Research Education Seminar Series

Lecture 5

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Basic outline

1. Research Overview

- Overarching aims of the research office
- Why do we engage in research?
- Simplified research framework
- Research translation framework
- Evidence-based practice pyramid

2. Robust study design

- Epidemiological methods – study designs
- Key elements of study validity and critical appraisal
- Measures of association
- Determining sample size – power analysis

3. Analysis

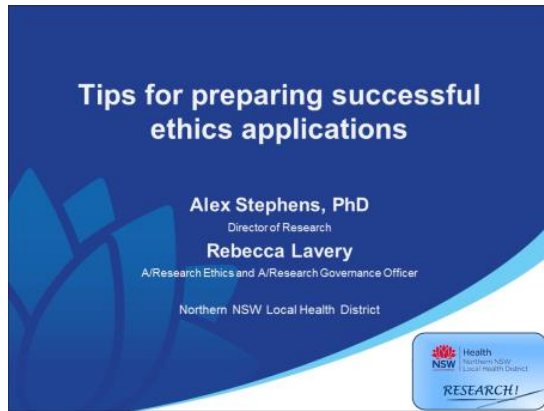- Basic biostatistical methods and analysis

4. Writing for research

- Writing grants, papers and scientific presentations

5. Ethics, governance and software

- Research ethics and governance
- Research software

Research ethics and governance

- Tips for preparing successful ethics applications – *PowerPoint presentation*

- Our ethics and governance website:
  http://nnswlhd.health.nsw.gov.au/about/northern-nsw-local-health-district/human-research-ethics-and-governance/

Surveys, data collection and database management

- Developed in 2004 by a multi-institution consortium led by Vanderbilt University as a secure data collection tool for clinical researchers

- REDCap is a very powerful tool for building and managing online surveys, data collection and databases.

- Is used as a secure, web-based application, with both online and offline development and data capture functionality

- Very wide footprint – used all over the world with 95 institutions already registered in Australia alone

- Used by numerous Universities and also by other LHDs

Main features

- Secure and online
- Caters for multi-site access via computer or mobile device
- Fast and flexible
- Allows offline development and data capture (with subsequent transfer to project upon internet connection)
- Powerful survey design tool
- Basic reporting
- Exporting feature to multiple programs and packages including Excel, PDF and numerous statistical packages (R, SPSS, SAS, Stata)
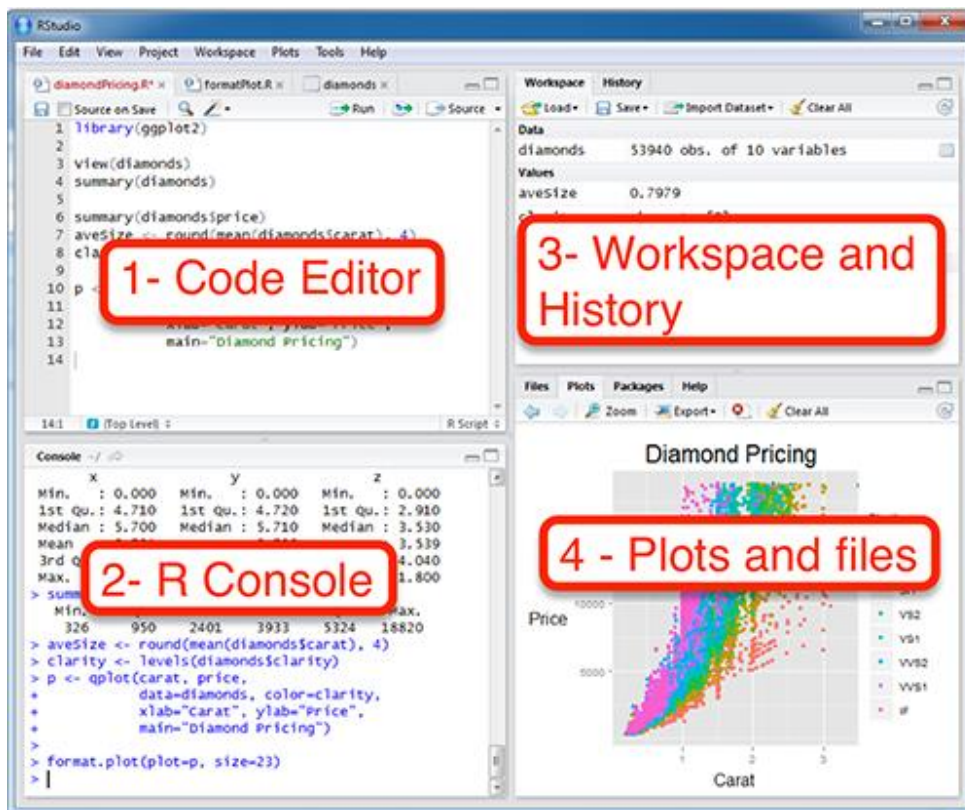
R statistical software

- The R project for statistical computing is an incredible, free, open source software for statistical analysis and graphics.

- R is underpinned by a multitude of packages that facilitate basic and advanced data and biostatistical analysis, and (very impressive) graphics.

- R is syntax-based – therefore, coding is required to run data manipulations and analysis.

- Although coding may appear to be time consuming, written code can be saved and run over again, or adapted to different projects → this will likely save time in the long run.

- A user friendly wrapper for R is R Studio, which provides graphical user interface (GUI)-type functionality, although coding is still required.

- Key elements include the code editor, R console, workspace and history, and plots and files consoles

- The program is incredibly flexible, catering for a vast suite of data manipulation and analysis techniques, and has excellent static and dynamic graphics and data presentation tools (including apps).
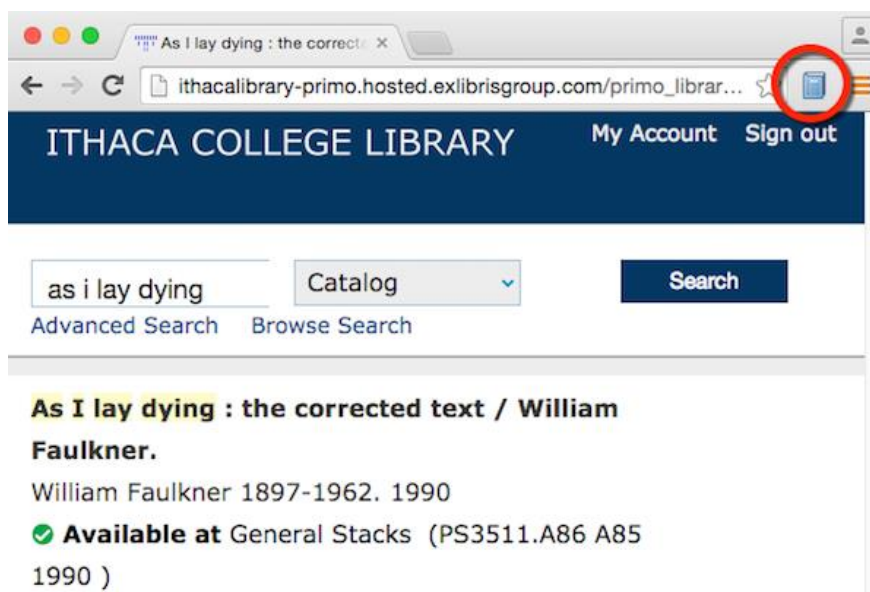
Main advantages

- Probably the most comprehensive statistical analysis software
- R (the programming language) is developed for statistical analysis by practicing statisticians
- Excellent graphical capabilities
- Free and Open Source
- Connects with many software and formats (e.g. CSV files, Microsoft Excel, SPSS, SAS, MySQL, Oracle)
- Extensive library of packages

Disadvantages

- Has a fairly steep learning curve to become familiar with programming language, although the language is intuitive and is of a similar level to other statistical program languages

- Documentation (for packages) can sometimes be difficult to follow

zotero

- https://library.ithaca.edu/sp/subjects/zotero

- Zotero [zoh-TAIR-oh] is a free, easy-to-use tool to help you collect, organize, cite, and share your research sources (https://www.zotero.org)

- Zotero allows you to capture and save bibliographic information about items found on the web

- Zotero software works on PC, Mac and Linux systems

- Bibliographic items are easily added to Zotero by clicking on an icon which appears in the browser toolbar once the program is installed

- Multiple item formats can be added to Zotero including library catalogues or databases, journal articles, or generic webpages (e.g. news site)

- If it's not possible to add an item from content, new items can be created and added manually in a variety of formats (e.g. book, book section, document, journal article).

- Bibliographies can be created from items saved in Zotero by simply selecting them, and clicking "Create Bibliography from Items…". Bibliographies can be created according to a number of styles.

- In-text citations can also be created (perhaps the most common and useful way to manage references) via the installation of plug-in in word processing software (e.g. Microsoft Word).