



# Do Lecture Pace, Detail, and Segmentation Affect Students' Comprehension and Memory for a PowerPoint-Assisted Lecture?



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## Introduction

- Although an industry-standard lecture aid, PowerPoint has received little systematic controlled research.<sup>1</sup>
- A recent well-controlled study found no effect of PowerPoint on students' immediate memory of lecture material.<sup>2</sup>
- Based on research evaluating multimedia presentations, the previous study manipulated only the amount of detail presented on PowerPoint slides.<sup>2</sup>
- Research on multimedia presentations also suggests that the rate of speech (pace) and segmentation affect retention of information from multimedia presentations, such as lectures accompanied by PowerPoint.<sup>3,4</sup>
- The current study explores interactions among detail of the PowerPoint slides, pace, and segmentation of the lecture on students' learning.

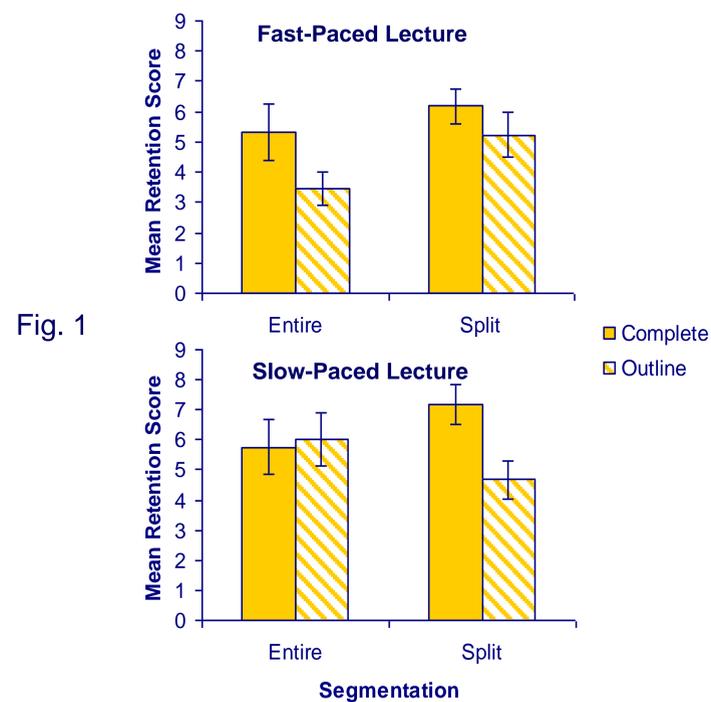
## Hypotheses

- Students will retain more from slow lectures, lectures aided by complete PowerPoint slides, and segmented lectures than fast lectures, lectures aided by partial PowerPoint slides, and non-segmented lectures.
- A fast lecture aided by partial PowerPoint slides will benefit students more than a fast lecture aided by complete PowerPoint slides. The opposite will be true for slow-paced lectures.
- Segmentation's effect will be enhanced by faster pace and greater detail.

## Method

- 142 college students volunteered for this study.
- The experiment took place in classrooms equipped with DVD players and video projectors.
- Materials included:
  - Identical lectures on DVD delivered by a speaker unknown to students that varied according to:
    - ✓ Pace (72 vs. 205 words per minute)
    - ✓ PowerPoint detail (partial vs. complete)
  - # 2 Pencils
  - Scantron sheets
  - MC test of what participants thought they knew about neural communication
  - Free-recall retention test
  - Essay transfer test
- We arbitrarily assigned participants to eight conditions (2 x 2 x 2 design) defined by pace, PowerPoint detail, and lecture segmentation (entire lecture vs. lecture in two parts).
- We asked participants not to take notes.

## Results



- Figure 1 displays the mean score on the free-recall retention test as a function of the three independent variables. Higher scores indicate better recall of material from lecture.
- Two independent raters scored the retention tests.
  - Inter-rater reliability:  $r = 0.85, p < .001$
- A 3-way ANOVA evaluated the effects of PowerPoint detail, lecture pace, and lecture segmentation on retention of material presented.
- Participants exposed to complete PowerPoint notes ( $M = 6.08, SEM = 0.40$ ) recalled more than participants exposed to outline PowerPoint notes ( $M = 4.58, SEM = 0.35$ ).
  - $F(1, 135) = 5.70, p < .05$
- Neither pace nor segmentation influenced retention of material.
  - $F(1, 135) = 2.58, p > 0.10$  (pace)
  - $F(1, 135) = 1.65, p > 0.10$  (segmentation)
- There were no significant interactions.
  - $F(1, 135) = 0.06, p > 0.10$  (pace x detail)
  - $F(1, 135) = 1.38, p > 0.10$  (pace x segmentation)
  - $F(1, 135) = 0.74, p > 0.10$  (detail x segmentation)
  - $F(1, 135) = 2.95, p = 0.09$  (pace x detail x segmentation)
- Two independent raters scored transfer tests unsuccessfully (the correlation did not achieve criterion of 0.80). No further analyses were run.
  - Inter-rater reliability:  $r = .50, p < .01$

## Discussion

- Contrary to our hypotheses, only one characteristic of the PowerPoint that we used produced significant effects.
- The effect size of PowerPoint detail was small (partial  $\eta^2 = 0.04$ ).
- Overall, the absence of effects for pace and segmentation and the minimal size of effects for detail are consistent with other findings in our research program.<sup>5,6</sup>
- Before we may conclude that these characteristics are irrelevant to PowerPoint's effects, we must consider difficulties we encountered in our work.
  - Retention scores were quite low, indicating that very little material was retained.
  - Participants may not have been adequately motivated to learn the material.
  - The pace manipulation may have been too extreme. The fast-paced lecture may have moved too quickly for comprehension. The slow-paced lecture may have impaired attention.
- Despite these methodological concerns, the consistency of the current findings with two other studies indicates that the variations in PowerPoint implementation do not influence students' retention of lecture material under these conditions.
- Future research must consider the influence of criterion measures, participant motivation, and realistic manipulation of lecture pace before we conclude that the variables in the current study have no effect on PowerPoint's effectiveness as a lecture aid.

## References

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