Priming and Attentional Cueing in Hemispatial Neglect

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Priming and attentional cueing

Previous studies (Kristjànsson et al., 2005) have shown that the priming effect is preserved on the contralesional side for participants suffering from spatial neglect. Druker and Anderson (2010) found that spatial probability can serve as a cue to direct attention. Can participants suffering from spatial neglect combine those two aspects to learn the probability distribution and use it to improve their performances?

General Method

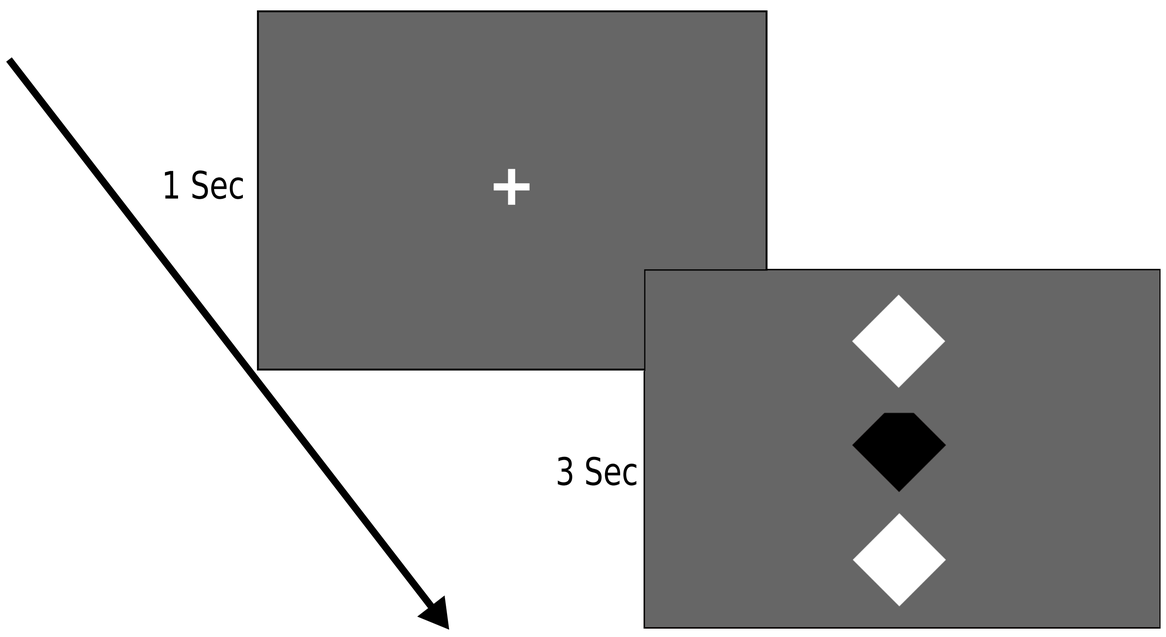

Figure 1: **Procedure details:** Three groups of participants, healthy controls (N=5), brain damaged group with left parietal lesions (N=4) and neglect participants (N=5) performed 3 blocks of 150 trials over a single session. After a white fixation cross, they were instructed to decide, as quickly as possible, if the odd colored diamond has its notch cutoff at the top or bottom. All participants performed 3 conditions: a baseline condition, a "repeat" condition with a high probability repeat and a "switch" condition with a low probability repeat.

Conditions

Table 1: **Transition Probability: Repeat Condition**

Actual Position	Next Position 1	Next Position 2	Next Position 3
Position 1	0.8	0.1	0.1
Position 2	0.1	0.8	0.1
Position 3	0.1	0.1	0.8

Table 2: **Transition Probability: Switch Condition**

Actual Position	Next Position 1	Next Position 2	Next Position 3
Position 1	0.2	0.4	0.4
Position 2	0.4	0.2	0.4
Position 3	0.4	0.4	0.2

The three groups benefit from the position priming but only the healthy controls participants learn the probability distribution

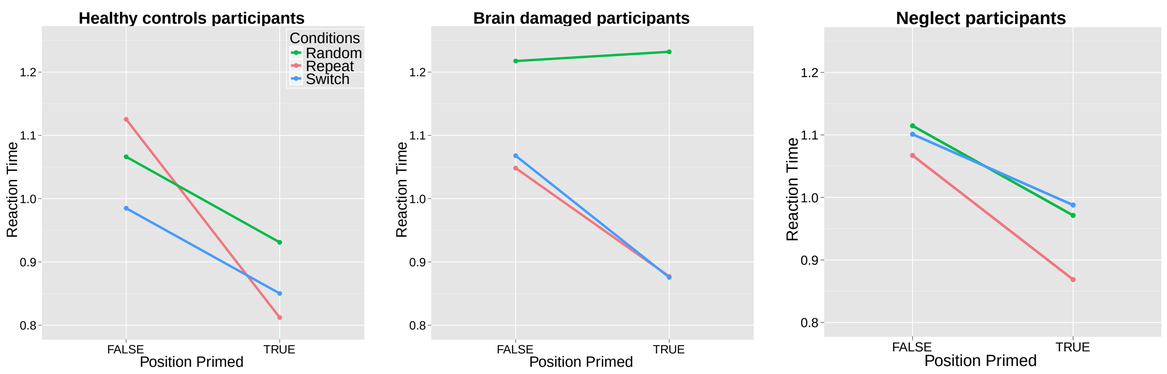

Figure 2: **Probability cueing for the three groups:** Healthy controls participants learn the probability distribution as they show a benefit for the condition, the repetition of the target and an interaction (pValue: <0.01). Brain damaged and neglect participants show a benefit of the priming effect (pValue:<0.01) but contrary to the healthy controls, they do not learn the probability distribution.

Differences in reaction time between the primed and non-primed positions for the three conditions

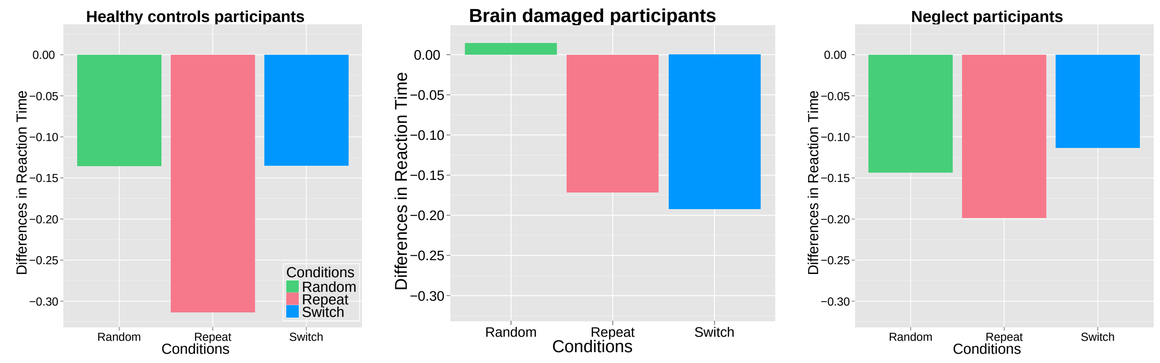

Figure 3: **Healthy controls benefit the most from the repeat condition:** Participants with a left parietal lesion improve their reaction time (RT) for the repeat and switch condition (pValue<0.02) and neglect participants are not sensitive to the different conditions.

Priming effect for the baseline condition

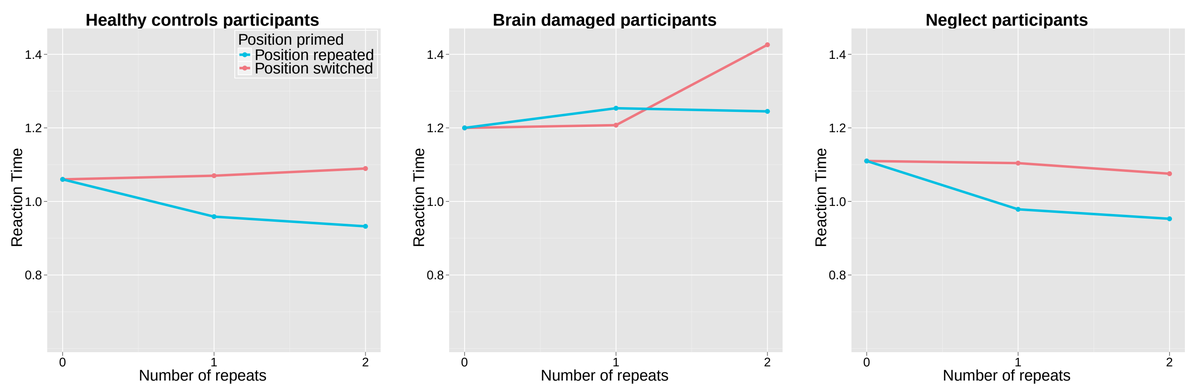

Figure 4: **Mean RT when the position is repeated 0, 1 or 2 times or switched (red line) after 0, 1 or 2 repetitions:** Brain damaged participants do not benefit from the position primed for the baseline condition, but their RT is influenced when the position is switched.

Priming effect for the high repeat condition

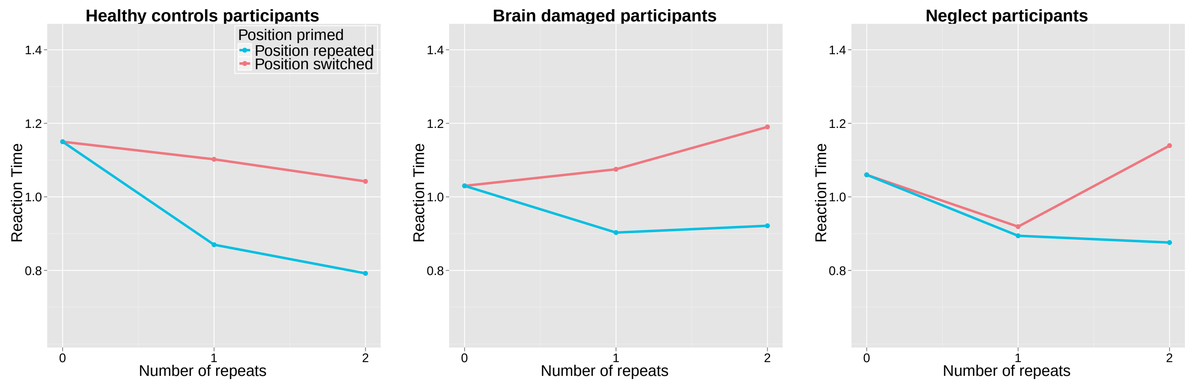

Figure 5: **The three groups benefit from the high probability repeat:** The priming effect has the most influence after two repeats, as a switch of the position after two repeats increases the RT for more than 200ms for the three groups.

Priming effect for the switch condition

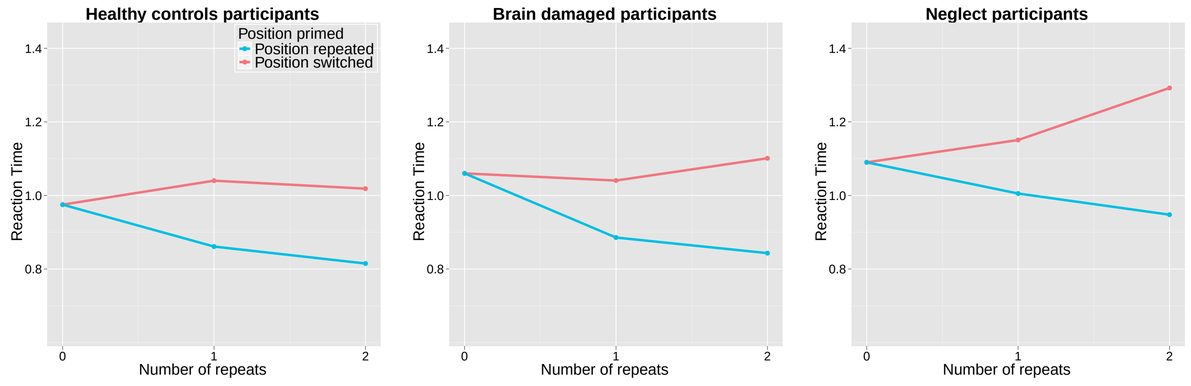

Figure 6: **Neglect participants are influenced by the switch of the position:** An increased number of repeats influences particularly participants suffering from a right parietal lesion as they become 325ms slower if the position is switched after 2 repeats.

Conclusion: The three groups benefit from the priming effect but the neglect and brain damaged groups do not show additional benefits from the probability distribution. Deficits in probability estimation may account for some of the behavioural deficits and refractoriness to rehabilitation in these patient groups.

Bibliography:

Druker, M. and Anderson, B. (2010). Spatial probability aids visual stimulus discrimination. *Frontiers in Human Neuroscience*, 4:1–10.

Kristjànsson, A., Vuilleumier, P., Malhotra, P., Husain, M. and Driver, J., (2005). Priming of color and position during visual search in unilateral spatial neglect. *Journal of Cognitive Neuroscience*, 17(6):3, 859–873.

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