ImPACT

• Clinical research data for concussions
• 5,400 high school athletes from the state of Maine
• scored twice
• largest database world-wide
• base-line tests, not post-concussion
Questions

• Is the test reliable?
  – By calculating correlation coefficients
  – Done for 4 composite scores
  – Individual subtests have not been analyzed

• Is there a difference in reliability for different categories of individuals?
  – gender, age, ADHD, and learning disabilities
Questions

• How many concussions occur in high school athletes?
  – number of prior concussions
  – difference between two tests gives concussion rates per year
  – concussion rate per sport
Questions

- Can we predict an athlete's second score based on their first plus demographic variables?
  - multi-variable modeling problem
  - alternative method of answering the test reliability question
  - if we can robustly predict the second score from the first, then if an athlete does not score close to the prediction, something may be wrong.
Clinical Goal

• To have a better idea whether the test is an accurate predictor of cognitive function.
• If you have one test from a subject, when can you say that a second test shows a clinically important change in that function?
• If you have only one test from a subject (and the associated demographic information), what is your confidence in the scores?
What has been done

• Straightforward calculations like means, concussion rates tally
• reliability statistics like Pearson's, ICC, and Spearman's coefficients (only composite scores)
What hasn’t been done

• Multivariable prediction of the second test based on the first test
• Just about any ML approach