Separating Surface from Structure: Study Schedules Affect What is Learned From Examples

Camila Sánchez, B.S. & Hannah Hausman, Ph.D.
University of California, Santa Cruz

Background

How should study exemplars be arranged to improve transfer?
Interleaving often improves classification of new exemplars compared to blocking. Interleaving: mixing exemplars of different concepts Blocking: studying all exemplars from one concept at a time Interleaving promotes discriminative contrast.

Methods

Learning
10 minutes
Lecture videos about ANOVAs, t-tests, and chi-square tests of independence (2x2 and 2x3)

Practice
18 exemplars
6 exemplars of each type across 6 blocks

JOLS
3 ratings
"What percentage of new ANOVA [t-test, chi-square] examples do you think you will match correctly?"

Transfer Test
12 questions
4 new exemplars of each type

Results

- Same story condition had better accuracy on the transfer test than the different story condition.
- Calibration did not differ dramatically between the two conditions.

Research Question

Exemplars of educational concepts can differ by:
- Surface features: things you can see
- Structural features: the concept; relationships and meaning

Novices attend to surface features over structural features.

Should we interleave by surface and/or structural features?
We hypothesized that when interleaving by structure (type of problem), blocking by surface features (storyline) will improve learning by making structural differences easier to identify.

Conclusion

Discussion
Interleaving by structure but blocking by surface features helps learners abstract conceptual understanding that isn’t visible in the examples themselves.

Future Research
Control for exposure to the total number of storylines and the benefit of same story may be even larger.
- Different story condition had 18 stories
- Same story condition had only 6 stories
- More exemplars often improves learning.

References


Contact: hhausman@ucsc.edu
Abstract

Compared to blocking, interleaving examples of different concepts can improve transfer of learning to novel examples. Often, examples (statistics problems) can differ in terms of structure (concept: t-test, ANOVA, chi-square) and/or surface (storyline: number of cars, temperature). We compared transfer of statistics learning to new problems when practice problems were blocked or interleaved by storyline, but always interleaved by concept. Interleaving by concept is thought to help participants identify the key features that differentiate concepts through a process known as discriminative contrast. However, we hypothesize that interleaving the storyline may increase difficulty identifying important structural differences between concepts as the surface features also differ between successive examples. Initial data supports this prediction, with blocking leading to better performance on a transfer test than interleaving by storyline. Results will be discussed in terms of structure mapping theory. Exploratory analyses of metacognition and mind wandering will also be discussed.