sampling & sources of bias

- census vs. sample
- sources of bias
- sampling methods

Duke UNIVERSITY

Dr. Mine Çetinkaya-Rundel
Duke University

census

Wouldn't it be better to just include everyone and "sample" the entire population, i.e. conduct a census?

- Some individuals are hard to locate or measure, and these people may be different from the rest of the population.
- Populations rarely stand still.

Illegal Immigrants Reluctant To Fill Out Census Form

by PETER O'DOWD

March 31, 2010 4:00 AM

npr

from KJZZ

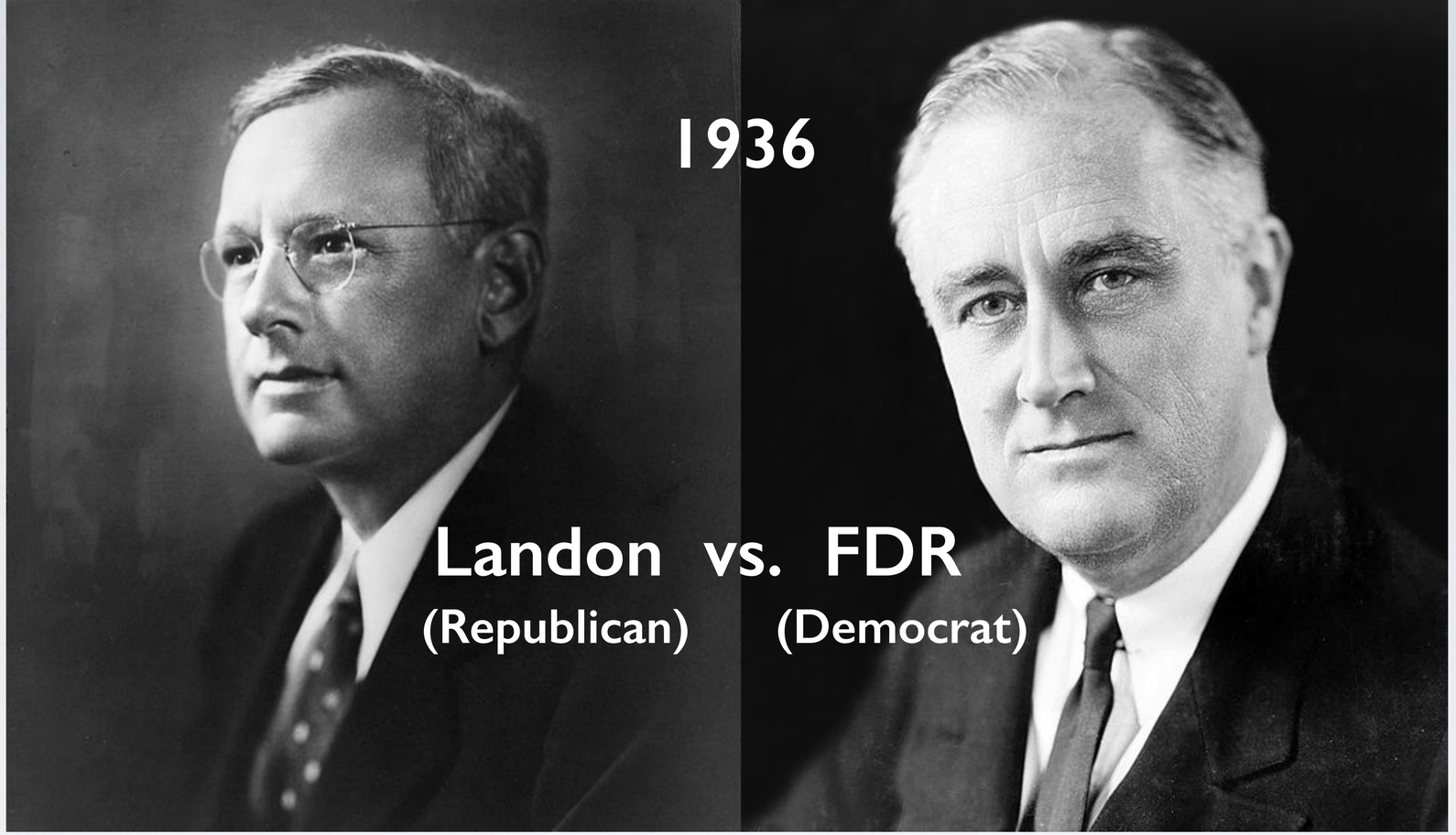
There is an effort underway to make sure Hispanics are accurately counted in the 2010 Census. Phoenix has some of the country's "hardest-to-count" districts. Some Latinos, especially illegal residents, fear that participating in the count will expose them to immigration raids or government harassment.

Listen to the NPR story at http://www.npr.org/templates/story/story.php?storyId=125380052

a few sources of sampling bias

- Convenience sample: Individuals who are easily accessible are more likely to be included in the sample
- Non-response: If only a (non-random) fraction of the randomly sampled people respond to a survey such that the sample is no longer representative of the population
- Voluntary response: Occurs when the sample consists of people who volunteer to respond because they have strong opinions on the issue

Poll source: edition.cnn.com, August 29, 2013



The Literary Digest

Election results

Lose with 43% of the votes

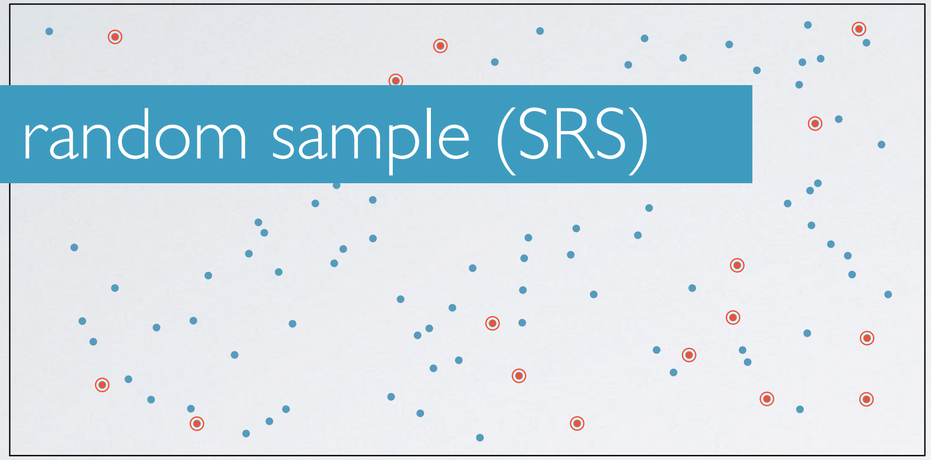
Win with 62% of the votes

Image sources: http://en.wikipedia.org/wiki/File:LandonPortr.jpg, http://en.wikipedia.org/wiki/File:FDR_in_1933.jpg, and http://en.wikipedia.org/wiki/File:LiteraryDigest-19210219.jpg

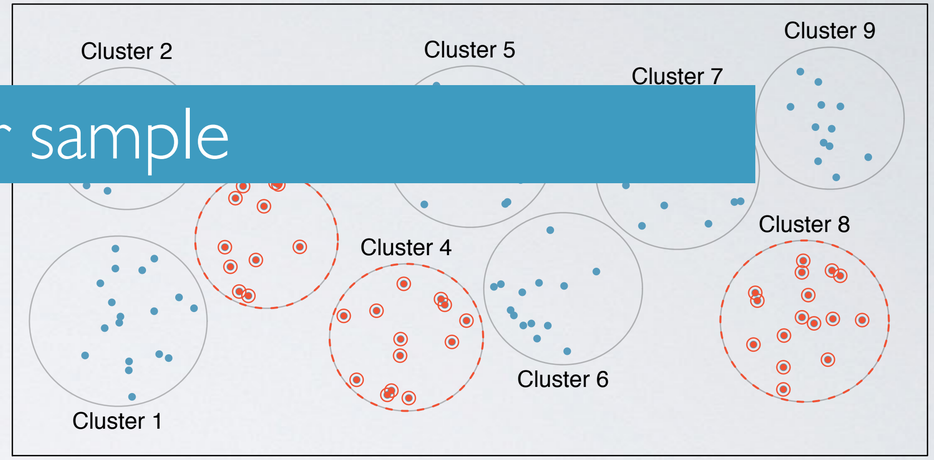
Image credit: Wonderlane CC BY 2.0 http://www.flickr.com/photos/wonderlane/6231888661

sampling methods

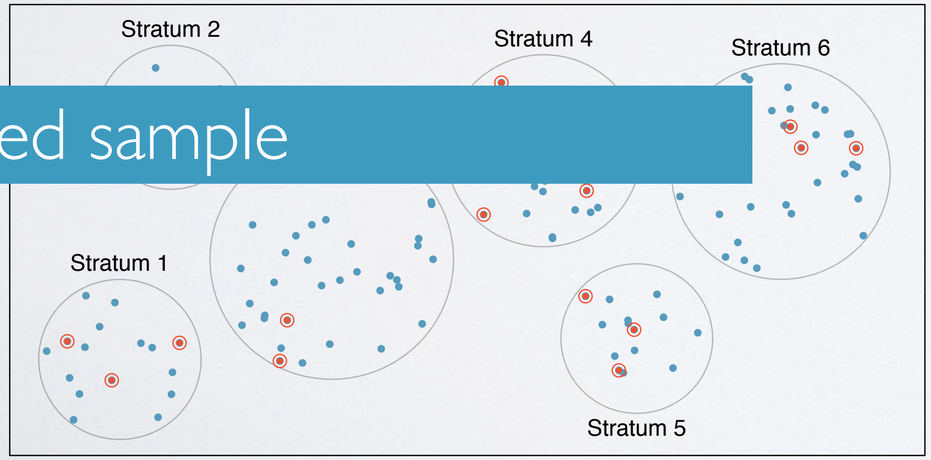
simple random sample (SRS)



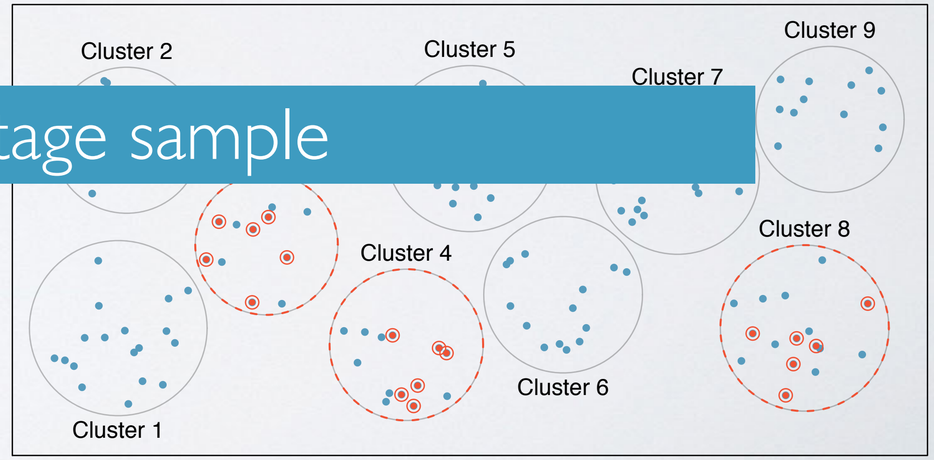
cluster sample



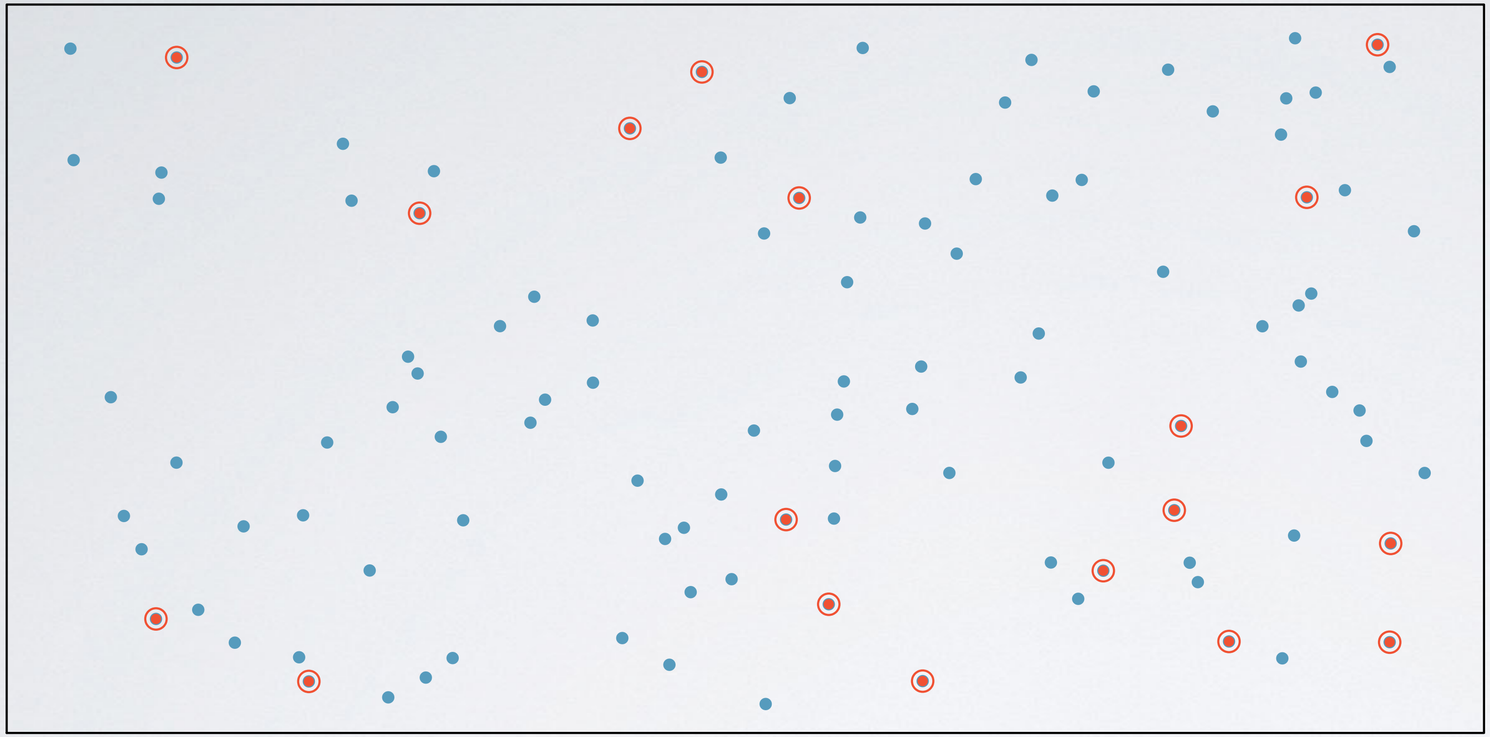
stratified sample



multistage sample

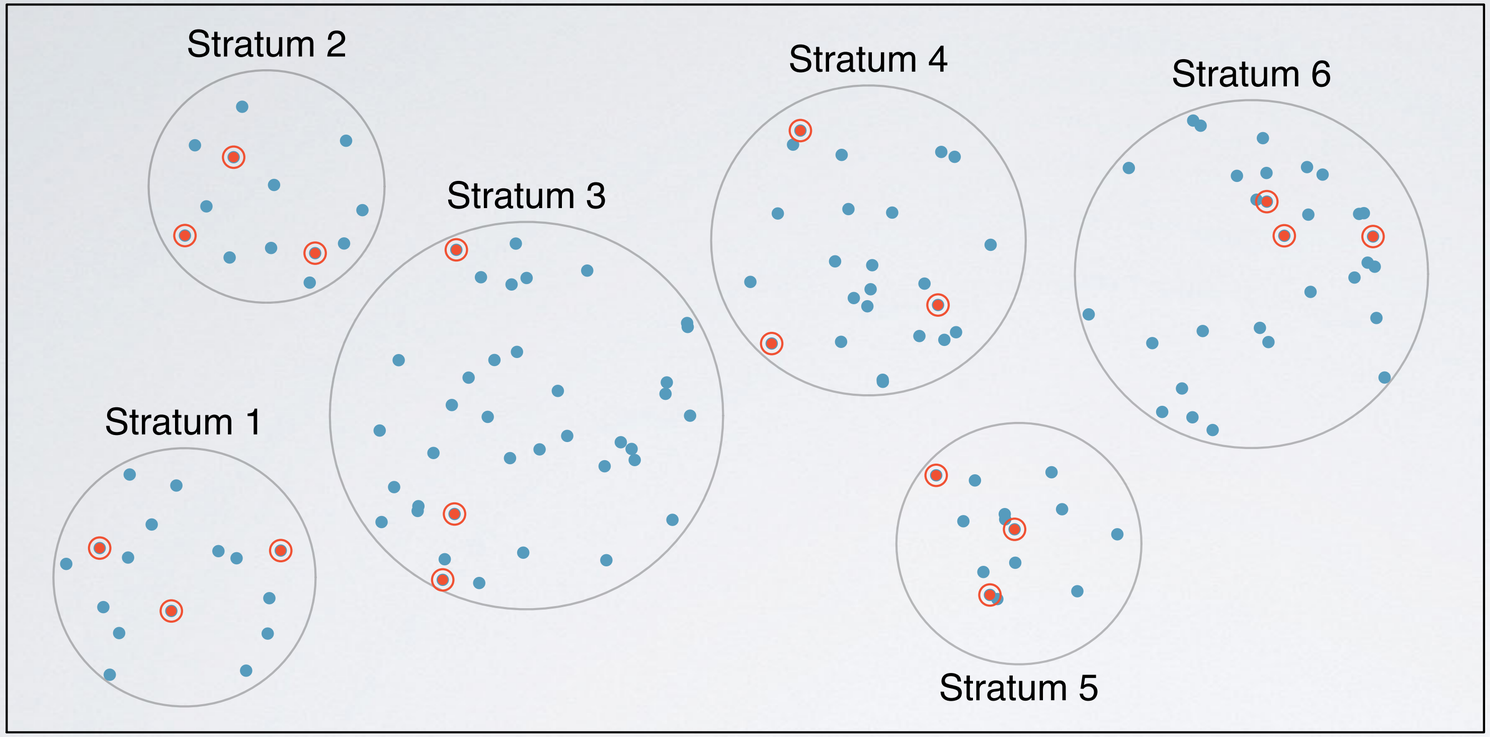


simple random sample (SRS)



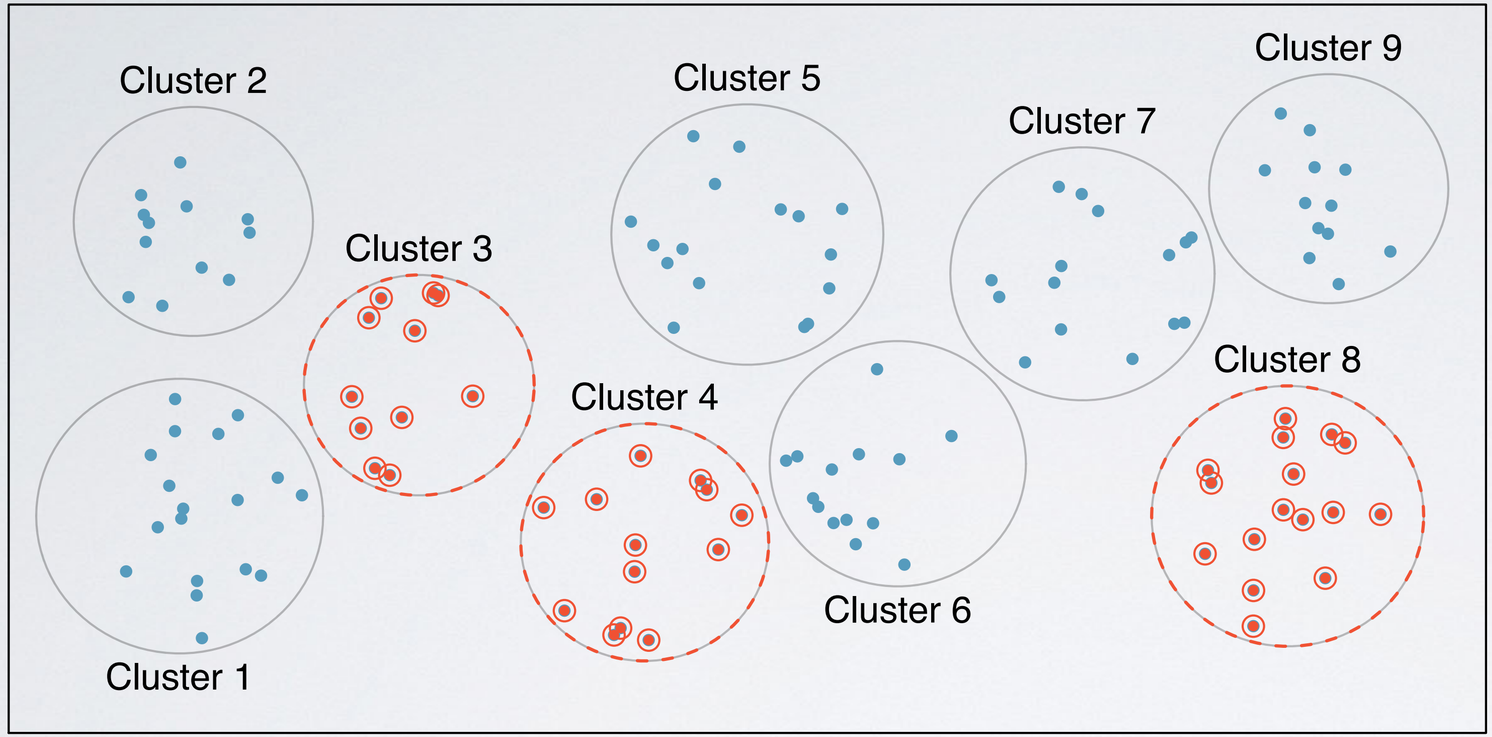
each case is equally likely to be selected

stratified sample



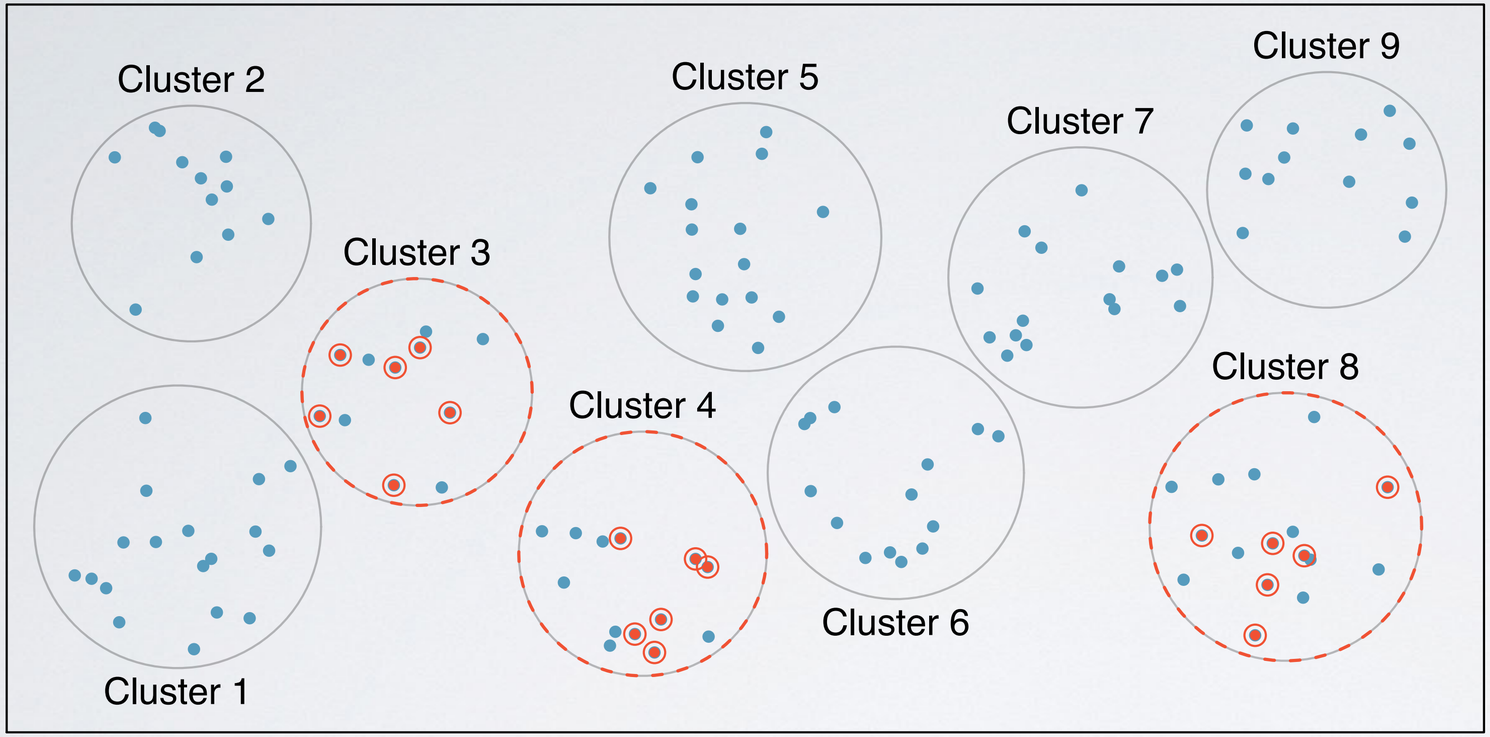
divide the population into homogenous strata,
then randomly sample from within each stratum

cluster sample



divide the population clusters,
randomly sample a few clusters,
then sample all observations within these clusters

multistage sample



divide the population clusters,
randomly sample a few clusters,
then randomly sample within these clusters