

Revisiting Statistical Versus Practical Significance

In an earlier video, we made the point that statistical significance is different from practical significance. It's easy to fall into a habit of thinking that a small p-value indicates an important finding, but that is not always the case. As a simple illustration, suppose that you are planning a long international flight. There are two airlines that fly the route.

You have no preference regarding the airlines, and the prices and available flights are nearly identical. Because this is a long flight, you're concerned about getting to your destination on time. You go online and find a large set of data about on-time arrivals. On average, the flights take approximately 15 hours. You run an appropriate test and find that Airline A arrives, on average, earlier than Airline B. What's more, the difference is statistically significant with a p-value close to 0.0001. You would pick Airline A, right?

Now suppose that, on average, Airline A gets you in 2 minutes earlier than Airline B. Assuming that prices and departure times are similar, would you care about a 2-minute difference? For a 15-hour flight, 2 minutes might seem trivial. What if the average difference is 45 minutes instead of 2? You'd likely care about this difference, particularly if there is a potential of missed connections or meetings. This is what we mean by practical significance. Statistical significance is not the final word in decision making, despite its critical importance in statistical testing.

You, the analyst, determine whether the results that you observe are of practical importance, based on the context, the nature of the problem, and the available evidence. We all need the skills to make decisions from data, to "listen" to what our data are telling us, and to effectively communicate the message in our data. However, even with powerful statistical methods, we cannot know the "truth" when we make decisions from sample data. This gets at the heart of statistical thinking. The correct application of statistical tools supplements, rather than replaces, subject matter knowledge and the need to think deeply about the practical and ethical implications of your findings. You, ultimately, need to make the best decisions with the information at hand.