Background: there is ample evidence that humans leverage the statistics of sequential stimuli to predict upcoming sequences. However, most previous work in the domain of temporal statistical learning has used artificial grammar stimuli. Instead, we have built an engine that generates narratives from probabilistic graphs. Stories generated from different graphs have different narratives, each path along a graph is an instance of a story, each node along this path is a state in the story, and edges define legal state transitions. This allows us to generate many story instances, which differ superficially but share common underlying narrative structure.

Question: Since our paradigm is unprecedented, the goal of this first experiment will be to cast a wide net and investigate (i) whether we can observe the usual statistical learning effects using these stimuli (ii) how difficult is learning; that is, we hope to estimate the learning rate. After these are known, the next steps will involve manipulating the learning regime in different ways to investigate how schemas are built, refined and used.

Design: 10 locally recruited subjects will be presented with 5 blocks of stories, each block containing 10 stories from two different graphs (20 stories per block). Stories will be presented a sentence at a time in black font against a white background, reading will be self-paced. After the last sentence of a given story is presented, a black screen will come up for 3 seconds before the next story begins.

Crucially, upon pressing the button to receive the next sentence, with a certain probability, the subject will instead be confronted with a question that asks them to predict what will come next in the narrative. At any given point of the narrative, there will be more than one possible question that could be asked. Therefore if a question is to be asked, one from the set of possible questions will be randomly sampled. On the question screen, will be a slider with two possible future states of the narrative. Subjects will be asked to predict which of the two possible states will occur next.

By recording their response on a continuous slider, we get an estimate of the subject’s estimate of the transition probabilities. We can compare these responses to the ground truth graph that generated the story, and by comparing early versus late trials we can assess (i) whether or not subject’s estimated transition probabilities converged to the graph’s probability structure, and (ii) how many trials it took for learning to occur.