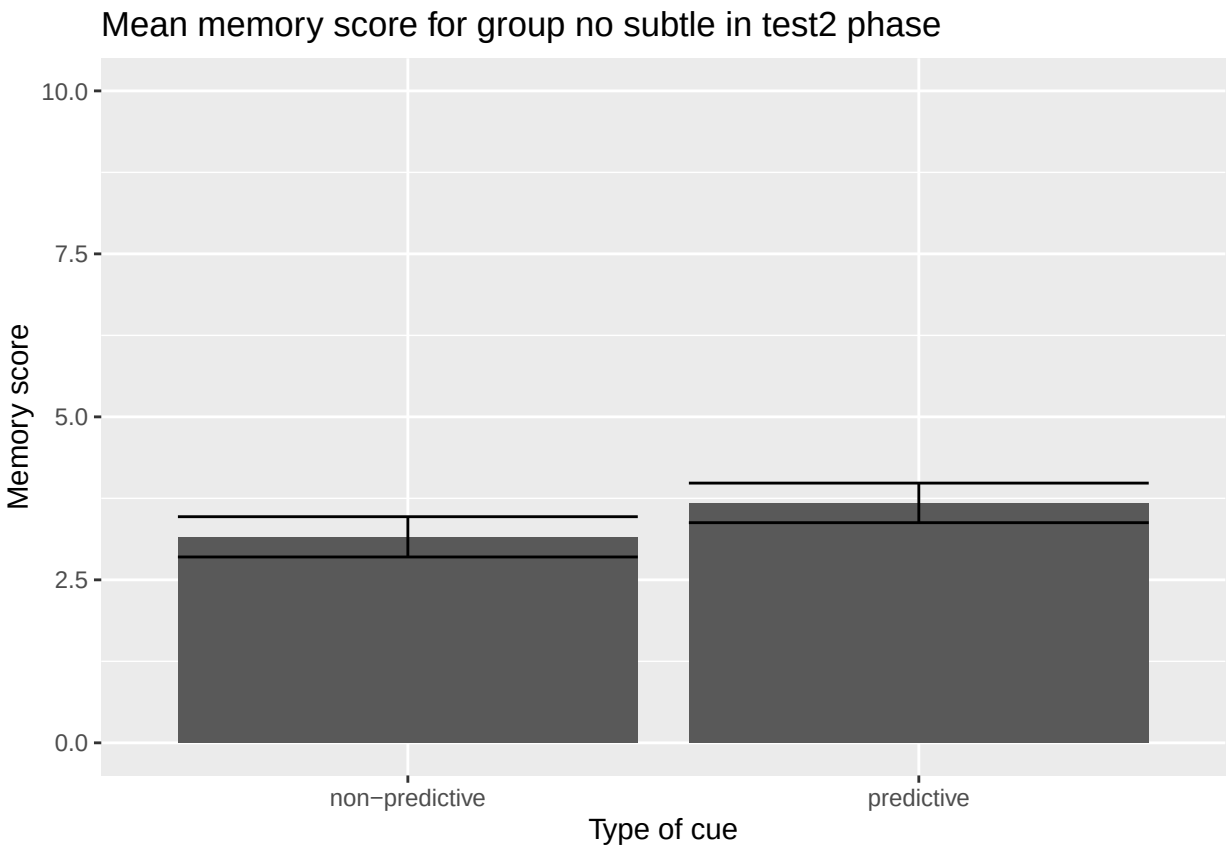
Test2

Accuracy



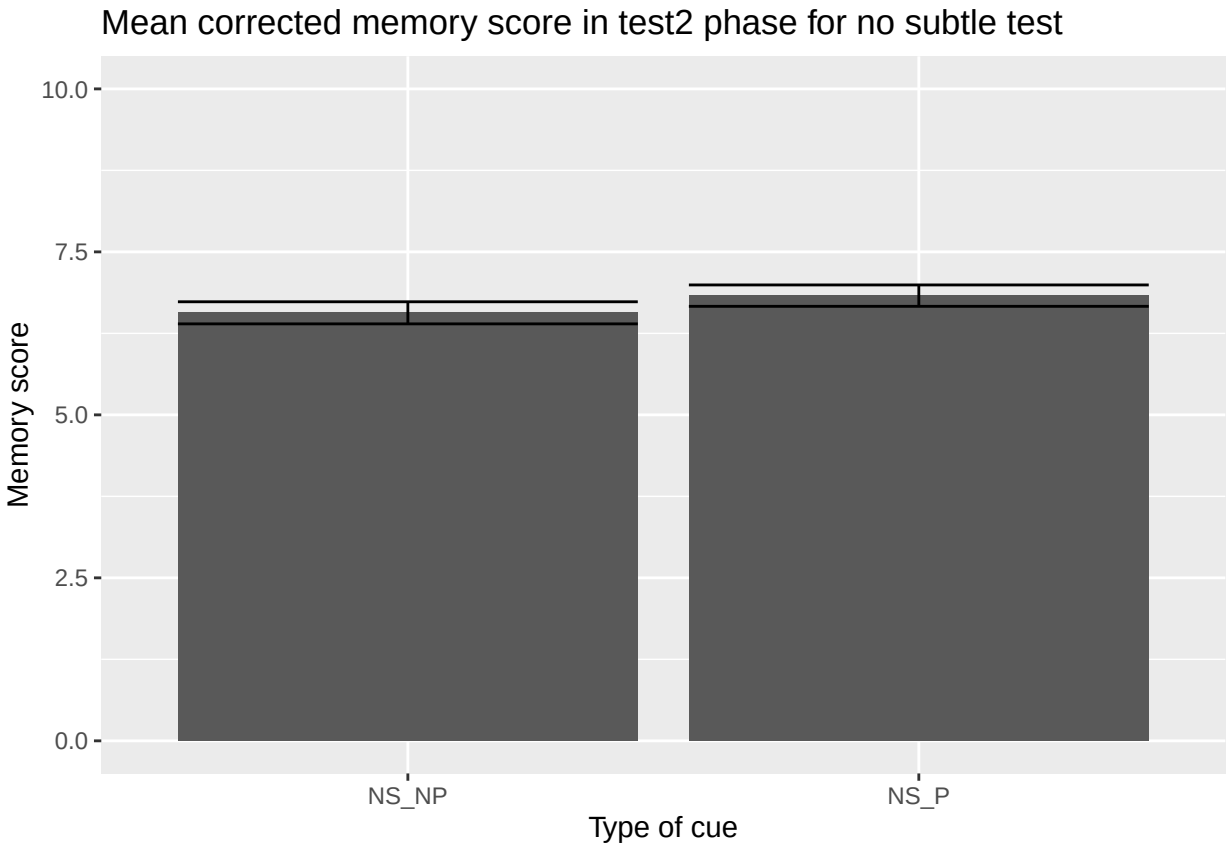
There are no differences in responding depending on the predictiveness of the target ($t(29)$ = -0.53, p = .597, d = -0.10, BF_{10} = 2.2x10^{-1} ± 0.03%).

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} = 2.7x10^{-1} ± 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, BF_{10} = 4.6x10^{-1} ± 0.03%).