

Data Collection and Analysis

Context of Data Set

- Secondary Science Methods Course
 - Students will become either Biology, Chemistry, Physics, or Earth Science Teachers
 - Variety of backgrounds (undergraduates, graduates, depth of science backgrounds)
 - Class Session was on Assessment
 - Question that I had “How much difference would there be between students with weak or strong backgrounds in Biology on a short and simple Biology test?”

The Measures

- Sample Items from the Indiana “Core 40” end of year Biology I exam that were on state website. Multiple Choice, Short Answer
- One more lengthy item from the 2005 NAEP exam released questions for the 12th Grade Science Test.
- Eleven items with a total possible score of 18

Example Item

7 In 1859, twenty-four European rabbits were brought to Australia for sport hunting. The rabbits had no natural predators, resulting in an exponential growth pattern for the rabbits. They ate crops and became a serious, destructive pest within a relatively short period of time. In an attempt to control the rabbit population, the *myxoma* virus was introduced into the rabbit population in 1950. Initially, the virus was highly effective, reducing the rabbit population by 99%. Currently, the *myxoma* mortality rate is less than 50%.

A. Describe one scientifically probable change in the rabbit population of Australia that resulted in the reduced effectiveness of the *myxoma* virus in controlling the number of wild rabbits.

B. Describe one scientifically probable change in the *myxoma* virus that resulted in the reduced effectiveness of the virus in controlling the number of wild rabbits.

What data elements were especially important?

- Distribution of responses to individual items
- Individual item difficulty
- Ability to produce sub-scores if desired
- Total Score
- Student self-report of approximate number of hours they had taken in Biology

Organization of Data

- Simple Excel Spreadsheet
- Individuals as rows and variables of interest as columns
- Keeping as much information as possible
 - Don't condense at the data organization stage
 - Individual responses to items
 - Separate “grade” for each item (alternative)
 - Separate “total” for instrument (alternative)
- Data table easy to spot for error

Analysis Example

- Directly import to SPSS
 - Descriptive Statistics First
 - Check for data entry errors and begin to get a “feel” for data
 - Means and standard deviations for all continuous variables
 - Relationship between variables of interest
 - Total Score and Hours of Biology
 - Individual Items and Hours of Biology
 - Group Membership (Few Hours or Many Hours)
 - Do their total scores differ by group membership?