**Test question analysis proposa**l

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**Goal**: Identify question features that influence the difficulty of multiple choice questions. For future tests, predict what is a “well-written” exam.

**Data**: Multiple choice tests and student responses. Instructor permission for exam use will be sought beforehand.

**Privacy**: Student IDs will be anonymized. If any results are made public, individual questions will not be included in the results, only summary statistics.

**Overview**: How do students solve multiple choice questions? After weeks of studying, the student is presented with a short question followed by four or five possible answers. Even if they have studied the material, however, the question might be difficult to process. The question might be long or use hard-to-read jargon. The answers might be very similar to each other, hindering the student’s ability to compare them. How can teachers design multiple choice questions that probe students’ knowledge, without unduly taxing students’ ability to solve complex word problems?

I will use text-based analyses to determine what features of multiple choice questions are difficult for students on exams. There are three main components of my planned analysis. 1) latent Dirichlet Topic analysis to identify different semantic question categories (e.g, “memory”, “language”, “perception”, etc.). 2) A suite of natural language processing analyses (e.g., length of questions, word frequency in English language, etc.). (1) and (2) will be used to design features of questions that predict performance. Then I will use 3) mixed effects model comparison to compare these predictors and identify features diagnostic of question performance.

Given a novel exam, the resulting fitted mixed effects model will allow instructors to identify what questions are worded in ways that will be difficult for students.