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The unknown average weight of all 2000 goats.

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	Experiment	**Observational study**
representative sample	Best!	No causality
biased sample	Can't generalize to population	useless

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The response variable would be performance on some driving task(s).

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Whether the person lives in a sunny area or whether the person is pale

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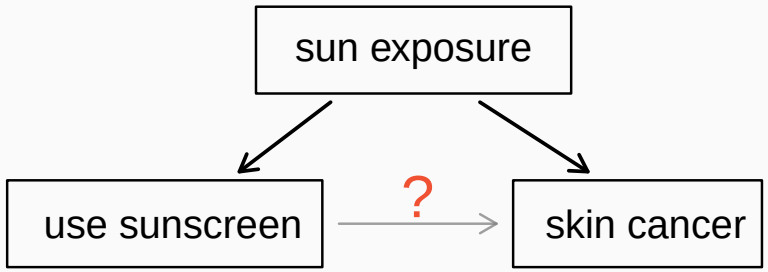

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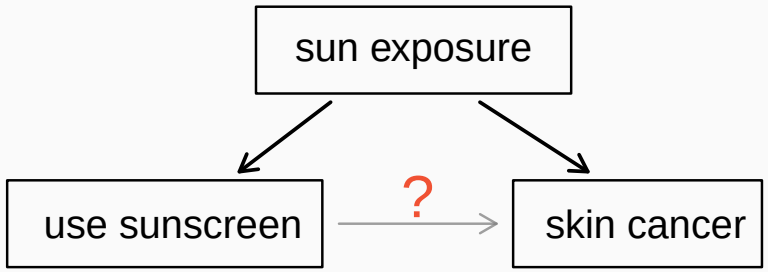

Sun exposure is a confounding variable that may explain why more suncreen is associated with more cancer.

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What could be a confounding variable?

Maybe hot temperatures cause more ice cream and more drowning.

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Prospective vs. retrospective studies

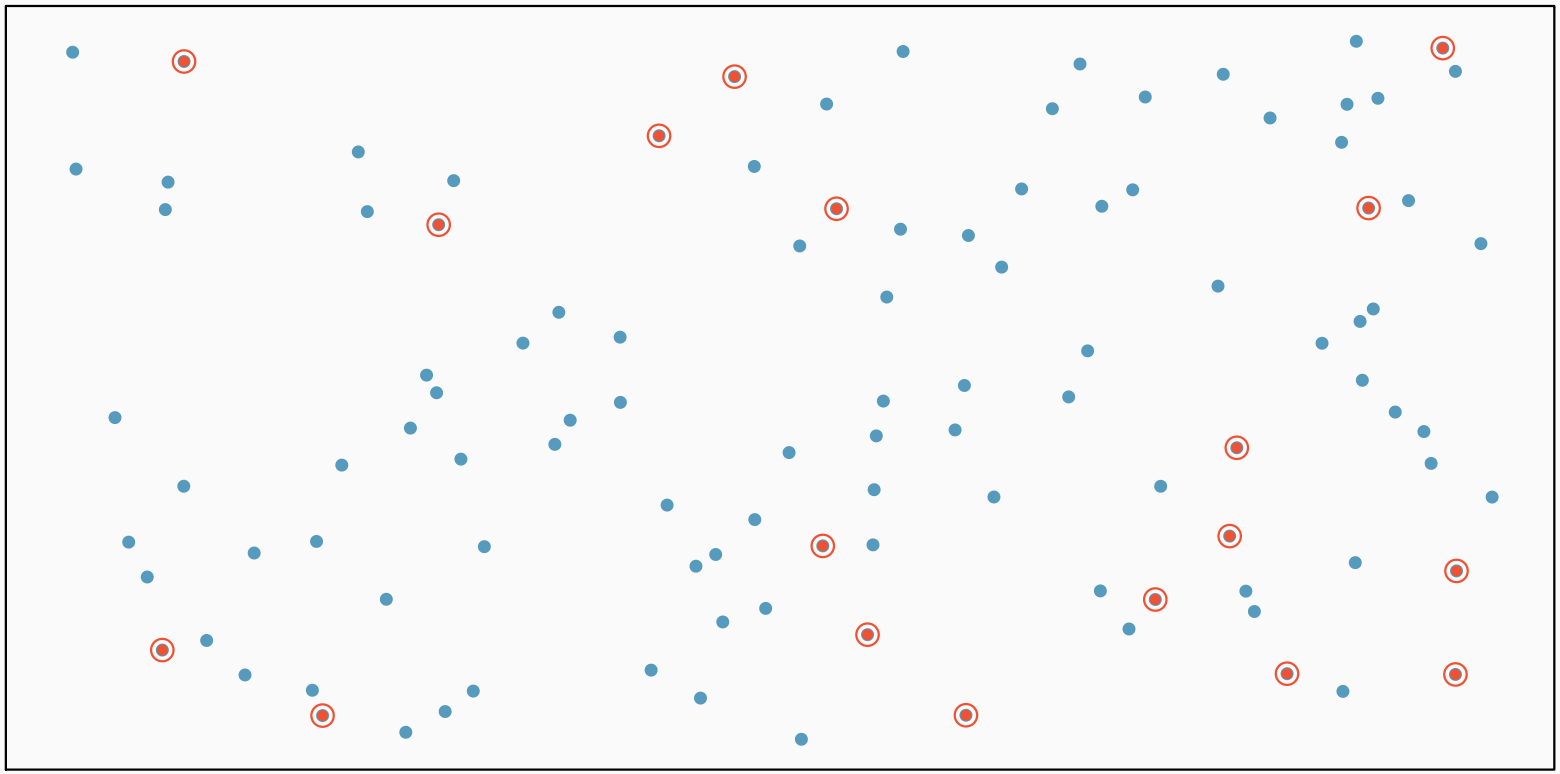
- A *prospective* study identifies individuals and collects information as events unfold.
  - Example: The Nurses Health Study has been recruiting registered nurses and then collecting data from them using questionnaires since 1976.
- *Retrospective studies* collect data after events have taken place.
  - Example: Researchers reviewing past events in medical records.

Obtaining good samples

- Almost all statistical methods are based on the notion of implied randomness.
- If observational data are not collected in a random framework from a population, these statistical methods – the estimates and errors associated with the estimates – are not reliable.
- Most commonly used random sampling techniques are *simple*, *stratified*, and *cluster* sampling.

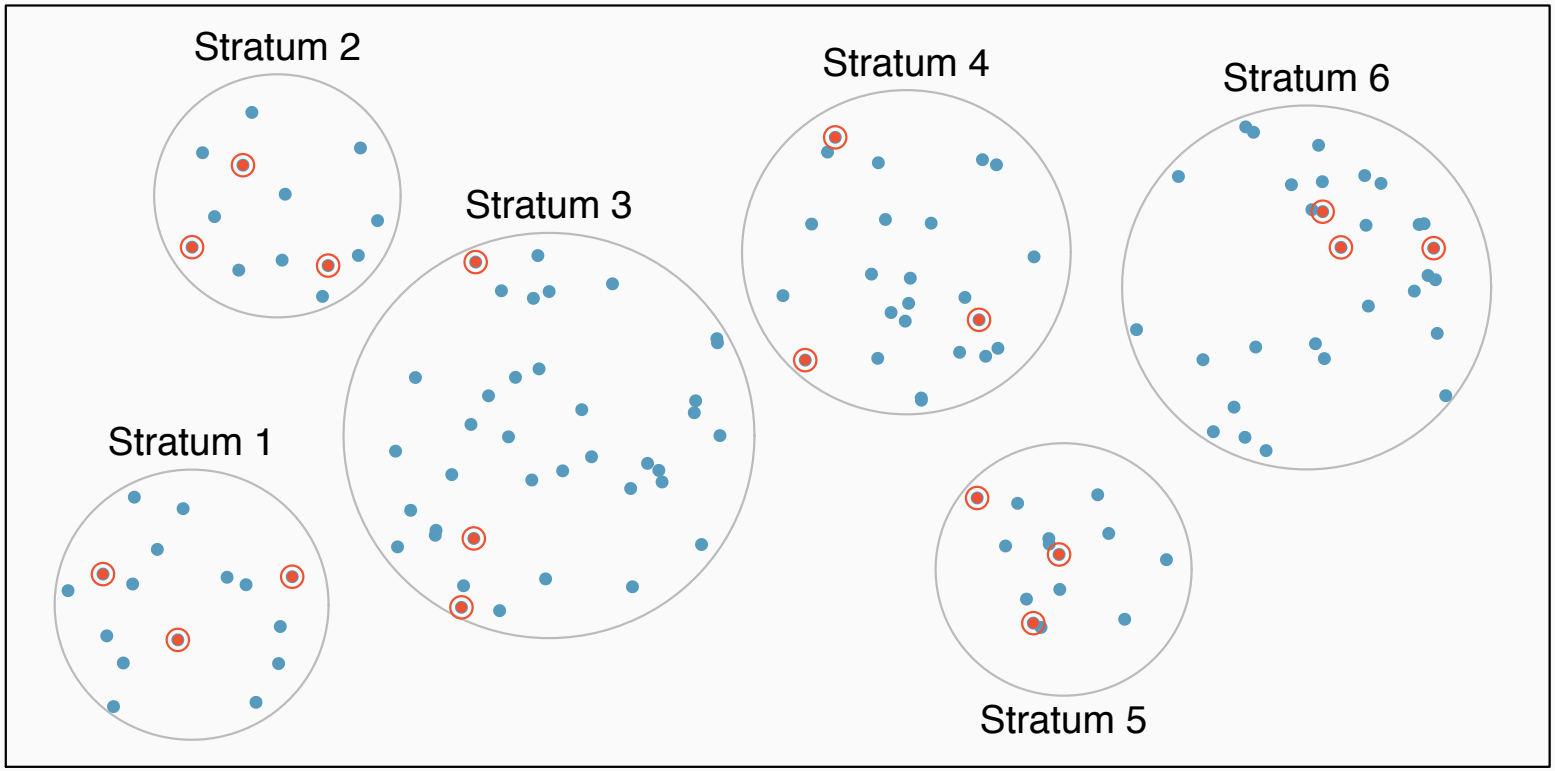
Simple random sample

Randomly select cases from the population, where there is no implied connection between the points that are selected.



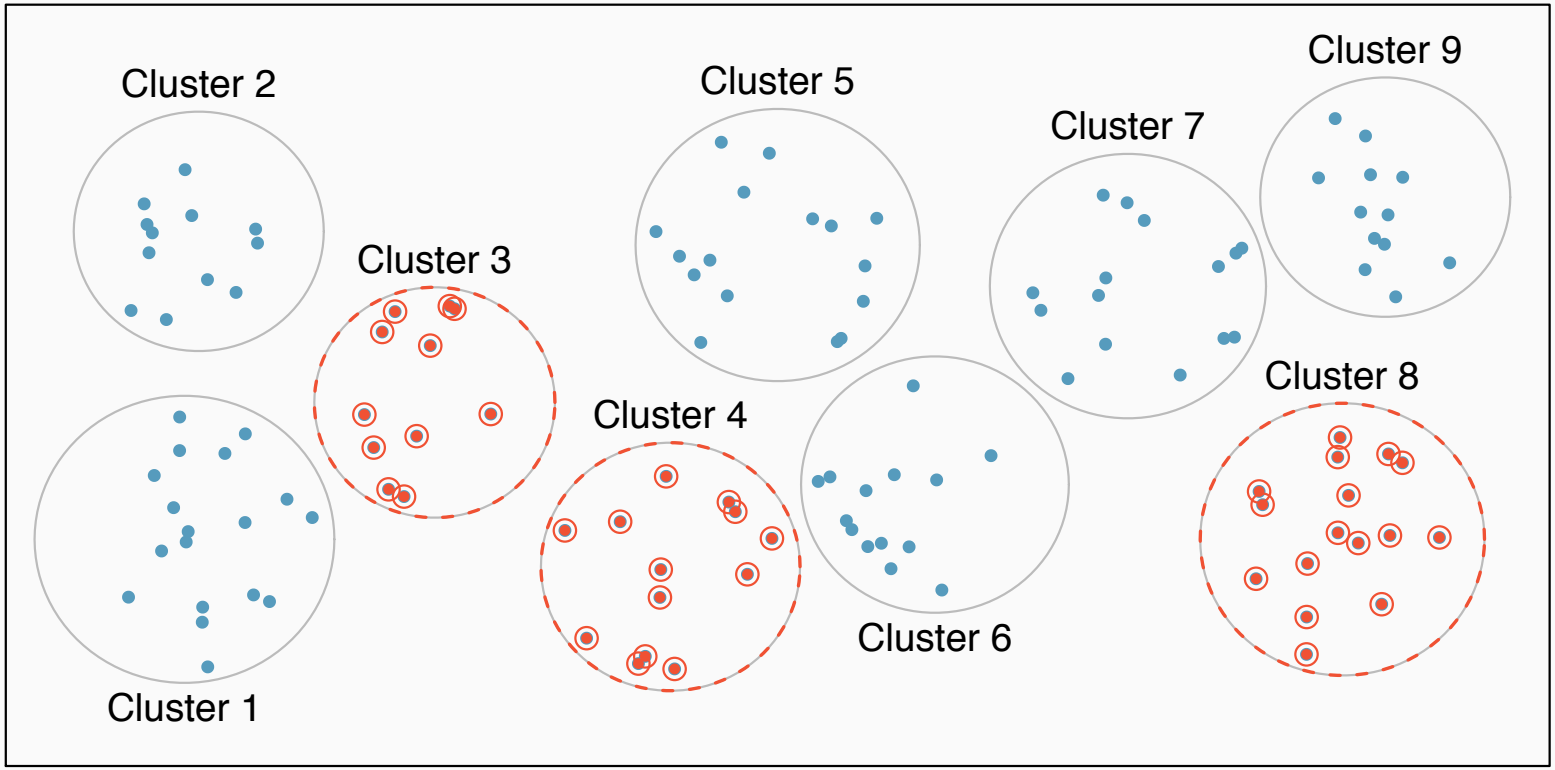
Stratified sample

Strata are made up of similar observations. We take a simple random sample from each stratum.



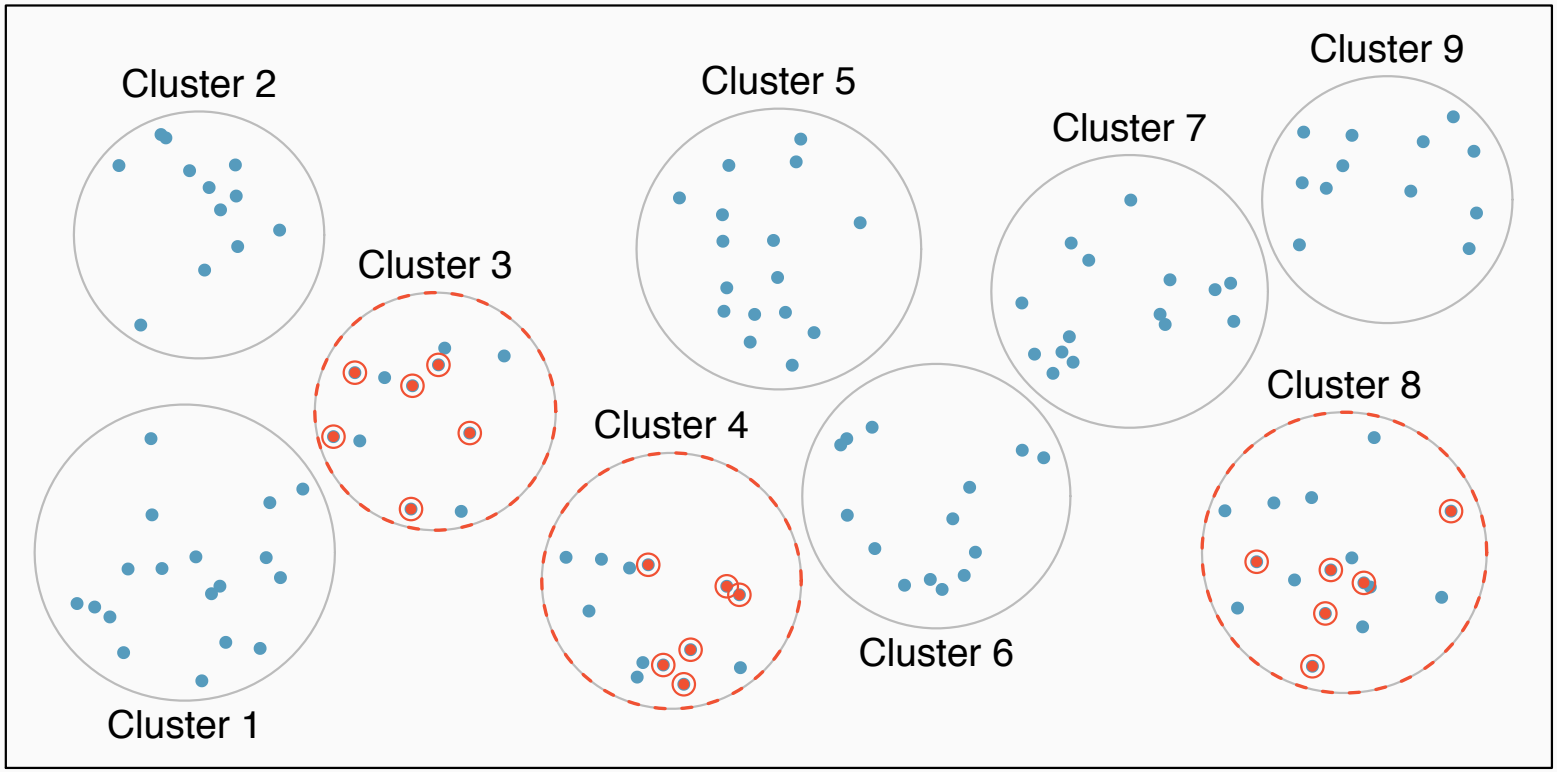
Cluster sample

Clusters are usually not made up of homogeneous observations. We take a simple random sample of clusters, and then sample all observations in that cluster. Usually preferred for economical reasons.



Multistage sample

Clusters are usually not made up of homogeneous observations. We take a simple random sample of clusters, and then take a simple random sample of observations from the sampled clusters.



Practice

A city council has requested a household survey be conducted in a suburban area of their city. The area is broken into many distinct and unique neighborhoods, some including large homes, some with only apartments. Which approach would likely be the least effective?

(a) Simple random sampling

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