

7.1: People, Samples, and Populations

Most of what we have dealt with so far has concerned individual scores grouped into samples, with those samples being drawn from and, hopefully, representative of a population. We saw how we can understand the location of individual scores within a sample's distribution via z -scores, and how we can extend that to understand how likely it is to observe scores higher or lower than an individual score via probability.

Inherent in this work is the notion that an individual score will differ from the mean, which we quantify as a z -score. All of the individual scores will differ from the mean in different amounts and different directions, which is natural and expected. We quantify these differences as variance and standard deviation. Measures of spread and the idea of variability in observations is a key principle in inferential statistics. We know that any observation, whether it is a single score, a set of scores, or a particular descriptive statistic will differ from the center of whatever distribution it belongs in.

This is equally true of things outside of statistics and format data collection and analysis. Some days you hear your alarm and wake up easily, other days you need to hit snooze a few [dozen] times. Some days traffic is light, other days it is very heavy. Some classes you are able to focus, pay attention, and take good notes, but other days you find yourself zoning out the entire time. Each individual observation is an insight but is not, by itself, the entire story, and it takes an extreme deviation from what we expect for us to think that something strange is going on. Being a little sleepy is normal, but being completely unable to get out of bed might indicate that we are sick. Light traffic is a good thing, but almost no cars on the road might make us think we forgot it is Saturday. Zoning out occasionally is fine, but if we cannot focus at all, we might be in a stats class rather than a fun one.

All of these principles carry forward from scores within samples to samples within populations. Just like an individual score will differ from its mean, an individual sample mean will differ from the true population mean. We encountered this principle in earlier chapters: sampling error. As mentioned way back in chapter 1, sampling error is an incredibly important principle. We know ahead of time that if we collect data and compute a sample, the observed value of that sample will be at least slightly off from what we expect it to be based on our supposed population mean; this is natural and expected. However, if our sample mean is extremely different from what we expect based on the population mean, there may be something going on.

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