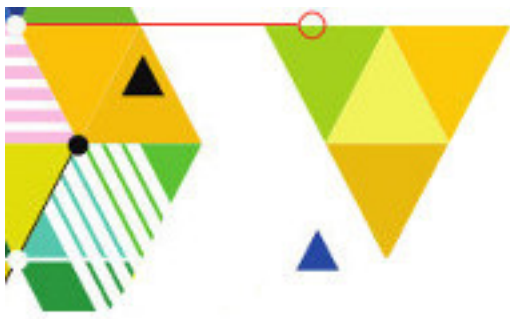


# *The trouble with research writing and what we can do about it*

Valerie Matarese

[www.uptoit.org](http://www.uptoit.org)





# Research publishing landscape

**Research article – important scholarly genre**

Status, career and funding decisions

Intellectual responsibility

Long-lasting public record

**Research output**

3 million articles in ~40,000 journals

+3% annually (recently +6%)

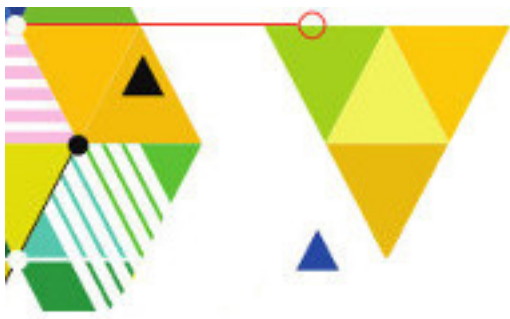
~7-9 million researchers and growing

**Publishers' responses**

A “crush of manuscripts” to be processed

More journals

Bigger journals



# Research publishing landscape

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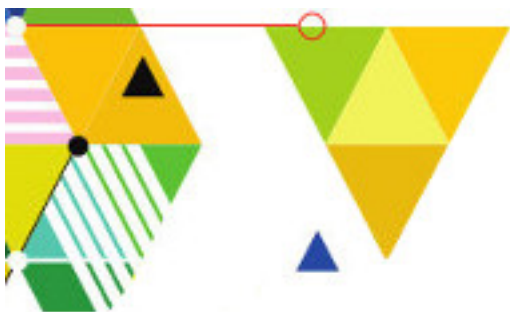
**Publishers' responses**

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# Internationalization of the researcher–author

**Globalization encourages**

**Researcher mobility for training**

**International collaborations for better research**

**Research teams are multicultural, multilingual**

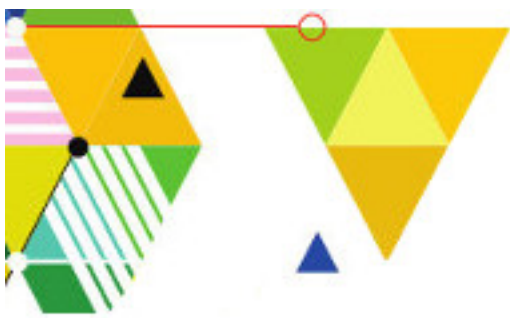
**50% of US postdocs are foreign born**

**Global output of science and engineering papers**

**Anglophone countries <30% (USA 17.8%)**

**China 18.6% (+8% annually)**

**Research is now predominantly done and reported by scholars who use *English as an additional language***



# Internationalization of academic English

Minority of research articles written by native English speakers  
Decline in **standard academic English**

## Writing

Influenced by other languages, writing cultures

--> **Linguistic interference**

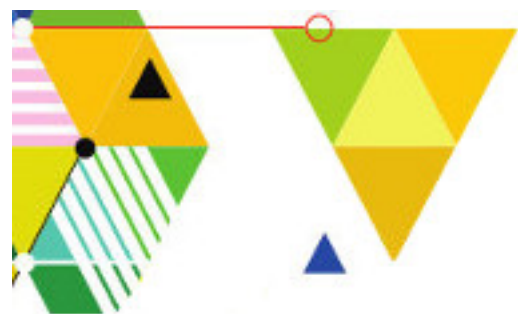
Modeled on published texts → self-perpetuating problem

Journal editors, reviewers also use **English as an additional language**

Tolerance of linguistic variation if “intelligible”

Standard academic English no longer required

**a new English is emerging**



# **Internationalization of academic English**

**English for research publication purposes**

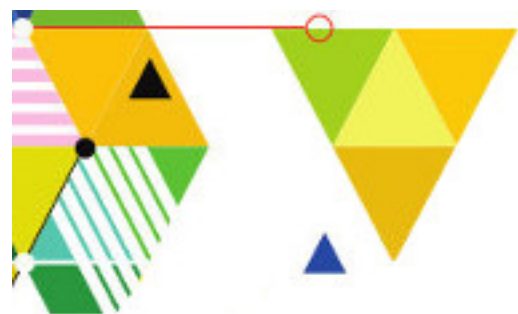
**Convergence of writing by native and non-native speakers**

**Standardized style within broad disciplines**

**Awkward, no longer wrong**

**Lower readability, risk of ambiguity**

**May defy comprehension, undermine reproducibility**



# English “for research” *examples*

## Non-standard paragraphing

- Too short (1-2 sentences)

- Too long (entire section)

- Confusion of topic sentence and headings

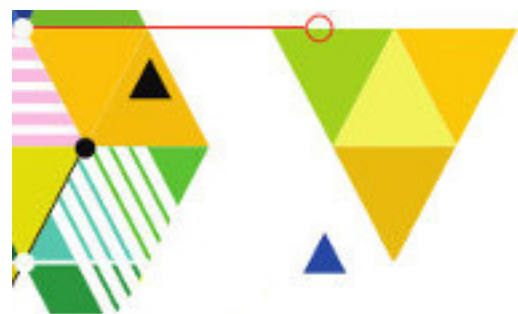
## Capitalization

- Too much: generic scientific terminology

  - Rituximab, Bromopyruvate, Pharmacovigilance*

- Too little: proper names

  - swedish, english, Department of public health*



# English “for research” *examples*

## *Evolution in meaning*

**proliferate (grow)**

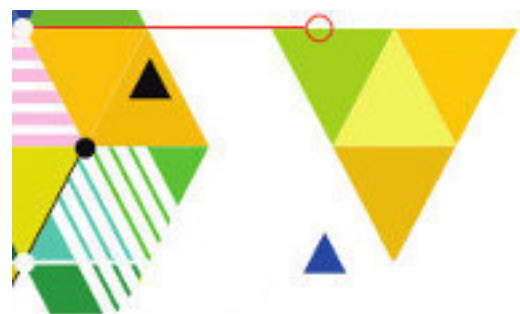
“resting and proliferating cells”

**post (after)**

patient had fever and rash at 24 h post injection (p.i.)

NSAIDs are used to relieve joint pain during and post-exercise

Biopsies were collected before, during and post intervention



# English “for research” *examples*

## *Evolution in meaning*

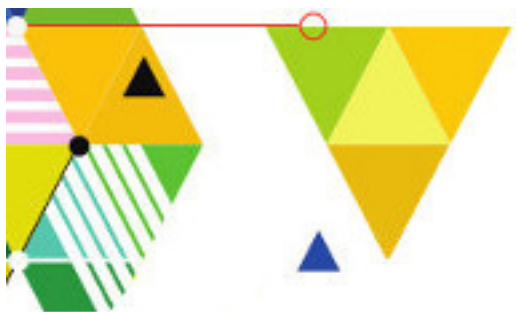
risk (harm)

"The potential risk of radiation exposure from CT cannot be reasonably estimated." (*PLoS One*)

fold change (ratio)

If A changes to B, fold change =  $(B-A)/A$

In bioinformatics, fold change =  $B/A$



# English “for research” *examples*

## *Comparisons*

### *Between A and B*

A is greater than B

A is greater **when compared with** B

A is greater **as compared to** B

A is **increased as compared to** B

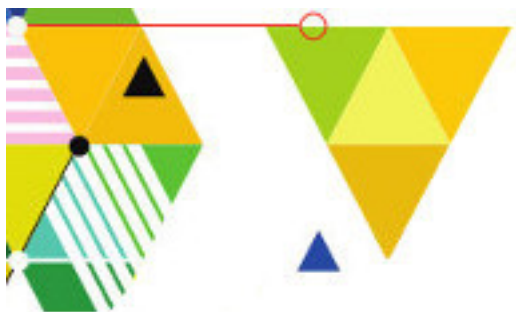
**"The response in cases was increased as compared to controls."**

### *No comparison intended*

A is high

A is **greater**

**"Pulmonary mycetoma is more frequent in AIDS patients."**



# English “for research” *examples*

## *Shortenings of multiword expressions*

cancer-related genes

hormone receptor-positive breast cancer

contrast medium administration

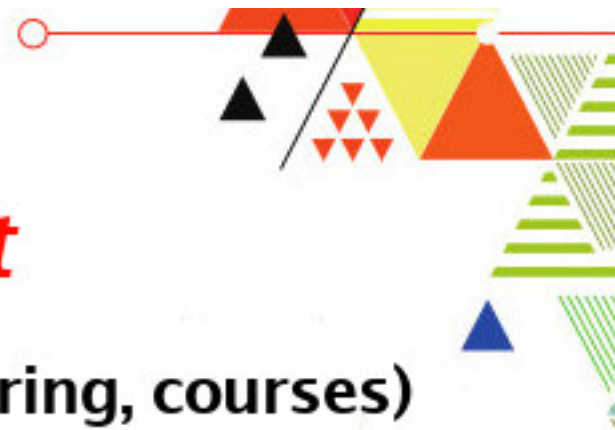
5% non-fat dry milk

nicotinic acetylcholine receptor

X-ray attenuation depends on a tissue’s  
effective atomic number (Z).

*jargon, laboratory speak*

# Scholarly writing is *inherently difficult*



Learned skill acquired via training (mentoring, courses)

Researchers not all fortunate to have training

Learn by doing, mimic articles in target journals

Spectrum of writing skills, irrespective of scientific ability

Novice writers

Produce text that reflects their thinking

Do not satisfy readers' needs for information

--> Called “**writer-based writing**”

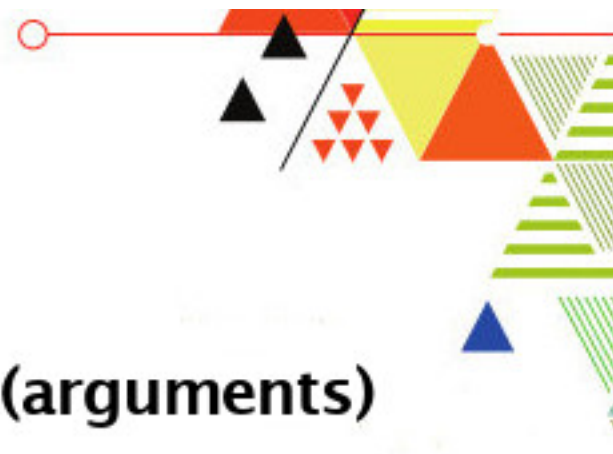
Skilled writers

First draft may be writer-based

Successive drafts take into account readers' needs

--> Produce “**reader-friendly writing**”

# Difficulties with academic rhetoric



Research article has persuasive elements (arguments)

Rhetorical argument

Set of premises that lead to a conclusion

Based on ancient Greek philosophy

Ingrained in Western society

Less familiar to Eastern cultures

Radiation can cause cancer.

Whole-body CT delivers a 15 mSv dose of radiation.

---

Therefore, whole-body CT can cause cancer.

# Difficulties with academic rhetoric



Rhetorical statements are claims about knowledge

Appropriate strength of verbs, e.g. indicate vs. suggest

Correct modal verb, e.g. *can, may, will cause cancer*

Difficult for non-native English speakers

Rhetorical errors (fallacies)

Due to poor writing, e.g. non-sequitur (missing premise)

All proteins denature upon heating.

Therefore, hemoglobin will denature upon heating.

Due to poor reasoning:

Circular reasoning

False dichotomy

Faulty generalization

# Deficits adhering to the research article genre



Adhering to genre = organizing text according to expectations

## Research article genre

- Four sections (IMRaD), subsections with headings

- Study aim, ethical research practices, display elements ...

- Citation, detail in methods, numerical precision ...

## Researchers learn genre by

- Mentoring, coauthoring

- Good* example articles, journals' instructions to authors

- Reporting guidelines

***But!* Disciplinary variations, sometimes conflicting advice,  
not all articles are good examples**

# Superficial methods



**Greater complexity of research --> minimal Methods sections**

**End of article (IRD – M)**

**Small font**

**Only online**

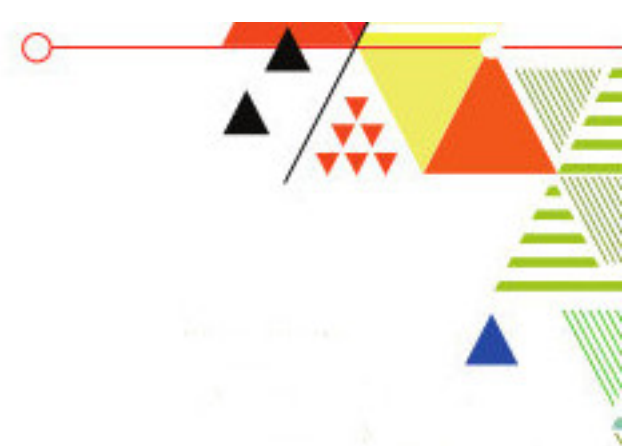
**Superficial methods hinder reproducibility**

**Journals are implementing change**

**Researchers resist detailed methods**

**Paradoxical adherence to genre = inadequate scientific reporting**

# Borrowing knowledge and citing sources



Research articles integrate new data into the knowledge base

--> Synthesize new knowledge

## Skills needed:

Search for literature, critical appraisal

Select authoritative sources

Paraphrase borrowed knowledge

Know when and how to use direct quotation

Attribute borrowed information to the source by **citation**

Write text to accompany citations

--> Inform readers of purpose

# Borrowing knowledge and citing sources



Many published articles have deficits

## Common errors

Unsubstantiated claims: statements of fact without citations

Inadequate references:

Lack expected evidence

Secondary sources of evidence (**cumulative error**)

References when none expected or for unclear reasons

Borrowed claims are copied, not paraphrased (**microplagiarism**)

# Confounding factors of current times

**Difficulty getting collegiate feedback on manuscripts**

**Hyperspecialization of science**

**--> Few colleagues can give feedback**

**Mentors lack time, may lack skills to help collaborators of different cultural linguistic backgrounds**

***Hence* feedback may only be from peer reviewers**

**Less support from most journals and publishers**

**Journal editors not interested, skilled in language issues**

**Reviewers score writing acceptability "yes" or "no"**

**Publishers have eliminated copyediting**

***Hence* manuscripts with errors are published**

**--> Serve as bad models**



# Bad textual mentors: a vicious circle

1. Internationalization of researchers has led to:  
English “for research” – awkward, ambiguous
2. Research writing is difficult:  
Inherently (rhetoric, genre, citation)  
Increasingly (complexity, multicultural, guidelines)
3. Researchers struggle to make **reader-friendly writing**
4. Journals tolerate non-standard English if “intelligible”  
Publish articles with infelicities and errors
5. Abundance of awkward articles  
Model for other authors who mimic them  
**“Bad textual mentors”**



## Researchers

*Research*

*Writing*

*Reviewing*

*Reading*  
*Replicating*

## Research reports

Manuscripts

*peer  
review*

Published articles



## Researchers

*Research*

*Writing*

*Reviewing*

*Reading  
Replicating*

*Less  
time*

*Teaching  
Mentoring  
Caring for patients  
...*

## Research reports

Manuscripts  
(awkward)



*Lost  
time*

Published articles

## Researchers

*Research*

*Writing*

*Reviewing*

*Reading*  
*Replicating*

*Waste*

*Less  
time*

*Teaching*

*Mentoring*

*Caring for patients*

...

## Research reports

Manuscripts  
(awkward)

R&R

*Lost  
time*

Published articles  
(mediocre)

## Researchers

*Research*

*Writing*

*Reviewing*

*Reading  
Replicating*

*Less  
time*

*Teaching*

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*Caring for patients*

...

## Research reports

Manuscripts  
(awkward)

**R&R**

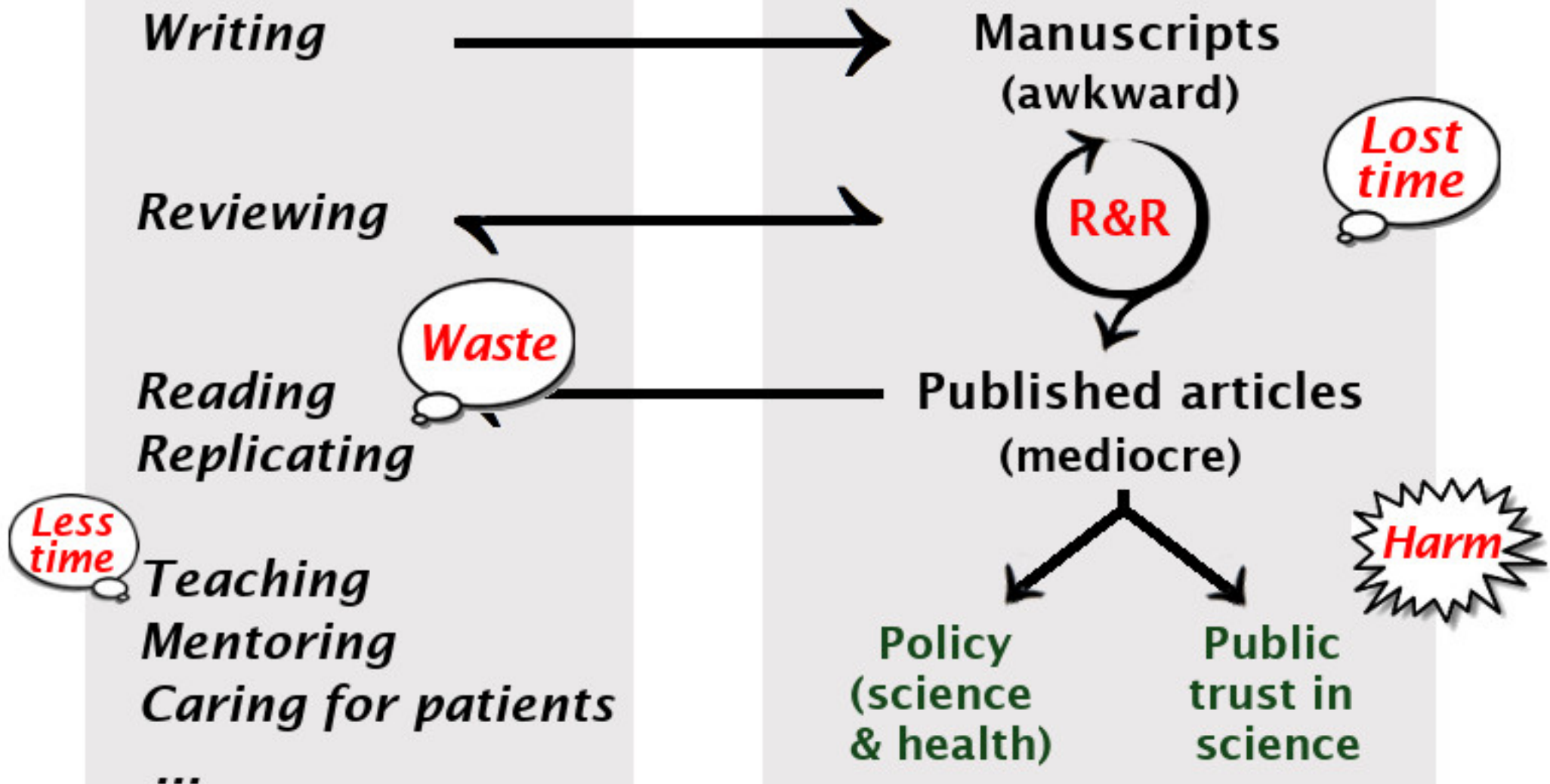
*Lost  
time*

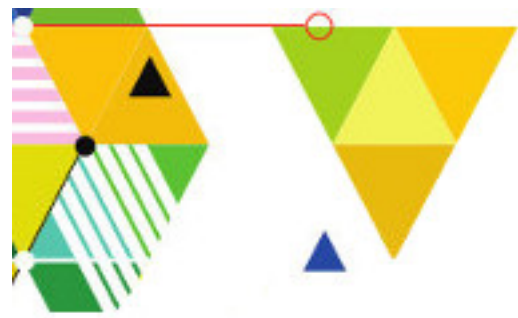
Published articles  
(mediocre)

*Policy  
(science  
& health)*

*Public  
trust in  
science*

*Harm*





# Solutions from academia, 1

## **“Uniform Requirements for Manuscripts Submitted to Biomedical Journals”**

**International Committee of Medical Journal Editors**

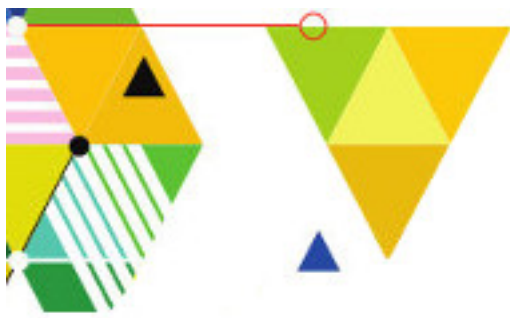
**Formatting an IMRaD research article**

**First issued 1979**

**Regularly revised and expanded**

**Now: “Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals”**

**Since 1990s, efforts to standardize the reporting of different types of studies: “reporting guidelines”**



# Solutions from academia, 2

## First reporting guideline, 1996

Consolidated Standards for Reporting Trials (CONSORT statement) 1

Randomized controlled trials

Checklist of items to include in different parts of article

Positive impact on quality of reporting

## Hundreds of reporting guidelines available today

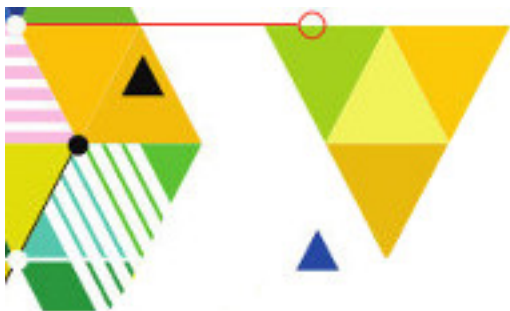
Clinical research: diagnostic, observational, case reports ...

Systematic reviews and meta-analyses

Preclinical animal research

etc.

***But!*** Not so effective, unfamiliar to authors, not required



## Solutions from academia, 3

**NIH joint workshop with *Science* and *Nature* journal groups**

**No word limit on methods sections**

**Authors submit checklist on key items for reproducibility**

**Resource Identification Initiative (<https://scicrunch.org/resources>)**

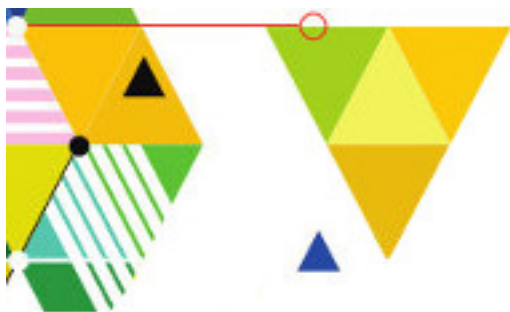
**Research Resource Identifier (RRID) for antibodies,  
model organisms, cell lines, plasmids, software, etc.**

**RRID Portal: access to repositories with information**

**Protocols.io**

**Open access repository of methods: post, edit, share**

**Digital object identifier (DOI) for citation**



## Solutions from academia, 3

### *Examples*

“The following antibodies were used: anti-Tbr1 (1:100; Abcam, catalog #ab31940 [RRID:AB\\_2200219](#))...”

“sgRNAs were generated by HiScribe (NEB E2050S) T7 in vitro transcription using PCR-generated DNA as a template ([dx.doi.org/10.17504/protocols.io.dm749m](https://doi.org/10.17504/protocols.io.dm749m)).”

## ***Grassroots solution***

# **An authors' editor in every scientific research institute**



**Research institutes should provide skilled editorial support**

**Authors' editor** works *with* authors

**Language editing:** grammar, style, text efficiency ...

**Substantive editing:**

**Correct some errors**

**Prompt author revision of errors, lacunae**

**Keep researchers up-to-date:** reporting guidelines, initiatives for reproducibility, ethics

**Individualized training:** manuscript conferences, didactic editing

**Screen for misconduct, e.g. plagiarism, data manipulation**

## ***Grassroots solution***

# **An authors' editor in every scientific research institute**



First in-house editors, US medical research, 1960s ...

### **Features of institutional editing service**

Disciplinary specialization

Workload (hours, manuscripts...)

Teleworking with occasional site visits ideal

Editor's skills (depends on researchers' needs)

### **Positive effects on**

Researchers: saved time, individualized instruction,  
good publishing practices, better manuscripts

Institutes: researcher training, protect reputation,  
contribute to advancement of science

## Researchers

*Research  
Writing*

**Authors'  
editor**



*Reviewing*



*Reading  
Replicating*



*Teaching  
Mentoring  
Caring for patients  
...*

## Research reports

Manuscripts



Published articles

## Researchers

*Research  
Writing*

**Authors'  
editor**



*Better*  
Manuscripts

*Reviewing*



*Easier*

*Reading  
Replicating*



Published articles  
*More usable*

*Teaching  
Mentoring  
Caring for patients*

...

## Researchers

*Research  
Writing*

**Authors'  
editor**

+

*Reviewing*

*Reading  
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*Teaching  
Mentoring  
Caring for patients  
...*

**More  
time**

## Research reports

*Better*  
Manuscripts

*Easier*

Published articles  
*More usable*



## Researchers

*Research  
Writing*

**Authors'  
editor**

+

*Reviewing*

*Reading  
Replicating*

*Teaching  
Mentoring  
Caring for patients  
...*

**More  
time**

## Research reports

*Better*  
Manuscripts

*Easier*

Published articles

*More usable*

Scientific  
knowledge  
advances

Institutional  
rankings  
increase



# Open science movement: *opportunity for change*

## Open science

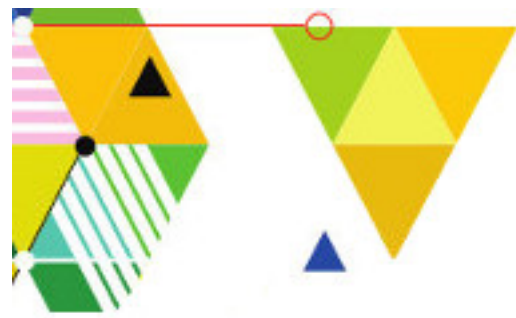
- Accessibility to research outputs for all members of society
- Maximize benefits of research
- Reduce barriers to access

## Open science and editorial support

- Methodology – accurate protocols
- Peer review – fair, diplomatic reviews
- Access – careful choice of journals



*In-house authors' editors can help  
research institutes transition to open science*



# Conclusions

**Non-standard English and laxity in scientific reporting:**

- > mediocre research reports
- > bad textual mentors

**Reporting guidelines and web-based tools:**

- > important for quality reporting

**Scientific research institutes with authors' editors:**

- > efficient use of time and resources
- > contribute responsibly to knowledge production
- > support open science

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