

Contextual cuing in the presence of an overt instruction

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Abstract

9

10 abstract here

11 Public significance statement:

12 *Keywords:* keywords

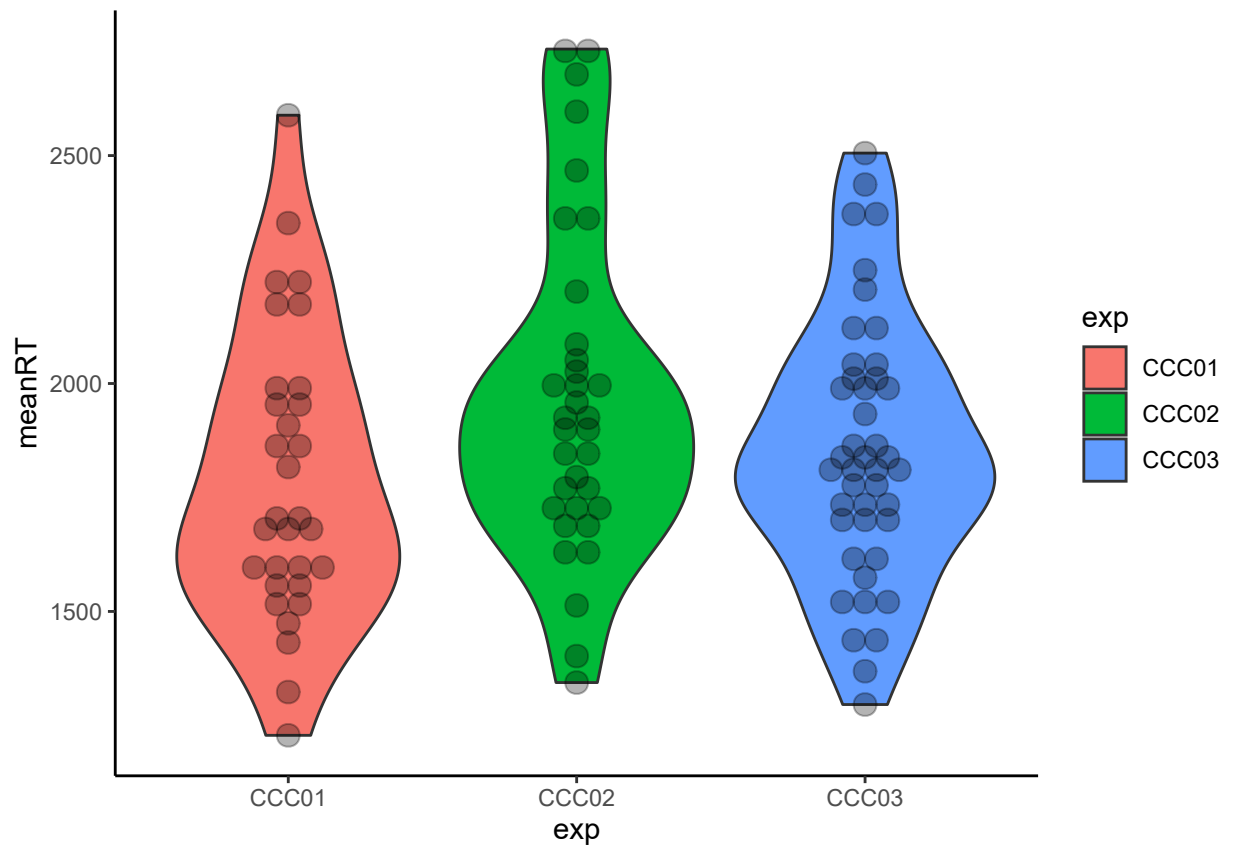
13 Word count: X

14

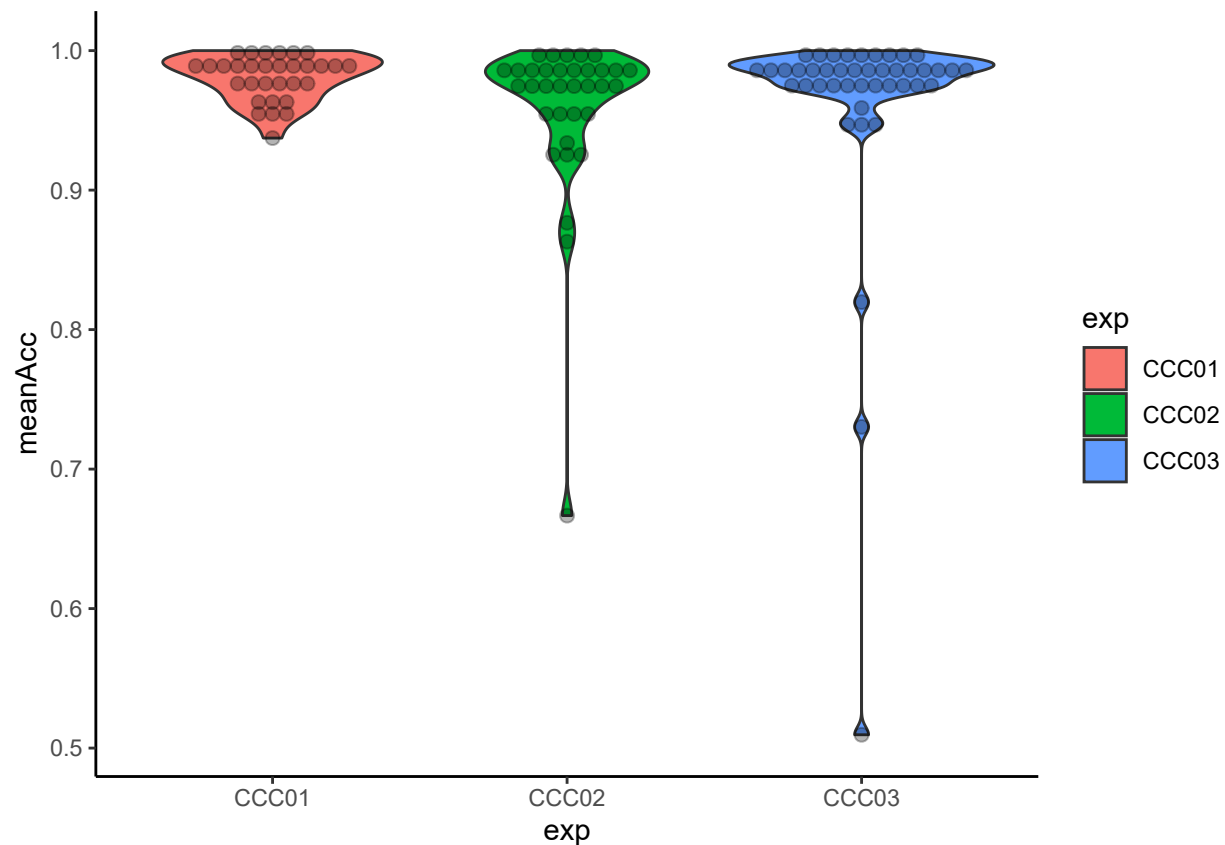
Contextual cuing in the presence of an overt instruction

15

Main text here (Beesley et al., 2015)

16 `## # A tibble: 3 x 2`17 `## exp num_Ps`18 `## <fct> <int>`19 `## 1 CCC01 31`20 `## 2 CCC02 34`21 `## 3 CCC03 43`

22



Experiment 1

Experiment 1 sought to examine whether the learnt attentional behaviour developed contextual cuing was expressed when participants were directed with a top-down instruction to search in a particular region of the search space. Participants were first trained with a set of four repeating configurations

Method

Participants. Thirty-one undergraduate students from Lancaster University were recruited (mean age = 20.13, SD = 1.09; 17 identified as male and 14 as female) via the Psychology Research Participation System in the Department of Psychology at Lancaster University, in return for the opportunity to use the recruitment system for their own research in future years.

Materials. Participants were tested individually in a quiet room with a Dell laptop with a 15.6" screen, a screen resolution of 1920 x 1080, and a full size external keyboard for participants to use to respond to the task. Participants sat approximately 50 cm from the screen. Stimulus presentation was controlled by MATLAB using the Psychophysics Toolbox extensions (Brainard, 1997; Kleiner, Brainard & Pelli, 2007; Pelli, 1997). Responses to the target stimulus were made by pressing the 'c' or 'n' key on a standard keyboard. All experimental materials are available at the github repository for this study.

Distractor stimuli were an 'L' shape (rotated 0°, 90°, 180°, or 270°) while the target stimulus was a 'T' shape (rotated at either 90° or 270°). Stimuli were arranged in a square grid of 144 evenly spaced cells (12 x 12) which was positioned centrally on the screen and was XXX mm (XX°) square. The grid itself was invisible to participants. The fixation cross (displayed centrally before each trial) was XX mm (X.X°) square. The stimuli were XX mm (X.X°) square. The background of the screen was grey (RGB: .6, .6, .6) and the stimuli were presented in black. There was a small offset in the vertical line of the 'L' distractors, which increased the similarity between the 'L' distractor and the target 'T', making the search task more difficult (Duncan & Humphreys, 1989).

Design.

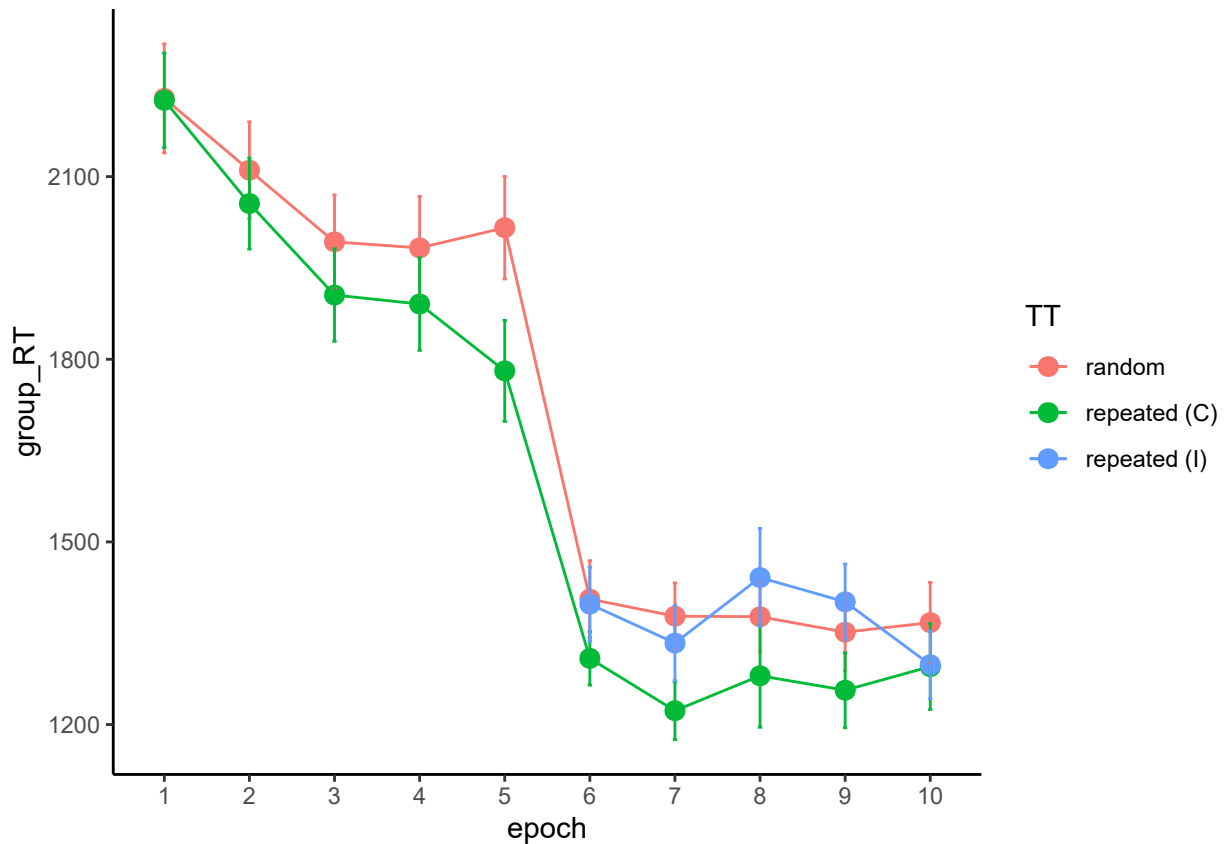
Procedure.

Results

Our criterion for removing outlier data, at both the participant level and the trial level, was 2.5 standard deviations above or below the mean of the sample. On average, trials ended with a timeout on 1.97% of trials (SD = 2.53). Two participants had an unusually high proportion of timeouts and were removed from the analysis. The mean accuracy of participants (not including timeout trials) was 98.10% (SD = 1.65%). One participants that had an unusually low proportion of accurate trials and were also removed.

The only participant deemed to be an outlier in terms of mean response time (hereafter RT) was also excluded on the basis of the timeout criterion, noted above.

For the remaining twenty-eight participants we removed trials with a timeout and inaccurate trials, before removing outliers from the RT data. On average, the proportion of outliers removed was 3.03% (SD = 0.79%). zero participants had an unusual proportion of trials removed as outlier RTs.



Anova Table (Type 3 tests)

##

Response: meanRT

| ## | Effect | df | MSE | F | ges | p.value |
|------|----------|-------------|----------|-----------|------|---------|
| ## 1 | TT | 1, 27 | 83590.71 | 7.48 * | .013 | .011 |
| ## 2 | epoch | 3.66, 98.95 | 65143.51 | 17.25 *** | .078 | <.001 |
| ## 3 | TT:epoch | 3.30, 89.04 | 41403.04 | 3.05 * | .008 | .029 |

```

74 ## ---
75 ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1 ' ' 1
76 ##
77 ## Sphericity correction method: GG

78 ## Anova Table (Type 3 tests)
79 ##
80 ## Response: meanRT
81 ##      Effect      df      MSE      F ges p.value
82 ## 1      TT  1.95, 52.75  70324.29  7.17 ** .021    .002
83 ## 2    epoch  2.18, 58.91 125085.52   0.88 .005    .430
84 ## 3 TT:epoch  5.14, 138.75  48674.61   1.22 .007    .304
85 ## ---
86 ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1 ' ' 1
87 ##
88 ## Sphericity correction method: GG

89 ##
90 ## Welch Two Sample t-test
91 ##
92 ## data:  meanRT by TT
93 ## t = 2.6582, df = 277.56, p-value = 0.008311
94 ## alternative hypothesis: true difference in means between group random and group repea
95 ## 95 percent confidence interval:
96 ##      26.83853 180.04444
97 ## sample estimates:
98 ##      mean in group random mean in group repeated (C)
99 ##      1376.039      1272.598

```

```

100 ##
101 ##  Welch Two Sample t-test
102 ##
103 ## data:  meanRT by TT
104 ## t = 0.037309, df = 276.73, p-value = 0.9703
105 ## alternative hypothesis: true difference in means between group random and group repea
106 ## 95 percent confidence interval:
107 ##  -76.27970   79.22693
108 ## sample estimates:
109 ##          mean in group random mean in group repeated (I)
110 ##                1376.039                1374.566
111 ##
112 ##  Welch Two Sample t-test
113 ##
114 ## data:  meanRT by TT
115 ## t = -2.5333, df = 277.78, p-value = 0.01185
116 ## alternative hypothesis: true difference in means between group repeated (C) and group
117 ## 95 percent confidence interval:
118 ##  -181.20322  -22.73253
119 ## sample estimates:
120 ## mean in group repeated (C) mean in group repeated (I)
121 ##                1272.598                1374.566

```

122 Experiment 2

123 Experiment 2 sought to examine ...

Method

Participants. Thirty-one undergraduate students from Lancaster University were recruited (mean age = 20.13, SD = 1.09; 17 identified as male and 14 as female) via the Psychology Research Participation System in the Department of Psychology at Lancaster University, in return for the opportunity to use the recruitment system for their own research in future years.

Materials. The materials and stimuli were identical to Experiment 1.

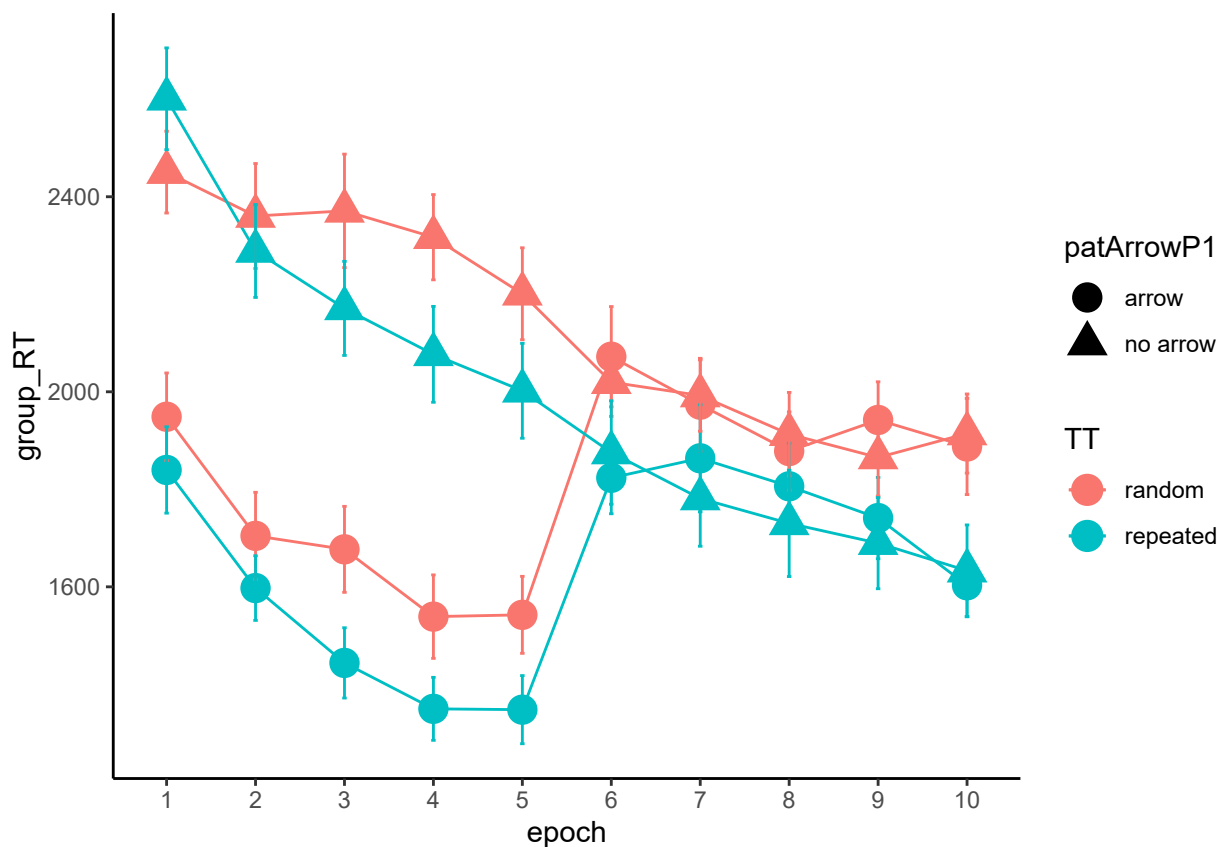
Design.

Procedure.

Results

Our criteria for removing outlier data were identical to Experiment 1. On average, trials ended with a timeout on 2.13% of trials (SD = 1.83). Zero participants had an unusually high proportion of timeouts. The mean accuracy of participants (not including timeout trials) was 95.85% (SD = 6.10%). One participant that had an unusually low proportion of accurate trials and were also removed. Zero participants were deemed to be an outlier in terms of mean RT.

For the remaining thirty-three participants we removed trials with a timeout and inaccurate trials, before removing outliers from the RT data. On average, the proportion of outliers removed was 2.81% (SD = 1.04%). One participant had an unusual proportion of trials removed as outlier RTs and were not included in the final analysis.



144

145 ## Anova Table (Type 3 tests)

146 ##

147 ## Response: meanRT

| ## | Effect | df | MSE | F | ges | p.value |
|------|---------------------|--------------|-----------|------------|-------|---------|
| ## 1 | patArrowP1 | 1, 32 | 442144.07 | 175.06 *** | .313 | <.001 |
| ## 2 | TT | 1, 32 | 151825.16 | 21.10 *** | .019 | <.001 |
| ## 3 | epoch | 3.13, 100.03 | 200796.66 | 24.76 *** | .084 | <.001 |
| ## 4 | patArrowP1:TT | 1, 32 | 164480.86 | 0.74 | <.001 | .395 |
| ## 5 | patArrowP1:epoch | 3.34, 107.03 | 147265.04 | 0.61 | .002 | .630 |
| ## 6 | TT:epoch | 3.48, 111.28 | 89997.46 | 4.53 ** | .008 | .003 |
| ## 7 | patArrowP1:TT:epoch | 3.39, 108.43 | 62430.81 | 2.24 + | .003 | .080 |

156 ## ---

157 ## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1 ' ' 1

```

158 ##
159 ## Sphericity correction method: GG

160 ## Bayes factor analysis
161 ## -----
162 ## [1] patArrowP1 + TT + patArrowP1:TT + subj : 0.187335 ±4.4%
163 ##
164 ## Against denominator:
165 ##   meanRT ~ patArrowP1 + TT + subj
166 ## ---
167 ## Bayes factor type: BFlinearModel, JZS

168 ## Anova Table (Type 3 tests)
169 ##
170 ## Response: meanRT
171 ##           Effect             df      MSE          F    ges p.value
172 ## 1      patArrowP1           1, 32 107851.75      0.48 <.001    .493
173 ## 2              TT           1, 32 117763.13 51.20 ***   .035   <.001
174 ## 3      epoch 3.44, 109.95  79887.36 10.79 ***   .017   <.001
175 ## 4    patArrowP1:TT           1, 32 284015.04      0.04 <.001    .850
176 ## 5    patArrowP1:epoch 3.58, 114.51  94104.45      0.47 <.001    .737
177 ## 6      TT:epoch 3.39, 108.54  89788.68      1.46  .003    .227
178 ## 7 patArrowP1:TT:epoch 3.70, 118.33  97123.16      0.75  .002    .549
179 ## ---
180 ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1 ' ' 1
181 ##
182 ## Sphericity correction method: GG

183 ## Bayes factor analysis

```

```

184 ## -----
185 ## [1] patArrowP1 + TT + patArrowP1:TT + subj : 0.1195972 ±10.37%
186 ##
187 ## Against denominator:
188 ##   meanRT ~ patArrowP1 + TT + subj
189 ## ---
190 ## Bayes factor type: BFlinearModel, JZS

```

191 Experiment 3

192 Experiment 3 sought to examine ...

193 Method

194 **Participants.** Forty-three undergraduate students from Lancaster University were
 195 recruited (mean age = 18.65, SD = 2.81; 29 identified as male and 12 as female) via the
 196 Psychology Research Participation System in the Department of Psychology at Lancaster
 197 University, in return for the opportunity to use the recruitment system for their own
 198 research in future years.

199 **Materials.** The materials and stimuli were identical to Experiment 1.

200 **Design.**

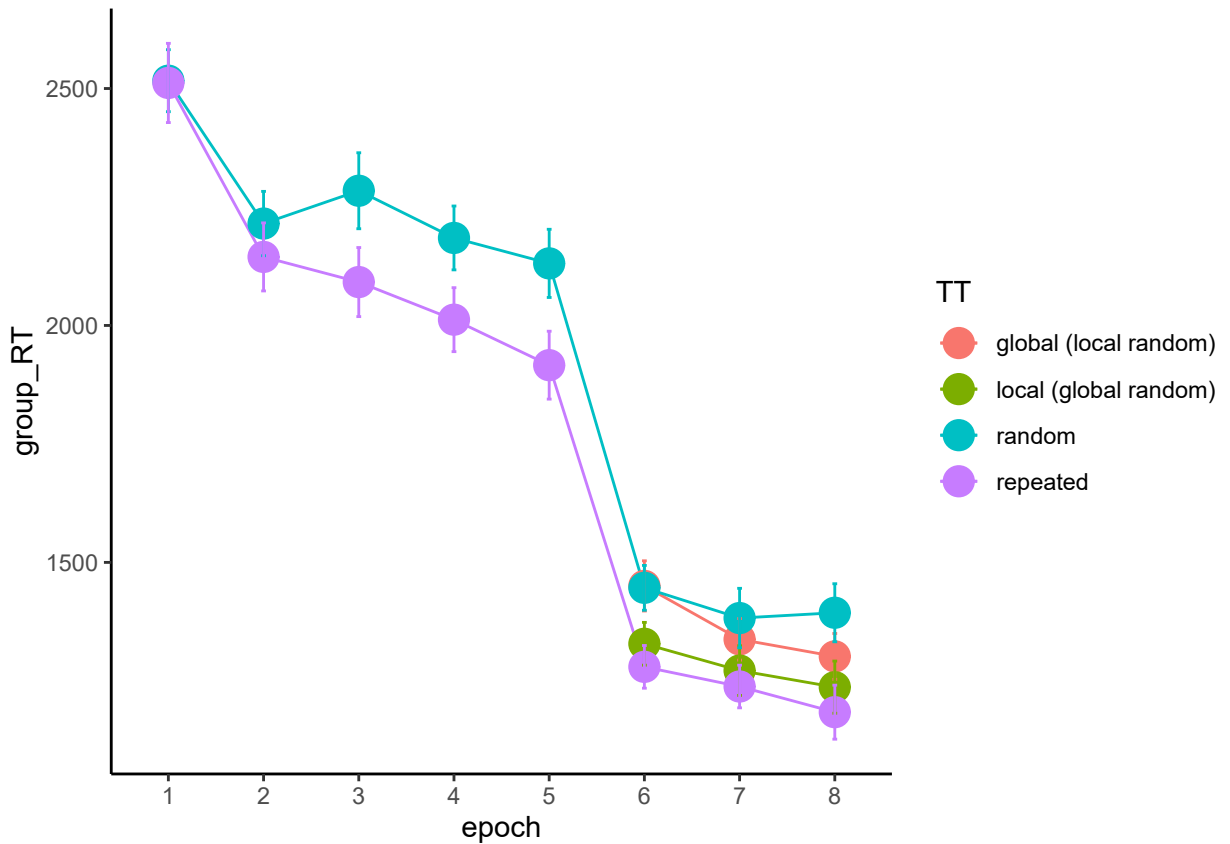
201 **Procedure.**

202 Results

203 Our criteria for removing outlier data were identical to Experiment 1. On average,
 204 trials ended with a timeout on 3.33% of trials (SD = 4.08). One participants had an
 205 usually high proportion of timeouts. The mean accuracy of participants (not including
 206 timeout trials) was 96.12% (SD = 8.47%). Two participants that had an unusually low

proportion of accurate trials and were also removed. Zero participants were deemed to be an outlier in terms of mean RT.

For the remaining forty participants we removed trials with a timeout and inaccurate trials, before removing outliers from the RT data. On average, the proportion of outliers removed was 3.13% (SD = 0.72%). zero participants had an unusual proportion of trials removed as outlier RTs and were not included in the final analysis [EAF4S].



Anova Table (Type 3 tests)

##

Response: meanRT

| ## | Effect | df | MSE | F | ges | p.value |
|------|----------|--------------|-----------|-----------|------|---------|
| ## 1 | TT | 1, 39 | 84371.29 | 20.35 *** | .021 | <.001 |
| ## 2 | epoch | 3.41, 132.99 | 110399.09 | 29.89 *** | .121 | <.001 |
| ## 3 | TT:epoch | 3.69, 144.06 | 67824.76 | 2.57 * | .008 | .045 |

```

221 ## ---
222 ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1 ' ' 1
223 ##
224 ## Sphericity correction method: GG

225 ## Anova Table (Type 3 tests)
226 ##
227 ## Response: meanRT
228 ##      Effect      df      MSE      F ges p.value
229 ## 1      TT 2.71, 105.61 31057.96 26.59 *** .043  <.001
230 ## 2    epoch  1.78, 69.46 51362.09  8.72 *** .016  <.001
231 ## 3 TT:epoch 4.44, 173.24 38443.76      0.77 .003   .558
232 ## ---
233 ## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '+' 0.1 ' ' 1
234 ##
235 ## Sphericity correction method: GG

236 ## Bayes factor analysis
237 ## -----
238 ## [1] TT + subj : 51187426917 ±0.57%
239 ##
240 ## Against denominator:
241 ##   meanRT ~ subj
242 ## ---
243 ## Bayes factor type: BFlinearModel, JZS

244 ## Bayes factor analysis
245 ## -----

```

```
246 ## [1] TT + subj : 0.8007408 ±0.79%
247 ##
248 ## Against denominator:
249 ##   meanRT ~ subj
250 ## ---
251 ## Bayes factor type: BFlinearModel, JZS
252 ## Bayes factor analysis
253 ## -----
254 ## [1] TT + subj : 1060730 ±1.33%
255 ##
256 ## Against denominator:
257 ##   meanRT ~ subj
258 ## ---
259 ## Bayes factor type: BFlinearModel, JZS
260 ## Bayes factor analysis
261 ## -----
262 ## [1] TT + subj : 10503.92 ±0.87%
263 ##
264 ## Against denominator:
265 ##   meanRT ~ subj
266 ## ---
267 ## Bayes factor type: BFlinearModel, JZS
268 ## Bayes factor analysis
269 ## -----
270 ## [1] TT + subj : 0.7662298 ±1.79%
```

```
271 ##
272 ## Against denominator:
273 ##   meanRT ~ subj
274 ## ---
275 ## Bayes factor type: BFlinearModel, JZS

276 ## Bayes factor analysis
277 ## -----
278 ## [1] TT + subj : 38.82576 ±1.68%
279 ##
280 ## Against denominator:
281 ##   meanRT ~ subj
282 ## ---
283 ## Bayes factor type: BFlinearModel, JZS

284 ##
285 ## Paired t-test
286 ##
287 ## data:  meanRT by TT
288 ## t = 4.0807, df = 119, p-value = 8.159e-05
289 ## alternative hypothesis: true mean difference is not equal to 0
290 ## 95 percent confidence interval:
291 ##   43.40317 125.22884
292 ## sample estimates:
293 ## mean difference
294 ##           84.31601
```


References

- Beesley, T., Vadillo, M. A., Pearson, D., & Shanks, D. R. (2015). Pre-exposure of repeated search configurations facilitates subsequent contextual cuing of visual search. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 41(2), 348–362.
<https://doi.org/10.1037/xlm0000033>