TODAY'S PEER REVIEW SYSTEM DOESN'T WORK

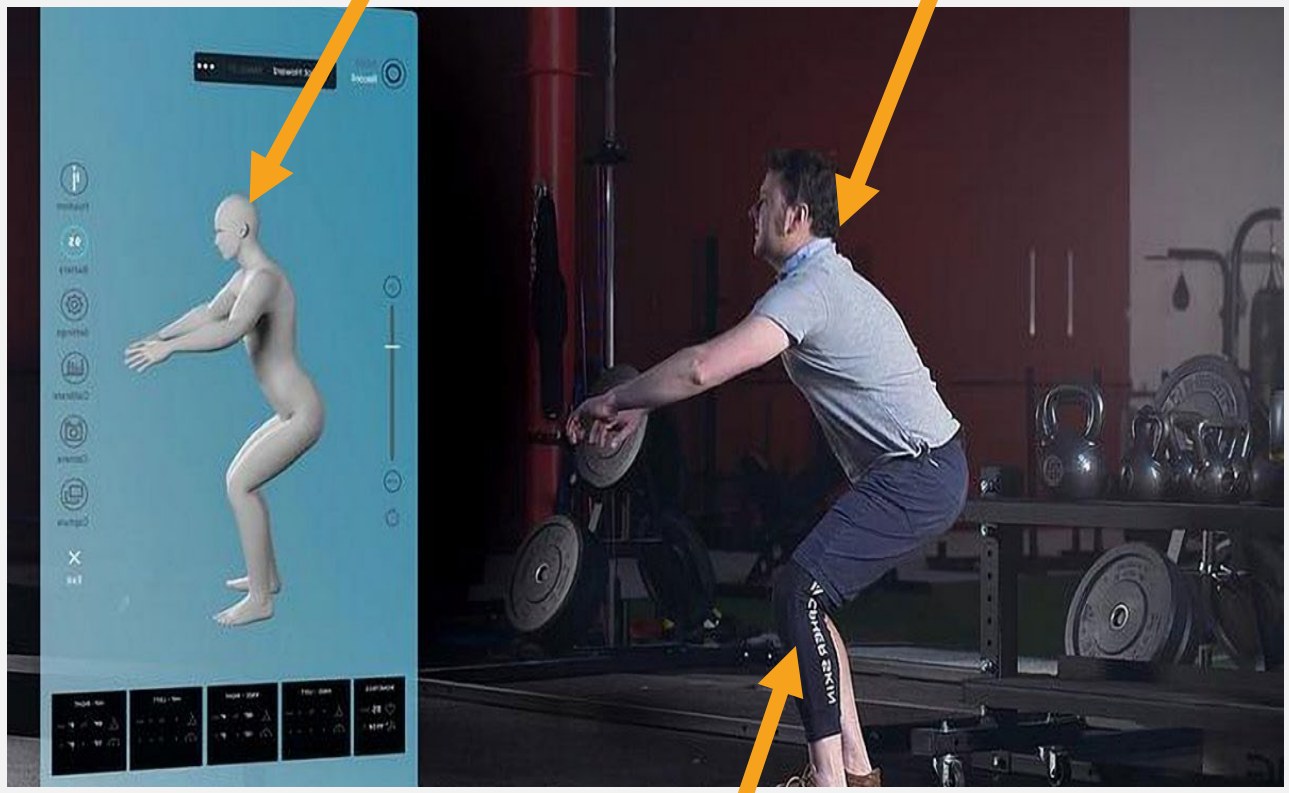
GET OVER IT

James Heathers, PhD

Cipher Skin

WHO AM I?

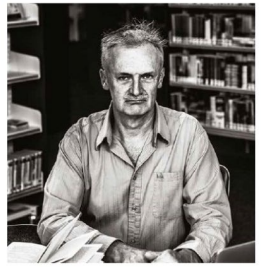
- PhD 2016
- Biosignal analysis, physiology, etc.
- **Metascience**
- CSO, CipherSkin.com



WHAT WE AREN'T TALKING ABOUT

- My other stuff

When you ask for the data



When it turns up

Maybe a little

USEFUL CONCEPTS

Faith game:

"*I will assume your work is fairly represented if you assume mine is*"

Retreat to formalism:

"*It was reviewed successfully so it must be correct*" and/or

"*A process exists, thus anything outside it is unnecessary or incorrect*"

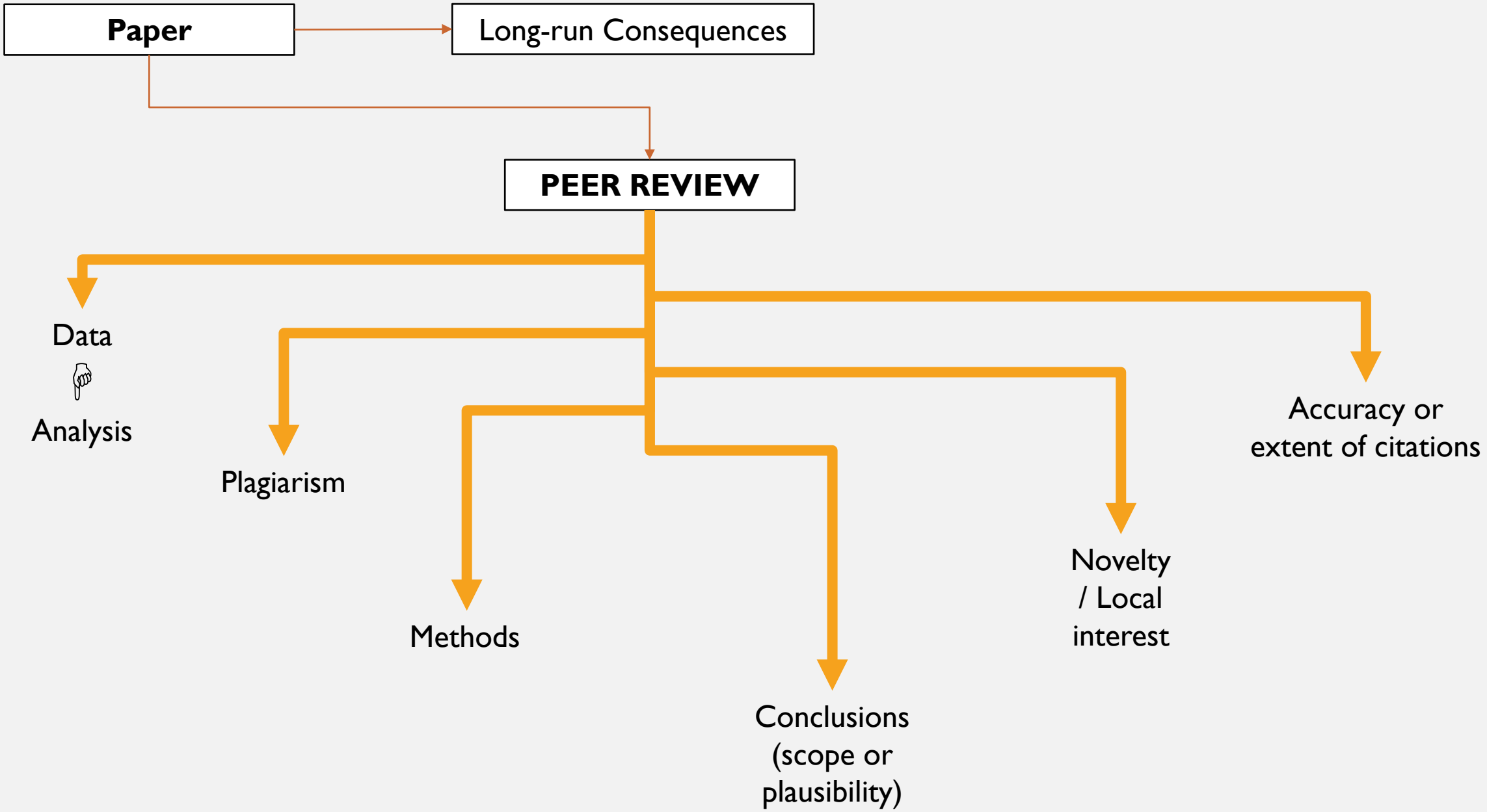
Irrevocable qualification:

"*Peer review invokes categorical acceptability that is hard to impossible to change once assigned*"

WHAT WE ARE TALKING ABOUT

- **My historical position: peer review is an institution of 'value'**
- I have had a Terrible, Horrible, No Good, Very Bad Plague.
- *This is my re-evaluation.*

HOW IT WORKS


Paper
Long-run Consequences
PEER REVIEW
Data
Analysis
Plagiarism
Methods
Conclusions (scope or plausibility)
Novelty / Local interest
Accuracy or extent of citations

THE PROBLEM

Peer review isn't that good

"most scientific editors know little about the now large body of evidence on peer review… they would discover that evidence on the upside of peer review is sparse, while evidence on the downside is abundant. We struggle to find convincing evidence of its benefit, but we know that it is slow, expensive, largely a lottery, poor at detecting error, ineffective at diagnosing fraud, biased, and prone to abuse."

Smith (2009)

METHODOLOGY REVIEW

2 / 3 reviewers ≠ identify conclusions unsupported by data (Baxt et al. 1998)

2 / 8 strong weaknesses identified (Godlee et al. 1998)

<3 / 9 major errors identified (Schroter et al. 2008)

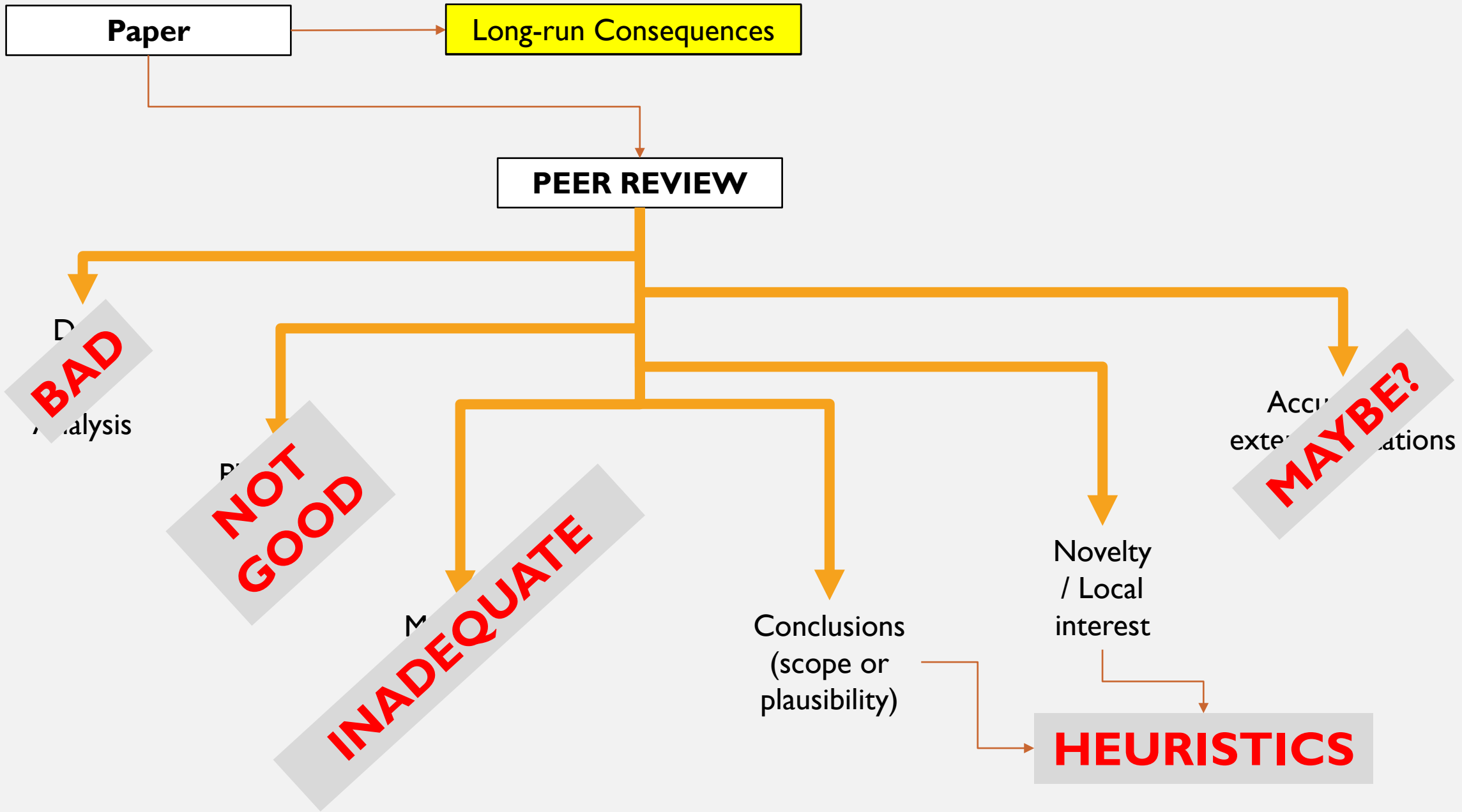
ACCURACY REVIEW

Less than half of editors check for plagiarism (Hamilton et al. 2020)

"We found that 95% of discrepancies go unnoticed even by readers specifically asked to look for them and directed to the figures and tables."

(Cole et al. 2015)

HOW IT WORKS


Paper
Long-run Consequences
PEER REVIEW
BAD
NOT GOOD
INADEQUATE
MAYBE?
Conclusions (scope or plausibility)
Novelty / Local interest
HEURISTICS

THE SHORT-RUN CONSEQUENCES

Journal shopping

- "**good** peer review incentivizes **more** peer review until **bad** peer review is achieved"

Overwork – editors

- My poll: "how many requests do you send to get two reviews?" Min: **7**. Max: **42**.

Overwork – reviewers

- You might feel this one yourself…
- COVID added est. 300K papers (2/22) to publication volume (Ioannidis et al. 2021)

HISTORY

Mid 19th C: associate editors were employed to *solicit* articles from correspondents – ‘more journal than articles’

Late 19th C: invention of typewriter allows enough copies to be made for local distribution to committees

1940: JAMA introduces external peer review (snail mail)

1959: commercial availability of Xerox

~1975: de facto standard

HISTORY … OF PROBLEMS

“Time and Effort. The reviewing system gobbles time in huge, unchewed mouthfuls. And both author and reviewer are the victims. Many a publication requests that a paper be evaluated within 2 weeks. Some reviewers manage, but the chances that both of two reviewers of a given paper would be so prompt are small indeed… The time demands on the reviewer, particularly on the authority who works thoroughly and promptly, tend to become intolerable.”

When?

Ingelfinger, 1974.

MY TERRIBLE, HORRIBLE, NO GOOD, VERY BAD PLAGUE

COVID has been fairly detrimental to my opinion of peer review

Simultaneously, increased social and scientific need for PRed information

This lead to some progress, but also

Totally avoidable mistakes
Opportunism
Propaganda / Misinformation

MY TERRIBLE, HORRIBLE, NO GOOD, VERY BAD PLAGUE

Turns out we could change peer review after all!

- We decided to triage papers into COVID / not-COVID,
- … and treat some faster than others, with limited or expedited review
- We decided preprints were here to stay,
- … and we dramatically raised awareness of reviewed vs. unreviewed status

CASE STUDY: 5G

May, 2020: Journalist sends article (2017) on 5G effects on miscarriage (during COVID / 5G scare). Concerns sent to journal.

March, 2021: EOC issued due to unavailability of data.

May, 2021: Formal paper sent to journal.

July, 2021: 3 reviews received.

November, 2021: Proofs received, publication.

Time: 18 months.

CASE STUDY: IVERMECTIN

November, 2020: Article pre-printed.

June, 2021: Meta-analysis #1 includes.

July, 2021: Our team outlines ***serious*** problems.
Meta-analysis #2 includes.
Pre-print withdrawn by ResearchSquare.

August, 2021: #1 writes update to meta-analysis. EOC issued for #2.

November, 2021: #2 retracted before replacement

February, 2022: #1 remains

PROBLEMS

Noticeable decrease in accuracy (unquantified)

Publication time compressed; post-publication review *worse than ever*

‘Irrevocable qualification’ on full display

Attention is a hell of a drug

SOLUTIONS

#1 – COMPUTATIONAL REPRODUCIBILITY

- “Can the contents of this paper be shown to be reproduced from analytical pathways?”
- This could replace preprints
- Never been easier to achieve
- So many basic errors could be caught

#2 –IN-HOUSE PREPRINTS

Having met #1, every journal becomes a preprint server.

Citations, views, or request from authors/readers triggers PR.

Review could be some time after public release.

Preprint can be updated *in situ*.

#3 – AUDIT VS. REVIEW

Audit = *forensic statistical review*

Triggered by strong public need, viral publicity, or flagged issues

Remember, statistical review is **often paid already**

#4 – SORT OUT YOUR DATA POLICIES

Make IPD requirements / requests normal!

(Lawrence et al. 2021)

Many fancy workgroups have terrible data handling and maintenance

If some full professors worked for me as a junior analyst, I would fire them

#5 – PROFESSIONAL REVIEWERS

Very little PR has training or follows a formal process. We rely on a cadre of ***dedicated amateurs*** who are perpetually replaced.

Analytical auditing and careful reviewing is *hard*

(Remember Slide 9 – 95% of mistakes missed when researchers are told to look for them)

A small cadre of 'super reviewers' already exist

Much cheaper and faster than paying for individual reviews.

($450 per review @ 2 per day annualizes to ~$235,000!)

CONCLUSION

“It all sounds like hard work, and it will reduce ‘productivity’”

Good.

A large chunk of present scientific reform amounts to:

“Put quality on a pedestal”