Priming and Statistical Learning Act as Cues to Direct Attention

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Priming and statistical learning

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

General Method

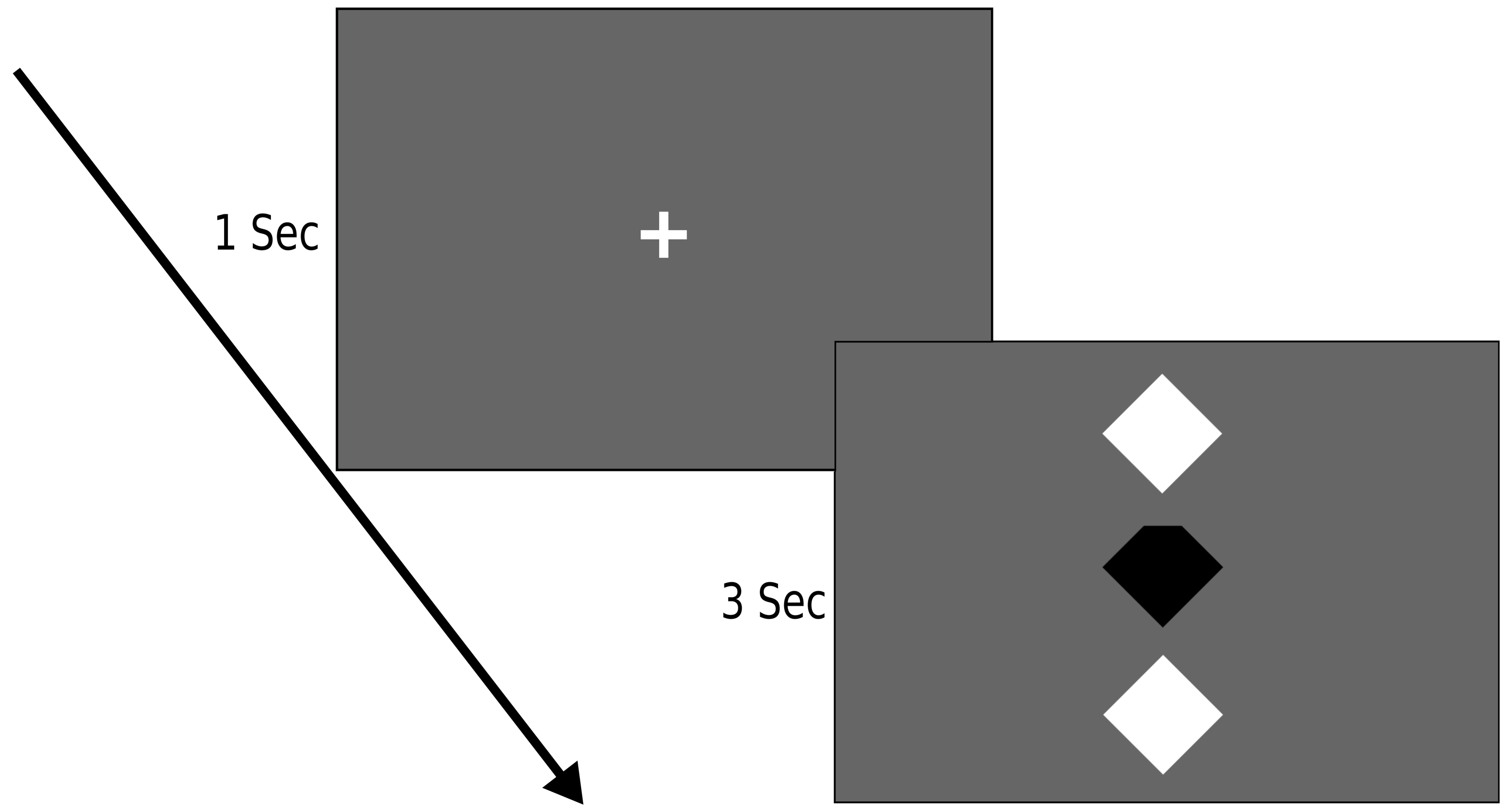

Figure 1: **Procedure details:** Four groups of participants, undergraduate students (N=20), older healthy controls (N=20), brain damaged participants with left parietal (LBD) lesions (N=5) and brain damaged participants with right parietal (RBD) lesion (N=5) performed 3 blocks of 150 trials over a single session. Participants were instructed to decide, as quickly as possible, if the odd colored diamond has its notch cut off at the top or bottom. All participants performed 3 conditions: a baseline condition, a "repeat" condition with a high-probability repeat of target position and a "switch" condition with a low probability repeat.

Conditions

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

Current 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**

Current 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

All the groups benefit from the priming effect

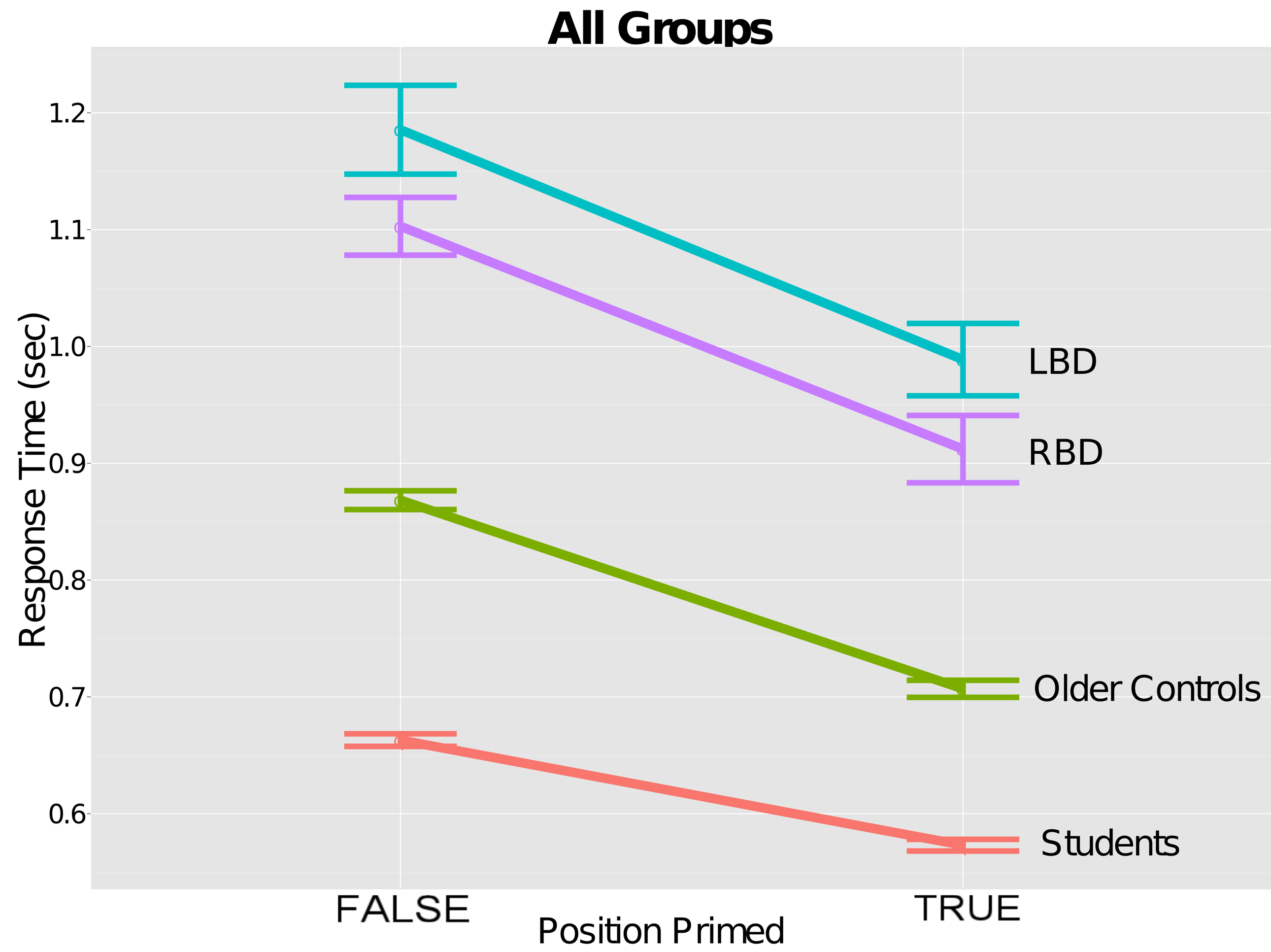

Figure 2: **Priming effect:** The four groups show a significant improvement (p<0.001 for all the groups) in their RT when the same position is repeated compared to when the position changes.

All groups show a similar benefit for consecutive repeats

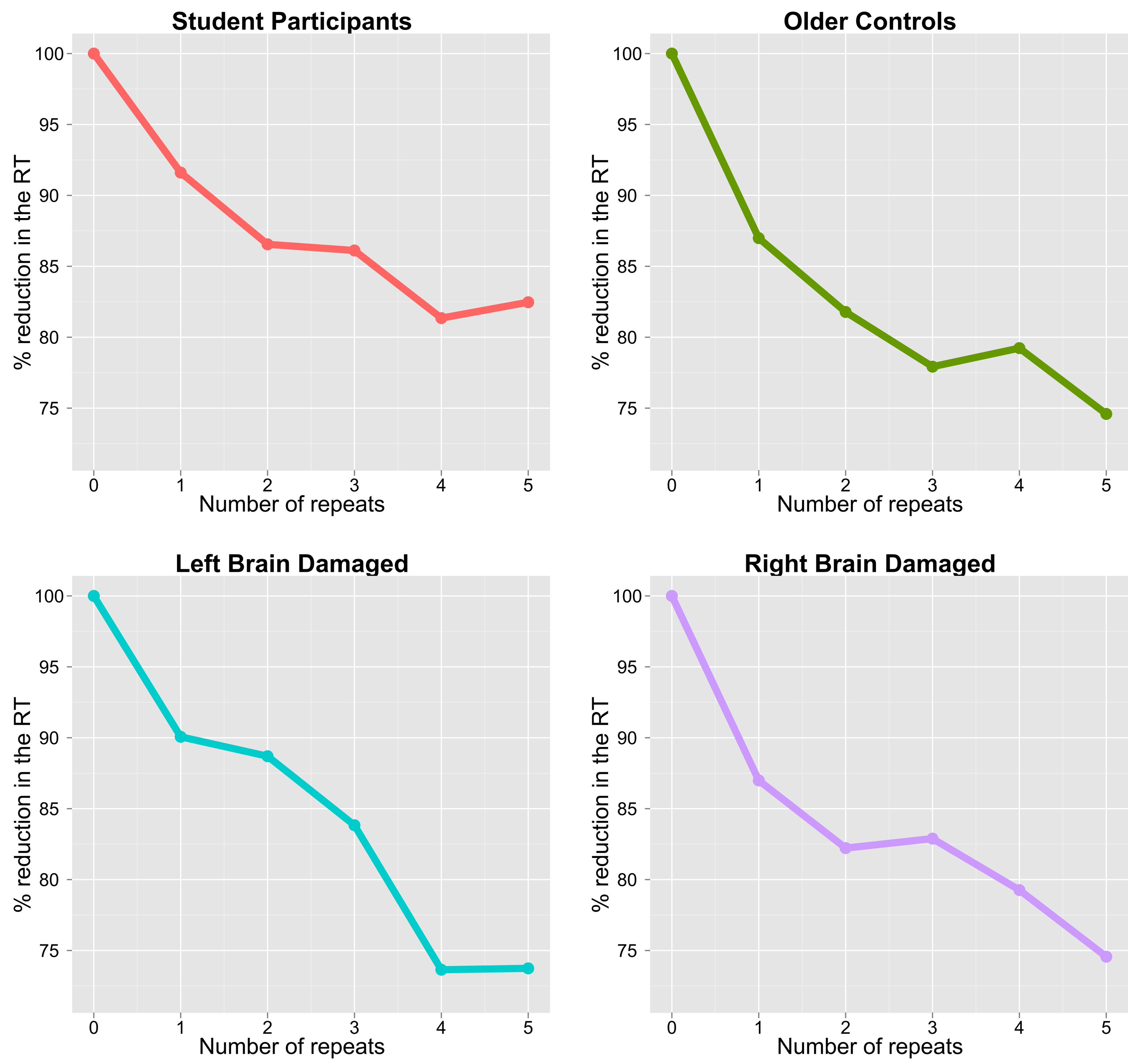

Figure 3: **Benefit from several repeats of the same position:** Students, older participants, LBD and RBD benefit from several repeats of the position. The graphs represent the benefits in RT as a proportion of 0 repeat of the position.

The four groups are faster to detect targets during the high repeat condition

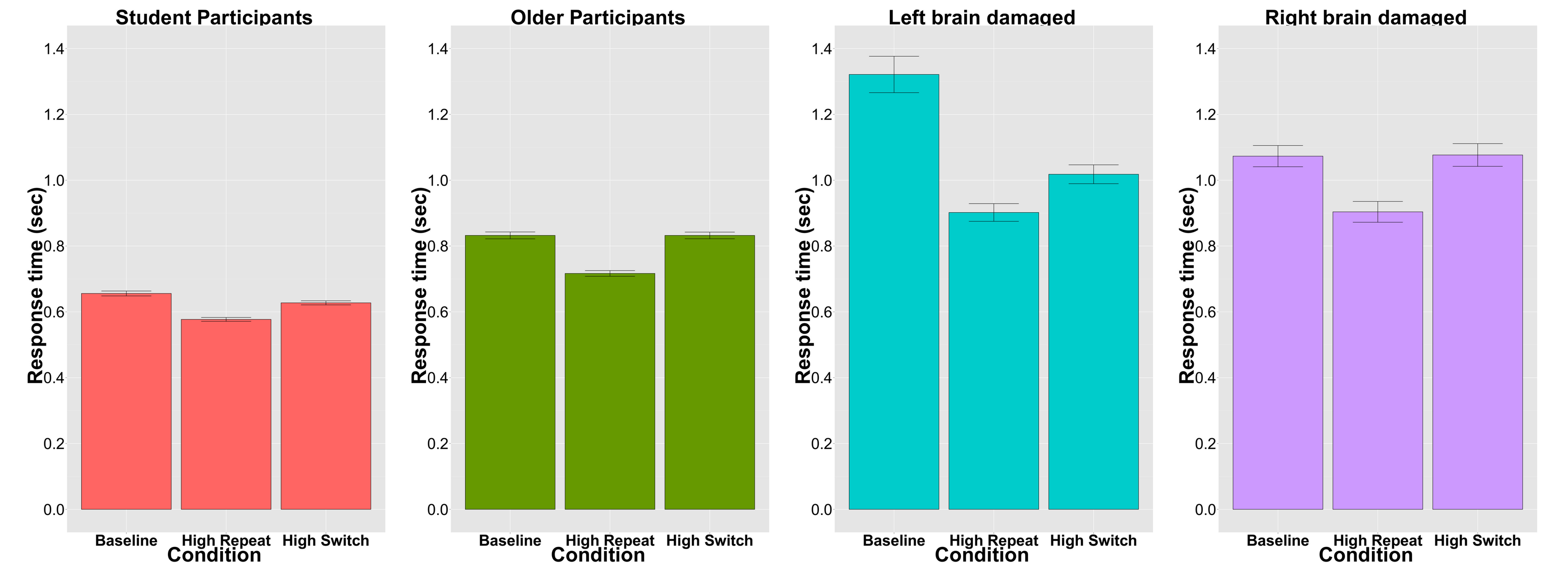

Figure 4: **RT for each condition:** The four groups are all faster to detect targets during the high repeat condition compared to the two other conditions. All demonstrated a p<0.001. Is this benefit due to priming or the learning of the statistical distribution?

Priming and statistical learning interaction: The LBD and RBD groups benefit only from priming, they do not show an interaction effect

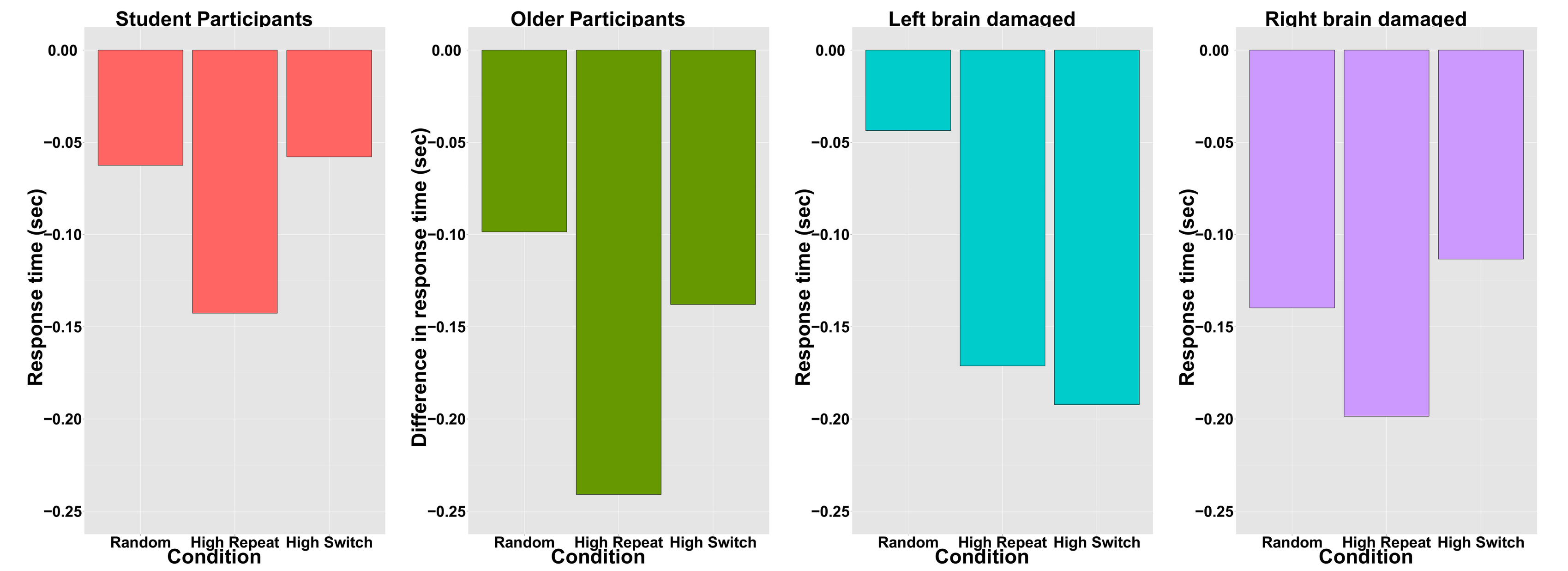

Figure 5: **Difference in RT between primed and non-primed trials based on condition:** LBD and RBD do not benefit more from the priming effect during the high repeat condition, as opposed to the two healthy groups. They do not have a significant interaction effect between the condition and the priming effect (p=0.39 for LBD and p=0.1 for RBD).

Conclusion

- The two healthy controls and the two brain-damaged groups benefit from the priming effect.
- The use of the probability distribution is impaired in LBD and RBD patients as shown by figure 5, but those patients have a preserved priming effect.
- Deficits in learning the probability distribution may account for some of the behavioral deficits in these patient groups.

Acknowledgements

The authors would like to thank the Grand River Hospital in Kitchener for their help with the recruitment of participants.

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