

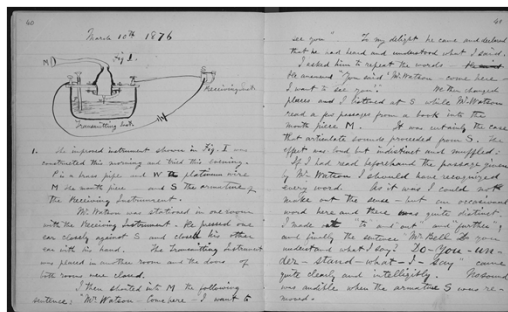
10.1.2018

# Tooling around

## Our dependency on software

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## Style of labnotes & publication from 1850-2000

[illegible]

## Digital hardware-late 1990s ed.



## Software-big role for acceleration in science

- Office suite: Manuscripts, Grant applications, Analyses, Reviews, Email
- Servers (Data storage, Upload)
- Software that drives lab hardware (PCR cycler, scanner for western blots, microscopy)
- Digital libraries (PubMed, Genbanks, ...)
- Helper software (stand alone or online)

## Basic software tools for researchers

### Essential

- Office Suite
  - Word processor
  - Spreadsheet
  - Screen Presentation
- Reference Manager
- Image Editing Software

### Good to Have

- Statistical Software
- Vector Graphics Editor

### Better to Have

- Strategy for note taking, organizing, archiving
- Strategy for backup /prevention of data loss

## Types of Software (licenses)

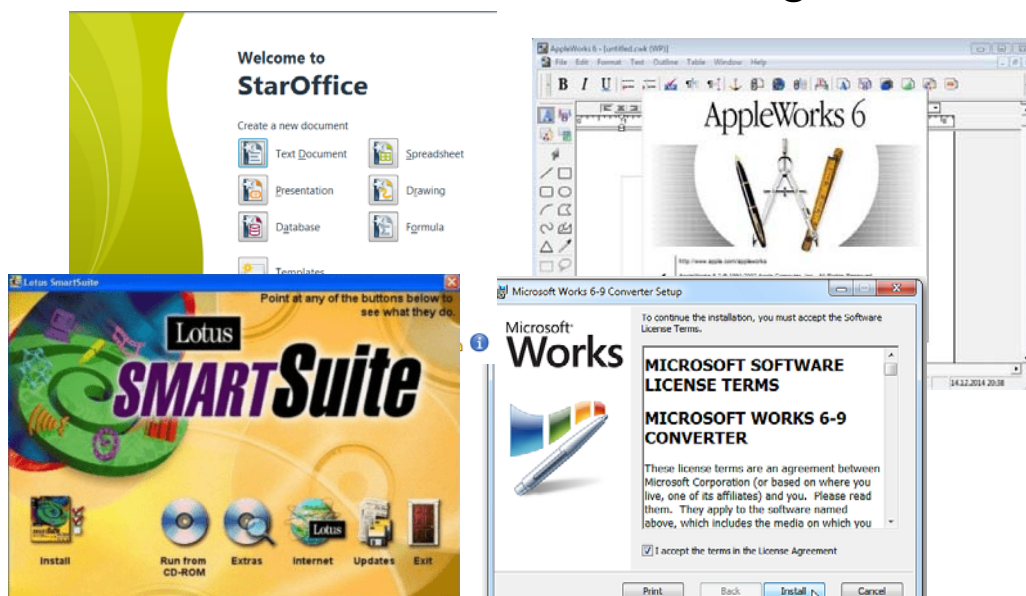
1. Commercial Software
2. Freemium Software
3. Freeware
4. Open Source

Which type of software am I going to use now and in the future ?

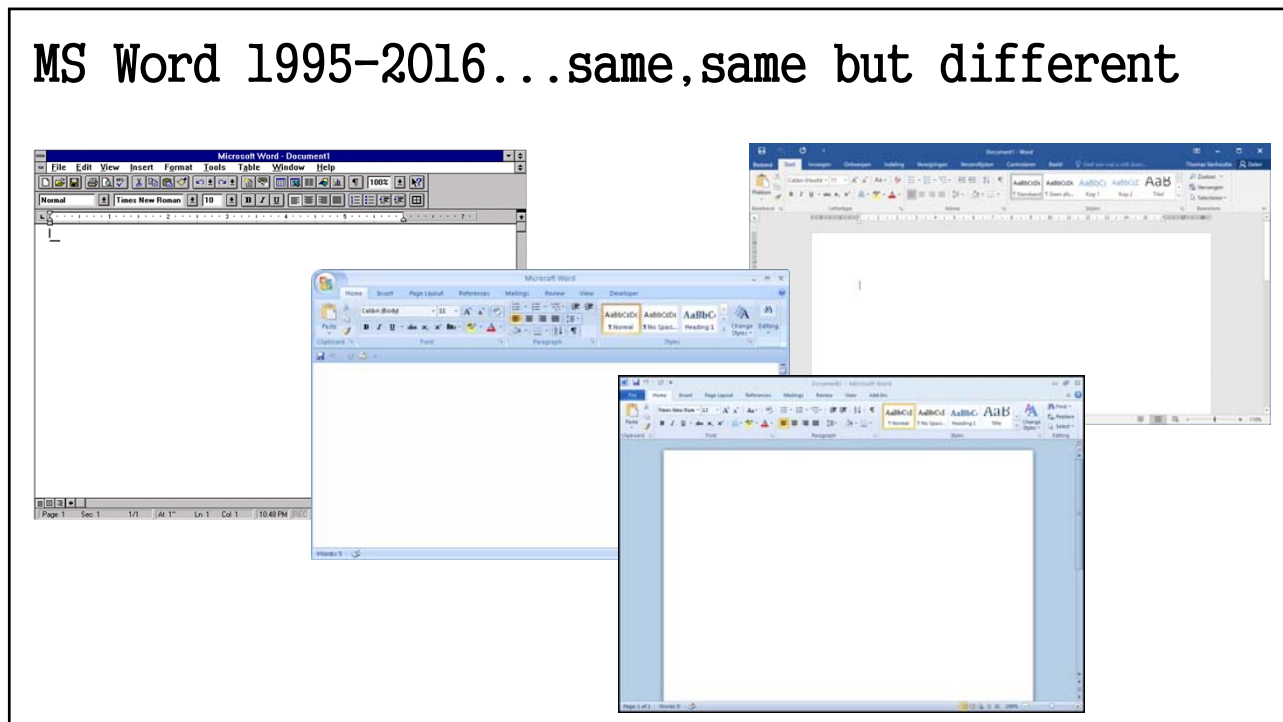
## Things you run into

- Software/Tools in your research environment changes (microscopy, mol bio)
- Software/Tools is not really fit-for-purpose
- You use only a small fraction of a software package for one specific function
- The software you need is not available at your institution

## Obsolete Office Packages



## MS Word 1995-2016...same,same but different



## Questions before committing to a (proprietary) software

- How long has the software been around (versions, update cycles) ?
- How much does one licence cost for home use /academic version ?
- What export and import formats exist? Are they useful to transfer your data to a competing product? Can I obtain raw data ?

## Questions before committing to a (proprietary) software

- Is/are there user forums dedicated to this software? How current are entries/versions users use ?
- Are there YouTube videos for certain functions ?
- Are there non-proprietary alternatives ?

## Basic software (proprietary)

### Essential

- Office Suite (Microsoft Office)
  - Word processor (Word)
  - Spreadsheet (Excel)
  - Screen Presentation (Powerpoint)
- Reference Manager (Endnote)
- Image Editing Software (Adobe Photoshop)

### Good to Have

- Statistical Software (SPSS, SAS)
- Vector Graphics Editor (Adobe Illustrator)

### Better to Have

- Strategy for note taking, organizing, archiving (MS OneNote)
- Strategy for backup /prevention of data loss (Google, Apple, Amazon Cloud service)

## When committing to non-proprietary...

- What is the software licence ?
- Does the software run on multiple platforms (incl. Linux) ?
- Is it open source /code on GitHub ?
- Is there a good documentation? Can you contact the developer?
- Are there propriatory alternatives? Comparable functionality?
- Do not rely on free online Tools

## Basic software (non-proprietary)

### Essential

- Office Suite (Apache OpenOffice, WPS Office Suite)
  - Word processor
  - Spreadsheet
  - Screen Presentation (GoogleDrive)
- Reference Manager (Zotero, Mendeley, JabRef)
- Image Editing Software (GIMP, Photoscape, Paint.NET)

### Good to Have

- Statistical Software (R Project)
- Vector Graphics Editor (Inkscape, Gravit, Vectr)

### Better to Have

- Strategy for note taking, organizing, archiving (Evernote, Google Keep, NAS-specific Note Station)
- Strategy for backup /prevention of data loss (Dropbox, Google Drive, Apple, Amazon Cloud service)

## René' s four rules for researcher software use

**Rule 1: The tools you use today are likely your tools tomorrow**

- if you made a meeting poster in PPT, you will always use PPT
- if made a figure for publication in Photoshop, you will most likely use PS over and over again

**Rule 2: You'll remember your tools but you will have forgotten how to use them**

- Write down your workflows
- Download that youtube video that explained the use

**Rule 3: The older you get, the more reluctant you will be to try out new tools**

- Couch is just more comfortable

**Rule 4: Learn how to code and you can set your own rules.**

- This skill will make you more valuable and successful than your peers

## Academic writing





# Google Documents



- Simplistic interface
- Free and syncs across devices
- Sharing (anyone with email address) view/edit
- Editing in real-time
- Chat & comment option
- Useful Addons (Fl000 Workspace)
- instantly saved online / offline working option

## Google Doc Example

specific scores can not only help during training but also offer better recall during actual scoring. Every training should be followed up by blinded tests to confirm the validity of the practice. In addition, multi-lab comparisons for test procedures can help identifying ambiguity in protocol and therefore ensure reproducibility.

**Protocol deviation**

Protocol deviation is any non-compliance with an existing protocol, SOP, or work instruction. Another irregularity from this category is known as "protocol drift" which is present when a protocol is executed without or only limited supervision or content checks. If this alteration does not result in immediate experimental failure or is otherwise noticeable, the practice becomes the norm and is most often only detected by accident, if at all. To combat this error, several steps can be taken. The SOP can be accompanied by a mandatory checklist list containing key elements of the protocol in a concise manner which need to be checked, or certain data that need to be inserted. Another element concerns mandatory regular checks of the protocol content by a

**3 working modes**

**Builtin searchbar:**  
Results are instantly citable as footnotes

error definition science

What is the definition of a "scientific error"? How is it distinguished from...  
https://www.researchgate.net/publication/3104121...  
The issue of "scientific error" and "infringement of rights" by scientists is very complex, and, on the other hand - clearly extends beyond the...

What is experimental error? definition and meaning.  
http://www.businessdictionary.com/define...  
Errors that may occur in the execution of a statistic of experiment design. Types of experimental error include human error, or mistakes in data entry; systematic error, or...

Error - definition of error by The Free Dictionary  
http://www.thefreedictionary.com/error  
Define error error synonyms, error pronunciation, error translation. English dictionary - computer science, computing - the branch of engineering science that...

Error dictionary definition | error defined  
http://www.yourdictionary.com/error  
The definition of an error is a mistake or the state of being wrong. An example of an error is when you add 2+2 and get 5. An example of error is when a mistake...

# F1000 Addon = Full Citation Manager

The screenshot shows the F1000 Workspace interface. On the left, there's a sidebar with various tools like 'g(Math)', 'easy accents', 'VeritySpell', 'Doc to Form', 'SAS WritingReviser', 'Highlight Tool', and 'CAS'. The main area displays a document with text and multiple citations. A callout box points to a citation link: <http://f1000.com/works/citation?id=2870261>, with the text 'Dynamic citation links'. Another callout box points to the 'MY REFERENCES' sidebar, with the text 'Multiple resources for citations'. The sidebar lists several references, including 'Aquarium pebble gravel 5-8 mm, 10 kg', 'Dry Ice Handling Procedures', 'Frozen Section Technique in the Animal Research Setting', 'A Cryoprotection Method That Facilitates Cutting Frozen Sections of Whole Monkey Brains', and 'An inexpensive replacement for dry ice in the laboratory'.

F1000Workspace
DASHBOARD
MY REFERENCES
TOOLS
HELP
RB

**Your subscription to Workspace has now expired\***

But there's good news - you can regain full access by taking out a [personal subscription](#), or for lab/groups and institutional subscriptions, by contacting us at [info@f1000.com](mailto:info@f1000.com). Students can enjoy a 50% discount by contacting [discounts@f1000.com](mailto:discounts@f1000.com). With all subscriptions you get FREE access to F1000Prime PLUS a free short article published on F1000Research.

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# Overleaf



- Uses **LaTeX** as document preparation system (plain text with commands; similar to HTML editor)
- True WYSIWYG output, layout of images and tables
- Good for building large documents, like thesis
- Import option for bibliographies
- Journal templates - direct submission (ORCID signin)

## Overleaf Template & Plans



The screenshot displays the Overleaf website interface. On the left, the 'F1000Research Journal Article Template' is featured, showing its author (Overleaf and F1000Research), license (LaTeX Project Public License 1.3c), and options to 'OPEN AS TEMPLATE' or 'VIEW PDF'. The template preview shows a document structure with sections like 'Author Name1 and Author Name2', 'Abstract', and 'Keywords'. On the right, the 'Individual Plans' section is visible, comparing three pricing tiers: Free, Pro, and Pro+. The Free plan offers up to 1GB storage and 60 files per project. The Pro plan offers 10GB storage and 500 files per project for €6 per month. The Pro+ plan offers 20GB storage and 1,000 files per project for €9 per month. A 'Pro & Pro+ features' list includes unlimited private projects, quick save to Dropbox, priority support, full project history, unlimited collaborators, save & restore version history, compare versions & tracked changes, tag, filter & clone projects, integrated spell-check, editor themes, LaTeX auto-complete, and Git across the board.

Plan	Storage Space	Files per Project	Price
Free	Up to 1GB	60	Free
Pro	10GB	500	€6/mo (Billed yearly (save 20%))
Pro+	20GB	1,000	€9/mo (Billed yearly (save 20%))

# Problem: Track changes can make Word documents almost unreadable

Doctor understands how terrible this action really is. And, seeing what his friend has become, he feels he has no choice but to depose her; the six words are just showing off.

The only character who really gets short shrift in "The Christmas Invasion" is Rose, which is surprising as she and Harriet Jones virtually carry the majority of the episode. Rose is great with the killer Santas, but, once the Sycorax arrive, her despondence is perhaps realistic but seems completely out of character, though it may be realistic for another person. (Even Rose's claim that she's rubbish with menaces closer to home seems hollow in light of "The Parting of the Ways.") The intent of the script is that Rose believes the Doctor has left her and she's grieving and her misery, coupled with the drive to have everyone need the Doctor more than ever, leaves her high and dry. Billie Piper tries gamely to make it all Rose's grief and misery work, but a useless Rose is not a pretty sight.

With all eyes on him, David Tennant immediately establishes himself as the Doctor in a five-minute monologue. He's smart. He's charming. He's sweet. He's goofy and manic (though in a very different way than Eccleston). As the episode progresses, we see other interesting facets develop, particularly when he finally confronts Harriet after shooting down the Sycorax ship.

Comments [C047]: To help the transition from the previous part, you could insert the text as another reason for why the scene is moving forward (excellent performance) it's a tricky situation with a dilemma that makes for compelling drama.

Comments [C048]: I am your parent but don't really think it works. I'm moving from actors to characters. It may be a little sticky but I can live with it.

Comments [C049]: I think it actually works without a transition at all. Cutting the first sentence makes the dilemma.

Comments [C050]: "Despite her abundance of resentment"

Comments [C051]: Suggest cutting. This sentence has been well covered in the episode guide so far.

Comments [C052]: Third use of music to describe the Doctor's character. He may be manic, but let's look for alternatives to mix it up for readers.

Comments [C053]: I've changed up one of the earlier suggestions. I'd prefer to keep it here.

## Draft(s) - Side by Side

DRAFT

Not to mention, as soon as we launched the first version of our product, which we'd been working on for a couple months, another competitor launches.

They've got a neat name, CrowdIQ. Their stuff looked super polished. They'd been working on it for a year. They even seemed to understand prediction markets much more than any of us did. I didn't have a clue what a "market scoring rule" was or how to interpret these crazy ass academic papers from the Godfather of prediction markets, Robin Hanson.

Most people would have stopped at our first problem. Come up with an idea, Google it, and realize there's already a dozen companies working to solve XYZ. Moan a bit about not having any luck and go back to

Not to mention, as soon as we launched the first version of our product, which we'd been working on for a couple months, another competitor launches

Worse yet, as soon as we launched the first version of our product, which we'd been working on for a couple months, another competitor launched

ACCEPT THIS CHANGE

I've got

had

ACCEPT THIS CHANGE

Silicon Valley (and mortgages in Chicago).

No clients or relationships to turn into clients.

Zero competitive advantage.

Worse yet, as soon as we launched the first version of our product, which we'd been working on for a couple months, another competitor launched.

They

had a neat name, CrowdIQ. Their stuff looked super polished. They'd been working on it for a year. They even seemed to understand prediction markets much more than any of us did. I didn't have a clue what a "market scoring rule" was or how to interpret these crazy ass academic papers from the Godfather of prediction markets,

# Draft



- Various import functions (Gdrive, Dropbox, Evernote, FTP)
- Commenting out function for not used text
- Transcription of podcasts, video presentations, and interviews (YouTube, vimeo)
- Create simple presentations, checklist within a doc
- Also for making blog entries and websites (CSS support)
- Social analytics reports

## Draft improves your writing



Bot analyzes text for redundancies

The screenshot shows the Draft app interface with a sidebar menu containing options like PUBLISH, NAME DOCUMENT, VIEW, EXPORT, MOVE, SHARE, ASK A PRO, and SIMPLIFY. The 'SIMPLIFY' button is highlighted with a blue arrow pointing to a modal window titled 'WANT HELP COPY-EDITING YOUR DOCUMENT?'. The modal text reads: 'Have a college educated staff, under a strict NDA, help edit your document. We'll notify you when the edits are ready (within 24 hours). You can accept or ignore any of their changes within Draft. 100% GUARANTEE. IF YOU DON'T LIKE THE RESULTS, YOU'LL BE REFUNDED IMMEDIATELY.' Below this, there are two green buttons: '15 MINUTES: \$6' and '45 MINUTES: \$18'. At the bottom of the modal, there is a text box containing the quote: 'I think this service is the coolest thing ever. — Tobin Lütke, CEO of Shopify' and a 'CANCEL' button.

# Writefull



- provides feedback on writing by checking your text against databases of correct language
- DB: Google Books, Google Scholar, Google News, Google (in 9-36 languages)
- can be activated in any tool like Word, Outlook, TextEdit
- Writefull's search bar
- Completely free of charge
- For MacOSX, Windows and Linux! - <http://writefullapp.com>

# Writefull



studies have \_ that

Books, Scholar, News, Web

studies have shown that	56%
studies have demonstrated that	10%
studies have found that	8%
studies have indicated that	8%
studies have suggested that	7%
studies have revealed that	3%
studies have reported that	2%
studies have confirmed that	2%
studies have concluded that	1%
studies have established that	1%
studies have documented that	1%
studies have noted that	<1%
studies have determined that	<1%

Missing word in context

a \*vivid\* experience

Books, Scholar, News, Web

a memorable experience	28%
a rich experience	25%
a powerful experience	14%
an intense experience	14%
a vivid experience	8%
a dramatic experience	6%
a stirring experience	2%
a realistic experience	2%
a gay experience	1%
a pictorial experience	<1%
a picturesque experience	<1%
a lifelike experience	<1%
a graphic experience	<1%

Synonyms in context

growing concern vs increasing concern

Books, Scholar, News, Web

growing concern	63%
increasing concern	37%

Examples from the Wikipedia:

ends at home, and their **growing concern** for him. Elizabeth McGovern  
 1960s. Since the 1970s, **increasing concern** for animal welfare led  
 wide, internet safety is a **growing concern** for both children and ac  
 materials becomes an **increasing concern**. Increase in the sophis  
 f 10 April, 2014, There is **growing concern** in Cameroon for the infl  
 tients have become an **increasing concern** for emergency nurses.  
 marine mammals are of **growing concern**. The effects can be bot  
 ter 1913. In 1940, with **increasing concern** about national security  
 2004[update], there was **growing concern** by many technology prc  
 Nations has expressed **increasing concern** at "the humanitarian ir

Comparison of two chunks

## REF-N-WRITE



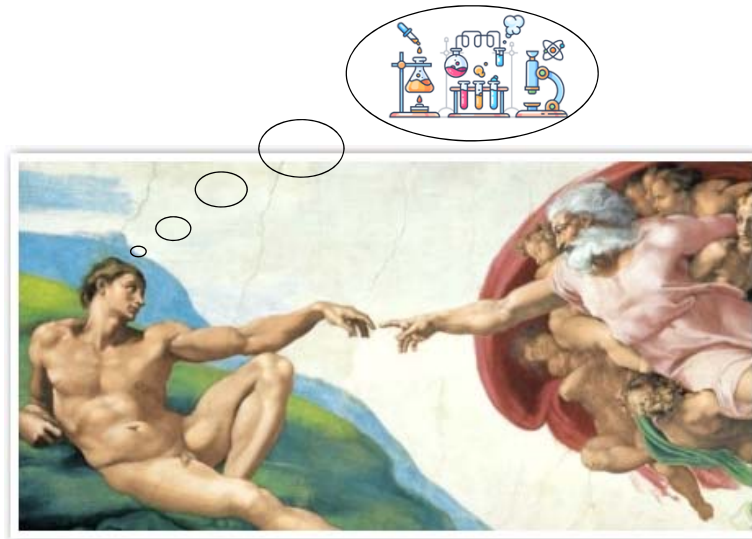
- Aimed at people struggling with academic writing, non-native English speakers and beginner writers
- Microsoft Word Add-in
- Import ref material for full text search within Word
- Lookup for language ideas and paraphrases
- Have your documents read out to you
- Recycle your own text while reducing self-plagiarism
- 30 £ per license

## Four useful services on the web

- NaCTeM Service Systems (<http://www.nactem.ac.uk/services.php>)
- NCBI services (<https://www.ncbi.nlm.nih.gov/gquery/>)
- Protocols.io (<http://blogs.plos.org/plos/2017/04/protocols-io-tools-for-reproducibility/>)
- LabWorm (<http://labworm.com>)



## The act of creating scientific knowledge



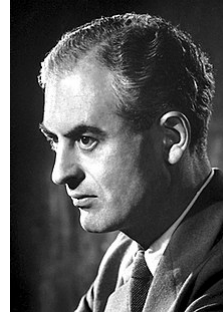
### Required skill: Creativity

- Needed for research proposal, grant applications, research publications, experimental designs, teaching, ...
- Basic German Law, Article 5 (3): Arts and sciences, research and teaching shall be free.
- Natural human curiosity and motivation are driving force
- How do scientist decide what to study?



## Art of the soluble

- Figuring out which questions are solvable through scientific investigation, and then figuring out the solutions to those questions
- Break big problems into smaller ones that are solvable
- Figure one which of the smaller ones could lead to a breakthrough
- Image in advance possible outcomes of different observations



Peter Medwar;  
biologist,  
Nobel Prize  
winner 1960

## Logical thinking

- Logical thinking is always a part of the creative process
- What if...? (logically thinking through consequences)
- Just like artists: Scientists have to use their imagination to come up with well-informed explanations
- Result is a rigorously tested story that makes sense at current knowledge base

## Observation skills

- E.g. Mendels experiments with garden peas; about heredity of traits
- Creativity involves abstraction – models, model organisms..
- Observe and document
- Mentally carve away some of the complexity to reveal simple principles

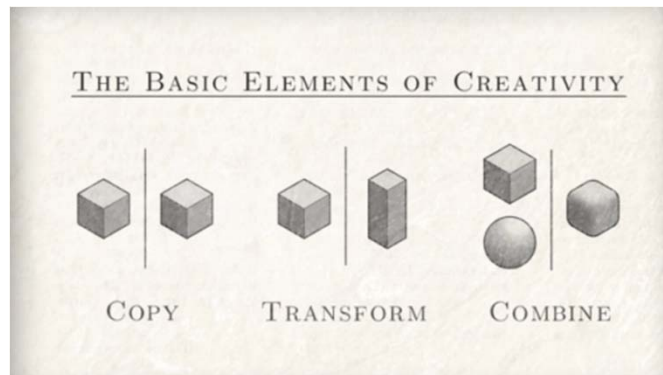


Source: <http://www.mendelweb.org>

## Develop your own scientific creativity

- Break down a very big question into more manageable part
- Take advantage of your background knowledge to think creatively about the answers to smaller questions
- Reading the literature; become familiar with materials, visit talks, posters, symposiums; talk to experts; visit patient groups
- New knowledge can be generated only if you know the current state
- Gain expertise in related or others fields and research techniques
- Develop a routine: every Friday I catch up with the literature, ...write on a grant, ...manuscript...

<https://www.visionlearning.com/en/library/Process-of-Science/49/Creativity-in-Science/182>



The most dramatic results can happen when ideas are combined. By connecting ideas together, creative leaps can be made, producing some of history's biggest breakthroughs." ~ Kirby Ferguson

Creativity isn't magic: it happens by applying ordinary tools of thought to existing materials. And the soil from which we grow our creations is something we scorn and misunderstand even though it gives us so much — and that's... copying." ~ Kirby Ferguson

## TED Talks about creativity

- Kirby Ferguson: Creativity is a remix - <https://www.youtube.com/watch?v=zd-dqUuvLk4>
- David Kelley: How to build your creative confidence - [https://www.ted.com/talks/david\\_kelley\\_how\\_to\\_build\\_your\\_creative\\_confidence/transcript#t-83946](https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence/transcript#t-83946)