



浙江大学爱丁堡大学联合学院
ZJU-UoE Institute

Comparing multiple means

ADS 2, Lecture 13

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Pre-lecture version

This lecture contains a lot of questions that I will ask you to think about in class. Providing the answers beforehand would defeat that purpose. Therefore, the version of the slides available to you before the lecture will not contain all of the information that is presented in the lecture.

A complete version will be uploaded to Learn after the lecture. In the meantime, here is a picture of an adorable baby koala.



By Sheba_Also 43,000 photos [CC BY-SA 2.0 (<https://creativecommons.org/licenses/by-sa/2.0/>)], via Wikimedia Commons

So, you know how to do a t-test



So, you know how to do a t-test



But what if you want to compare more than two means?

Learning Objectives

After this week, you should be able to . . .

- Design and interpret a simulation-based hypothesis test
- Use a simulation-based test to compare more than two means
- Discuss limitations of t-tests
- Discuss problems around multiple testing

What if I want to compare more than two groups?

Can you name situations where this problem would arise?

OK, we can't just run a t-test here

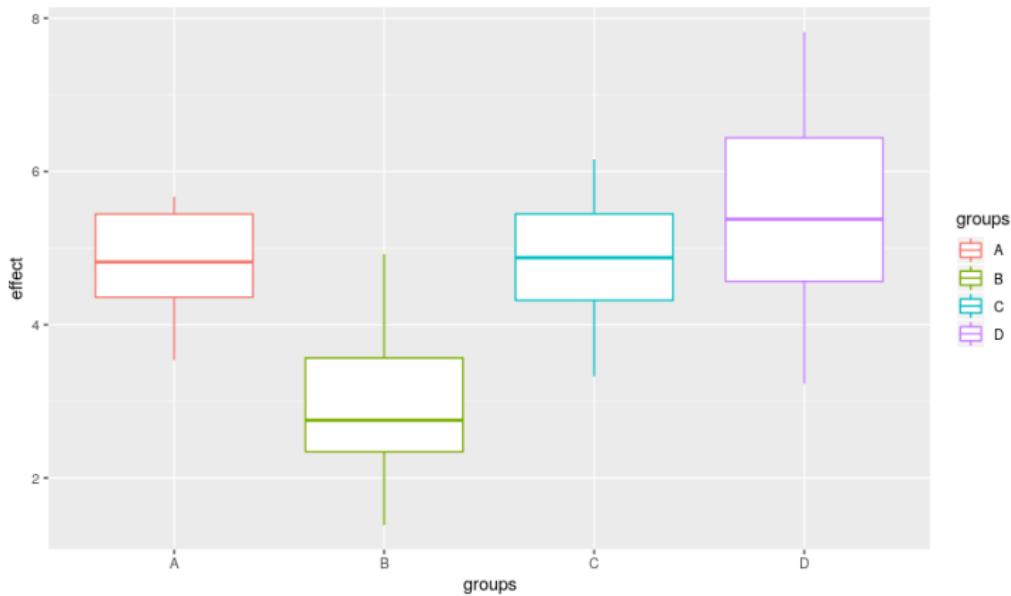
Why?

OK, we can't just run a t-test here

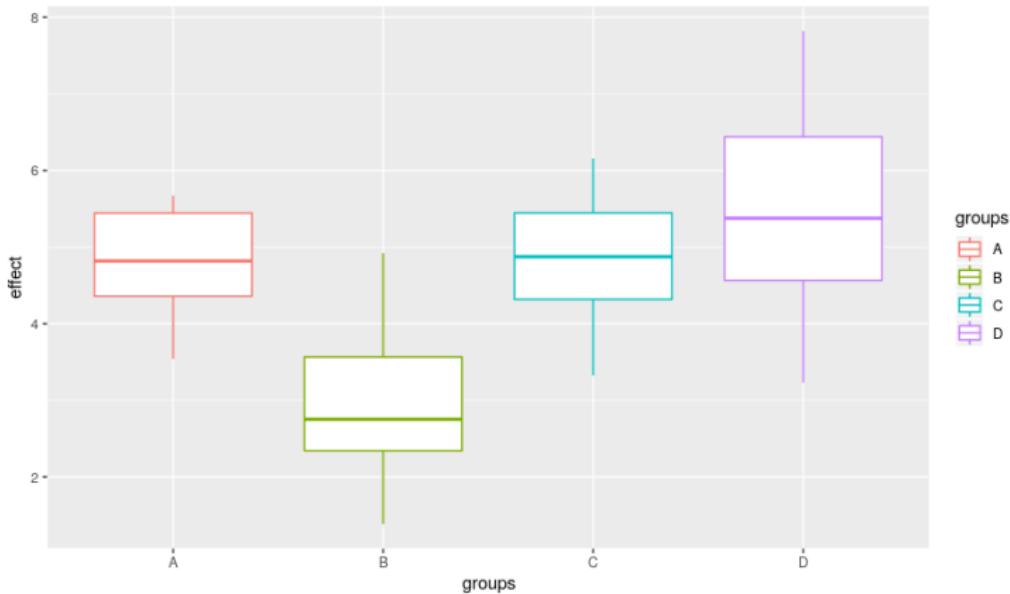
Why?

OK. But maybe we can run several t-tests?

Example: Comparing four groups



Example: Comparing four groups



How many t-tests would you need to run?

t-test review

What is the probability of getting a false-positive result if there really is no difference?

If you are not sure, think about what happens when we do a t-test. What does your p-value mean? How do you use it to decide?



Yes, OK, but ...

If we can't do a bunch of t-tests, what other option do we have?

Key idea

Looking not at group means, but at variation between individuals.

Key idea

Looking not at group means, but at variation between individuals.

Key question

If I select two individuals from different groups, are they going to be more different than if I select two individuals from the same group?

Can you think of another way of phrasing this question?

Key idea

Looking not at group means, but at variation between individuals.

Key question

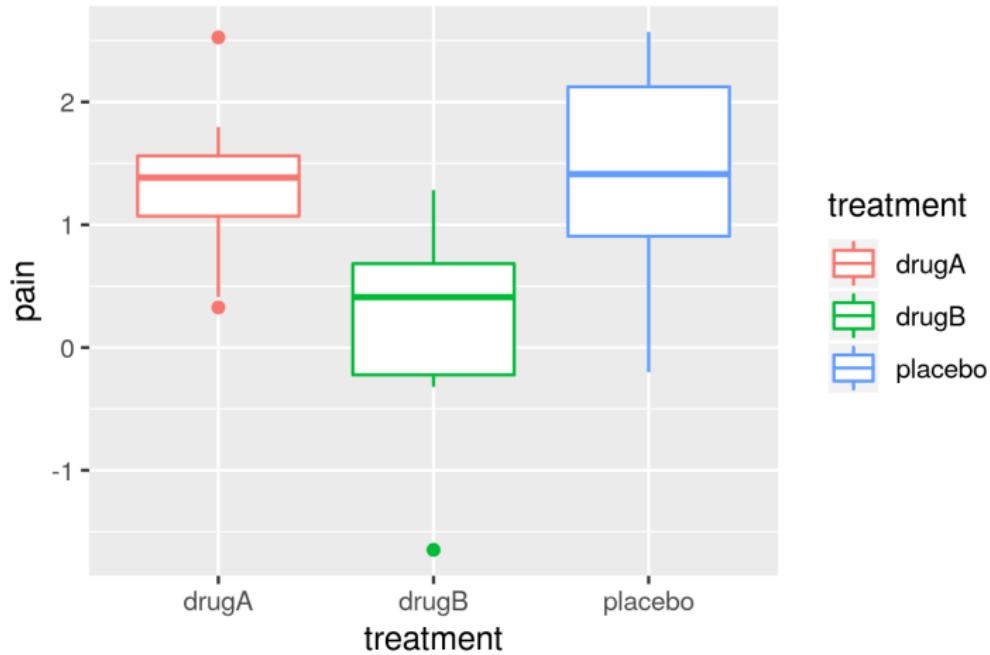
If I select two individuals from different groups, are they going to be more different than if I select two individuals from the same group?

Can you think of another way of phrasing this question?

How does this help?

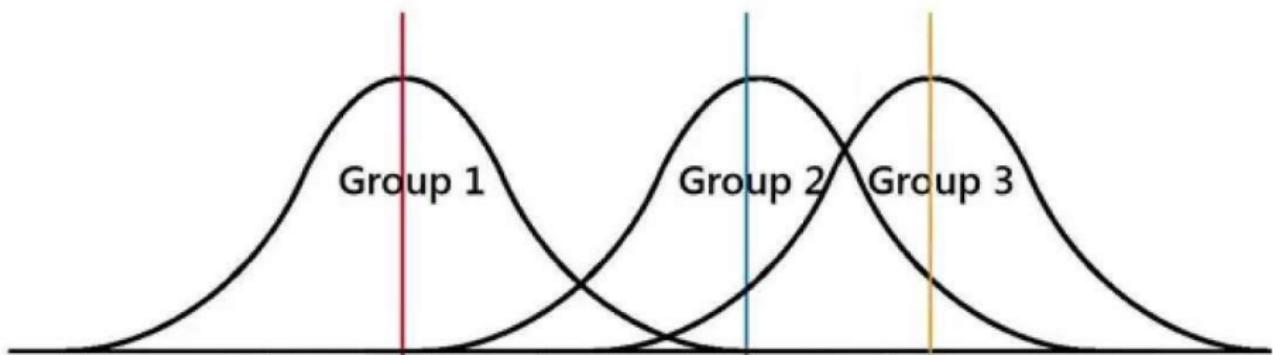
Preview: This afternoon's practical

Using a simulation-based approach to determine whether there are differences between 3 groups.



Preview: Next week's lecture

A more formal look at ANalysis Of VAriance



What questions do you have?

After this week, you should be able to . . .

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Image credits

- ANOVA. From a lecture by Nicola Romano for ABMS2, 2018/10.
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