EVENT SCHEMAS: LEARNING AND USE IN HUMANS AND RECURRENT NETWORKS

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

Schemas

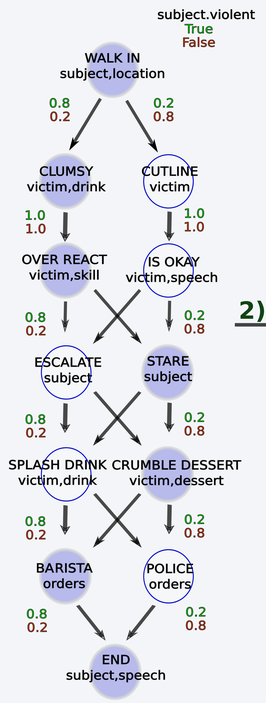
* are the scaffolding of memory
* constructed from multiple episodes
* afford generalization
* support encoding
* how are they learned and used?

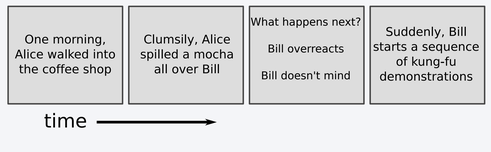
Approach

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

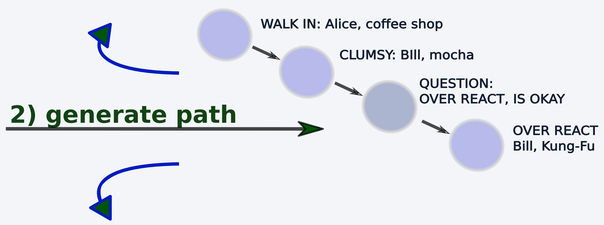
1) sample fillers

fix probabilities

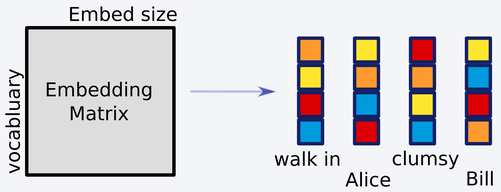




3a) encode human task



3b) encode network task



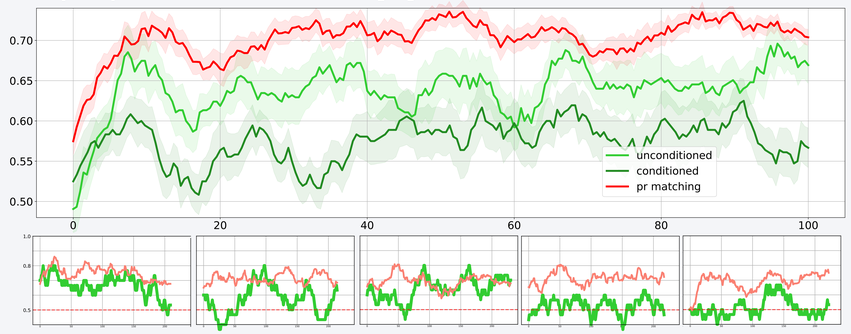
Humans

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?

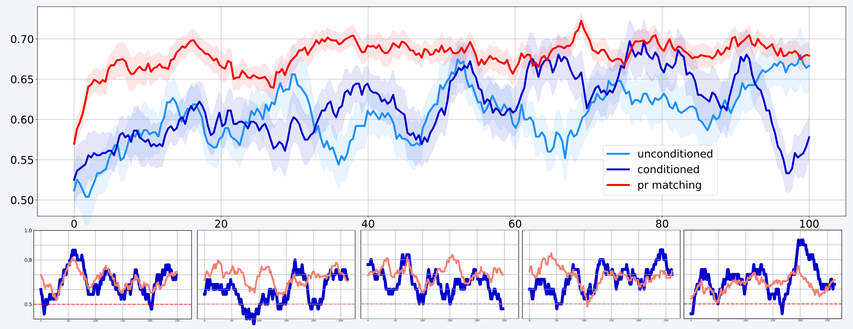
- only subject and victim names changing



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

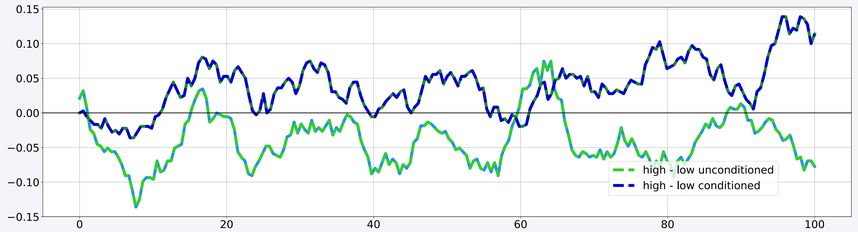
high filler complexity

4096 possible different combinations of fillers



- learning is still possible in high filler complexity

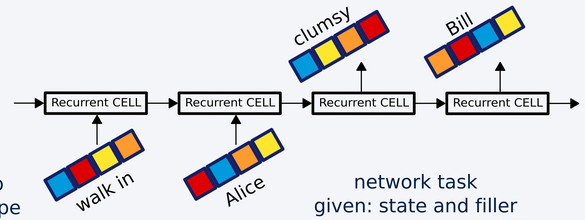
does surface complexity help or hinder learning?



- surface complexity helps on conditioned transitions but hinders on unconditioned transitions

Networks

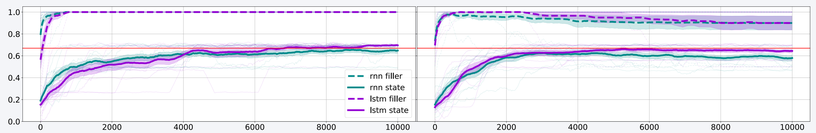
RNN vs LSTM



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

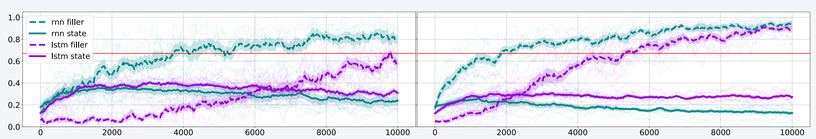
Unconditioned **Conditioned**



- network performance mirrors human performance. both networks probability matched on next state questions and scored close to perfect on filler questions

Future directions

Unconditioned **Conditioned**



- generalization task: filler vectors randomized.
- randomizing inhibits 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?

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Take home

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

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