EVENT SCHEMAS: LEARNING AND USE IN HUMANS AND RECURRENT NETWORKS

Andre Beukers, Qihong Lu, Cathy Chen, Christopher Baldassano, Uri Hasson, Kenneth Norman

PRINCETON Neuroscience INSTITUTE

Schemas

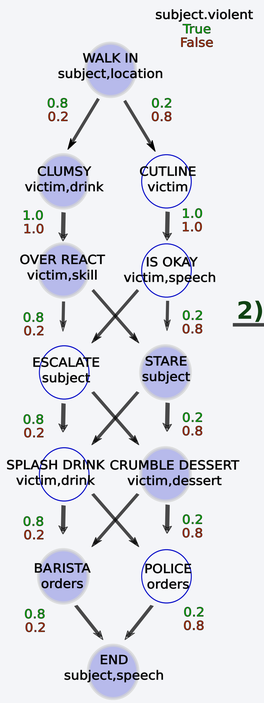
* are the scaffolding of memory
* constructed from multiple episodes
* afford generalization
* support encoding
* how are they learned and used?

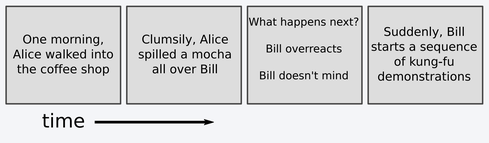
Approach

* algorithmically generate narratives with:
  - long range probabilistic dependencies
  - filler dependent transition

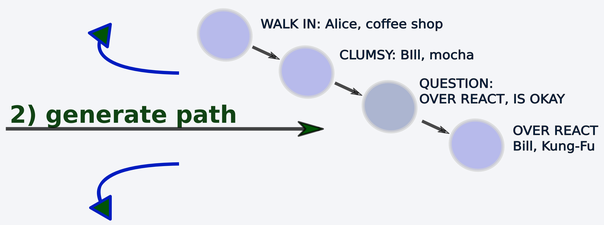
1) sample fillers

fix probabilities

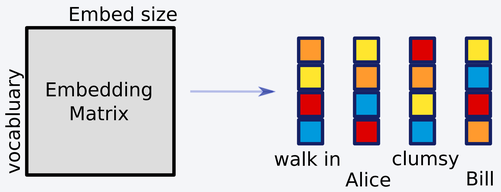




3a) encode human task



3b) encode network task



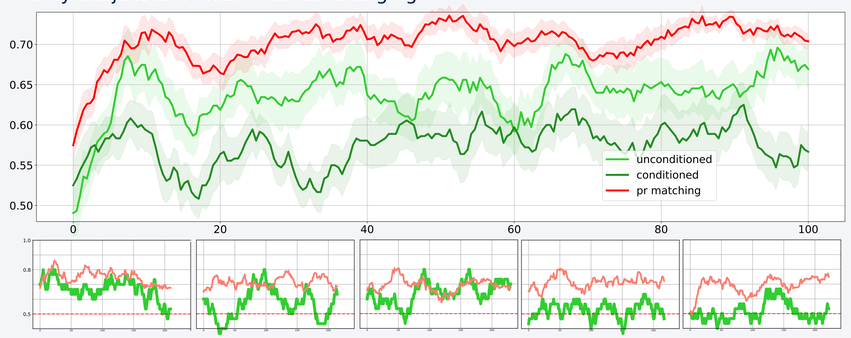
Humans

stop and ask 2AFC. what happens next?

all experiments on mturk. n=25 above catch question thresh. chance is 50%

is learning possible in our task?

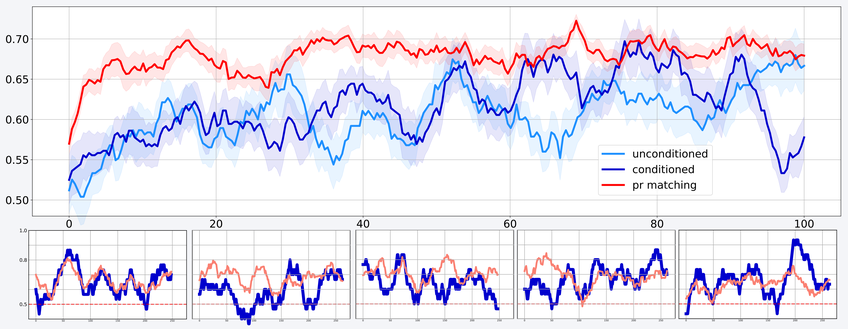
- only subject and victim names changing



- subjects approached probability matching performance on unconditioned transitions more so than on conditioned transitions.

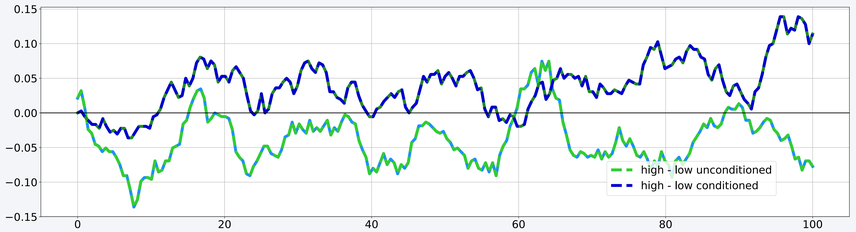
high filler complexity

4096 possible different combinations of fillers



- learning is still possible in high filler complexity

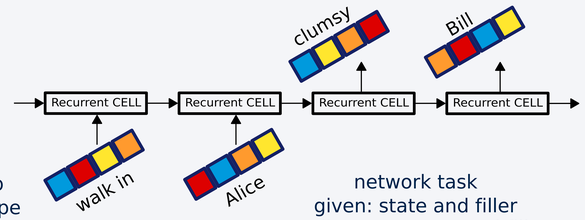
does surface complexity help or hinder learning?



- surface complexity helps on conditioned transitions but hinders on unconditioned transitions. note however: does not survive bonferoni correction.

Networks

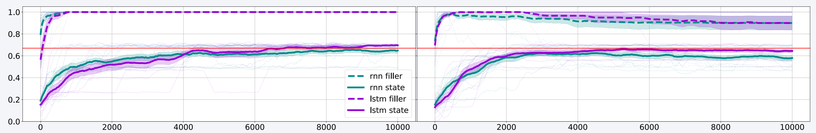
RNN vs LSTM



all experiments on laptop
n=10 of each network type
chance is 0.05%

network task
given: state and filler
predict: next state and filler

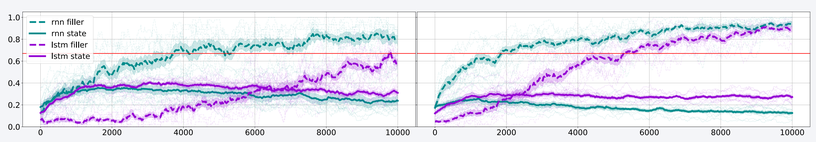
Unconditioned **Conditioned**



- network performance appears to probability match on next state questions and scored close to perfect on filler questions. note however these results are tentative and still being explored.

Future directions

Unconditioned **Conditioned**



- generalization task: filler vectors randomized.
- randomizing compromises probability matching behavior.
- networks at chance in conditioned transitions where filler information is required for next state questions.
- began investigating the impact of different learning regimes: blocked versus interleaved learning, and curriculum learning. how do these influence learning dynamics, task solutions and latent representations?

Take home

* validation of new task for studying schemas
* naturalistic complexity might help learning
* different mnemonic architectures have different learning dynamics and task solutions

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