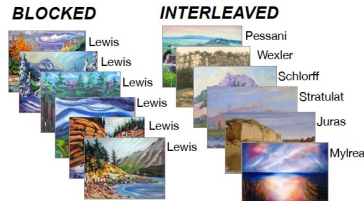


Reframing Effort to Improve Learners' Study Strategy Choices

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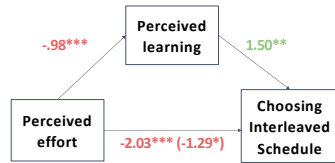
Background

Interleaving is effective, but underappreciated
(Kornell & Bjork, 2008; Yan et al., 2016)



Final test: **35%** (Blocked) vs **61%** (Interleaved)

...in part, due to misinterpreted effort.
(Kirk-Johnson et al., 2019)



But, how effort is framed may matter.

Koriat et al. (2014) found that the relationship between effort and perceived learning was negative when framed as "required" by the learning material, but positive when framed as the learners' choice to invest into learning.

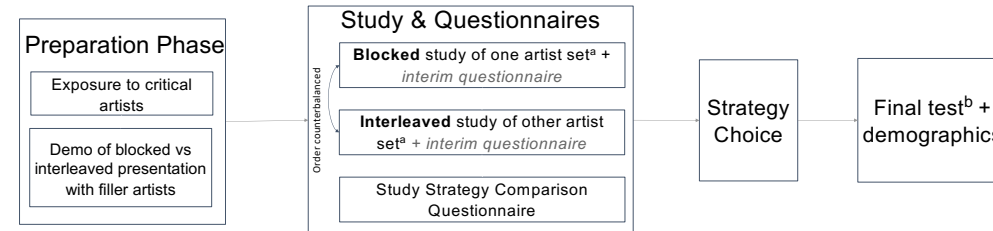
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Methods

Participants: 173 participants recruited from undergraduate subject pool. Randomly assigned to "effort-as-required" (n = 86) or "effort-as-voluntary" (n = 87) conditions for the main study/questionnaires.

Materials: Two sets of artist paintings (realistic, stylistic). Each set consisted of 4 artists x 12 paintings (8 for study phase, 4 for final test).



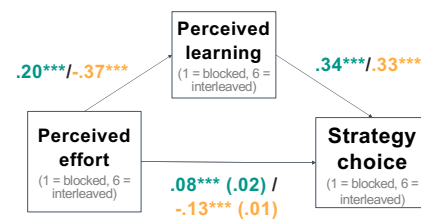
DVs on Comparison Questionnaire:
Likert scale response (1 = blocked, 6 = interleaved)

- **Perceived effort** (6 items, e.g., Which strategy required more mental effort/did you choose to put in more mental effort into?)
- **Perceived learning** (3 items, e.g., Which do you think is a more effective learning strategy for you?)

a. Interim questionnaire consisted of questions about only the one strategy (versus comparing the two strategies). Patterns were similar to that of the comparison questionnaire; we report comparison results only here but are happy to discuss the interim results upon request.
b. Final test performance showed interleaving benefit (M = .40, SD = .18) over blocking (M = .36, SD = .18), t(171) = -2.84, p = .005, Cohen's d = .22.

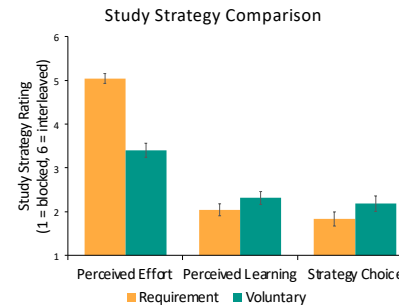
Results

Did framing affect strategy perception and choice?



Moderated mediation analysis did show predicted pattern:

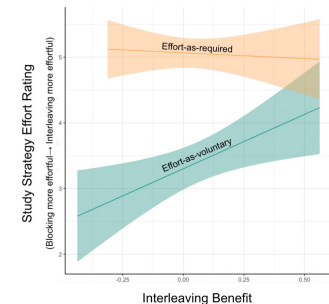
- **Effort-as-required condition:** the more effortful interleaving was perceived to be → the less effective interleaving was perceived to be → less likely to choose interleaving
- **Effort-as-voluntary condition:** the more effortful interleaving was perceived to be → the more effective interleaving was perceived to be → more likely to choose interleaving
- Indirect effects (ACME) were significantly different from each other, p < .001.



Unfortunately, the framing changed the ratings of perceived effort: Interleaving was given higher effort ratings in the "required" condition compared to the "voluntary" condition, d = 1.29.

People thought blocking was both more effective and chose it more often compared to interleaving.

Did size of interleaving effect matter?



Effort judgments:
Under effort-as-required framing, effort judgments are not sensitive to actual interleaving benefit. Under effort-as-voluntary framing, the larger the interleaving benefit, the more participants judged interleaving to be effortful.

Perceived learning:
...But the same pattern was not found for perceived learning. Size of interleaving benefit was unrelated to perceived learning from interleaving and did not interact with framing.

SUMMARY AND CONCLUSIONS

1. In the effort-as-voluntary condition, the more effortful participants felt interleaving was, the more they felt they learned when using it, and the more likely they were to choose to interleave in the future. This pattern was the reverse of that found in the effort-as-requirement condition.
2. HOWEVER, the effort framing manipulation was not sufficient to affect perceived learning or study strategy choice. Participants still overwhelmingly preferred blocking despite learning and performing better using interleaving.
3. Future studies may investigate whether different or additional manipulations might be more effective in altering study strategy choice, or if the effort framing manipulation might be more effective regarding a separate set of study strategies with less inherent bias surrounding it (e.g. rereading vs retrieving information).