Reading materials: Statistical considerations when planning your research project

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Links in the presentation

These are the links that we have checked and found useful. We provide links to some applets which include tutorials that guide you through the basic statsitical concepts such as sampling distribution of the means, effect size, power and sample size. You are encouraged to play with the applets and follow the short tutorial before the webinar. We will discuss these concepts together during the webinar.

Hands-on workshops in R

http://ecoscope.ubc.ca/events/

Survey sampling - selection bias

Learn why pollsters were wrong about Brexit

http://uk.businessinsider.com/pollsters-know-why-they-were-wrong-about-brexit-2016-7

Sampling distribution - applets

Learn about the sampling distribution of the means. Change the sample size and see how it affects the sampling distribution of the mean. Click on the tutorial button to guide you through the applet. You will learn how the sample size affects the precision of the estimates.

Applet 1. Sampling distribution of the means when population follows normal distribution

http://www.zoology.ubc.ca/~whitlock/Kingfisher/SamplingNormal.htm

Applet 2. Sampling distribution of the means when population follows non-normal distribution

http://www.zoology.ubc.ca/~whitlock/Kingfisher/CLT.htm

For more stat tutorials visit StatSpace

https://statspace.elearning.ubc.ca/

Applet 3. Sample size and power

Learn how the changes in sigma, effect size and power affect the sample size needed. You can select various study designs.

Power and Error Limits If the applet does not work from the web browser, you can download the **piface.jar** You will need. You will need to have the Java Runtime Environment (JRE) or the Java Development Kit

(JDK) installed on your system. You probably already have it; but if not, these are available for free download for several platforms from **Sun**.

Other resources for sample size calculation are included in

Wikipedia -> **Statistical Power**

Disussions covered in the presentation

Sampling methods

https://www.bcps.org/offices/lis/researchcourse/develop_data_sampling.html

Election polling

https://www.nytimes.com/2016/10/06/upshot/when-you-hear-the-margin-of-error-is-plus-or-minus-3-percent-think-7-instead
html

Confounding

https://blogs.qub.ac.uk/griefstudy/2013/12/18/dag-blog-part-1-understanding-confounding/

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4017459/

Simpson's paradox

https://en.wikipedia.org/wiki/Simpson%27s_paradox

The Significance of Power

http://asq.org/quality-progress/2015/07/statistics-roundtable/the-significance-of-power.html

Effect size

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3444174/

Randomized block design

https://onvegetables.com/2014/03/31/snake-oils/

Experimental design

http://www.3rs-reduction.co.uk/html/9___experimental_designs.html

Factorial experiment

http://www.3rs-reduction.co.uk/html/10___factorial_experiments.html

Repeated measurements within a subject

https://dsowen.wordpress.com/2011/12/01/the-advantages-and-disadvantages-of-repeated-measures/

Expremental units and Pseudo-replication

https://www.statisticsdonewrong.com/pseudoreplication.html

https://onlinecourses.science.psu.edu/stat502/node/174

https://www.ma.utexas.edu/users/mks/statmistakes/pseudorep.html

http://www.3rs-reduction.co.uk/html/9___experimental_designs.html

Good article on the multiple testing problem:

http://egap.org/methods-guides/10-things-you-need-know-about-multiple-comparisons

Other resources

Various stat resources

https://www.stat.ubc.ca/~jenny/resources.html

Introductory stat references:

Statistics and data with R: an applied approach through examples, Cohen, Yosef; Cohen, Jeremiah Y (2008) http://onlinelibrary.wiley.com.ezproxy.library.ubc.ca/book/10.1002/9780470721896

See http://ezproxy.library.ubc.ca/login?url=http://link.springer.com.ezproxy.library.ubc.ca/bookseries/3022 for the rest:

The R Software, Fundamentals of Programming and Statistical Analysis, Pierre Lafaye de Micheaux, Rémy Drouilhet, Benoit Liquet (2013)

Introductory Statistics with R, Peter Dalgaard (2008)

Evolutionary Statistical Procedures, An Evolutionary Computation Approach to Statistical Procedures Designs and Applications, Roberto Baragona, Francesco Battaglia... (2011)

Software for Data Analysis, Programming with R, John Chambers (2008) This one seems to be mainly about using R and not on any types of specific analyses

The following two references cover a good variety of popular topics and how to use R in each case:

The R book, Michael J. Crawley (2012) http://onlinelibrary.wiley.com.ezproxy.library.ubc.ca/book/10.1002/9781118448908

A Handbook of Statistical Analyses Using R, Second Edition, Torsten Hothorn and Brian S. Everitt (2009) http://www.crcnetbase.com.ezproxy.library.ubc.ca/doi/book/10.1201/9781420079340 There is a third edition in 2014 which the library says they have online but I wasn't able to access it