

Statistical Playgrounds

In 1996 Richard Shavelson published the third edition of his textbook, [Statistical Reasoning for the Behavioral Sciences](#). To accompany the text Maria Ruiz-Primo and I (Mathew Mitchell), along with Richard, created the [Student Guide for Statistical Reasoning for the Behavioral Sciences 3rd Edition](#). One of the features of this student guide was a series of **statistical playgrounds** which were dedicated MS Excel spreadsheet products that did calculations on small samples for the key topics in the textbook.

Over time (20+ years) things have changed quite a bit. One of the downsides of the playgrounds is they were spreadsheet-based. They worked well, they were user-friendly, but still too many students tended to not feel “warm and fuzzy” about using spreadsheets (though it was definitely a step up in friendliness from using traditional statistical software). During the summer of 2017 I have re-conceptualized and reformatted the “playground” idea. The result is a series of web-based **statistical playgrounds**.

Why Playgrounds?

Playgrounds are not good at doing calculations for real research. They are too limited in what they do, and can only use a small number of data entry points. For real, and quick, calculations you would want to use a dedicated statistical analysis program such as SPSS or Wizard or many other selections. Spreadsheets are also great tools for calculation. Not as powerful as dedicated statistical software, but very good indeed.

Here's the problem I face as an instructor: students need to develop an intuitive understanding of statistical measures. In addition a number of students tend to be afraid/wary/anxious about using statistical software or spreadsheets.

Playgrounds help develop a better intuitive understanding because you can see all the calculations at a glance. The small sample sizes are an advantage because then each data point can potentially have a big impact on the resulting measures. Thus by tweaking the data numbers students can immediately see the impact on the resulting statistical measure: and this helps develop a more intuitive feel for the measures under study.

The Playground Schema

You can use the playgrounds on their own. But most topics in our course will come with a small set of activities. The activities are organized around the **POE principal**. First **predict**, then **observe**, and finally **explain**.

The purpose of the predict step is that you write down your predictions before entering data for a particular exercise. This step is extremely important: I do not want to encourage people to mindlessly input numbers until a correct solution is reached. Instead, I want to encourage you to actively think about the questions and make your best educated guess before starting to enter data. Observing the results of data entered based on your well thought out prediction builds a better stage for understanding where and when you have misconceptions.

More importantly, students should view using the Statistical Playgrounds as an iterative process. This means that you will enter some data, receive feedback, and then you can revise your data as often as necessary to meet the conditions stated in a particular problem. If your observation is very different from what you predicted, then you will have an important basis for re-evaluating and re-conceptualizing where and why your prediction was off base. The final step is to explain either the similarities between your prediction and subsequent observation OR to explain the dissimilarities.

My experience with students who use these Playgrounds is that they enjoy the process of learning statistics more and develop a deeper conceptual understanding of the topic than without them. This means that you can also use the playgrounds to explore your own questions regarding specific statistical concepts.

How to Use

You can always start entering data by pressing the **tab** key on your keyboard. That action will automatically take you to the first data entry box. Once done entering a number, tab to go to the next box. At the last data entry box you will sometimes need to use the **return** key to finalize this entry.

Before you have entered all your data you will get misleading results as the web-based calculator will use the zeros in the other boxes as part of its calculations. Not what you want!

Use the up/down arrow-options in each box to tweak the scores. Look at the resulting difference to the statistical measures. Test out different scenarios: do the results **make intuitive sense** based on your understanding of the statistical concepts?
