# General Background

* + 1. *Source Memory*
* Some general background on source memory and why it is important in the broader study of episodic memory

An early demonstration of a source memory task is Mandler’s (1980) butcher-on-the-bus example.

* Recollection and familiarity as two parts of a dual-process system of episodic memory
* Remember vs knowing, broader question of how many memory systems there are, why we might expect there to be multiple systems (Tulving, 1985)

Source memory tasks are interesting because they provide a way to investigate how memories are bound to contexts, and how that context is retrieved.

## 1.1.2 Continuous and Threshold models of Source Memory

Retrieval from source memory can be described as a single process with variable precision. Threshold models assume that retrieval from memory is “all or none” or “some or none”. In either instance, the assumption that retrieval of information from memory can fail entirely necessitates a secondary cognitive process by which responses are generated in the absence of memory-driven information.

* Need to be careful with language when introducing dual process recollection/familiarity, so as not to confuse it with memory and guessing processes implied by a source memory threshold.

## Evidence from prior literature

The matter of whether source memory is governed by a single or by multiple cognitive processes is one that has further implications for existing competing frameworks by which episodic memory as a whole is understood. For example, in the dual-process framework (Yonelinas), source memory understood as a pure recollection process and says source memory should be thresholded.

* Summarise ROCs, and the distinctive qualities of source ROCs. Linear ROCs support a dual process, curvilinear support a single process model

Contrast with models that say recollection is a continuous rather than a discrete process

* Source-monitoring framework (Johnson et al., 1993; Qin et al., 2001)
* Banks (2000), uncorrelated bivariate equal-variance normal distributions
* DeCarlo (2003), correlated distributions (high recognition means high source accuracy too), with linear boundaries
* Hautus et al., 2008, like DeCarlo but with nonlinear boundaries captures joint recognition and source data without separate recollection process by partitioning item strength/source strength 2D space. Increasingly better fit to item and source ROCs across these three models.
* Slotnick and Dodson (2005), Collapsing across levels of confidence produces averaging artefacts that makes curvilinear source ROCs appear linear
* Rotello and Zeng (2008), recognition judgements faster than source judgements, but this can be explained by different distributions of confidence levels across the two tasks. Evidence from response time data.
* Dube, Starns, Rotello, and Ratcliff (2012), recognition memory

Sherman et al. (2003), Onyper et al. (2010): evidence for some-or-none recollection. Recollection fails for some items, but produces a continuous distribution of memory strengths when it succeeds. Support for a threshold, foreshadow hybrid model in Study 1.

Summary: increasingly sophisticated and mixed evidence looking at ROCs, outcomes from two-choice task and confidence ratings. The two types of models should make different predictions in a continuous-outcome task.

## Continuous-outcome tasks (this may not need to be its own section, really just want to springboard off Harlow and Donaldson)

## How does the whole story around continuous report source memory tasks change when we account for RTs?

* 1. **Modelling decision-making and response time data**

In this section I will give an overview of the theoretical framework behind the models developed through the thesis.

## 1.2.1 Making decisions about memories

When we measure performance in a memory task, we ask participants to undertake some action based on what they can retrieve from memory, and assess the fidelity of memory by evaluating that action. The process that turns information into action is decision making, and cannot be overlooked. We cannot make inferences about the function of memory based on observable actions without also understanding the contribution of the intervening decision making process.

Response times allow us to investigate not only what the outcome of a cognitive process is, but also the time it takes to arrive at that outcome. Both shed light on how that process operates.

* E.g., Ratcliff and Starns (2009) RTCON model, having a decision mechanism that takes RTs into account changes how recognition memory ROCs are interpreted.

## 1.2.2 Sequential sampling models

* Perceptual decisions describe the process by which sensory information is used to generate a response to stimuli.
* Noisy accumulation of evidence over time until a criterion is reached

## 1.2.3 Diffusion Models

* Describe standard (2-choice) diffusion model

## 1.2.4 Circular diffusion model

* The standard diffusion model for a binary set of decision outcomes can be extended to tasks with continuous outcomes by …
* Link to Study 1

## 1.2.5 Mixture and Race models

* When we assume that multiple processes contribute to a response, we also need to consider how those processes are combined.
* Guessing and intrusions as processes that get mixed with memory (Study 2).
* Set up the idea of racing diffusion models for memory, intrusion, and guesses (Study 4).

# Intrusions between items in source memory

The second research question investigates how memory for other trials in a list of items impacts the pattern of responses. To investigate this, I extend the model introduced in Study 1 by incorporating a systematic model of intrusions between items…

Binding errors, swap errors, intrusions.

*1.3.1* *Models of intrusions in visual working memory*

* Bays, Catalao and Husain (2009), three component mixture model
* Oberauer and Lin (2017), interference model, non-targets intrude based on proximity to target in context space

## 1.3.2 Factors that influence the likelihood of intrusions

* Popov, So, and Reder (In press), not all non-targets equally likely to intrude, sequential order effects in the study list.
* Temporal proximity in study list, spatial proximity in display, semantic similarity, orthographic similarity
* Do unrecognized items intrude?

## 1.3.2 Preview of Study 2

Study 2 introduces an alternative process by which error responses are generated. Instead of simply guessing at random, errors might be generated when a response is driven by information, but that information is associated with the wrong item among the set of items stored in memory. The process is characterized as a probabilistic mixture of memory, intrusion, and guessing processes.

* 1. **How does stronger encoding affect source responding?**
  2. **How do different types of responses compete over time?**

**Overview of Studies**

Study 1 introduces the circular diffusion model and applies it to a continuous outcome source memory task to model response accuracy and response time data. We conduct a model comparison to evaluate three different variants of the circular diffusion model that express continuous, thresholded, and hybrid processes. The conclusion of the model comparison exercise suggested that a single, continuous process was insufficient to produce the joint accuracy and response time data observed and that a guessing process was necessary. There was no clear advantage offered by the flexibility of the “some or none” hybrid model, which lead us to prefer the thresholded “all or none” model by virtue of its parsimony.

Study 3

Study 4 addresses one of the fundamental ambiguities of the model presented in Study 2 by replacing the mixture of probabilities with a race model that describes the process occurring over time by which one type of response occurs instead of the other alternatives.

Taken together, this series of studies present an evolving understanding of how memory for source information is retrieved and subsequently used in the process that generates a response to the task.