

Compound cueing in free recall

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Introduction

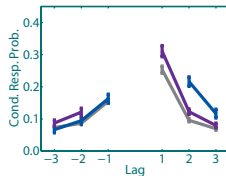
In serial recall, participants use an amalgam of previously presented items as a compound cue

We examined this phenomenon in free recall, and tested two models' predictions of the results

Experimental compound lag-CRPs

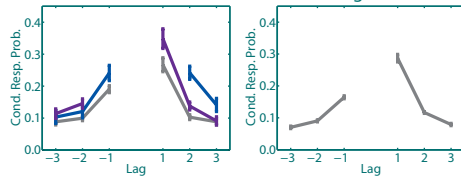
previous transition = +1:
most likely transition = +1

previous transition = -1:
current transition similar to
| previous transition | > 3



Results do not reflect rehearsal or irregular lag-CRP

Continual-distractor free recall



Conclusions

Compound lag-CRPs suggest that participants use a combination of previously recalled items as a cue

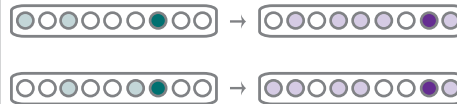
Retrieved-context models can account for these results

References

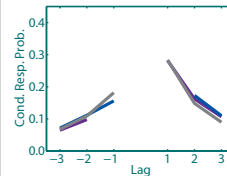
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- Polyn, S.M., Norman, K.A., Kahana, M.J. A context maintenance and retrieval model of organizational processes in free recall. *Psychological Review*, 116 (1), 129-156.
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Search of associative memory (SAM) model

Recall cue: just-recalled item and current context



Model predictions of the compound lag-CRPs



compound lag-CRPs are minimally affected by the previous transition

Model structure

- item-to-item associations formed in short-term store
 $S(i,j) = S(i,j) + f(e_1)$
 $S(j,i) = S(j,i) + f(e_2)$
 where $f(x) = x * ISI / (\# \text{ items in STS})$

- update context-item associations

$$S(i, \text{context}) = S(i, \text{context}) + f(e_3)$$

- sample items using the just-recalled item and context

$$P_s(i|r, \text{context}) = \frac{S_s(i,r)^{W_s} S(i,r)^{W_e} S(i, \text{context})^{W_c}}{\sum_{k=1}^L S_s(k,r)^{W_s} S(k,r)^{W_e} S(k, \text{context})^{W_c}}$$

- recall decision

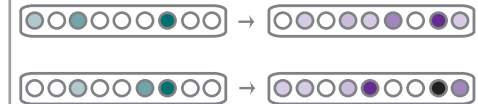
$$P_r(i|r, \text{context}) = 1 - e^{-W_s S_s(i,r) - W_e S(i,r) - W_c S(i, \text{context})}$$

- update item-to-item and context-item associations

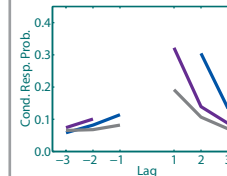
$$\begin{aligned} S(i,j) &= S(i,j) + r_1 \\ S(j,i) &= S(j,i) + r_2 \\ S(i, \text{context}) &= S(i, \text{context}) + r_3 \end{aligned}$$

Context maintenance and retrieval (CMR) model

Recall cue: current state of context



Model predictions of the compound lag-CRPs



previous transition = +1:
compound cueing effect

previous transition = -1:
no compound cueing effect

Model structure

- no direct item-to-item associations
- input to context, from studying or recalling an item
 $C_i^{\text{IN}} = M^{\text{FC}} f_i$
- update context
 $C_i = \rho_i C_{i-1} + \beta_{\text{enc}} C_i^{\text{IN}}$
- update context-item associations

$$\Delta M_{\text{exp}}^{\text{FC}} = (\Delta M_{\text{exp}}^{\text{CF}})^T = c_i f_i^T$$

- context as a cue to recall the next item

$$f_r^{\text{IN}} = M^{\text{CF}} C_r$$

$$\text{where } M^{\text{CF}} = s M_{\text{pre}}^{\text{CF}} + M_{\text{exp}}^{\text{CF}} = s S_s + M_{\text{exp}}^{\text{CF}}$$

- recall decision

$$X_j = (1 - \tau_K - \tau_L N) X_{j-1} + \tau f_r^{\text{IN}} + \epsilon$$

- update context

$$C_{r+1} = \rho_{r+1} C_r + \beta_{\text{rec}} C_{r+1}^{\text{IN}}$$