

Can we enhance learning of STEM concepts by highlighting their temporal structure?



#2452556: *Learning Temporally Structured Concepts* (https://www.nsf.gov/awardsearch/show-award?AWD_ID=2452556)

Background

Event Boundary Cueing Condition



end of "washing hands" event



end of "scrambling eggs" event



end of "cooking eggs" event

Event Middle Cueing Condition



middle of "washing hands" event

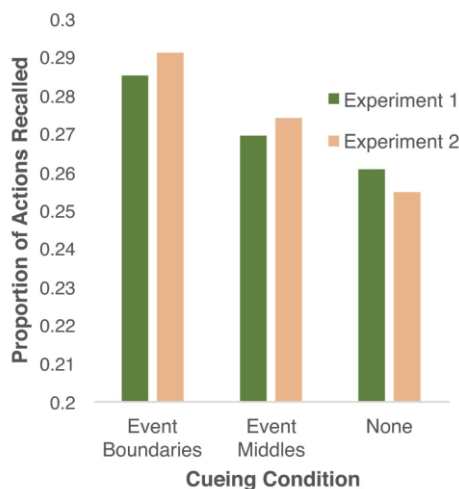


middle of "scrambling eggs" event



middle of "cooking eggs" event

Cueing
boundaries
between
temporally
extended events
enhances
comprehension
and memory



Flores et al., 2017; Gold et al., 2017

What is Not Yet Known

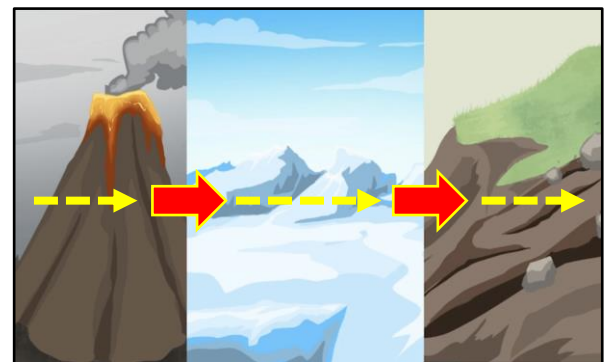
← These effects were discovered in the context of subjects viewing movies of everyday events, like making breakfast.

Will these effects apply in educational contexts?

Like everyday events, many STEM concepts have temporal structure!



Can we **enhance learning of STEM concepts** by cueing the boundaries between ideas?



Methods

STEM videos

Cueing structure

- We have developed a stimulus set of 12 temporally-structured STEM concepts with accompanying animations.
- Half of these concepts feature cues at **critical idea boundaries**, and half are miscued (i.e., during middle points).
- Using validated exam questions, we will test comprehension of each concept as a function of cueing condition.

Challenge Areas

Stimuli

- Animations are a significant bottleneck, as they take considerable time and resources to produce.
- Selecting appropriate STEM concepts while accounting for degree of depth and difficulty, reliance on temporal structure, prior experience of participants from diverse backgrounds, and other factors poses a challenge.

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