# The culture of open scholarship

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# About me

- Applied statistician working in genetics
- Co-author on 170 papers and 1 book
- Reviewer for 90 different journals
- Formerly
  - Associate editor and Senior editor at *Genetics*
  - Associate editor at *Biostatistics*
  - Associate editor at *Journal of the Americal Statistical Association*
  - Academic editor at *PeerJ*
  - Editorial Board member of *BMC Biology*

`kbroman.org/broman_cv.pdf`

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# Data Organization in Spreadsheets

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**ABSTRACT**

Spreadsheets are widely used software tools for data entry, storage, analysis, and visualization. Focusing on the data entry and storage aspects, this article offers practical recommendations for organizing spreadsheet data to reduce errors and ease later analyses. The basic principles are: be consistent, write dates like YYYY-MM-DD, do not leave any cells empty, put just one thing in a cell, organize the data as a single rectangle (with subjects as rows and variables as columns, and with a single header row), create a data dictionary, do not include calculations in the raw data files, do not use font color or highlighting as data, choose good names for things, make backups, use data validation to avoid data entry errors, and save the data in plain text files.

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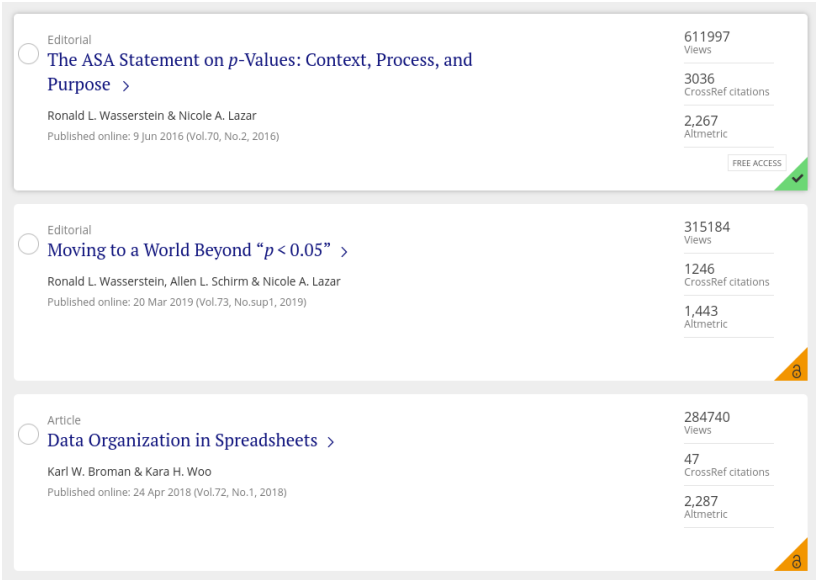
**KEYWORDS**
Data management; Data organization; Microsoft Excel; Spreadsheets

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | Date | 11/3/14 | | | | | |
| 3 | Days on diet | 126 | | | | | |
| 4 | Mouse # | 43 | | | | | |
| 5 | sex | f | | | | | |
| 6 | experiment | | values | | | mean | SD |
| 7 | control | | 0.186 | 0.191 | 1.081 | 0.49 | 0.52 |
| 8 | treatment A | | 7.414 | 1.468 | 2.254 | 3.71 | 3.23 |
| 9 | treatment B | | 9.811 | 9.259 | 11.296 | 10.12 | 1.05 |
| 10 | | | | | | | |
| 11 | fold change | | values | | | mean | SD |
| 12 | treatment A | | 15.26 | 3.02 | 4.64 | 7.64 | 6.65 |
| 13 | treatment B | | 20.19 | 19.05 | 23.24 | 20.83 | 2.17 |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# data organization organizing data in spreadsheets

My collaborators sometimes ask me, “In what form would you like the data?” My response is always, “In its current form!” If the data need to be reformatted, it’s much better for me to write a script than for them to do a bunch of cut-and-paste. I’m a strong proponent of data analysts being able to handle any data files they might receive.

But in many cases, I have to spend **a lot** of time writing scripts to rearrange the layout of the data. And how would you like your data analysts to spend their time? Reorganizing data, or really analyzing data?

Most of my collaborators enter and store their data in spreadsheets, and mostly Microsoft Excel. Before starting to enter data into a spreadsheet, it’s good to spend some time thinking about the layout. The way that you organize the data in spreadsheets can have a big impact on your data analyst’s quality of life.

This is a tutorial on that topic: *how to organize data in spreadsheets*. For complex, high-dimensional data, it may be better to use a formal database. But for many projects, spreadsheets are perfectly fine. But data in spreadsheets can be pretty and easy to work with, or they can be a sloppy mess requiring serious downstream reorganization efforts. We want to avoid the latter.

I don’t think these ideas come naturally to anyone. So if you’re not happy with the structure of your current data files, don’t despair! And also don’t apply tedious and potentially error-prone hand-editing to revise the arrangement. Rather, apply these principles when designing the layout for your next dataset, to help make analyses easier.

- Be consistent.
- Write dates as `YYYY-MM-DD`.
- Fill in all of the cells.

# Data organization in spreadsheets

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September 11, 2018

**Abstract**

Spreadsheets are widely used software tools for data entry, storage, analysis, and visualization. Focusing on the data entry and storage aspects, this paper offers practical recommendations for organizing spreadsheet data to reduce errors and ease later analyses. The basic principles are: be consistent, write dates like YYYY-MM-DD, don't leave any cells empty, put just one thing in a cell, organize the data as a single rectangle (with subjects as rows and variables as columns, and with a single header

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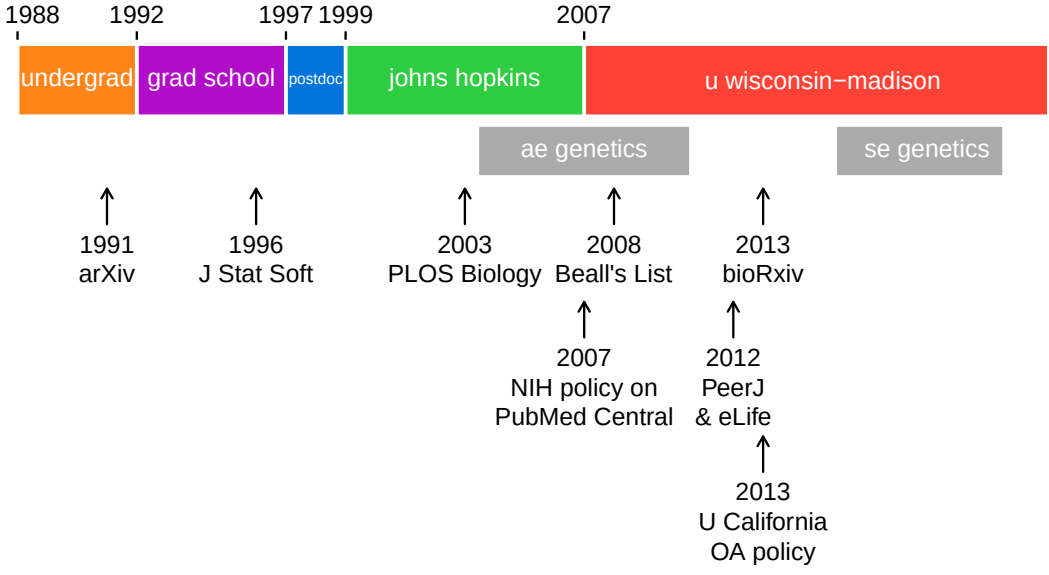
# Personal timeline



# What has changed?

- Rise of preprints in biology
- Rise of *Nature Communications*
- PubMed Central: expansion, with no embargo
- Emphasis on computational reproducibility

# What hasn’t changed?

- Attachment to Impact Factor
- Attachment to Science, Nature, and Cell
- Researchers don’t read much

# Barriers to OA

- Most scientists don’t seem to care
- Cost