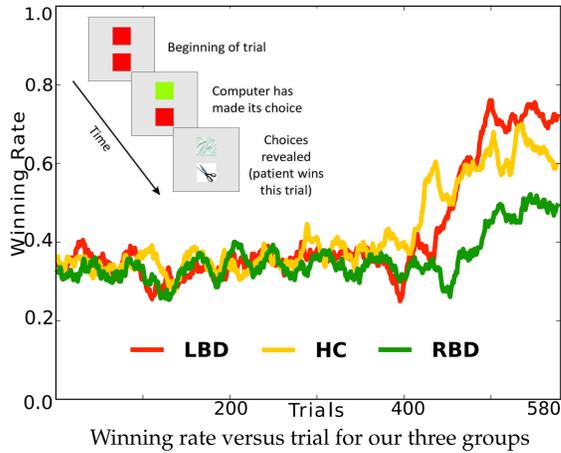


## RBDs Show Impairment In The Rock-Paper-Scissors Experiment

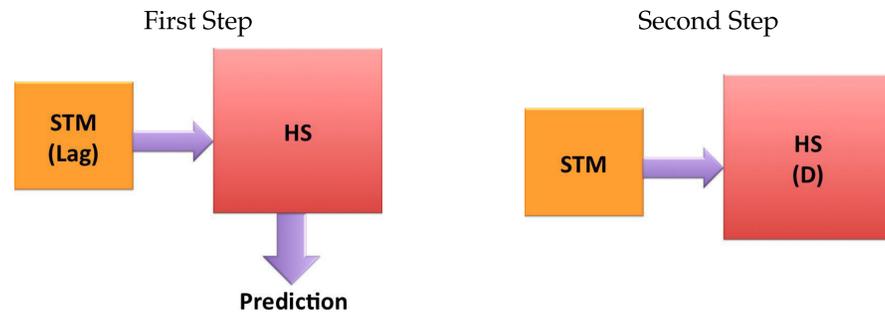


- Participants:
  - 12 Healthy Control (HC)
  - 13 Right Brain Damage (RBD)
  - 10 Left Brain Damage (LBD)
- Computer played 3 blocks of 200 trials:
  - No Bias: uniform choice
  - Moderate Bias: 50% rock
  - Strong Bias: 80% paper

In the strong condition, HC and LBD patients noticed the strong bias in the computer play fairly quickly. However, RBD patients' ability to notice this bias is impaired (Danckert et al., 2011).

## The Computational Model: ELPH

- ELPH consists of two main compartments (Jensen et al., 2005):
  - Short Term Memory (STM): consisting of most recent temporally ordered observations.
  - Hypothesis Space (HS): consisting of individual hypotheses.



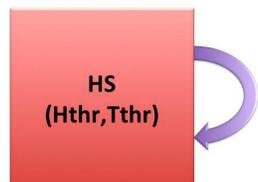
### Prediction function:

- Predicts the next observation based on current content of the STM and the HS.
- Lag value determines the length of STM.

### Updating function:

- Updates the HS based on new observation.
- D value determines how far in the past ELPH can remember.

### Third Step

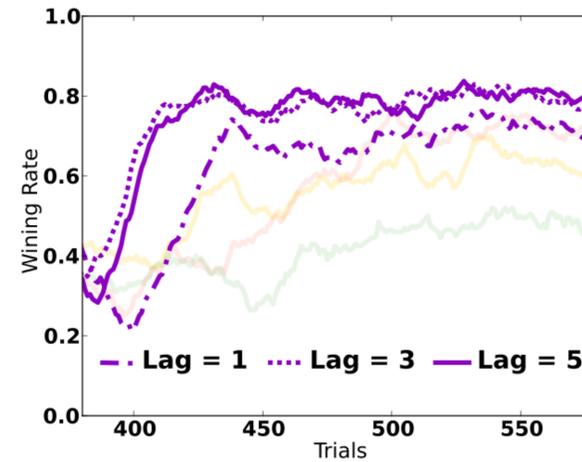


### Pruning function:

- Deletes some hypotheses based on:
  - Hthr value, determines the Entropy threshold for deciding to keep or delete a hypothesis.
  - Tthr value, determines the upper number of hypotheses ELPH can remember in each trial.

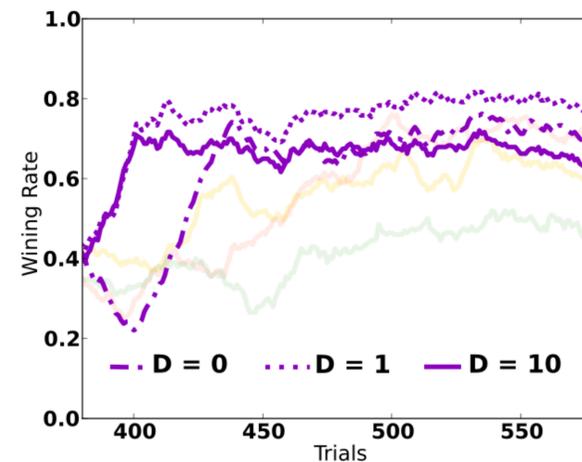
## RBD Impairment Is Not Due to STM

- Lag = n means ELPH is looking for a relation between n+1 successive observations.



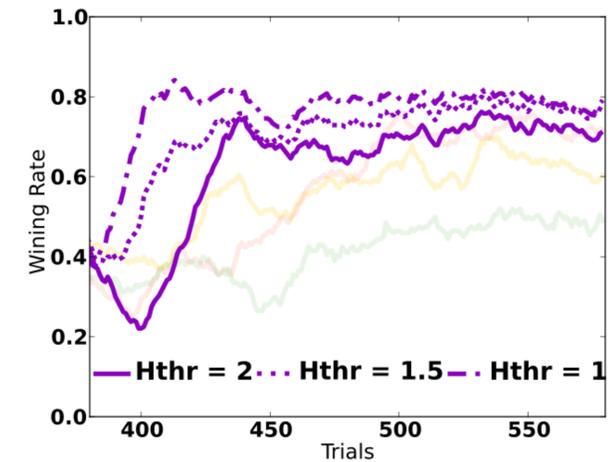
## RBD Impairment Is Not Due To Forgetting Observations

- The larger the D value, the less possibility for ELPH to remember its previous observations.



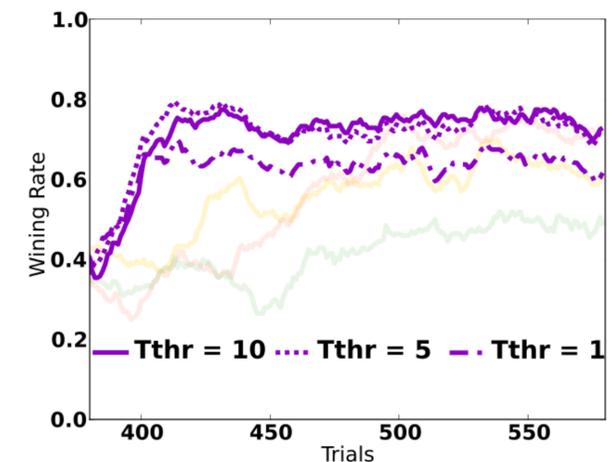
## RBD Impairment Is Not Due To Hypothesis Quality

- The lower Hthr, the more informative a hypothesis has to be to be retained in the HS.



## RBD Impairment Is Not Due To Forgetting Hypotheses

- The smaller the Tthr value, the less the capacity for HS to keep hypotheses.



## Conclusion and Future Direction

- There is no value for any of these parameters that makes ELPH play like our participants in terms of (1) speed of learning (2) average winning rate.
- ELPH not only always outperforms RBD patients, but also HCs. It seems that ELPH's results most closely resemble the results of LBD patients. However even compared to LBDs, ELPH is faster in learning.
- What is ELPH missing that makes it unable to replicate our participants' result? What is impaired in LBDs that make them (1) behave different from others and (2) similarly to ELPH?