


Statistical Advice

LECTURE 20

Objectives

- ▶ Explain basis of statistical advice presented
- ▶ Apply statistical advice presented to solving statistical problems.

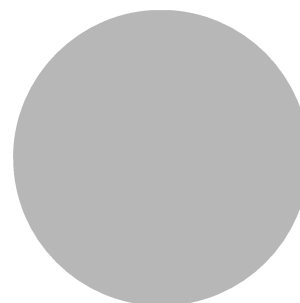


- ▶ Statistics lets you make general conclusions from limited data.

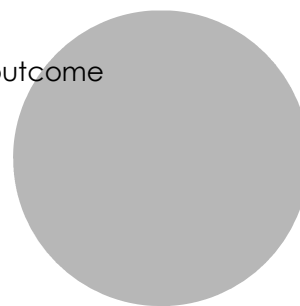


- ▶ Garbage In, Garbage Out
 - ▶ GIGO

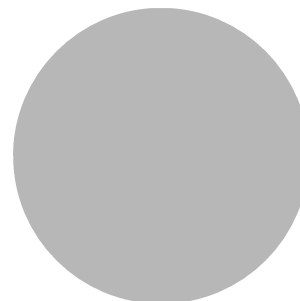
- ▶ Correlation or association does not imply causation.



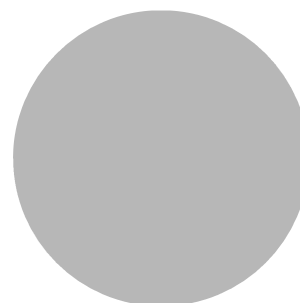
- ▶ Distinguish between studies that measure an important outcome and studies that measure a proxy or surrogate outcome.

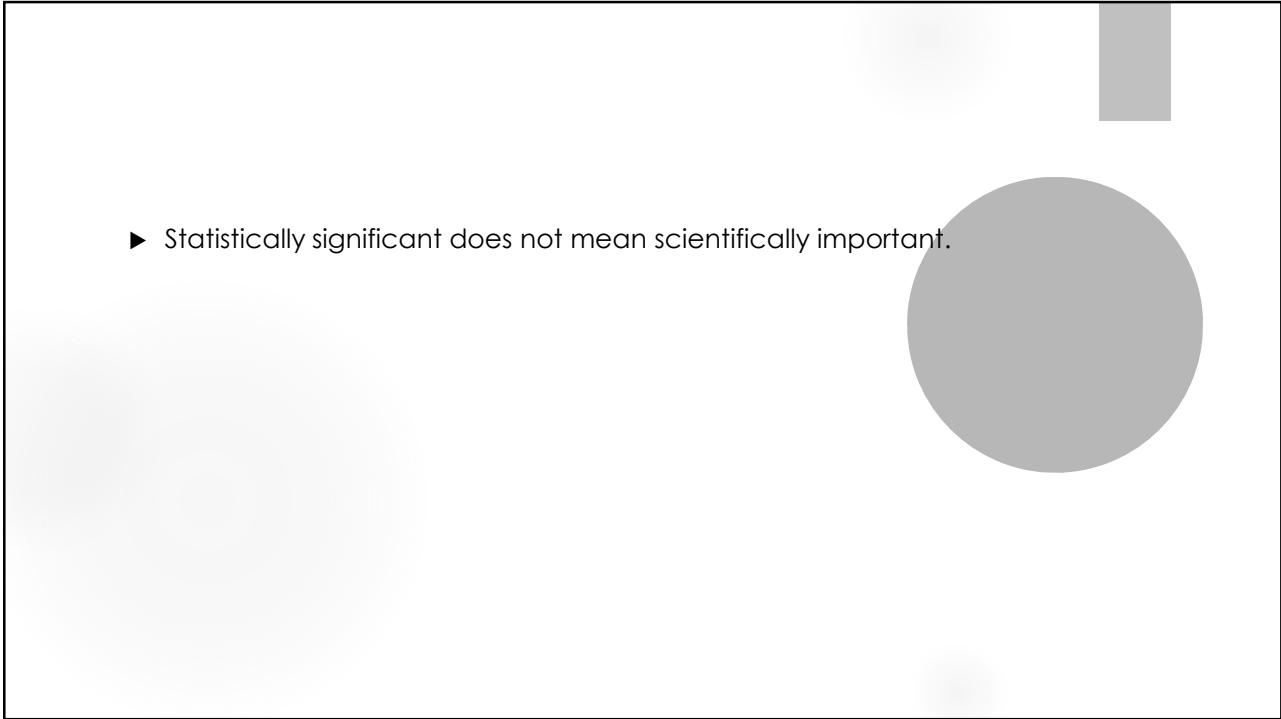


- ▶ Beware of very small and very large sample sizes.

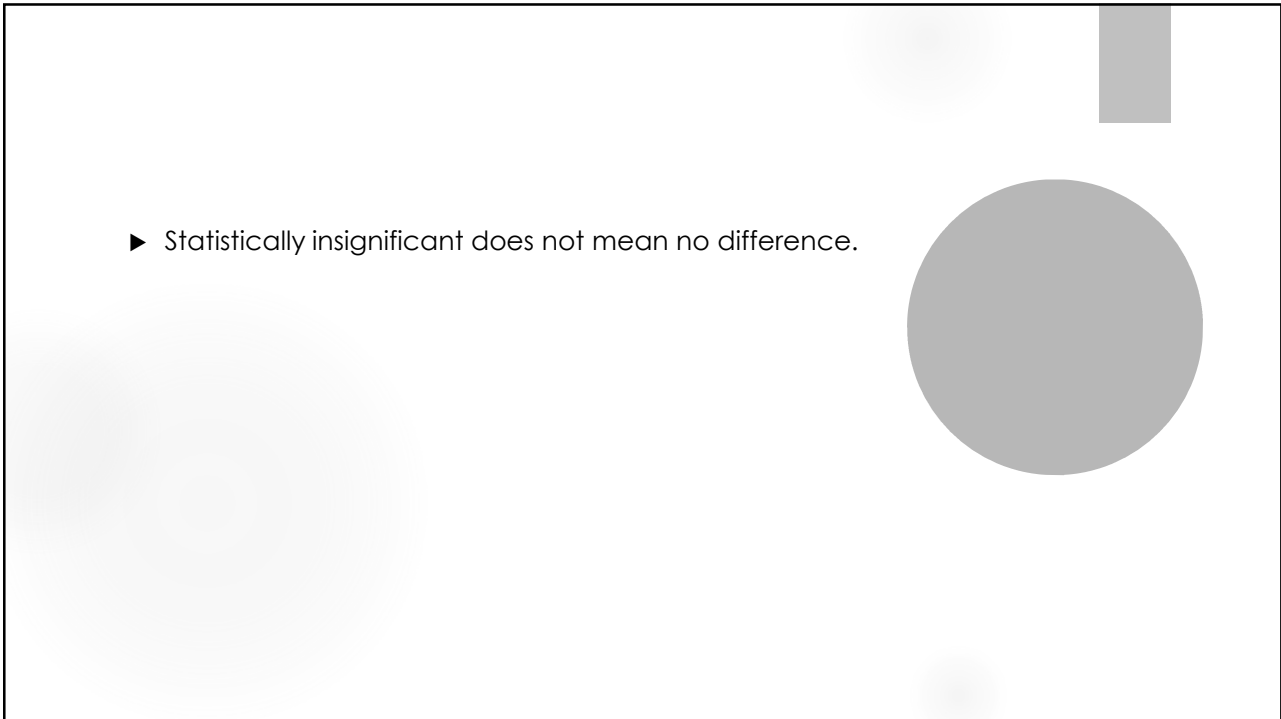


- ▶ $P < 0.05$ is not sacred.



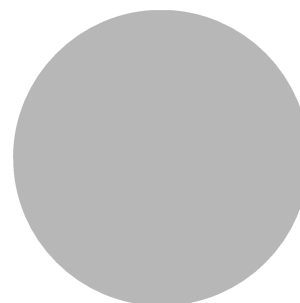


► Statistically significant does not mean scientifically important.

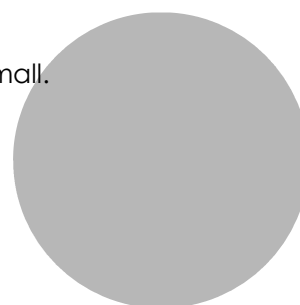


► Statistically insignificant does not mean no difference.

- ▶ Published P values tend to be optimistic.



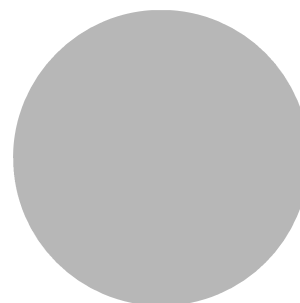
- ▶ If you compute enough P values, some are likely to be small.



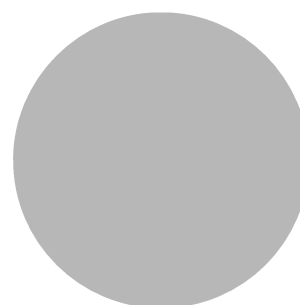
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- ▶ Distinguish between studies designed to generate a hypothesis and studies designed to test one.

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- ▶ Decisions about how to analyze data should be made in advance.

- ▶ Don't pick and choose from the results of multiple tests.

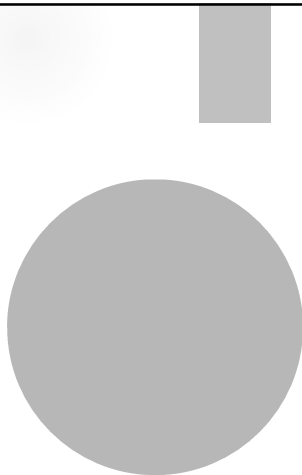


- ▶ Look at the data





► Graph the data.

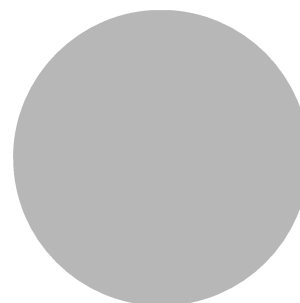


► Look beyond the data.

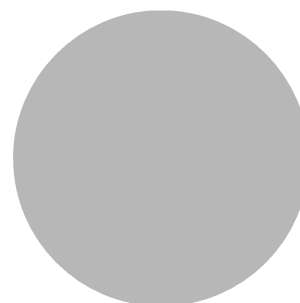
- ▶ Outliers might be important.

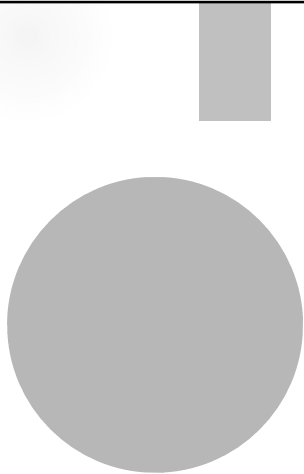
- ▶ Don't ask only whether the means are different ask whether the SDs are different.

- ▶ Non-Gaussian distributions are normal.



- ▶ Pooled data can hide important findings.



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- ▶ Beware of lurking variables.

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- ▶ Many (perhaps most) published research findings are false.

Protocol

1. Formulate biological hypothesis, carry out experiment, and collect data.
 - Steps 1-4 of the 10-step
 2. Data exploration
 3. Apply statistical model or test
 - Steps 5-10 of the 10-step
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