In this article, we had two main aims, one theoretical and one empirical. Our theoretical aim was to attempt to characterize performance on a continuous-report source memory task using a mathematical model of the decision process, the circular diffusion model, to ascertain whether it could predict the distributions of decision outcomes and RT from such a task. In applying the model to this kind of task, we sought to ascertain whether the conclusions of Harlow and Donaldson (2013), which were based on the distributions of decision outcomes only, would continue to hold when both outcomes and RTs were taken into account. Our empirical aim was to ascertain whether Harlow and Donaldson’s conclusion that source memory is thresholded would continue to hold for memory condition on item recognition.

Regarding our empirical aim, we found that source accuracy for unrecognized items was uniform across all participants, which suggests that there was no source memory for trials in which recognition failed. Even with these trials excluded, a heavy-tailed pattern was present in most participants’ source responses. The simple mixture model, which incorporates a uniform distribution of response error on a proportion of trials, captured this heavy-tailed property of the data well.

Regarding our theoretical aim, the circular diffusion model was able to predict both performance and RT in the source memory task. Comparison of the continuous, threshold and hybrid variants of the circular diffusion model shows a preference for the models which allow for a mixture of a positive drift and a zero-drift process, namely the threshold and hybrid models. Across-trial drift rate variability is not sufficient to fit the tails in the distribution of response error, and in comparing the threshold and hybrid models, the addition of drift rate variability in the latter does not improve the fit of the model to data. The heavy tails instead appear to be a product of no information being available on a proportion of trials. RT data corroborates this conclusion, as slow error pattern was absent in the joint distribution of RT and response accuracy, which would be predicted by the continuous model that relies on trial-to-trial drift rate variability. As this pattern of response is present even when recognition is successful, it can be inferred that the no-information state is not simply due to a failure to attempt source memory retrieval, as in the Hautus et al. (2008) model.

With the generalized von Mises model, we allow for non-linear scaling of source location stimuli to the representation of this information which serves as the phase angle component of drift in the evidence accumulation process. The earlier comparison of circular diffusion models suggests that a threshold underlies performance in source memory tasks. The generalized von Mises model arrives at a similar conclusion through an entirely different parameterization of across-trial variability.

Some qualifications must be made when drawing conclusions from this study. Firstly, the sequential presentation of item and source information may constitute a methodological bias towards the appearance of discrete failures as the temporal separation of the two parts increases the difficulty of binding the item to its supposedly associated source. The current modelling exercise is not able to distinguish between errors arising from such a failure and errors due to a retrieval threshold. The original motivation for presenting item and source information in this manner was to replicate the Harlow and Donaldson (2013) paradigm, in which these components were separated to prevent *unitized familiarity*, meaning that unitization of source and item might allow participants to use familiarity to complete the task, making it “more difficult to isolate a recollection threshold”. This methodology assumes a Yonelinas (1999) dual-process framework, and potentially biases results to reflect the supposed recollection threshold it was meant to isolate. There is no reason to expect that source memory in a natural environment would operate under these conditions, and a model of source memory should be able to characterize performance when source and item information is presented simultaneously. An illuminative future experiment might be to modify the experimental paradigm so that source and item are presented simultaneously in this manner, to investigate if the models presented in this article perform similarly under simultaneous presentation.

Secondly, overall performance in the source memory task was poor. Even barring the two participants whose responses did not deviate from uniformity, several participants exhibited a high rate of guessing, although their responses were not strictly uniform according to the Rayleigh test. If only a proportion of responses in the task were driven by source information, it is possible that our conclusions made on the basis of that proportion could change if overall performance was enhanced. This could be done by making the source memory task easier, perhaps with additional correlated source information or shorter study lists, to see if the present findings still hold with higher overall source accuracy.

**Implications for Models of Source Memory**

The present data corroborates the Harlow and Donaldson (2013) finding that performance on the source memory task is comprised of two components: informed responses made in an information-driven state, and guesses made in a no-information state. This corroboration comes with additional support from source response data conditioned on recognition, and a decision model that is able to account for newly collected RT data in addition to source accuracy data. Having determined that participants undertaking this task guess, it is not yet clear why these guesses arise.

SAM model, recall works by given a cue and you use to sample memories, memory strengths have to exceed a certain threshold to be output. Underlying strength is continuous. Location on circle is retrieved, with continuous strength,

**Application of the Circular Diffusion Model**