How to write highly cited papers a short introduction

Also available as a UKCEH training course (over one or two mornings)

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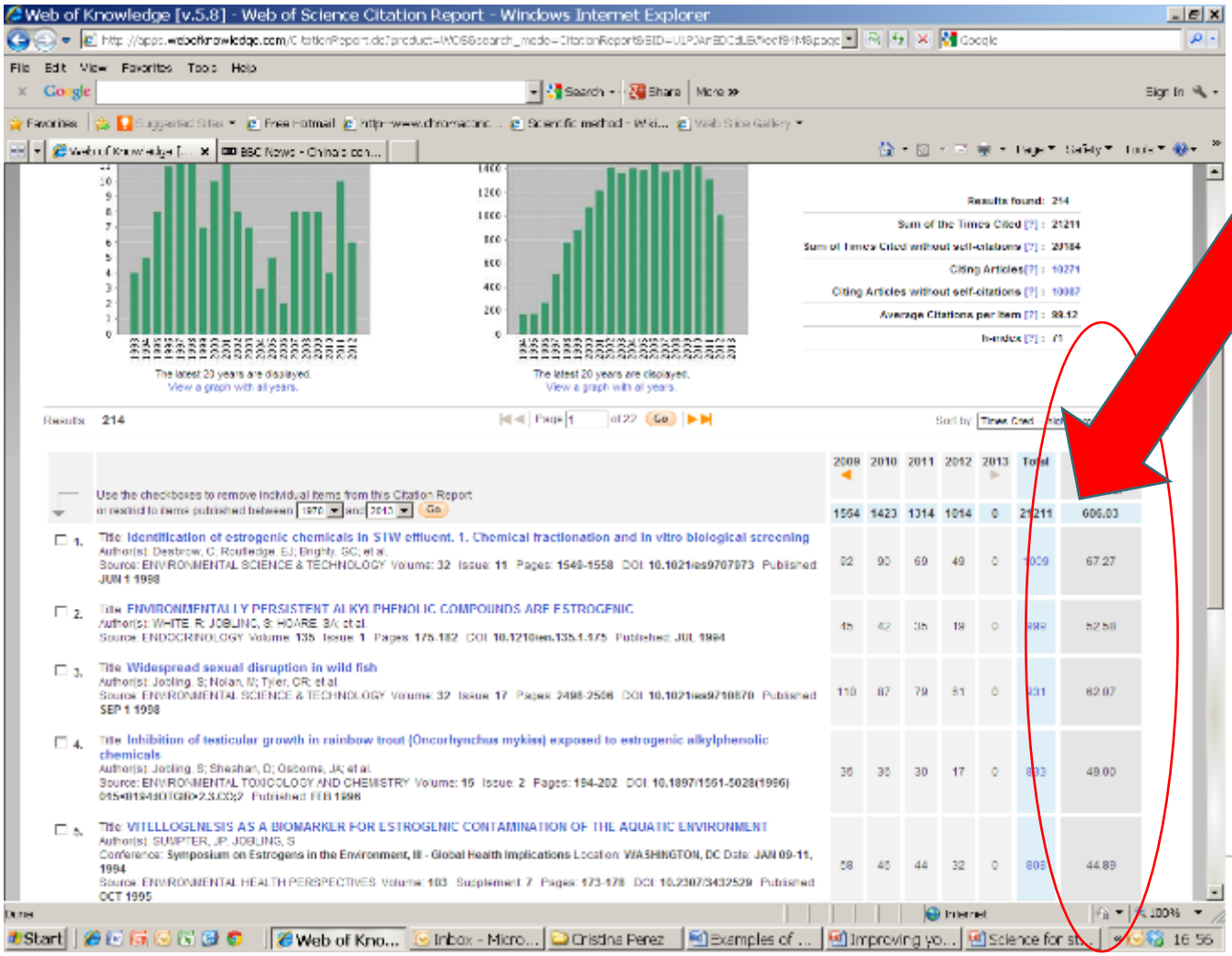
The objective is to ensure as wide an audience as possible appreciates your work

- That you write in a way that ensures maximum impact
- In other words, don't 'mess up that opportunity'!
- The personal reward is you get more citations
- Your papers receive a higher evaluation in the REF, so good for your institution too

One way we can gauge our scientific impact is through citations



Web of Science
Google Scholar
and others keep a running score of the number of citations each of your papers receive

When writing your own paper ask yourself .....

In your references section, why do <u>you</u> cite one paper rather than another??

What is it that makes one paper more likely to be cited than its competitors?

BEYOND THE HYPE: EVALUATING LOW-CARBOHYDRATE DIETS 10

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Can you go beyond writing a paper for your few fellow techy nerds and reach out to a wide range of non-specialists? …….

Problem is there are only 10 of them…

A wider audience could be many 1000s' and your writing could reach influential people including policy makers

Think of your own behaviour! When reviewing a topic…

- You may read the **titles** of say 60-95% of the papers in your field
- Based on the titles you may read the **abstracts** of only 10-20% of this total
- Based on the abstracts, you may then actually read the whole paper of only 1-2% of these

So, there is a message here, don't underestimate the importance of your title and abstract!

THE TITLE

Exercise 1

Could a well written title help your chance of getting cited?

Alternatively, could a badly written title doom your chances of getting cited?

Exercise 1.1

Can you Guess? Which of these papers from 2000-2005 were highly cited (>100 citations) and which were poorly cited (<10 citations)?

(1) Anthropogenic nitrogen sources and relationships to riverine nitrogen export in the northeastern USA 2002	(2) Water quality variability at two coastal lagoons in Northern Greece 2000	(3) Influence of nontrophic interactions between benthic invertebrates on river sediment processes: a microcosm study 2004	(4) Selectivity assessment of chlorfenvinphos reevaluated by including physiological and behavioral effects on an important beneficial insect 2001	(5) Aquatic toxicity of triclosan 2002	(6)) Influence of salinity and eutrophication on bioaccumulation of (99)Technetium in duckweed (2001)
(7) Global distribution of perfluorooctane sulfonate in wildlife 2001	(8)Arsenic contamination of groundwater and drinking water in Vietnam: A human health threat 2001	(9) Evaluation of two hybrid metric-conceptual models, for simulating phosphorus transfer from agricultural land in the River Enborne, a lowland UK catchment 2005	(10) Vive la difference: plant functional diversity matters to ecosystem processes 2001	(11) Mid-Texas, USA coastal marsh vegetation pattern and dynamics as influenced by environmental stress and snow goose herbivory 2005	

The clue is in the title?

(1) Anthropogenic nitrogen sources and relationships to riverine nitrogen export in the northeastern USA
2002
Cited 228 times

(2) Water quality variability at two coastal lagoons in Northern Greece
2000
Cited 8 times

(3) Influence of nontrophic interactions between benthic invertebrates on river sediment processes: a microcosm study
2004
Cited 8 times

(4) Selectivity assessment of chlorfenvinphos reevaluated by including physiological and behavioral effects on an important beneficial insect
2001
Cited 5 times

(5) Aquatic toxicity of triclosan
2002
Cited 158 times

(6)) Influence of salinity and eutrophication on bioaccumulation of (99)Technetium in duckweed
(2001)
Cited 5 times

(7) Global distribution of perfluorooctane sulfonate in wildlife
2001
Cited 780 times

(8)Arsenic contamination of groundwater and drinking water in Vietnam: A human health threat
2001
Cited 382 times

(9) Evaluation of two hybrid metric-conceptual models, for simulating phosphorus transfer from agricultural land in the River Enborne, a lowland UK catchment
2005
Cited 5 times

(10) Vive la difference: plant functional diversity matters to ecosystem processes
2001
Cited 426 times

(11) Mid-Texas, USA coastal marsh vegetation pattern and dynamics as influenced by environmental stress and snow goose herbivory
2005
Cited 5 times

Tips for good titles

Have a go at suggesting guidelines for a good title?

Should have...

- Can understand instantly on first reading (avoids highly technical terms)
- Contains key words in common currency
- Indicates a broad ambition!
- Suggests will deliver an unambiguous result to the question it poses
- Suggests could be a 'one stop shop' reference on the topic
- Makes you curious to know more?

Should avoid...

- Ambiguous meaning
- Includes highly technical terms only understood by a few people
- Appears to address only a very local issue, not relevant to majority
- Unclear how it will drive science forward

THE ABSTRACT

Could a well written abstract help your chance of getting cited?

Alternatively, could a badly written abstract doom your chances of getting cited?

What is an abstract for?

Merely a dry description of what was done?
Or, an attractive shop window which might lure in customers to read your whole paper?

An abstract can also reveal your honesty and rigour as a scientist – inspiring confidence in potential readers….

Which do you prefer the look of?

Exercise 2

Which abstracts appeal to you and why?

Read the abstracts as quickly as you can on the screen. Then use the raise hand function.

If the abstract didn't work for you, why not?

Example 1

Abstract: We developed a model for evaluating the environmental risk of persistent organic pollutants (POPs) to aquatic organisms. The model is based on fuzzy theory and uses information provided by international experts through a questionnaire. It has been tested in two case studies for a particular type of POPs: brominated flame retardants (BFRs). The first case study is related to the EU-funded AQUATERRA project, with sampling campaigns carried out in two Ebro tributaries in Spain (the Cinca and Vero Rivers). The second one, named the BROMACUA project, assessed different aquatic ecosystems in Chile (San Vicente Bay) and Colombia (Santa Marta Marsh). In both projects, the BFRs under study were polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecane (HBCD). However, the model can be extrapolated to other POPs and to different aquatic ecosystems to provide useful results for decision-makers.

A bad example!

I don't need to know about the EU project acronyms and it is not clear what I should conclude? It does not explain how the model output was tested. We have to trust that the model is as useful as the authors believe!

Example 2

Abstract: Diclofenac residues have been found in surface water, and thus could present a potential risk to aquatic species. The aim of this study was to assess the impact of diclofenac on the mortality, growth, and development of fish, as well as the impact of the drug on histological changes and selected parameters of oxidative stress in the fish. Subchronic toxic effects of diclofenac at concentrations of 0.015, 0.03, 1, and 3 mg/L on embryos and larvae of common carp (Cyprinus carpio) were investigated during a 30-day toxicity test under experimental conditions. Exposure to diclofenac at 3 mg/L was associated with increased mortality, increased activity of glutathione S-transferase, and decreased activity of glutathione reductase. Decreases in the levels of thiobarbituric-acid-reactive substances were associated with concentrations >= 0.03 mg/L. Based on these results a no observed effect concentration (NOEC) = 0.015 mg/L and lowest observed effect concentration (LOEC) = 0.03 mg/L were generated.

Good one! Simple and clear on what it offers,
I might cite this one, shame there was no final conclusion!

Example 3

Imidacloprid is a neonicotinoid pesticide heavily used by the agricultural industry and shown to have negative impacts on honey bees above certain concentrations. We evaluated the effects of different imidacloprid concentrations in sugar syrup using cage and field studies, and across different environments. Honey bee colonies fed sublethal concentrations of imidicloprid (0, 5, 20 and 100 ppb) over 6 weeks in field trials at a desert site (Arizona), a site near intensive agriculture (Arkansas) and a site with little nearby agriculture but abundant natural forage (Mississippi) were monitored with respect to colony metrics, such as adult bee and brood population sizes, as well as pesticide residues. Hive weight and internal hive temperature were monitored continuously over two trials in Arizona. Colonies fed 100 ppb imidacloprid in Arizona had significantly lower adult bee populations, brood surface areas and average frame weights, and reduced temperature control, compared to colonies in one or more of the other treatment groups, and consumption rates of those colonies were lower compared to other colonies in Arizona and Arkansas, although no differences in capped brood or average frame weight were observed among treatments in Arkansas. At the Mississippi site, also rich in alternative forage, colonies fed 5 ppb imidacloprid had less capped brood than control colonies, but contamination of control colonies was detected. In contrast, significantly higher daily hive weight variability among colonies fed 5 ppb imidacloprid in Arizona suggested greater foraging activity during a nectar flow post treatment, than any other treatment group. Imidacloprid concentrations in stored honey corresponded well with the respective syrup concentrations fed to the colonies and remained stable within the hive for at least 7 months after the end of treatment.

I'm confused! This could be a really important study but maybe I muddled my Arkansas with my Arizona?

Exercise 3

What are your tips for good abstracts and things to avoid?

What makes a great abstract?

Have a go at suggesting what makes an abstract work well?

- **Entrée**: Short background statement of not much more than one sentence, a good idea to make this quite striking. Ideally this is 'the problem'
- **Wide relevance**: Try to capture the attention of the widest possible audience.
- **Accessible:** Aim to reach beyond the 'techy' specialists in your field! Use plain language.
- **Clear results:** What was done? What were the key data values, both maximum and mean/median
- **Focus:** Remain focused on a main message
- **Easy win for the reader**: Could someone cite your paper on the basis of the abstract alone?
- **Great finalé**: Try to finish with a dramatic, eye-catching, clear and unambiguous statement.

The meat of the paper

or

?

What makes reading a paper a satisfying experience, or a miserable one?

Like it or not, having to write scientific papers means you have joined the guild of story tellers!

The essential ingredients of a story?

It is believed that humans pay more attention to information conveyed in the form of a story.

So from our point of view what are the critical steps?

Think back to your classic fairy stories or legends you remember from your childhood, what is their essential structure…..?

The essential ingredients of a memorable story

from our point of view this might be:

- A problem exists (scary dragon)
- Others have struggled to solve it (note the bodies of your failed competing scientists in the background)
- You make a novel intervention (long lance)
- You bring it to a resolution (save the princess or prince!)

Let us use a story-telling format that has worked for 1000s' of years to our advantage!

How to report all these interesting findings on goings on in the wood?

Better to stick to one story!

Scientists are humans too!

We can only cope with and

remember simple messages

We then enjoy the paper,

likely to cite it,

likely to go on citing it!

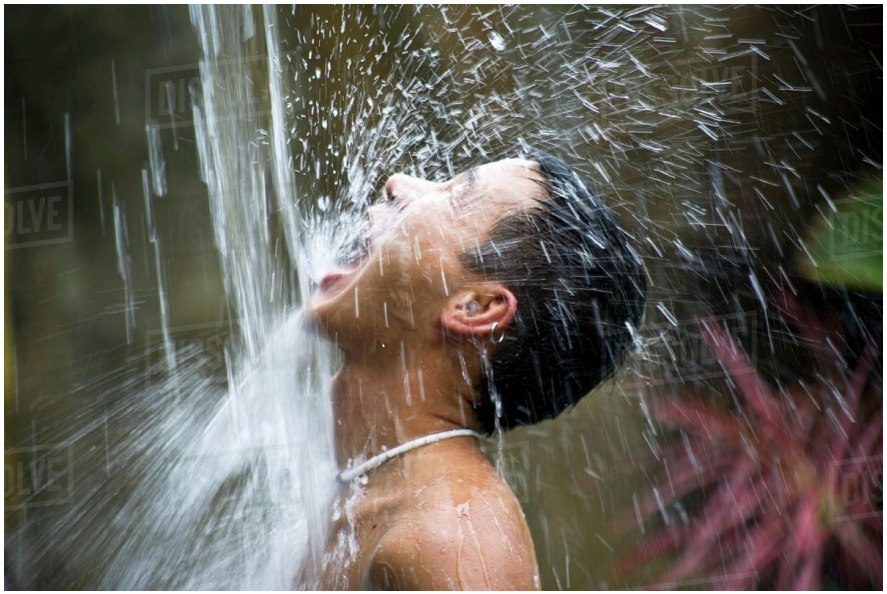
Keep those other messages

for a future paper?

Information management

Gently and delicately feed the key information to your reader. Do it teaspoon by teaspoon. It must be digestible!

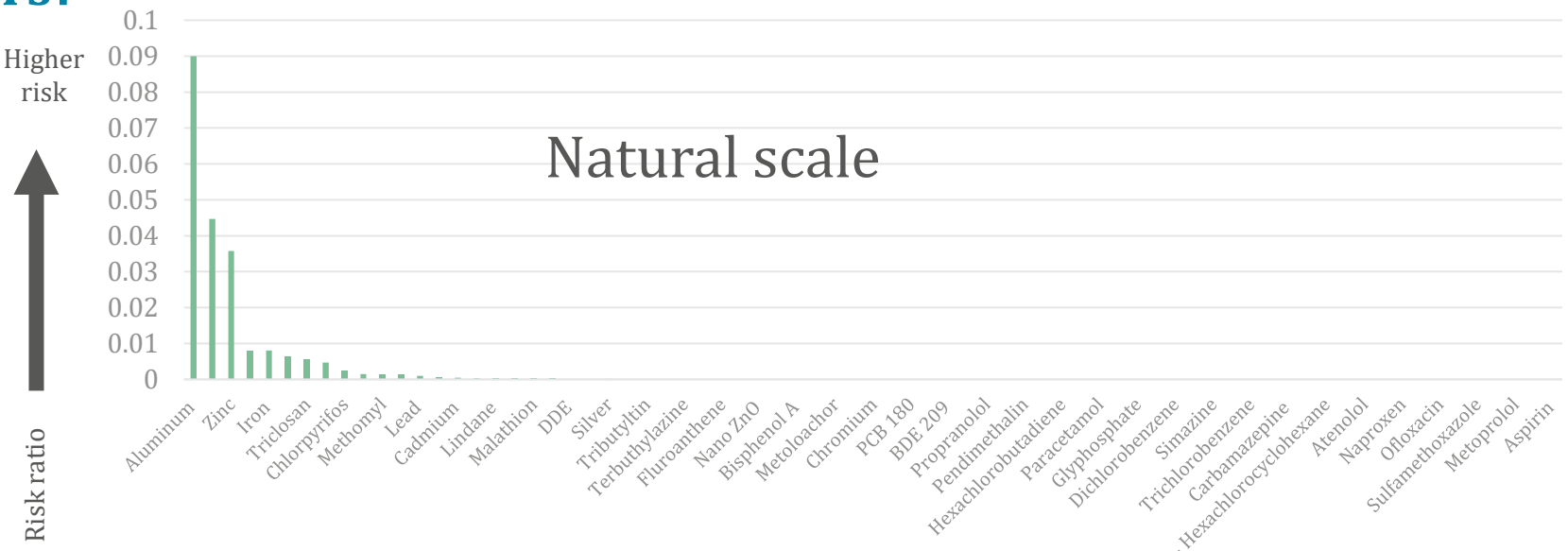
Don't drown them in data and multiple opinions right from the beginning



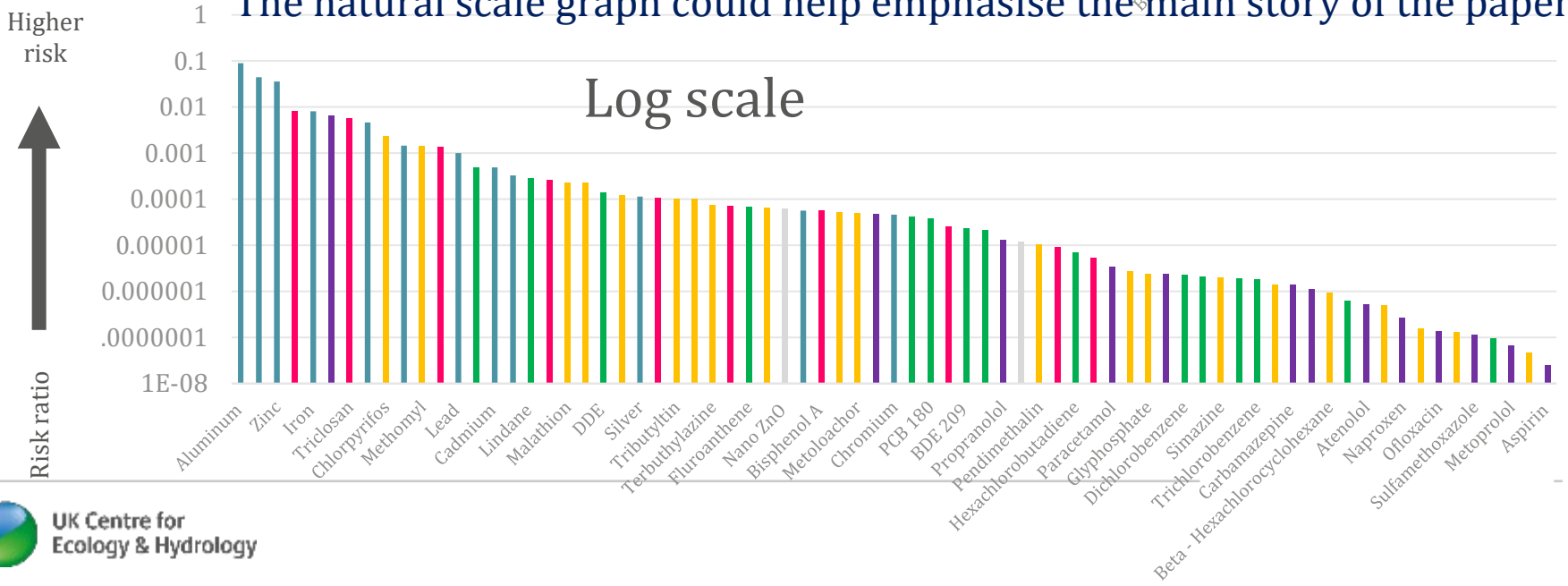
Results and discussion – keep it short!

- **Let your figures do the 'heavy lifting'**
- Allow your reader to focus on your main messages
- Don't chase outlier points (copious explanations on why a data point does not fit the pattern)
- Don't make the discussion another literature review! Refer to other science to give context, but no more than is strictly necessary. It's all about <u>your</u> message
- Nothing should distract from guiding your reader to the route you want them to take…….

How to emphasise some chemicals are much more dangerous than others?



The natural scale graph could help emphasise the main story of the paper



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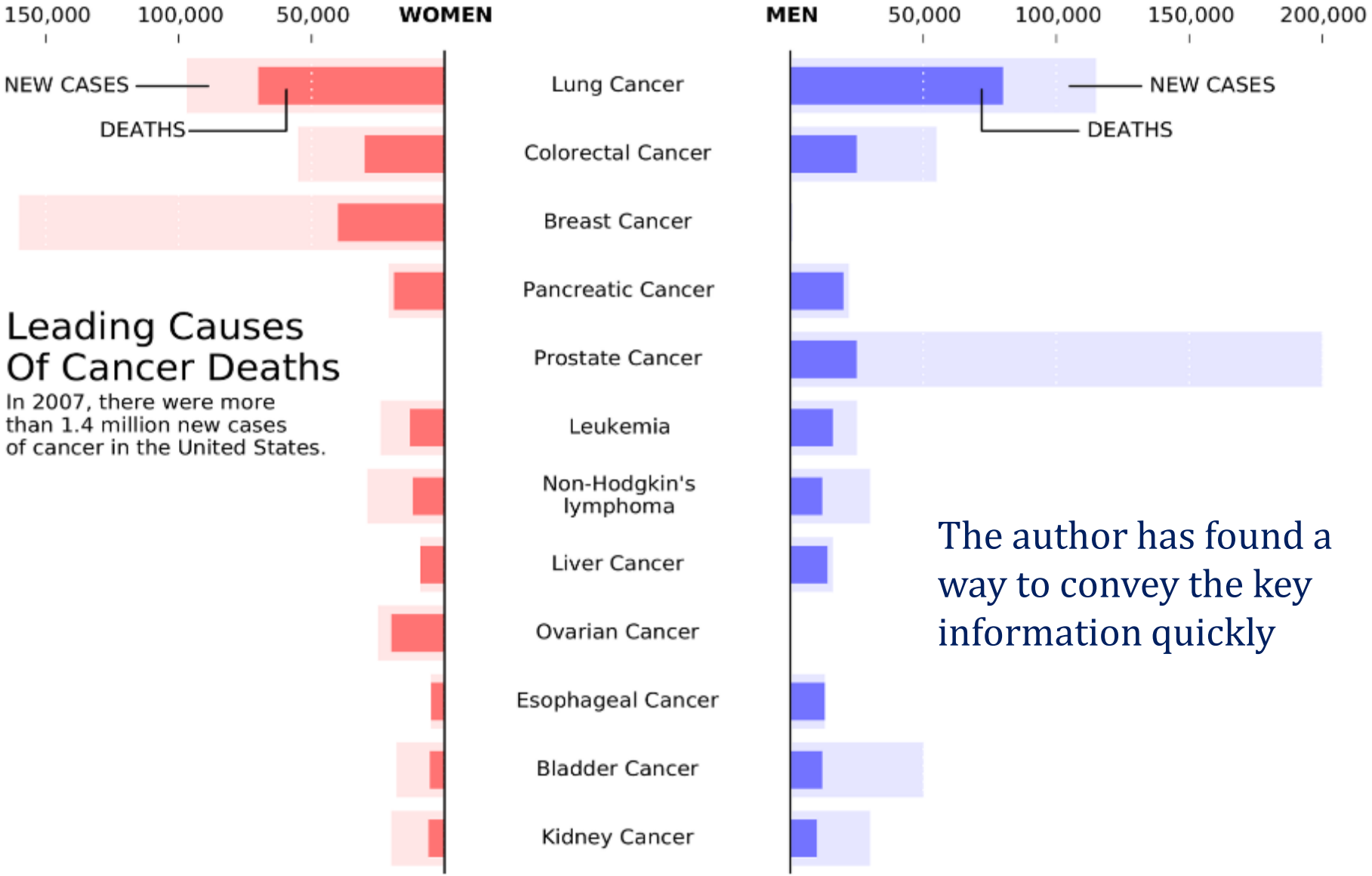
Organising your data

Allow the reader to pick up the essentials quickly.



The author has found a way to convey the key information quickly

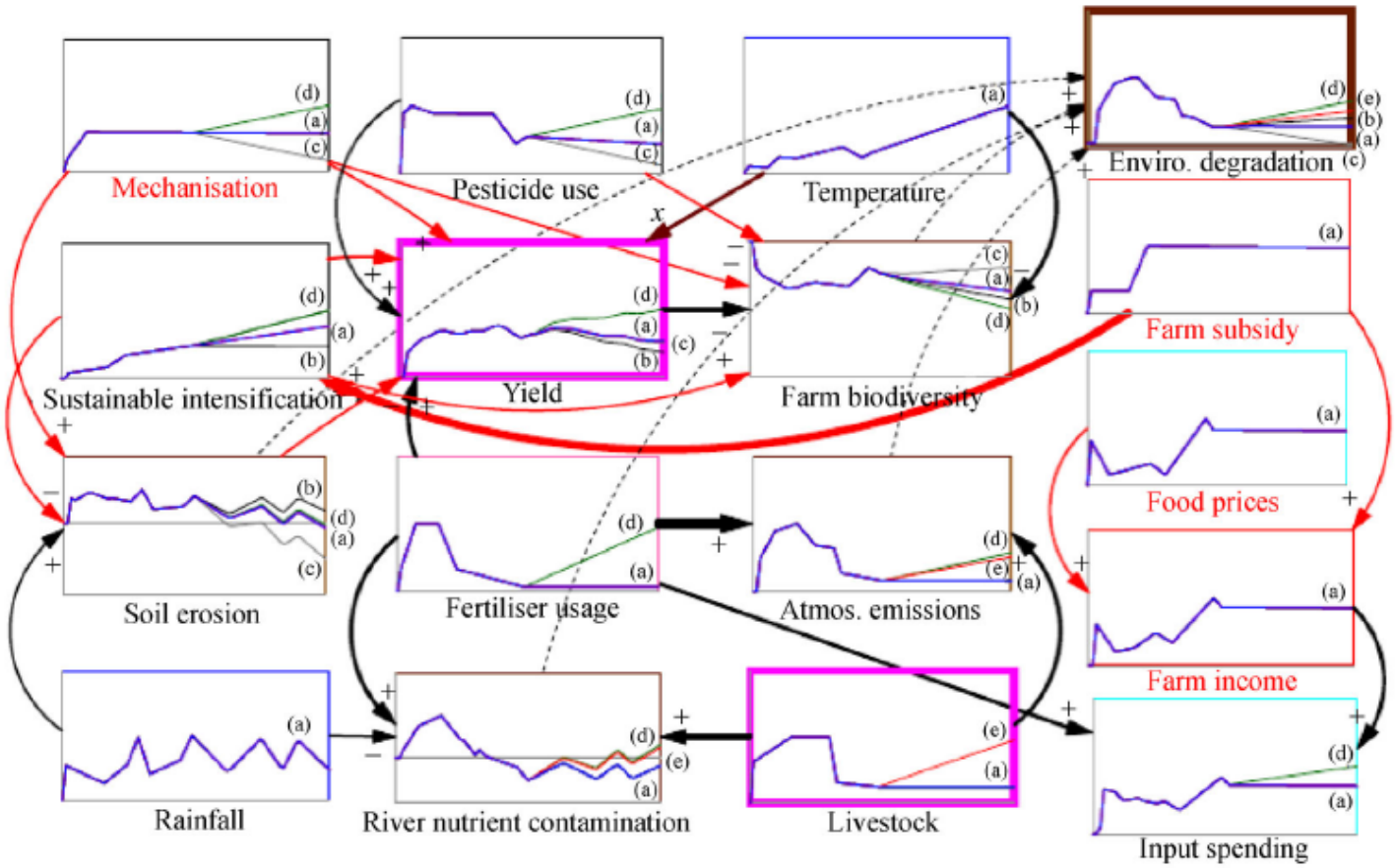


Fig. 1 Extended simple system dynamics model for the English agroecosystem, showing how different aspects of the system can be modeled. Here simulation results are shown for 1980–2050 under different scenarios: (a) continual SI (blue lines); (b) no further SI (black); (c) biodiverse SI (gray); (d) maximize yield (green); (e) livestock intensification (red). Adapted from Armstrong McKay et al.[47], with permission from Elsevier.

Oh goodness, this is not working!

What is the best guarantee of being able to write a good paper in the shortest available time?

Other than panic, what is the best way to start?

Organise!

- Review your data and results so far……
- Make a selection that is sufficient to tell one good story
- Put the rest of your data and literature to one side
- Only use that which is essential to your chosen story!

Why the single story makes sense?

- The reader (e.g. you) only tends to remember and cite a paper for one reason
- This approach is super economical on your time

How should a paper communicate?

Let the reader sit back and relax as you tell them a fascinating story,

OR

Make it dry and technical? After all you struggled a lot, why shouldn't the reader suffer too? Maybe people will only believe I'm a scientist if I make it complex and boring?

George Orwell's rules for writing

(Politics and the English Language, 1946)

1. Never use a long word where a short one will do.
2. If it is possible to cut a word out, **always** cut it out.
3. Never use a technical word or a jargon word if you can think of an everyday English equivalent.

Keep it simple!

- Any fool can make a complex issues with complex techniques and ambiguous results appear complicated
- The clever thing is to represent these issues in a

  SIMPLE AND CLEAR WAY!
- Essential skill to acquire if you want your science to influence others.

  ‘easy reading is damn hard writing’

Aim of every professional scientist

Replace long technical jargon-filled sentences with short simple ones!

Please make a personal promise to yourself (and me):

I will not make my readers suffer (when they read my paper)!

A paper is not so much telling people what you know (I'm such a genius...)

It should be about telling people **what they need to know** (supplying the answers they will find helpful) as

Your sympathies should always be on the side of the reader (after all, you know what it is like to struggle to read someone else's paper)!