What I Like Is What I Remember: Memory Modulation in Preferential Choice

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Introduction

Try to remember the food items in your refrigerator

Now try to remember these items with the explicit goal of choosing what to eat for dinner

A large body of work has established the importance of memory for many different decisions across different contexts. The critical influence of memory has been demonstrated with:

- recognition and fluency heuristics (e.g., Gigerenzer & Goldstein, 1999)
- judgments of likelihood (Dougherty et al., 1999)
- how prior experiences inform decisions (e.g., Shohamy & Daw, 2015)
- how context cues recall of attributes (Johnson, Häubl, & Keinan, 2007)

But, how do memory processes during preferential decision making compare with memory processes that guide recall when individuals do not have to make a choice?

Our goal is to introduce a novel experimental paradigm and systematically study the differences between standard and choice-based recall.

Methods
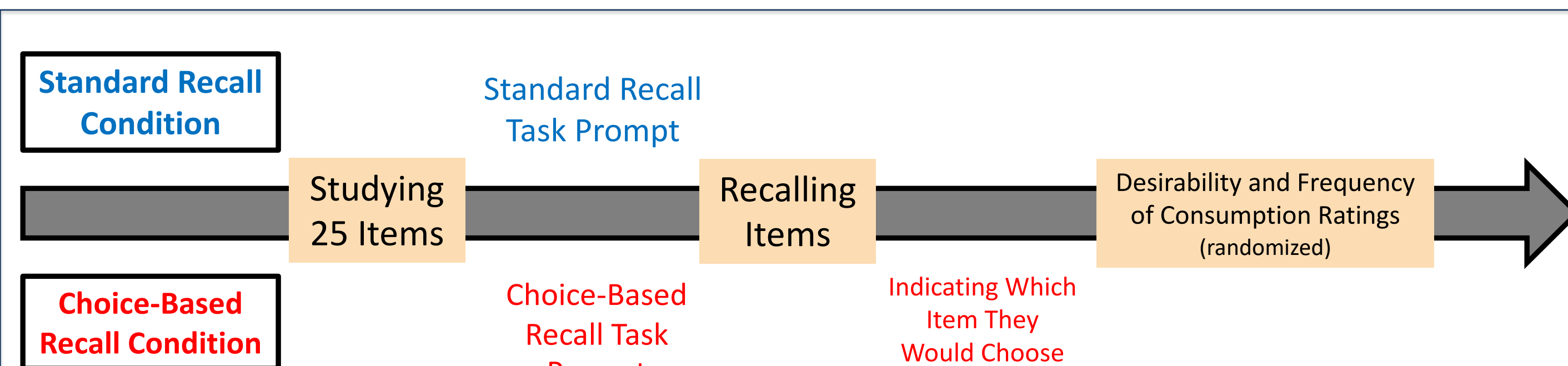
- A classical list learning paradigm

- Participants were asked to remember all of the items that come to mind (standard recall condition) or deliberate through the items with the ultimate goal of making a decision (choice-based recall condition)

- 2 parallel, pre-registered studies in two decision domains:
  Study 1: Food choices (Results reported here)
  Study 2: Gift choices (Main findings replicate, but are not shown here)

- Participants (N = 352; mean age = 33; 52% self-identified as female) in Study 1 and participants in Study 2 (N = 361; mean age = 34; 49% self-identified as female), recruited from Prolific Academic, performed the experiment online

References
Dougherty, M. R., Gettys, C. F., & Ogden, E. E. (1999). MINERVA-DM: A memory processes model for judgments of likelihood. *Psychological Review, 106*(1), 180.
Gigerenzer, G., & Goldstein, D. G. (1999). Betting on one good reason: The take the best heuristic. In *Simple heuristics that make us smart* (pp. 75-95). Oxford University Press.
Johnson, E. J., Häubl, G., & Keinan, A. (2007). Aspects of endowment: a query theory of value construction. *Journal of experimental psychology: Learning, memory, and cognition, 33*(3), 461.
Shohamy, D., & Daw, N. D. (2015). Integrating memories to guide decisions. *Current Opinion in Behavioral Sciences, 5*, 85-90.
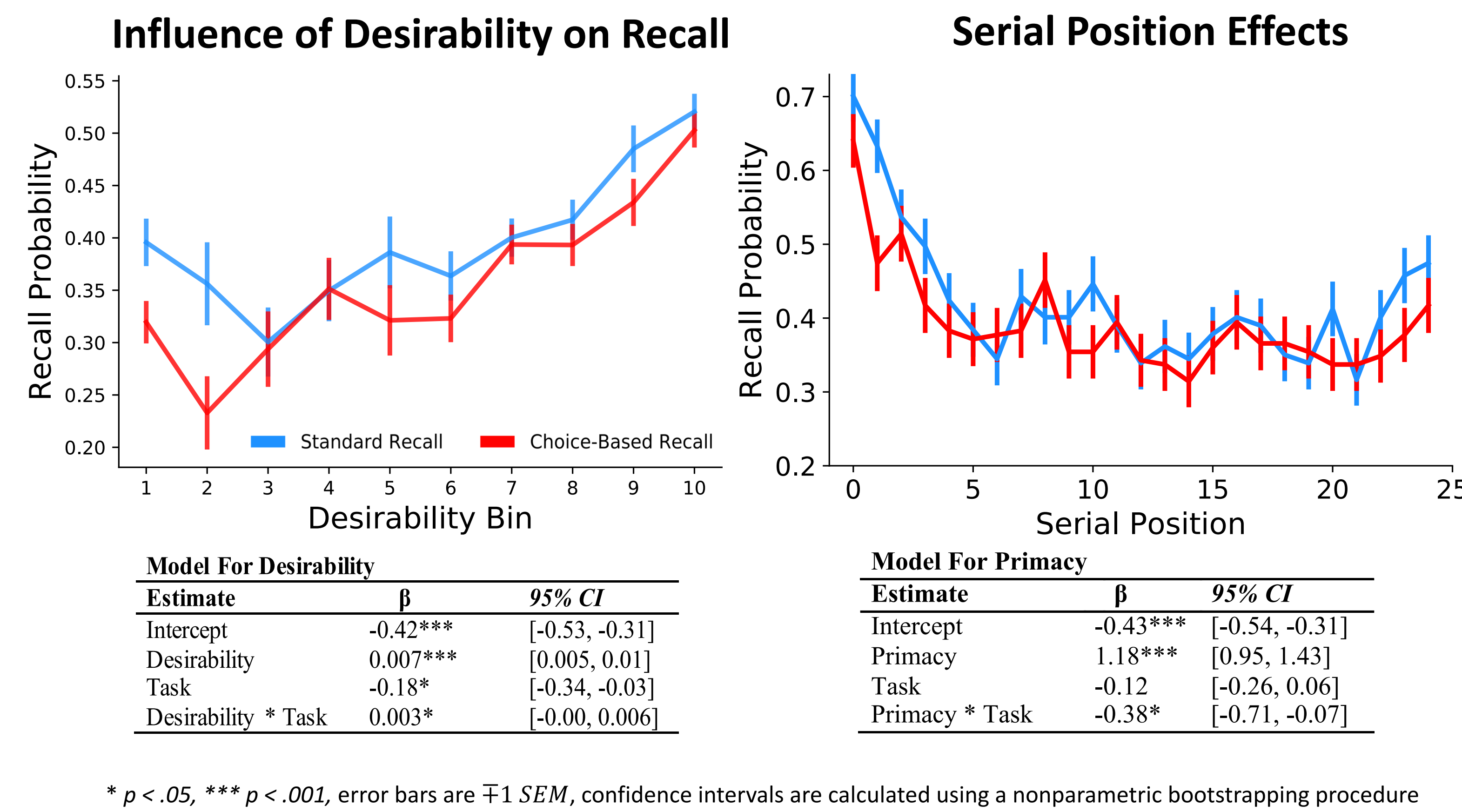
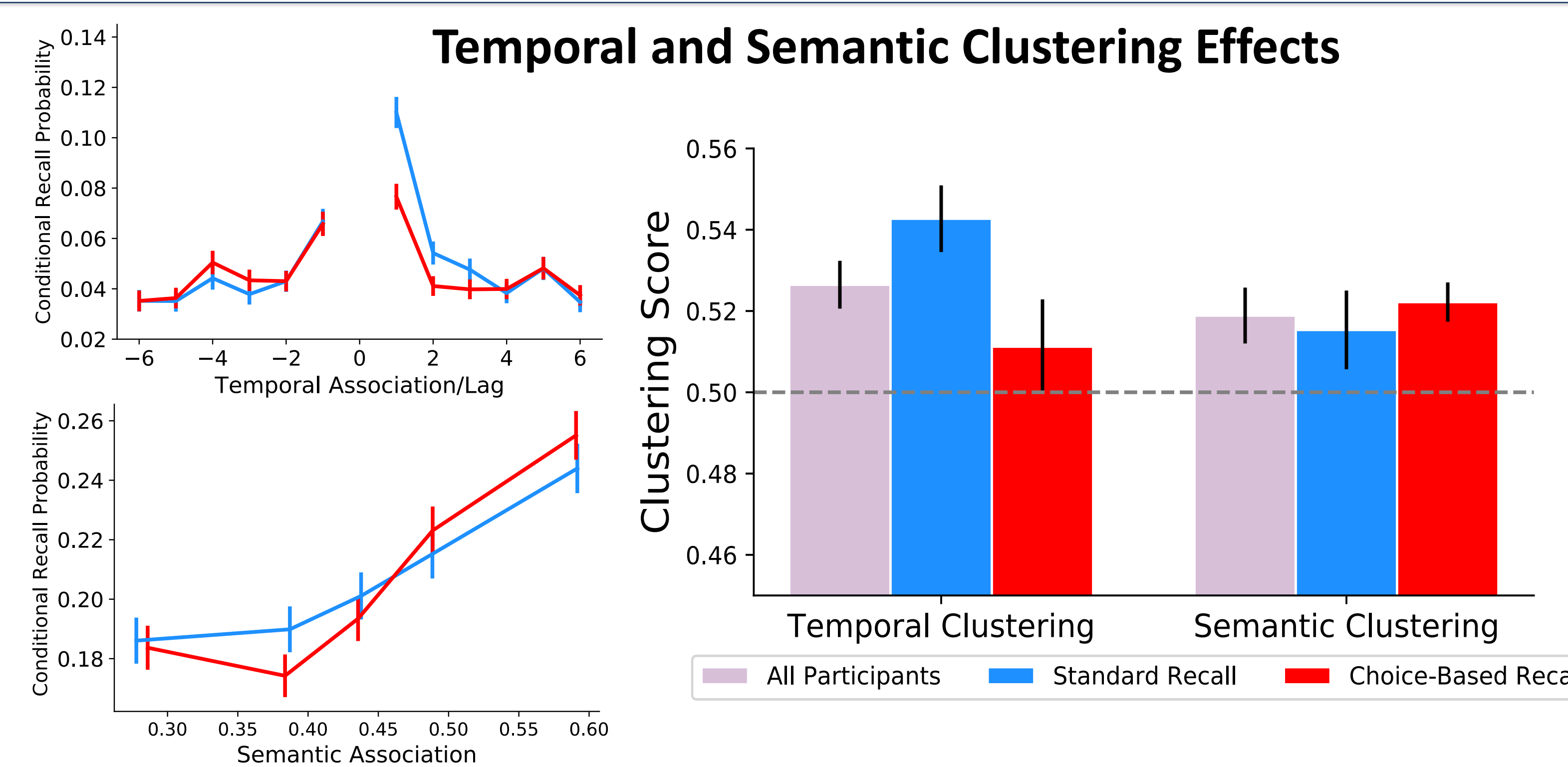Link to pre-registration and copy of our poster can be obtained from:

https://osf.io/gjeay/
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Determinants of Absolute Recall

Influence of Desirability on Recall

Serial Position Effects

Model For Desirability

Estimate	β	95% CI
Intercept	-0.42***	[-0.53, -0.31]
Desirability	0.007***	[0.005, 0.01]
Task	-0.18*	[-0.34, -0.03]
Desirability * Task	0.003*	[-0.00, 0.006]

Model For Primacy

Estimate	β	95% CI
Intercept	-0.43***	[-0.54, -0.31]
Primacy	1.18***	[0.95, 1.43]
Task	-0.12	[-0.26, 0.06]
Primacy * Task	-0.38*	[-0.71, -0.07]

$* p < .05, *** p < .001$, error bars are ∓ 1 SEM, confidence intervals are calculated using a nonparametric bootstrapping procedure

Determinants of Conditional Recall

Temporal and Semantic Clustering Effects

All Participants | Standard Recall | Choice-Based Recall

Computational Memory Model

An Example List

	Item 1	Item 2	Item 3	Item 4	...	Item 25
Presented Item	croissant	muffin	hamburger	cheeseburger	...	pizza
Desirability Rating	5	10	30	35	...	50

Desirability — Primacy — Recency

- Desirability
- Primacy
- Recency
- Semantic Association
- Temporal Association
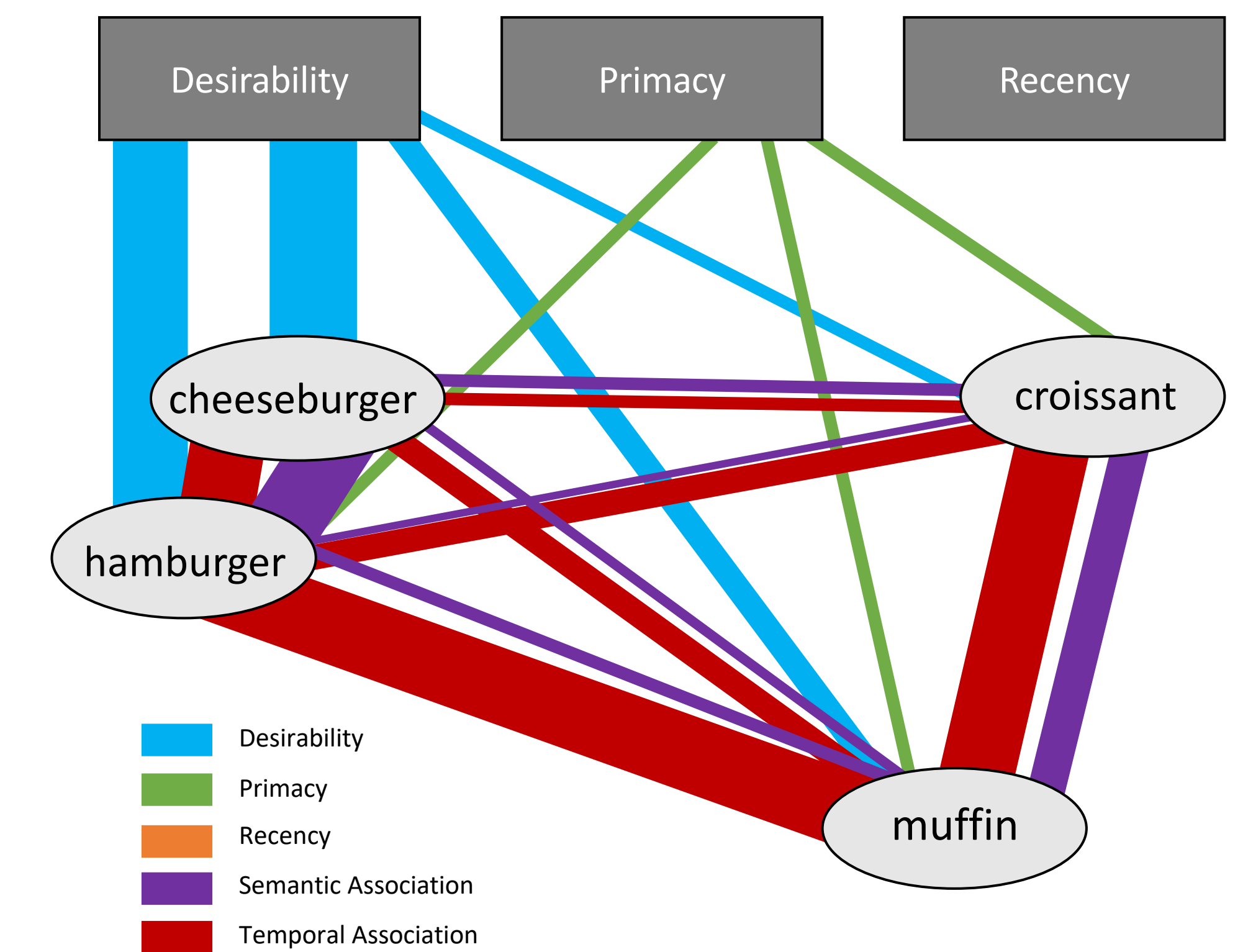
While inputs to each item node are provided by the desirability ratings, primacy and recency, temporal and semantic associations create the connections between the item nodes. Items with larger inputs have higher activation and are more likely to be recalled.

Model	-Log Likelihood	Chi-Square	P-Value
Base Model	19,945		
w/ Desirability * Task	19,941	8.17	0.004
w/ Primacy * Task	19,944	1.05	0.3
w/ Recency * Task	19,945	0.06	0.93
w/ Temporal Clustering * Task	19,938	13.25	<.001
w/ Semantic Clustering* Task	19,945	0.25	0.62

Comparisons between models with task-based interactions with the variables, and the base model without task-based interactions. The chi-square values involve log-likelihood differences between the base model and each of the remaining models, and indicate whether or not adding the task-based interaction for that variable results in superior fits.

Conclusions

- This report is the first to attempt a systematic examination of memory effects in standard recall and choice-based recall. We found evidence that traditional memory regularities such as the primacy effect, and the semantic and temporal clustering effects, persist during decision making.

- Critically, desirability is more pronounced and temporal clustering is less pronounced in choice-based recall, suggesting that preferential choice modulates memory by activating choice-relevant features of items, and diminishing the influence of other elements of memory organization, such as temporal structure.

- We look forward to future work that applies theories from both memory and decision making research to influence and improve the choices of individuals.