

# Lecture 6:

## An introduction to non-parametric tests

PSYC234: Statistics: from association to modelling causality

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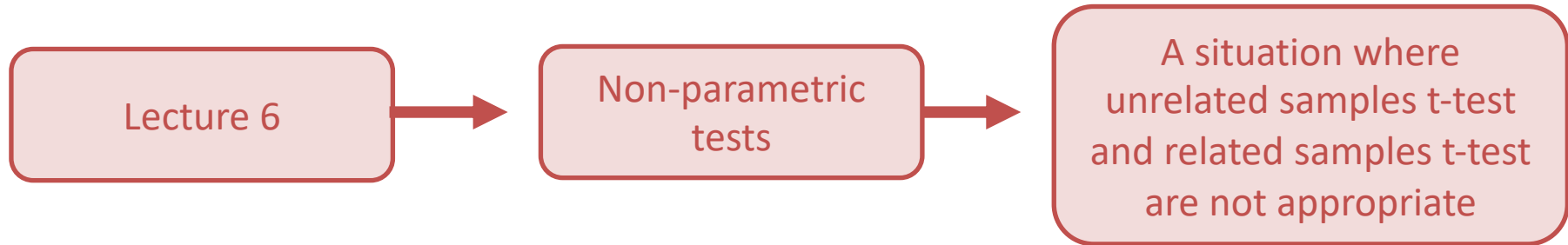
# Learning objectives

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- To understand what non-parametric tests are and when they are appropriate
- To understand how to check whether the assumption of normality is met when the data consists of two independent groups or two related samples
- To understand the theory behind Wilcoxon rank-sum test and the Wilcoxon signed-rank test
- To understand how to run the Wilcoxon rank-sum test and Wilcoxon signed-rank test in R

# The plan

**My aim:** to add a few final statistical tests to your toolbox for when the statistical test you've learned about might not be appropriate

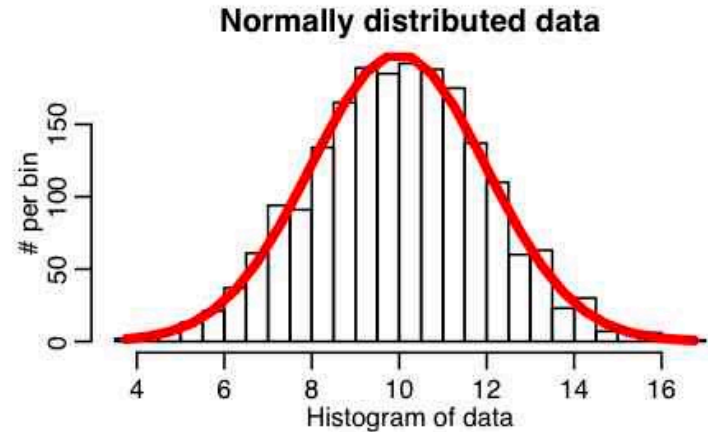


## Part 1

**What are non-parametric tests and when should they be used?**

# Parametric tests

- T-tests and ANOVAs are parametric tests
  - Rely on the assumption that the data comes from a normally distribution population
- What if the assumption of normality is violated?
  - You can conduct non-parametric tests
- Non-parametric tests are more flexible:
  - Data does not need to come from a normally distributed population



# How do non-parametric tests work?

- Parametric tests calculate the test statistic (e.g.  $F$ ,  $t$ ) using values of the dependent variable
- Most non-parametric tests do **not** use the values of the dependent variable

Group (independent variable)	Dependent variable
1	23
1	31
2	2
2	4

# How do non-parametric tests work?

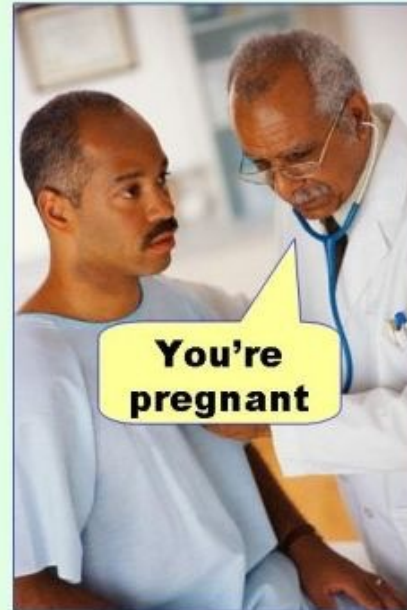
- Parametric tests calculate the test statistic (e.g.  $F$ ,  $t$ ) using values of the dependent variable
- Most non-parametric tests do **not** use the values of the dependent variable
- Instead, the data is ranked using the values of the dependent variable (lowest value = 1)
- Analysis then carried out on the ranks

Group (independent variable)	Dependent variable	Rank
1	23	3
1	31	4
2	2	1
2	4	2

# Why not just always perform non-parametric tests?

- Non-parametric tests have less statistical power
- Non-parametric tests more likely to result in Type II error (relative to parametric tests)

Type I Error  
False positive



Type II Error  
False negative

