



The Effects of “Seductive Animations” on Multimedia Learning

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BACKGROUND & HYPOTHESIS

The coherence principle states that people learn better when extraneous information is excluded from a lesson (Mayer, 2008). Consistent with these findings, research has shown that adding seductive details to a video lesson leads to students remembering less details, and adding video clips increases cognitive load (Mayer et. al, 2001). Similarly, although animations are attractive and motivating to learners, they are hard to conceive, leading to increases in cognitive load (Betrancourt, 2005). Despite this, animations might still conditionally matter. Using representational animation is significant superior to using representational static images (Höffler, 2007). More research is needed to determine the importance of relevant animations and their uses when creating a multimedia lesson.

In this study, we decided to manipulate whether or not participants saw an animated or narrated lesson, as well as whether or not the visual stimulus they saw was relevant towards what was being taught or irrelevant. We thus asked the question: **Do videos with relevant animations lead to better learning?**

Hypothesis: Animation is helpful when relevant but unhelpful when irrelevant.

PROCEDURE

Recruitment through Qualtrics

Prior Knowledge Questionnaire

Relevant Animation

Irrelevant Animation

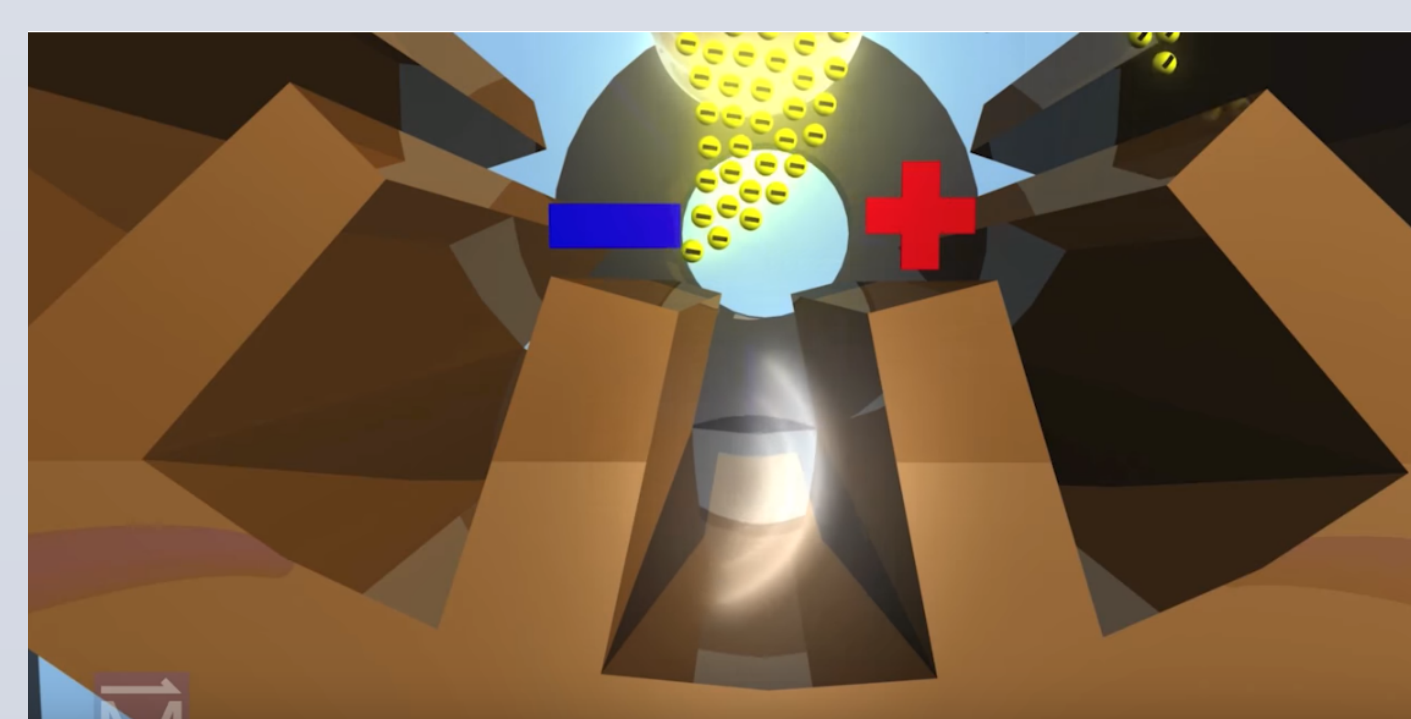
Relevant Static

Irrelevant Static

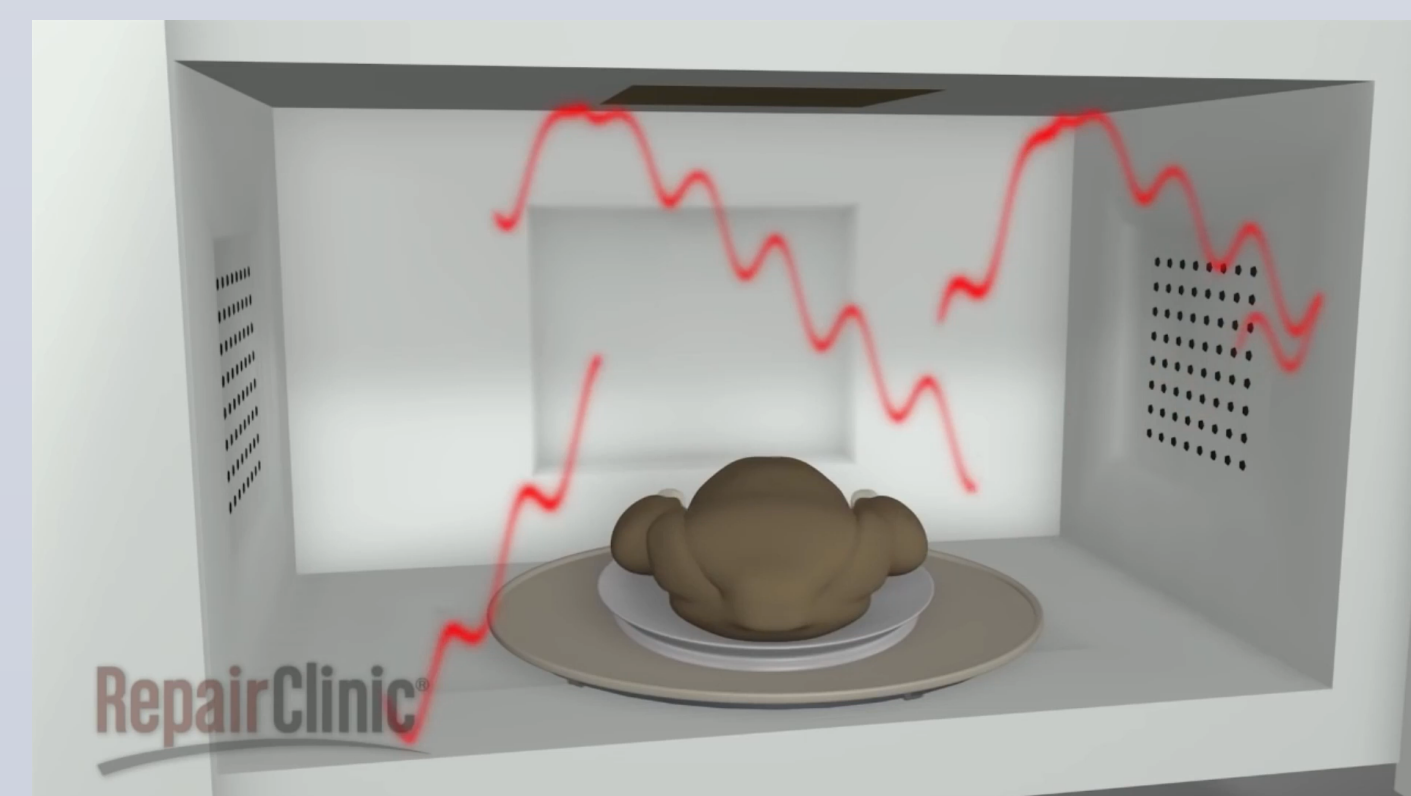
Current State Questionnaire

Retention + Transfer Questionnaire

Sample Relevant Image/Animation



Sample Irrelevant Image/Animation



MATERIALS AND METHODS

Participants

(N= 237) , University of California, San Diego Students

Materials

Prior Knowledge Questionnaire

Open response question assessing knowledge on microwaves. Participants also asked to select from list of relevant terms.

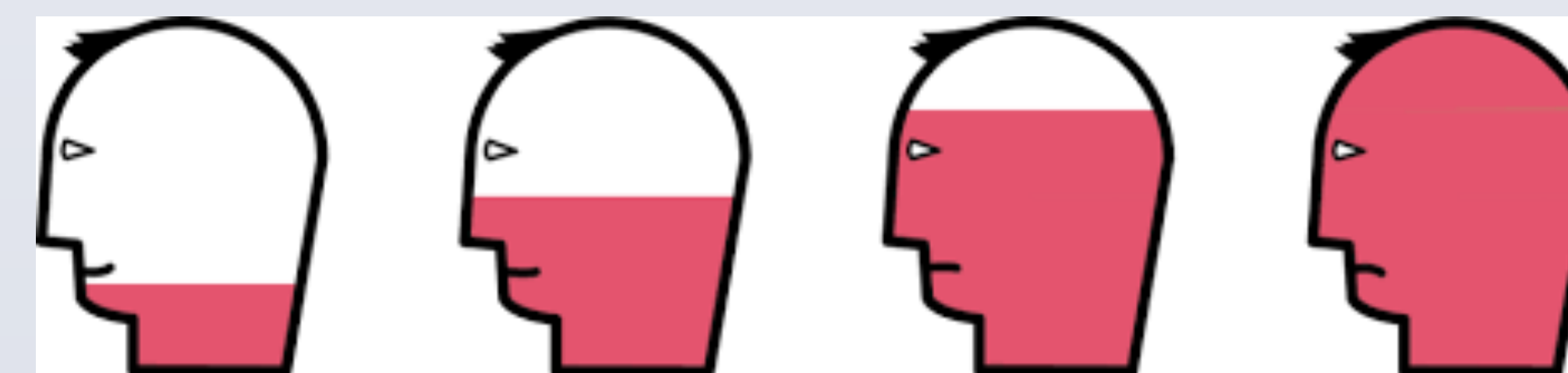
Microwave Video

Brief, ~3min lesson on how microwaves work. All participants were shown the same audio, with different visuals based on condition.

Current State Questionnaire

Asking about how annoyed, bored, tired, stressed, focused people were.

Contained a diagram assessing total perceived load



Cognitive Load Questionnaire

This questionnaire breaks down cognitive load into 3 sections asking participants on a scale of 0 (not the case) to 10 (completely the case) statements such as:

- **Intrinsic Load:** “The topics covered in the video were very complex”
- **Extraneous load:** “The instructions were full of unclear language”
- **Germane Load:** “The video really enhanced my understanding of the topics covered”

Retention Post-Test

2 Open Response, 14 Multiple Choice questions about the video lesson in the pervious section

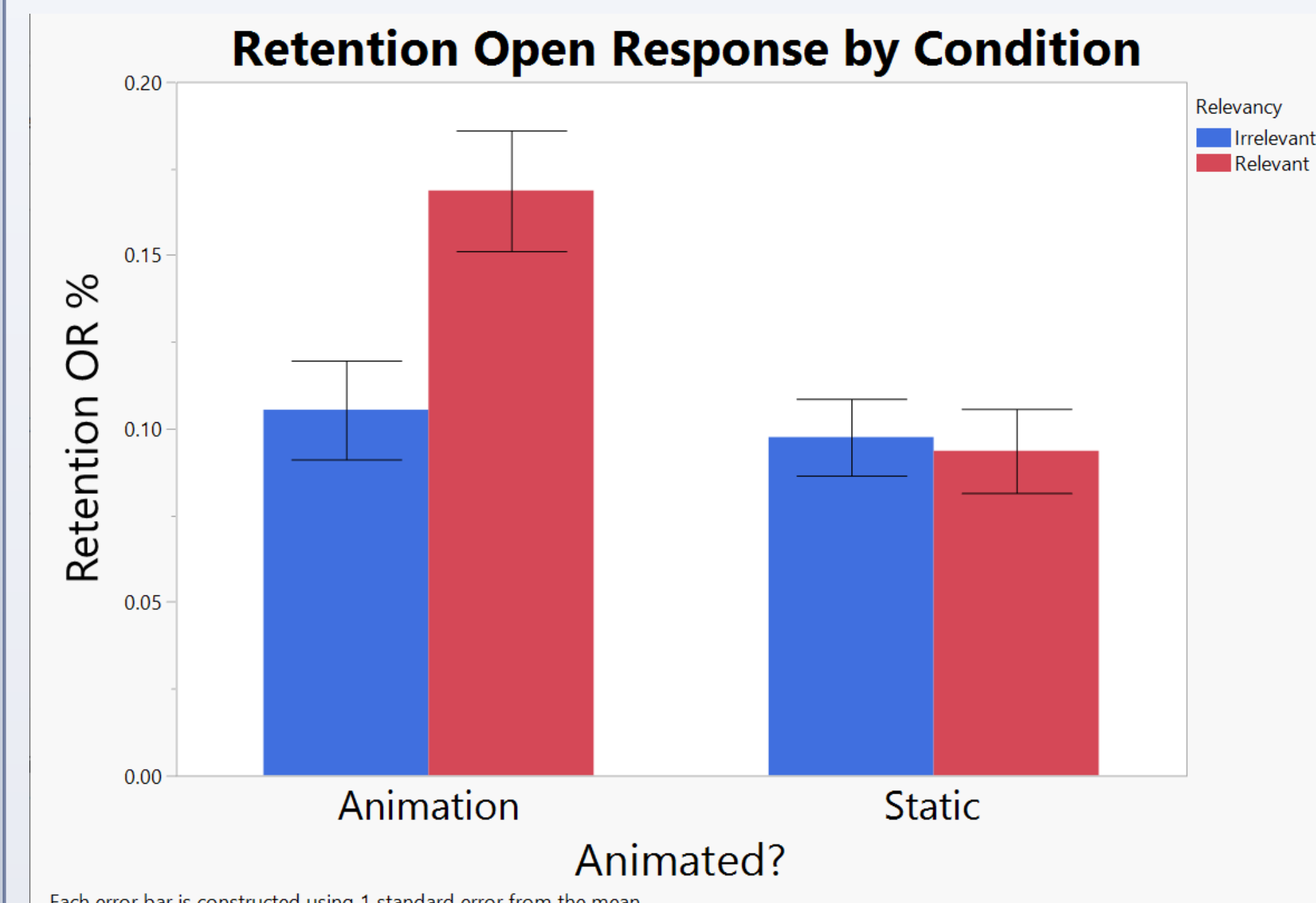
- Ex: “Describe the parts of the magnetron and how they produce electromagnetic waves”
- Ex: “Explain how electromagnetic waves heat up food”

Transfer Post-Test

3 Open Response, 3 Multiple Choice asking participants to transfer the knowledge from the video to a new scenario

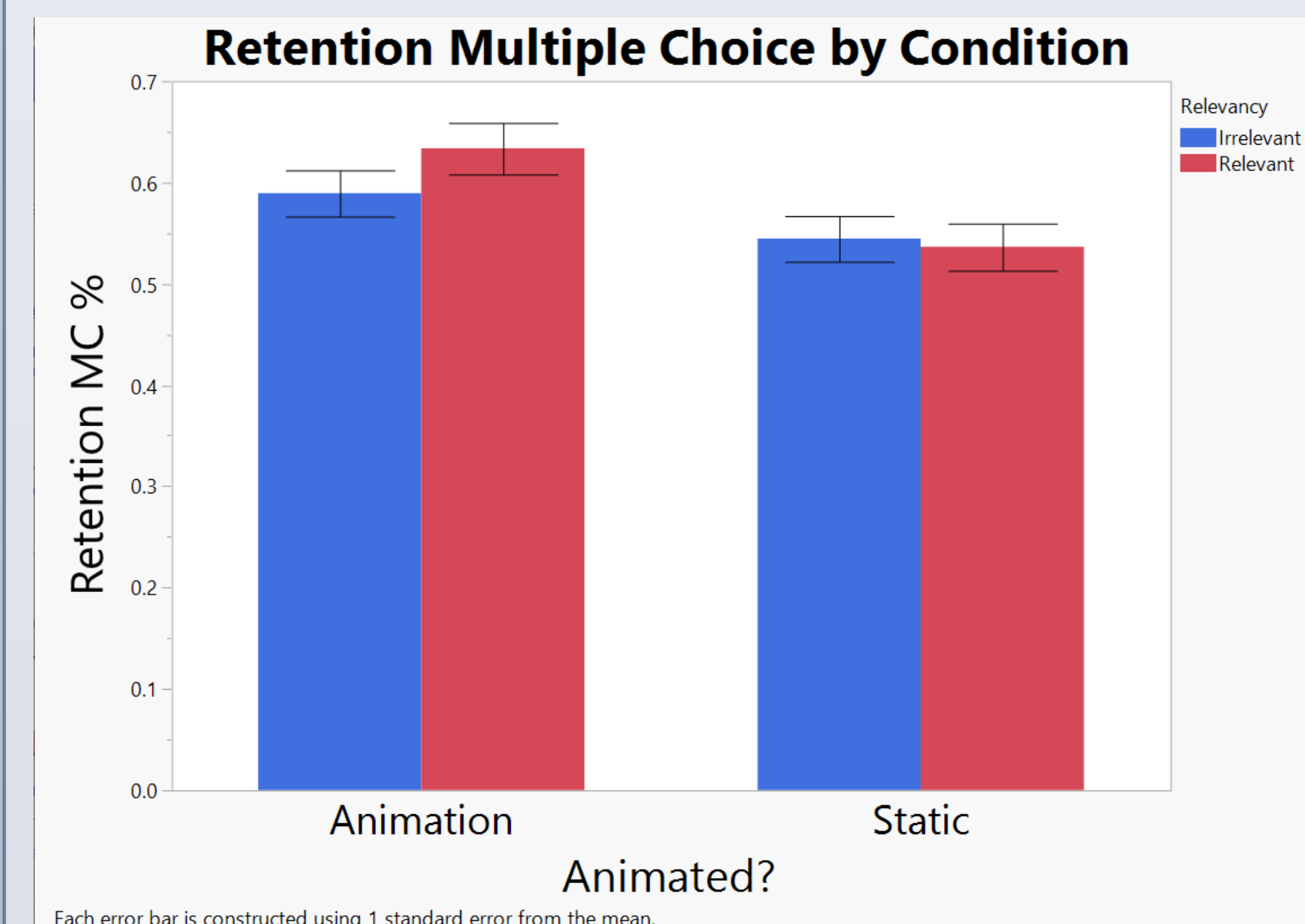
- Ex: “Why is it that sometimes parts of your food come out of the microwave very hot while other parts are still very cold”

RESULTS



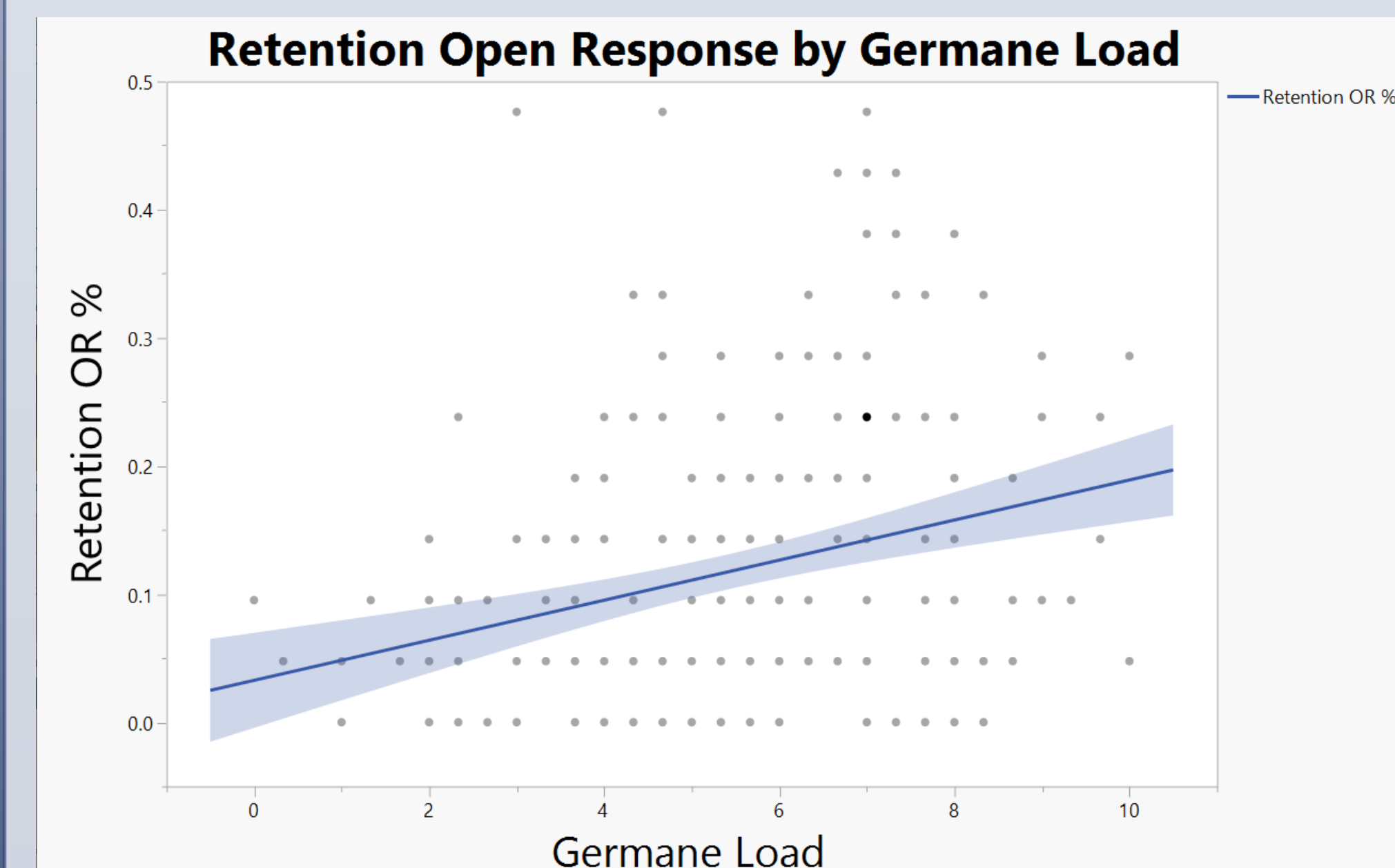
Retention Open Response

Interaction between Animation/Static and Relevancy (p=0.0155)



Retention Multiple Choice

Main effect of Animation/Static (p=0.0099)



Exploratory Analysis

Germane Load significantly predicts Retention OR (p= 0.0035)
Intrinsic and Extraneous Load do not predict Retention OR

Discussion

Animation is only important when it is relevant rather than irrelevant.

Animation marginally benefits MC performance but the effect is small.

These differences do not seem to be explained by differences in cognitive load.

Germane load predicts recall performance even though it does not differ across conditions.

This is evidence that animation can improve learning, but the mechanism in which it does so is still unclear.

Future Directions & Limitations

Future Studies should look to replicate our findings with other common classroom lessons. Ideally, we would like to conduct our study in an actual classroom setting.

Likewise, it should be noted that we observed a floor effect for the Retention OR. New questions could be developed that are easier to answer and easier to code. Ideally, we would like to remove all MC questions and focus on having only OR questions in order to truly measure participant knowledge.

Potential changes with the video are also an option, specifically developing better animations that fit with the lesson in order to improve the animated conditions.

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