

# **Tutorial 01, Michaelmas Term**

Research Methods for Political Science (PO3600)

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<http://muellerstefan.net/research-methods>

1. Tutorial Structure
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5. Distribution of the Sample Mean

# Tutorial Structure

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- Deepen and apply knowledge from the lectures
- Learn how to use SPSS
- Apply theories, concepts and statistical methods to real-world data
- Clarify questions, discuss homework
- **But tutorials do not replace the lectures!**

Students taking the entire module:

1. 60% of mark based on end-of-year exam (covers methods and statistics).
2. 2 homework assignments counting 4% (1 during MT, 1 during HT).
3. 2 papers counting 10% (one at the end of each term). Work will be done *in pairs* submitting joint papers.
4. 8 homework exercises (4 per term). Submit online via Turnitin *before class*.

## Exchange students (one term only)

1. 1 homework assignment counting 12%.
2. 80% of the mark based on two papers: a research proposal (30%) and a final paper based on that proposal (50%).
3. 8% based on the 4 homework exercises to be submitted *before* the tutorials.

Separate Turnitin modules per term.

MT: Class ID: **16383023**; Password: **po3600**

HT: TBD

Please register as soon as possible!

## Homework

Submit 4 homework exercises per term on Monday evening (11:59pm) preceding the tutorial session

- Week 4: HW 1 (next Monday!)
- Week 6: HW 2
- Week 9: HW 3
- Week 11: HW 4

## Paper deadlines

- Homework 1: 10/11 2017, 11:59pm
- Research proposal (one-term students only!): 24/11 2017, 11:59pm
- Paper 1: 15/12 2017, 11:59pm



## **Support & Additional Material**

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- Constant feedback through short surveys
- Notes, useful links and literature:  
<http://muellerstefan.net/research-methods>
- Questions: [mullers@tcd.ie](mailto:mullers@tcd.ie)

# How to Use SPSS

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- How to open (data) in SPSS?
- How to work reproducibly in SPSS?

## **Mean, Standard Deviation and Standard Error**

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# Application: Mean and standard deviation (#COYBIG)

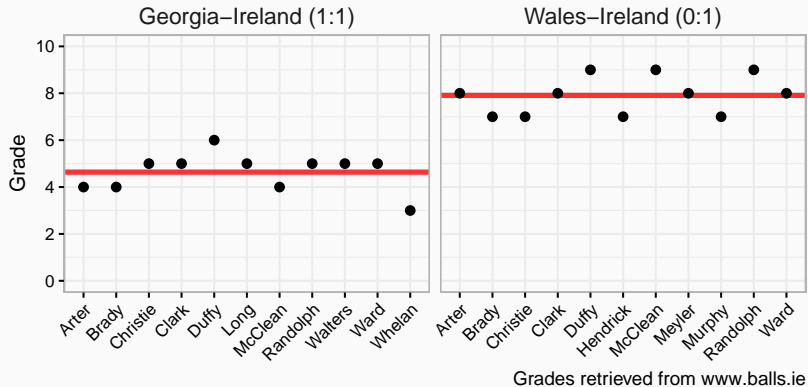
## The Ireland Player Ratings From A Truly Woeful Performance In Tbilisi



## The Ireland Player Ratings From A Bloody Heroic Performance In Cardiff



# Application: Mean and Standard Deviation (#COYBIG)



Match	$\bar{x}$	$\sigma$
Georgia-Ireland	4.63	0.81
Wales-Ireland	7.91	0.83

# Estimate mean, standard deviation, and standard error

1. Estimate mean:  $\bar{x} = \frac{\sum x}{n}$
2. Estimate standard deviation:  $\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$
3. Estimate standard error of the mean:  $sd(\bar{X}) = \frac{\sigma}{\sqrt{n}}$

Hands-on exercise: Estimate  $\bar{x}$ ,  $\sigma$ ,  $sd(\bar{X})$  for the following sample:  
9, 2, 5, 4



$$\text{Mean: } \bar{x} = \frac{9+2+5+4}{4} = \frac{20}{4} = 5$$

$$(9 - 5)^2 = 4^2 = 16$$

$$(2 - 5)^2 = (-3)^2 = 9$$

$$(5 - 5)^2 = (0)^2 = 0$$

$$(4 - 5)^2 = (1)^2 = 1$$

$$16 + 9 + 0 + 1 = 26$$

$$\text{Standard deviation: } \sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} = \sqrt{\frac{26}{4-1}} = 2.94392$$

$$\text{Standard error: } sd(\bar{X}) = \frac{\sigma}{\sqrt{n}} = \frac{2.94392}{\sqrt{4}} = 1.47196$$

## **Distribution of the Sample Mean**

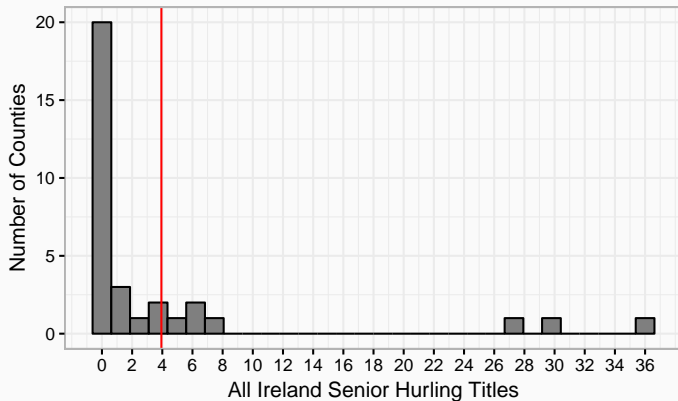
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As your sample size ( $n$ ) increases, we find a normal distribution when (for example) taking sample mean or sample sum.

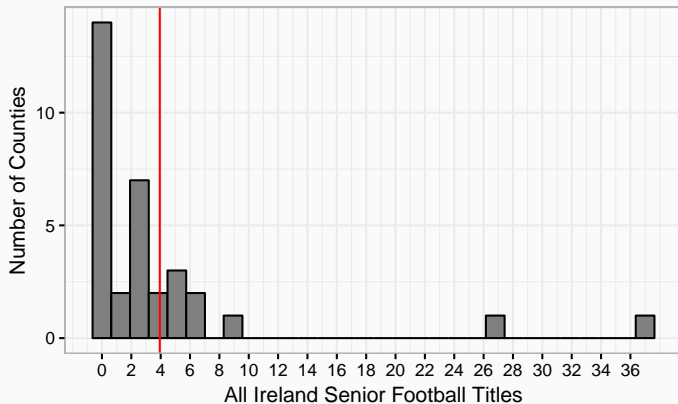
# Irish Example of Skewed Distribution



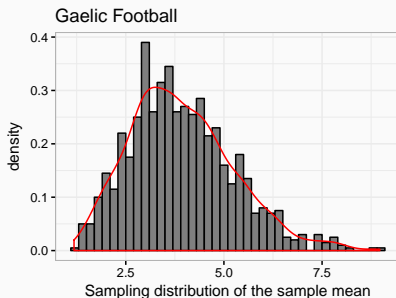
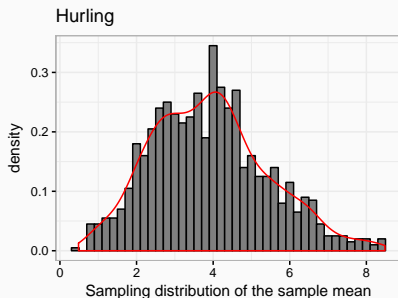
# Distribution of All-Ireland Hurling Titles per County



# Distribution of All-Ireland Football Titles per County



# Distribution of Bootstrapped Sample Means



*Note:* 1000 random draws, plot distribution of means; hypothetical example as we draw from the population!