Task Difficulty Based Mental Effort: When Cognitive Load Theory Fails

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Background:

Cognitive Load Theory predicts that people should learn problem-solving more effectively when learning in steps, starting with a simpler version of the task. However, it is unclear whether this is actually the case.

In previous experiments we used the Towers of Hanoi task to determine how well participants were able to learn in two conditions: an increasing-disc condition with consecutive trials of a low, medium, and high number of discs, or a constant-disc condition with three trials of a high number of discs. Participants solved each task and then continued to the next trial.

We devised a new experiment to consider whether trial duration differences between groups could account for differences in participant performance.

Hypothesis:

A constant series of difficult tasks will contribute to effective problem solving schemata better than a series of increasingly difficult tasks.

Methods:

Participants were assigned to a 3/5/7-disc or 7/7/7-disc sequence of trials. Instead of trial duration lasting until the task was complete, trial 1 lasted 5 minutes, trial 2 lasted 10 minutes, and trial 3 lasted 30 minutes. Participants repeatedly solved the assigned task until the trial time elapsed. We recorded participants' progress each time they solved the task and at the end of each trial.

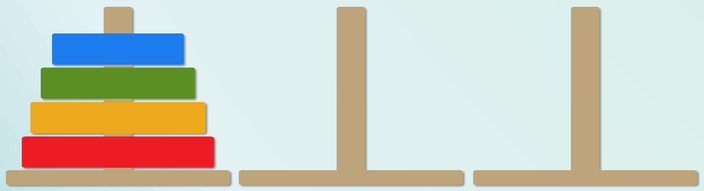
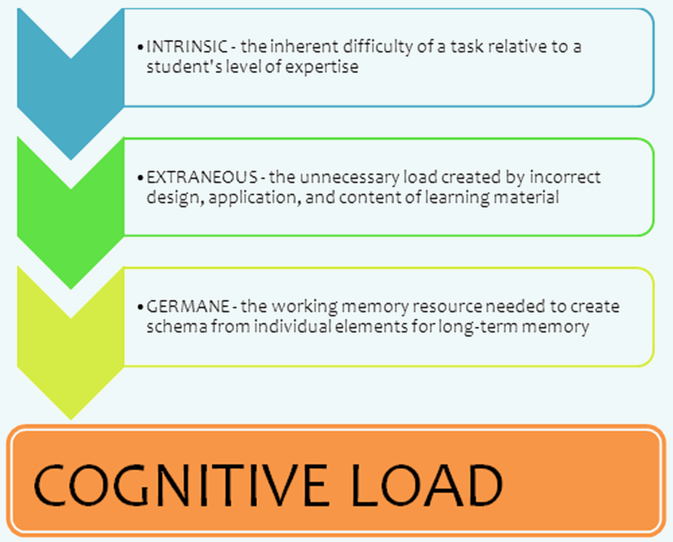


Figure 1: Towers of Hanoi Task

Results:

We measured success in three different ways:

- Whether or not the participant solved the puzzle on the third trial:
  X^2 (2, N = 61) = .512, p =.474 (NS)
- Percent of puzzle solved on the third trial:
  U = 436, p = .621 (NS)
- Total percent of puzzle completed, including multiple solves:
  U = 395.5, p = .315 (NS)



Discussion:

CLT would expect performance on the final trial to be significantly better for groups in the increasing-disc condition. However, our previous experiments using the Towers of Hanoi task showed that a constant high number of discs contributed to effective problem-solving better than a sequentially increasing-disc condition.

Because we found no significant differences, our result does not provide support for Cognitive Load Theory or our alternative hypothesis. It appears that learning is unchanged whether people use difficult tasks or easy ones. A new model of learning may be necessary to explain these results.