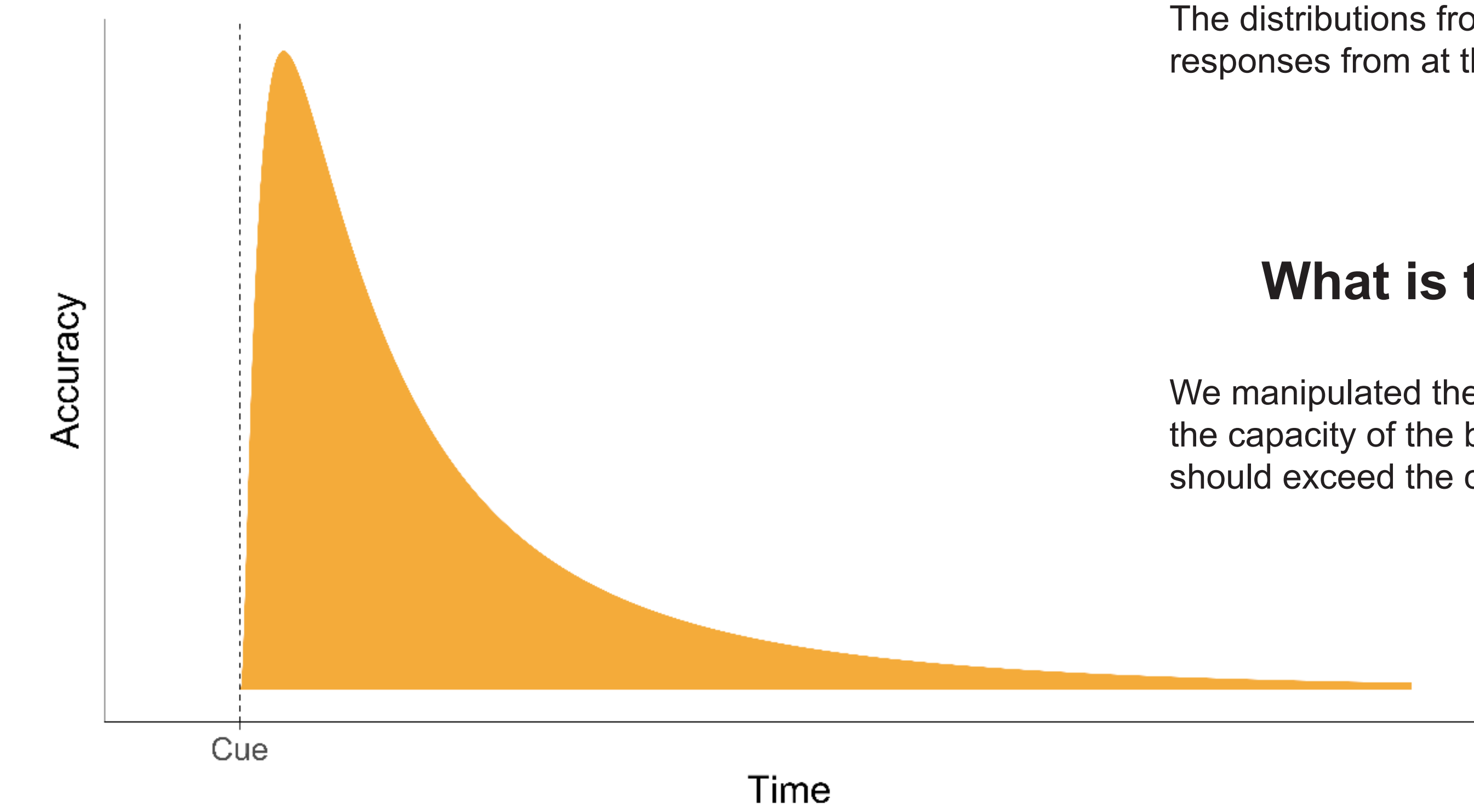


Buffering or an attention shift?

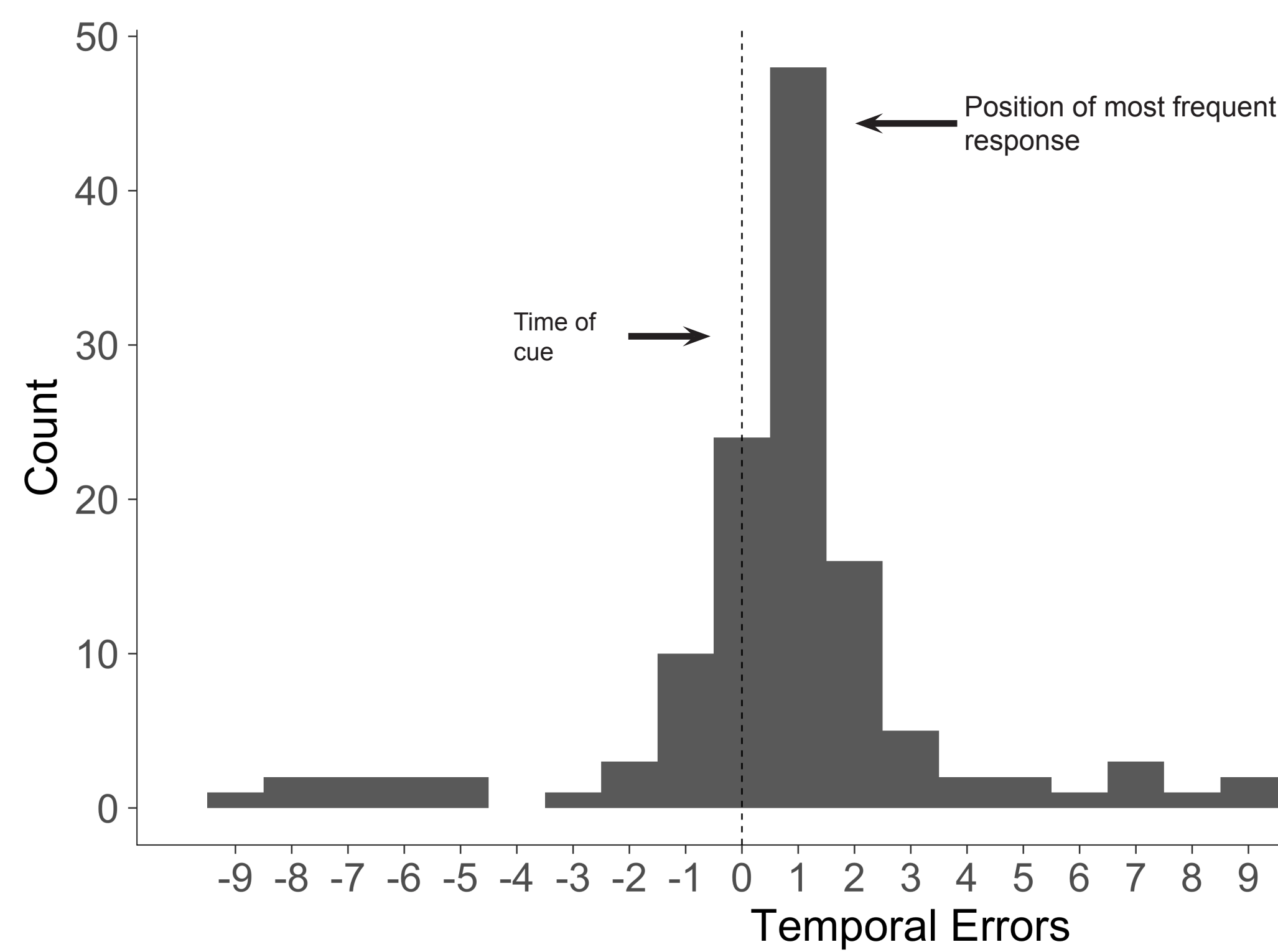
Spatial shifts of attention in response to informative exogenous at-tention cues elicit a skewed pattern of accuracy, as depicted below.



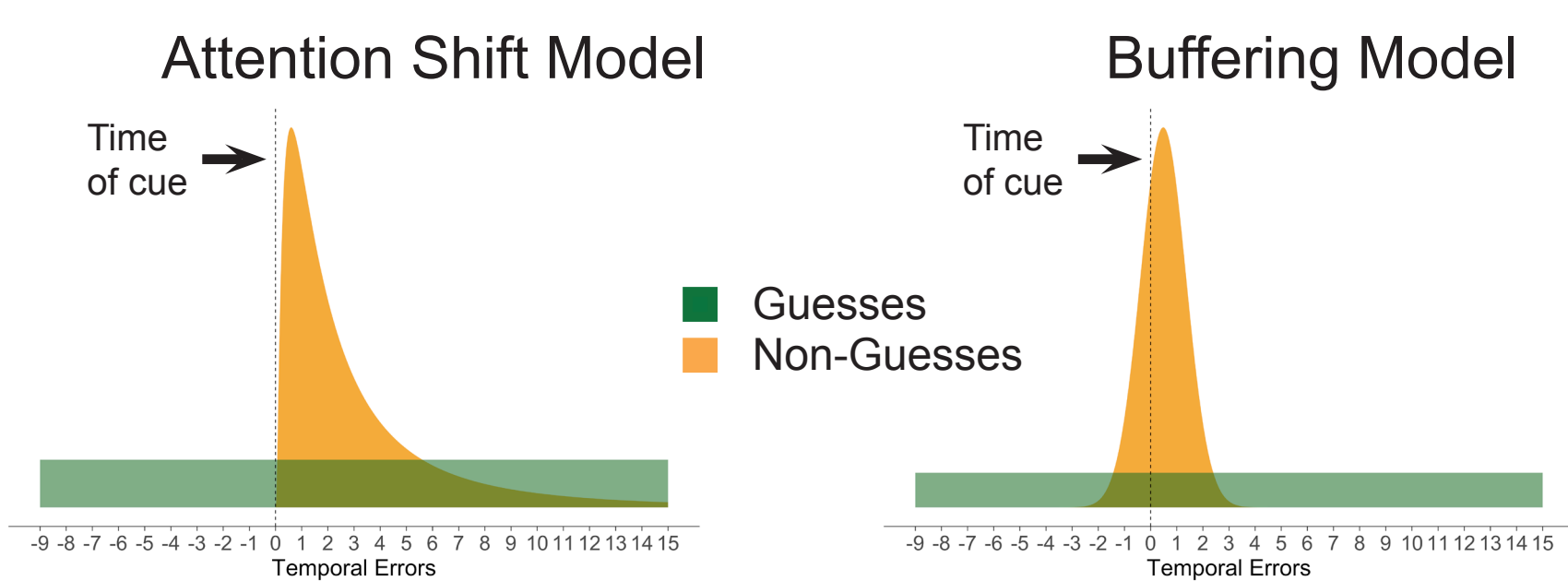
Goodbourn and Holcombe (2015) argued that in dual-stream RSVP, stimuli are **buffered and bound**, rather than selected after an attention shift.

In their study, participants responded with the cued letter from one of two RSVP streams,

We might expect an attention shift in this task, but the data suggest a different pattern



The temporal distribution of errors over many trials appeared sym-metric with a peak just after the cue.



To confirm the lack of skew, we fit two mixture models to data from Goodbourn and Holcombe (2015), represented above.

Bayes factors favoured the buffering model in the majority of cases (81%), and never favoured the attention shift model

The evidence favours buffering

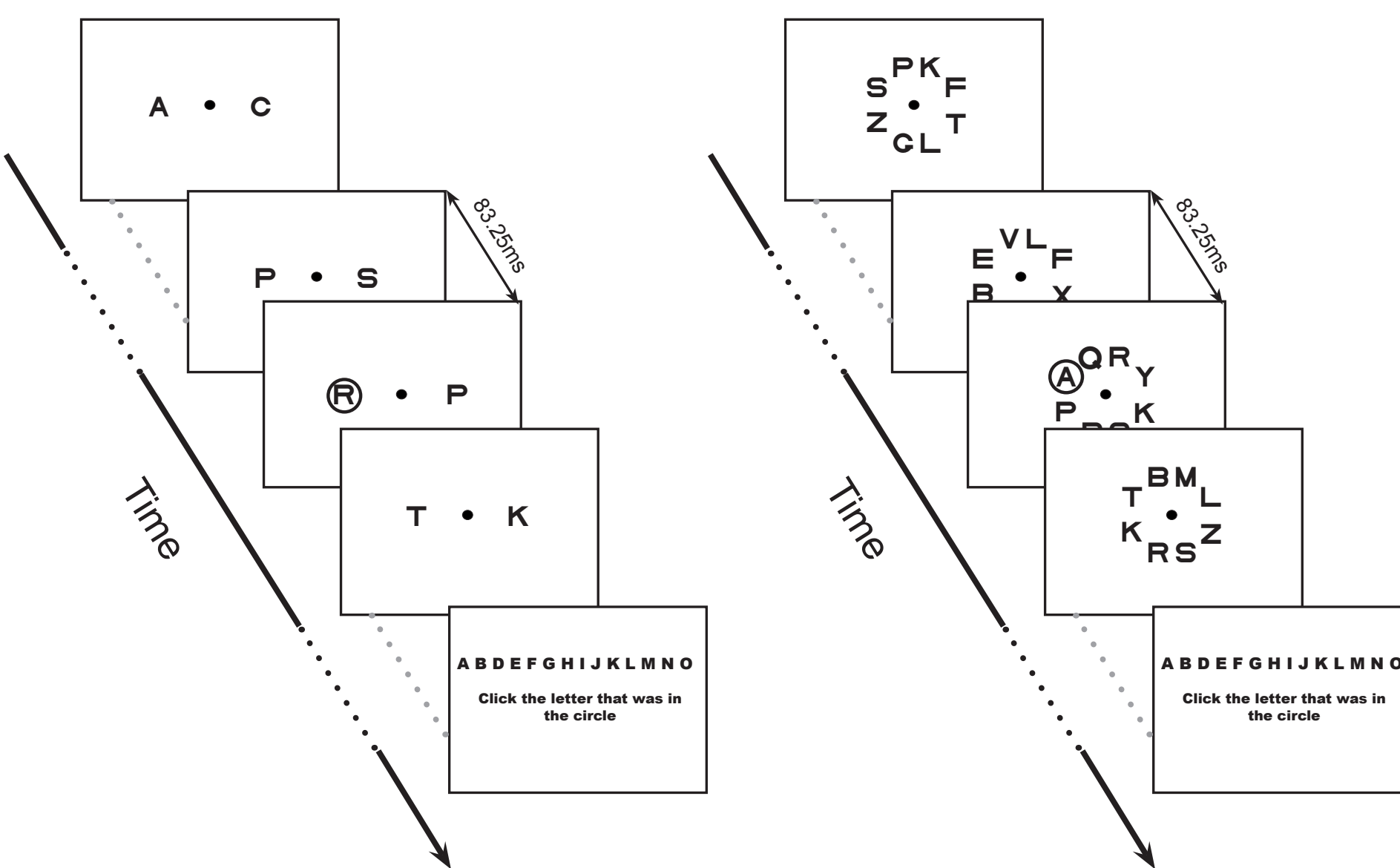
Stimuli’s representations are stored in a temporary buffer and one is bound with the representation of the cue for response.

The Bayes factors largely favour the buffering model.

The distributions from the Gaussian model include non-guessing responses from at the cue or before.

What is the capacity of the buffer?

We manipulated the number of simultaneous streams to investigate the capacity of the buffer. A large number of simultaneous streams should exceed the capacity of the buffer



Method

On each trial, participants (N=10) saw 2 or 8 simultaneous RSVP streams of .9° Sloan letters spaced around an invisible circle with a radius of 3°.

Each stream was the alphabet in a random order. SOA was 83.25ms.

At one point in the trial, a circle subtending 1° appeared around a particular stream for the duration of a letter. Participants’ task was to report the letter in the stream

Pre-registration: <https://osf.io/7hkgd/>

Materials, Data and Analysis: <http://bit.ly/BufferGit>

Analysis

We fit buffering and attention shift models to each participants’ data from each condition

We used Bayes factors to assess model fit and differences between groups.

Parameters

There are 3 parameters in the mixture model

Efficacy: The proportion of non-guesses

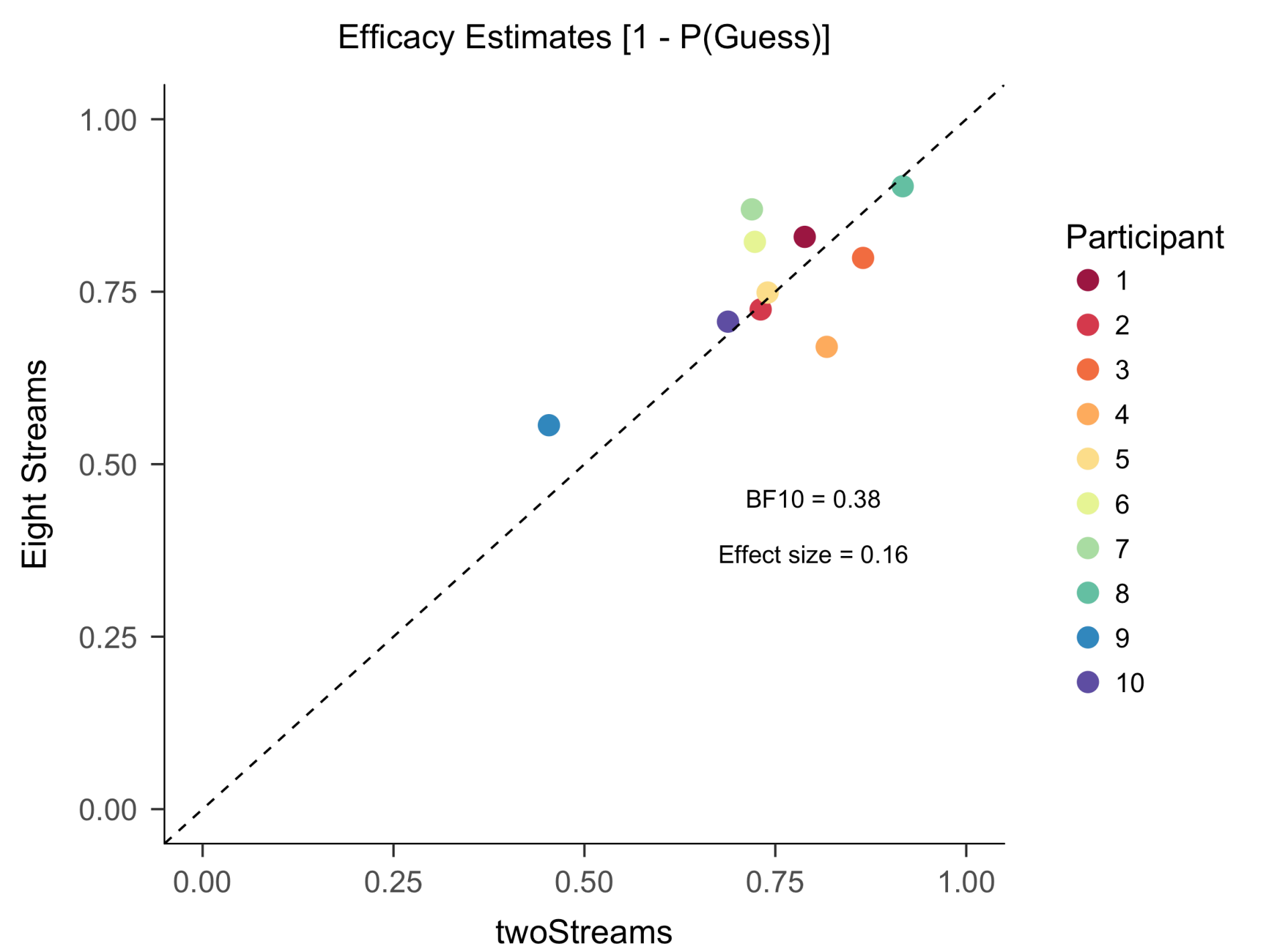
Latency (ms): The mean of the non-guessing distribution (relative to the time of the cue)

Precision (ms): The standard deviation of the non-guessing distribution.

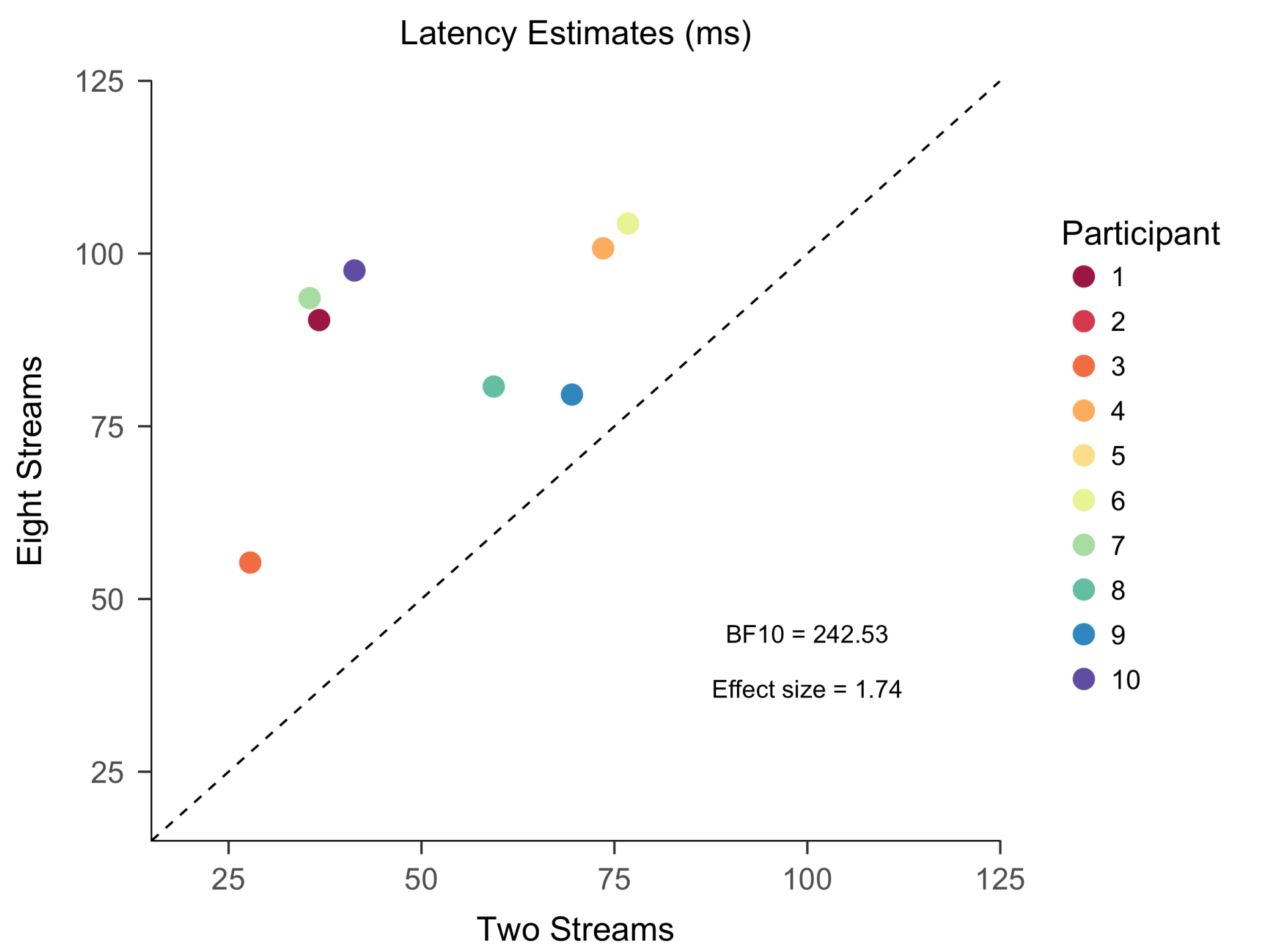
Results

The model fits always favoured the Gaussian model, regardless of condition.

Model fit BF_s ranged from 78 to 10⁴²

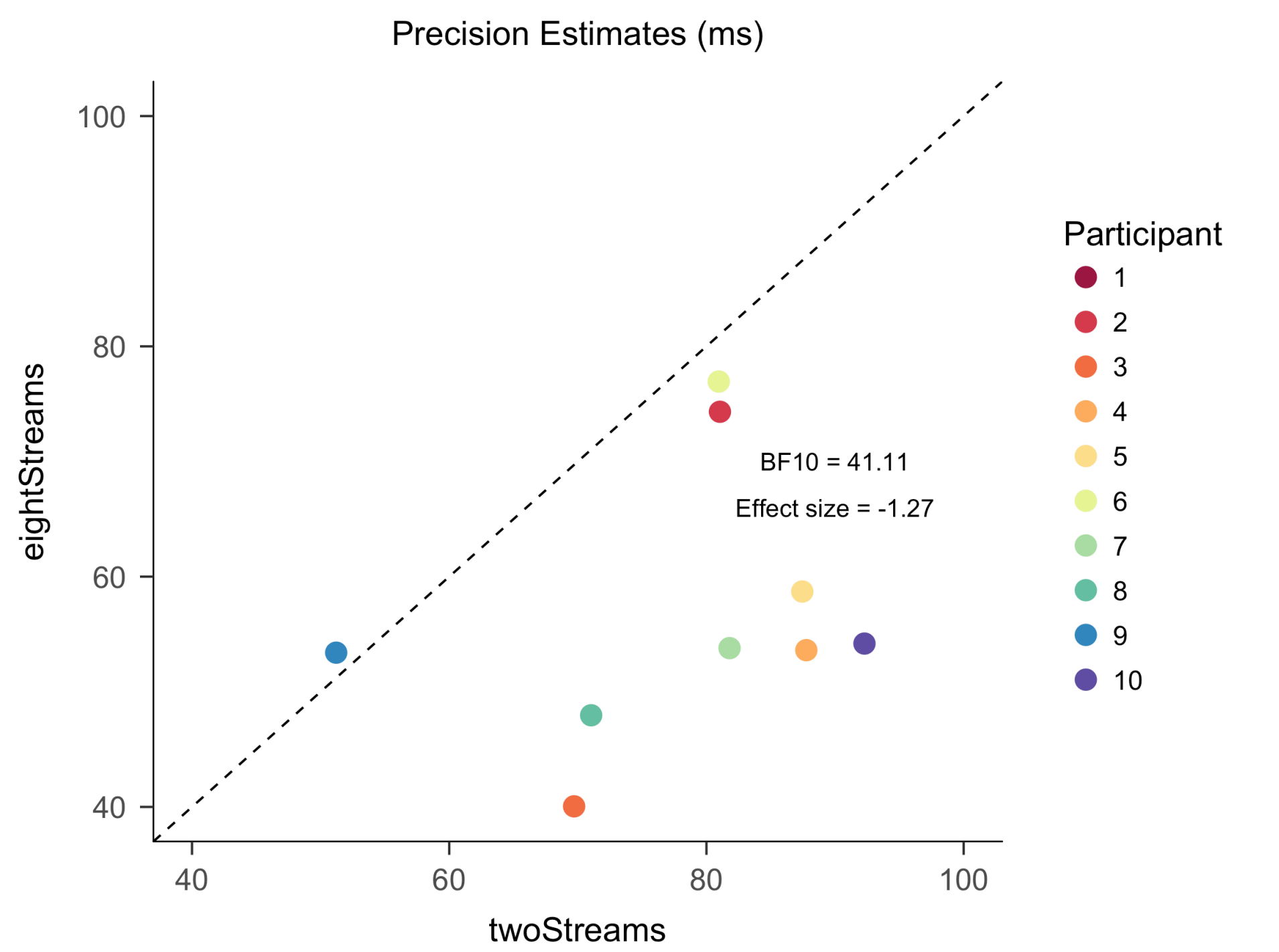


Efficacy did not differ between the conditions.



The non-guessing distribution is delayed with eight streams (M = 91 ms), relative to two streams (M = 50ms). **There is a small cost of the number of streams.**

The eight streams condition’s distribution is centred near the first item after the cue(SOA = 83.25ms)



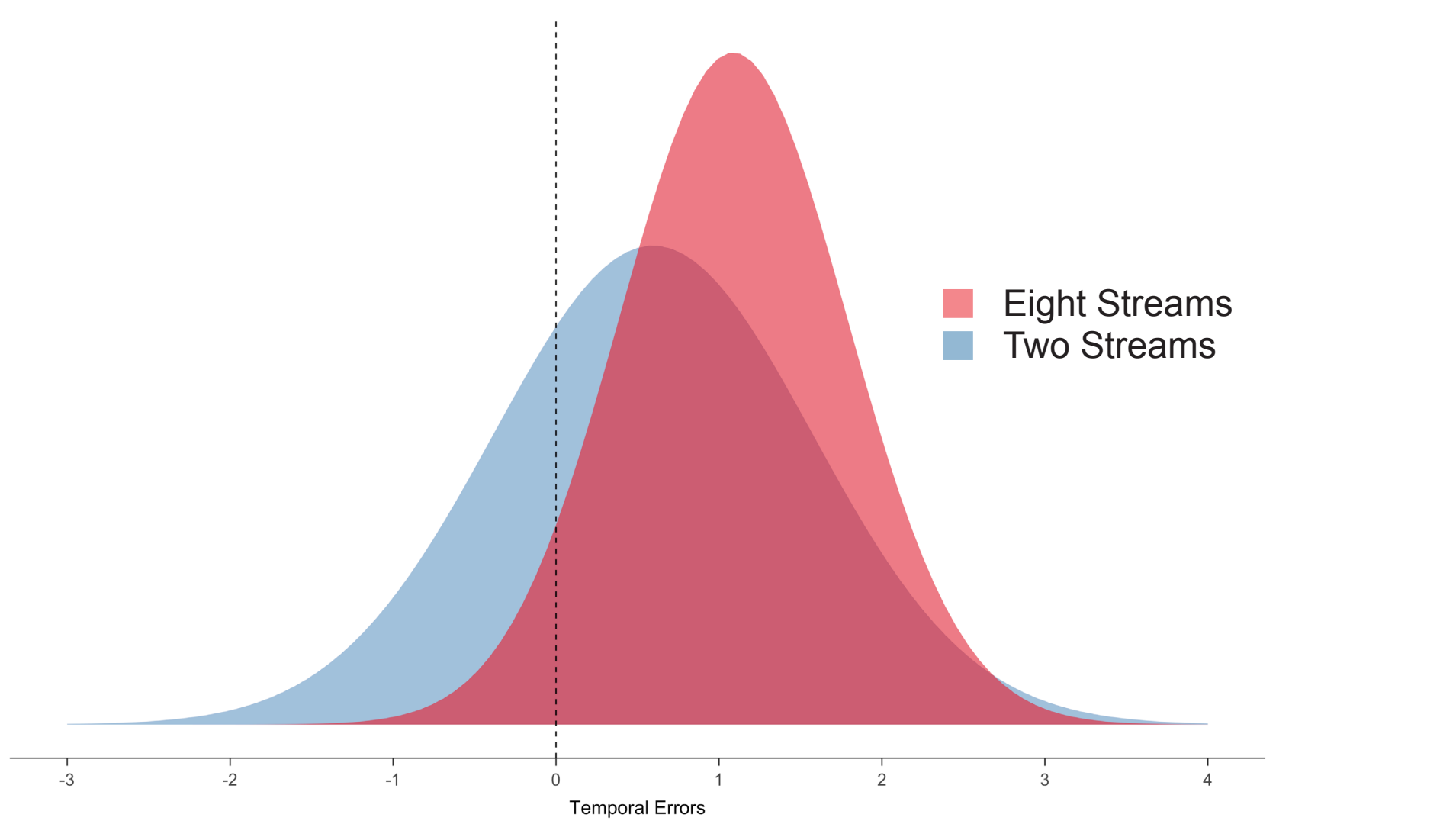
An unexpected result! The error distributions have a smaller SD in the eight streams condition (60ms vs 81ms). Attentional selection is delayed, but has less variance over time.

Conclusion

Q: What is the capacity of the buffer?

A: At least 8 items.

Selection is delayed, but still Gaussian in the eight stream condition



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