

Scientific Writing: Pushing it through

Jonathan Fuchs, MD, MPH

Director, Center for Learning & Innovation
San Francisco Dept. of Public Health
Professor of Medicine, UCSF

January 19, 2024

CFAR Mentoring Program



Objectives

- Offer a structured approach to paper writing
 - ❖ For you
 - ❖ For your mentees
- Provide a forum to share key lessons learned in paper writing

What lingering questions do you have about paper writing?





The 5 Ws (and an H) in approaching paper-writing

- **Why** we publish
- **Where** to publish
 - ❖ Journal selection
- **Who** (or with whom) to publish
 - ❖ Authorship
- **What** is the structure for the article
 - ❖ Framework for paper writing
- **When** to write
 - ❖ Timelines and getting to the end
- **How** to communicate
 - ❖ With co-authors, with the journal

Remember why you are publishing: Altruistic reasons? Moral duty

- **Ethical obligation to subjects**
- **Ethical obligation to society**
- **Greatest public health impact**
- **Contribute to knowledge**

Remember why you are publishing: Selfish reasons? Duty to yourself

- **Documents ideas are yours**
- **Documents your productivity**
- **Builds your reputation as an expert**
- **Future grant applications**
- **Builds your career: “Publish or perish”**
- **The “currency” of research**

The 5 Ws (and an H) in mentoring others in paper-writing

- Why we publish
- **Where** to publish
 - ❖ Journal selection
- **Who** (or with whom) to publish
 - ❖ Authorship
- **What** is the structure for the article
 - ❖ Framework for paper writing
- **When** to write
 - ❖ Timelines and getting to the end
- **How** to communicate
 - ❖ With co-authors, with the journal

**To keep moving forward,
know where you are going!**



Choosing a Scientific Journal

- **Guiding principle: Reach the right audience**
- **Field:** Biomedical, psychological, social science, statistical
- **Audience:** Global or domestic?
- **Focus:** HIV-focused or general audience?
- **Content:** Clinical, basic science, epidemiological, behavioral, policy?

Offer a clear message

- Write to the message, not the topic
- What is the single most important finding
- Main study aim or hypothesis
- First sentence of newspaper article on your research
- Elevator test



Elevator test in 2-3 sentences

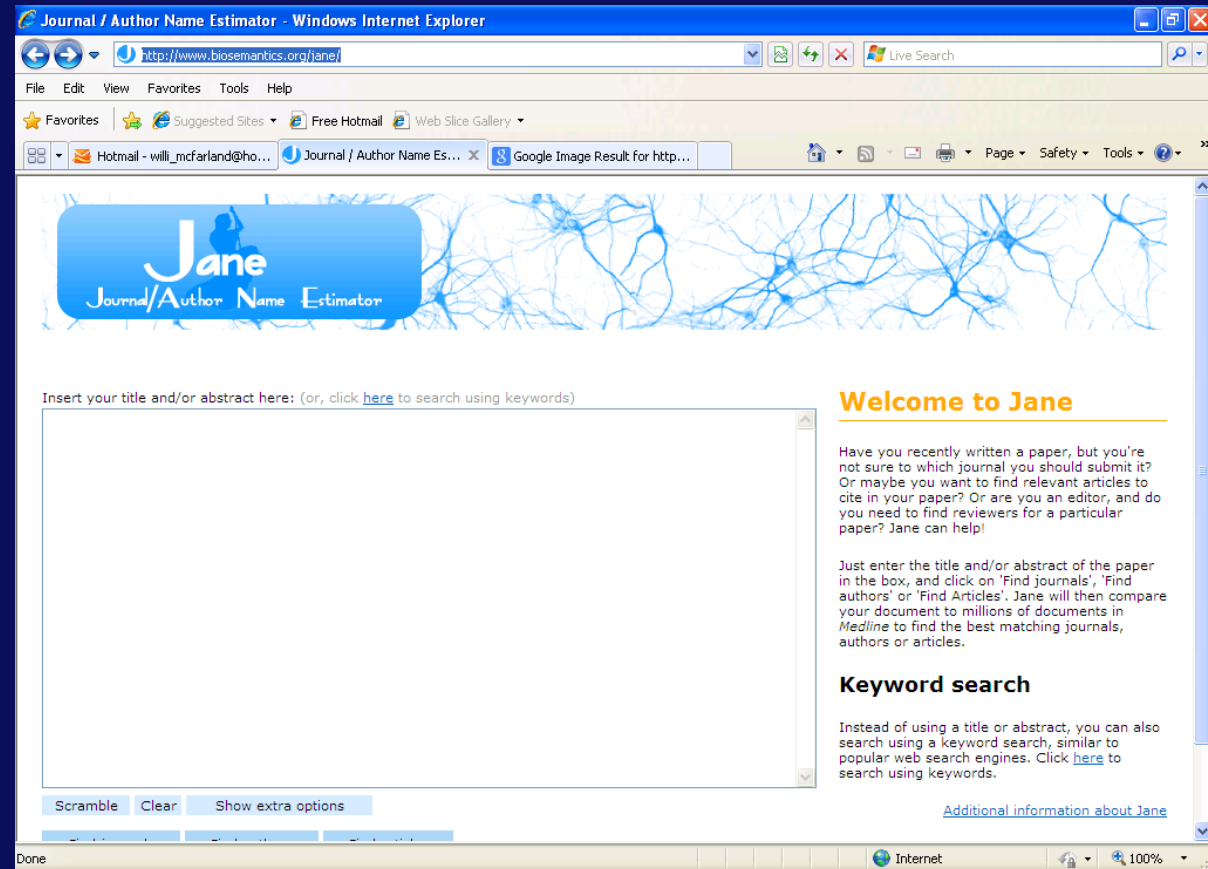
1. Quick study design (how)
2. Quick subjects (who)
3. Primary results (what)
4. Relevance, significance of findings
 - ❖ Why?
 - ❖ The Message

Where should I submit?

Choosing a journal using your title and/or abstract

Ask JANE! (Journal/Author Name Estimator)

Jane.biosemantics.org



The screenshot shows the Jane website in a Windows Internet Explorer browser window. The address bar displays <http://www.biosemantics.org/jane/>. The page features a blue header with the Jane logo and the text "Journal/Author Name Estimator". Below the header, there is a large text input field with the placeholder text "Insert your title and/or abstract here: (or, click [here](#) to search using keywords)". To the right of the input field, there is a "Welcome to Jane" section with a yellow heading. The text in this section reads: "Have you recently written a paper, but you're not sure to which journal you should submit it? Or maybe you want to find relevant articles to cite in your paper? Or are you an editor, and do you need to find reviewers for a particular paper? Jane can help!" Below this, it says: "Just enter the title and/or abstract of the paper in the box, and click on 'Find journals', 'Find authors' or 'Find Articles'. Jane will then compare your document to millions of documents in Medline to find the best matching journals, authors or articles." There is also a "Keyword search" section with the text: "Instead of using a title or abstract, you can also search using a keyword search, similar to popular web search engines. Click [here](#) to search using keywords." At the bottom of the input field, there are buttons for "Scramble", "Clear", and "Show extra options". A link for "Additional information about Jane" is located at the bottom right of the page. The browser's status bar at the bottom shows "Done" and "Internet" with a 100% zoom level.

Choosing a Scientific Journal

- Logistical considerations
- Check word count, length requirements, style guide
 - ❖ Full article of original research
 - ❖ Brief
 - ❖ Data letter
 - ❖ Letter to the editor
- Timing to share results with the world
- Prestige (aim high and go lower, or sure thing?)
- Open access (PLoS)

IMPACT FACTOR

Counting references to rank the use of scientific journals.

The “impact factor ratio” is calculated as the number of citations in 1 year for all articles divided by the number of articles published in the journal in the last two years.

**2022
General
Medicine**

Rank	Journal	Impact Factor
1	Lancet	168.9
2	NEJM	158.5
3	JAMA	120.7
4	Ann Int Med	39.2
5	PLOS Med	11.6

**2022
Infectious
Disease**

Rank	Journal	Impact Factor
1	Lancet Infect Dis	56.3
2	Clin Infect Dis	11.8
3	J Infect Dis	6.4
4	AIDS Pt Care STDs	4.9
5	AIDS & Behav	4.8

<http://www.nobelprizeii.org/videos/important-journals-impact-factor/>

Choosing a Scientific Journal: Other Messages

- Guiding principle: Use *any* angle to get accepted
- Consider sponsored supplement
- Editor seems to understand your work (they “get it”)
- Luck!
- Persevere – try another journal

Pre-prints: any concerns?

- Does my target journal allow for it prior to submission?
- Does it take more time to publish a preprint?
- What if I receive negative comments on my paper?
- What if someone else scoops my research idea and publishes ahead of me?
- Doesn't publishing preprints make it harder for scientists and the public to distinguish between high- and low-quality research?

The 5 Ws (and an H) in approaching paper-writing

- Why we publish
- Where to publish
 - ❖ Journal selection
- **Who** (or with whom) to publish
 - ❖ Authorship
- **What** is the structure for the article
 - ❖ Framework for paper writing
- **When** to write
 - ❖ Timelines and getting to the end
- **How** to communicate
 - ❖ With co-authors, with the journal

Authorship

- The “currency” of research
- But, a source of hurt feelings
 - ❖ Recognition of collaborators
 - ❖ Cultural differences



Authorship

- **Potential problems**
 - ❖ Omission of those who merit authorship (or should have been offered the opportunity)
 - ❖ Inclusion of those who do not merit authorship
 - ❖ Order of authorship
- **Clarify authorship as early as possible**
 - ❖ But, don't stymie productivity
 - ❖ Research mentors may need to shield mentees if conflict arises



Uniform Requirements for Manuscripts Submitted to Biomedical Journals:

Updated April 2010

Download a PDF version of the full text of the Uniform Requirements for Manuscripts Submitted to Biomedical Journals [here](#).

Statement of Purpose >

[About the URM](#)

[Potential Users](#)

[How to Use the URM](#)

Ethical Considerations >

[Authorship and Contributorship](#)

[Editorship](#)

[Peer Review](#)

[Conflicts of Interest](#)

[Privacy and Confidentiality](#)

[Protection of Human Subjects and](#)

[Animals in Research](#)

Publishing & Editorial Issues >

[Obligation to Publish Negative](#)

[Studies](#)

[Corrections](#)

[Copyright](#)

[Overlapping Publications](#)

[Correspondence](#)

[Supplements](#)

[Electronic Publishing](#)

[Advertising](#)

[General Media](#)

[Obligation to Register Clinical Trials](#)

Manuscript Preparation >

[Preparing for Submission](#)

[Sending the Submission](#)

References >

[Print References](#)

[Other Sources](#)

Uniform Requirements for Manuscripts (URM)

✓ Statement of Purpose

• [About the URM](#)

• [Potential Users](#)

• [How to Use the URM](#)

✓ Ethical Considerations

• [Authorship and](#)

[Contributorship](#)

• [Editorship](#)

• [Peer Review](#)

• [Conflicts of Interest](#)

• [Privacy and Confidentiality](#)

• [Protection of Human](#)

[Subjects and Animals in](#)

[Research](#)

✓ Publishing and Editorial Issues

• [Obligation to Publish](#)

[Negative Studies](#)

• [Corrections, Retractions,](#)
[and "Expressions of Concern"](#)

• [Copyright](#)

• [Overlapping Publications](#)

• [Correspondence](#)

• [Supplements, Theme Issues,](#)
[and Special Series](#)

Authorship Criteria (JAMA)

- **Each author can swear, in writing:**
 - ❖ Unique, previously unpublished
 - ❖ Can provide the data to publishers
 - ❖ Agree corresponding author can edit
- **Each author approves final manuscript**
- **Each author must meet all 3 criteria:**
 1. Contributed to conception, design, analysis, or interpretation
 2. Put pen to paper, or major editing
 3. Provided statistical expertise, obtained funding, logistical support, or supervision

Authorship Rank

Best: First and *corresponding = Responsible for paper

Also, co-first author, sharing equal responsibility for primary authorship

2nd best: Last, “senior author”, PI, “grandparent of ideas”

3rd best: Second

4th best: Third, then drops off from here (only 3 authors then “et al” in many reference formats

5th best: Fourth and so on according to contribution

Worst: Next to last

Actually, there is now a “co-senior” author as next to last

***Corresponding author is responsible for paper:** Can be anyone and any position - Adds prestige, but responsibility

Alternatives to Authorship

- **Acknowledgements**

- ❖ For those who do not meet authorship criteria but who contributed

- **Group authorship**

- ❖ Provides a means to add many authors
- ❖ “...for the HVTN 090 Protocol Team”
- ❖ All names now found in Medline/Pubmed

The 5 Ws (and an H) in mentoring others in paper-writing

- Why we publish
- Where to publish
 - ❖ Journal selection
- Who (or with whom) to publish
 - ❖ Authorship
- **What** is the structure for the article
 - ❖ Framework or formula for paper writing
- **When** to write
 - ❖ Timelines and getting to the end
- **How** to communicate
 - ❖ With co-authors, with the journal

Acknowledgement



Willi McFarland, MD, PhD

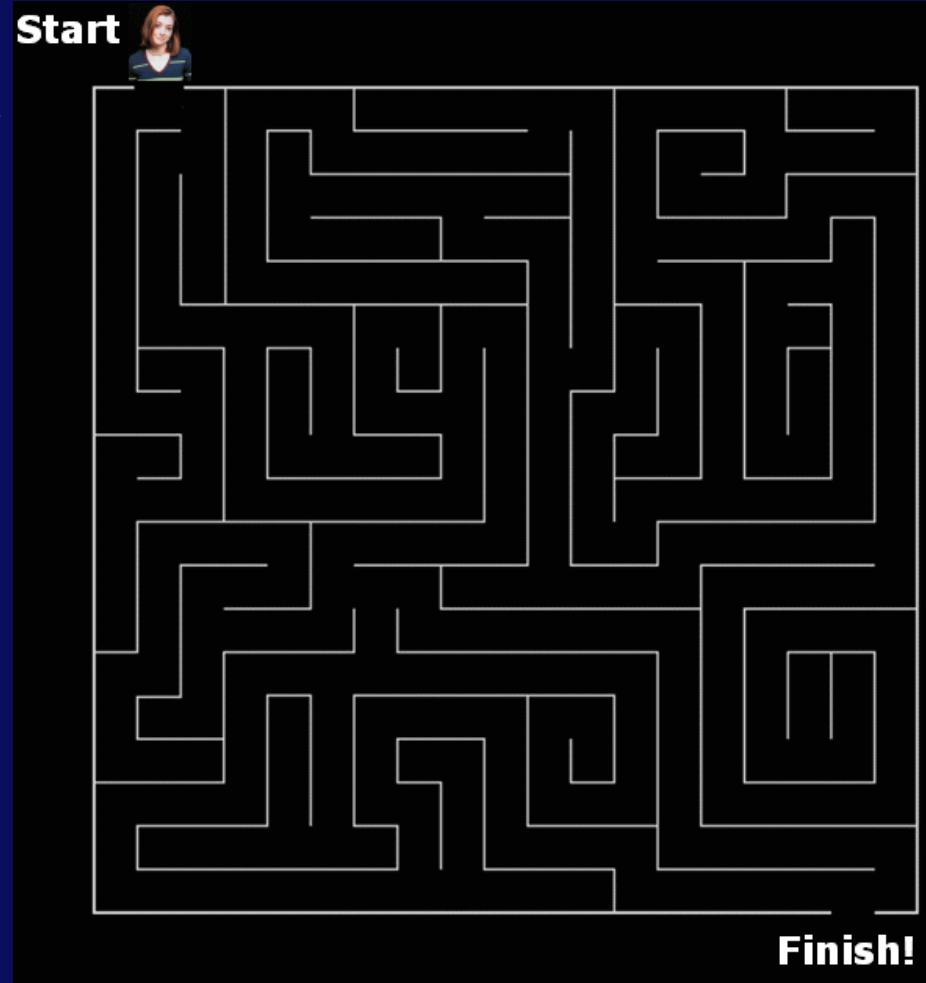
- 20 years
- Hundreds of students/trainees
- Mentorship using this formula resulted in hundreds of publications (and counting...)

Tip: Do not compose you paper in the conventional order

- 1. Abstract**
- 2. Introduction**
- 3. Methods**
- 4. Results**
- 5. Discussion**
- 6. References**
- 7. Tables and Figures**

Start at the end, work towards the start

- Easier to get started if you know where you are going
- Easier to pose the question if you know the answer



Find the message and compose backwards from it

1. Tables and Figure
2. Results
3. Discussion
4. Introduction
5. Methods
6. Abstract
7. References

Rule of 4

4 x 4

1. Introduction

1. Big Picture
2. Specific Issue
3. Gap in knowledge
4. How we fill the gap

2. Methods

1. Overall study design
2. Study subjects
3. Measures
4. Analysis

3. Results

1. Trust me
2. Cool measures
3. No tricks
4. It's solid

4. Discussion

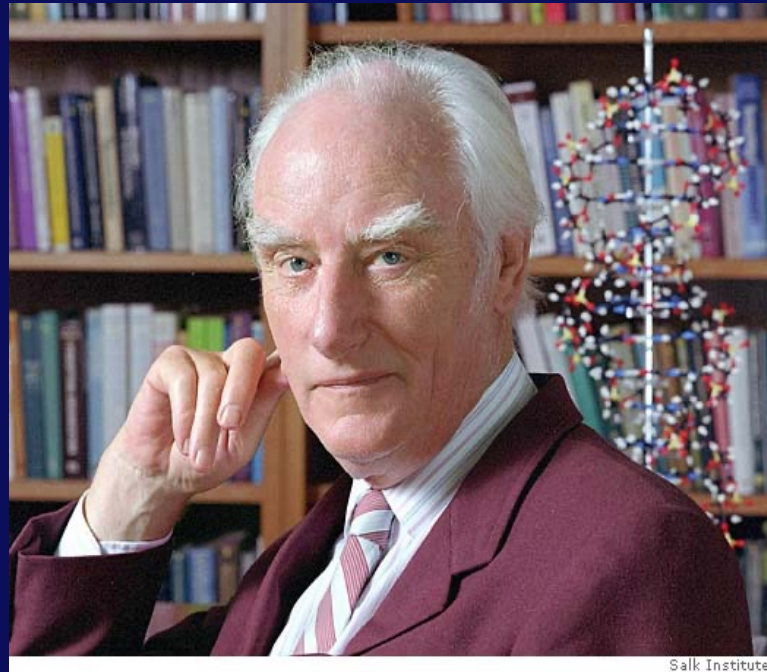
1. Mission accomplished!
2. Not only that...
3. Mea culpa
4. Kumbaya

•4 also as 3 Tables and 1 Figure

Scientific Writing Reflections: Summing Up

There is no form of prose more difficult to understand and more tedious to read than the average scientific paper.

Francis Crick, *The Astonishing Hypothesis*, 1994



Journals Regularly Plead for Clarity

The infectiousness of pompous prose.

Nature, 1992.

In pursuit of comprehension.

Nature, 1996.

Evidence-based illiteracy: time to rescue "the literature".

The Lancet, 2000.

Compliance (COMmunicate PLease with Less Abbreviations, Noun Clusters, and Exclusiveness).

Am. J. Respir. Crit. Care Med., 2002.

Clear as mud.

Nature, 2003.

Tips from my English teacher

- Be concise
 - To write well is to re-write shorter
 - No unnecessary words
 - Have non-experts read your work
- ❖ Grant, *Right your Writing*, The Scientist



Use of AI in scientific writing?

- AI tools can be used at different stages in writing
 - ❖ Edit, format, correct or create content
 - ❖ Generative AI can create text, images, other media and synthetic data (OpenAI's GPT, Google's Bard, Meta's Llama)
- Most journal publishers including Springer Nature, Elsevier, Taylor and Francis, JAMA, etc. preclude AI authorships
 - ❖ Primary concern: Responsibility for authorship
 - ❖ Most publishers ask for proper mention of AI usage

Are you using AI, and if so, how?

A sample checklist for leveraging AI in scientific writing

Acknowledge AI usage

Mention AI tools, like ChatGPT, as you would for any other software to prioritize transparency

Avoid AI authorship due to accountability concerns

Preserve confidentiality

Refrain from inputting confidential info into AI models as they may store prompts for training

Fact-check AI-generated content

Verify content created and avoid content generation whenever possible

Enhance language and brevity

A checklist for leveraging AI in academic writing

Leverage AI for **summaries**

Can assist with structuring outlines

Document Search using AI

Certain tools can allow uploading documents for information retrieval. Can expedite research by analyzing PDFs

Stay updated on **guidelines**

As AI tools continue to evolve, stay informed about changing guidelines from publishers

The 5 Ws (and an H) in approaching paper-writing

- Why we publish
- Where to publish
 - ❖ Journal selection
- Who (or with whom) to publish
 - ❖ Authorship
- What is the structure for the article
 - ❖ Framework or formula for paper writing
- **When** to write
 - ❖ Timelines and getting to the end
- **How** to communicate
 - ❖ With co-authors, with the journal

When to write: Some tips

- Are 3 hour blocks to write necessary? Will 30 minutes do?
- Save a relatively easy paragraph to write in the morning
- Write in an environment that works for you
- Retreat!
- Others???

The 5 Ws (and an H) in approaching paper-writing

- Why we publish
- Where to publish
 - ❖ Journal selection
- Who (or with whom) to publish
 - ❖ Authorship
- What is the structure for the article
 - ❖ Framework or formula for paper writing
- When to write
 - ❖ Timelines and getting to the end
- **How** to communicate
 - ❖ With co-authors, with the journal

Communicating with co-authors (and you)

- **Set up a schedule** with key milestones and communicate to co-authors
- **Define roles** early on
 - ❖ Who is drafting which sections?
 - ❖ Lead author drafting full manuscript or are sections distributed, or combination thereof?
- How many **rounds of reviews**?
 - ❖ Including your edits/suggestions
- For **Network or Consortia-based papers**, what time for central review may be required?
Sponsor review?

Communicating with the Journal

Selling yourself: you must get through “triage”



Editorial Triage

- ✓ Does this article have a clear message?
- ✓ Is it original?
- ✓ Is it important?
- ✓ Is it true?
- ✓ Is it relevant to our readers?

Gavin Yamey, MD

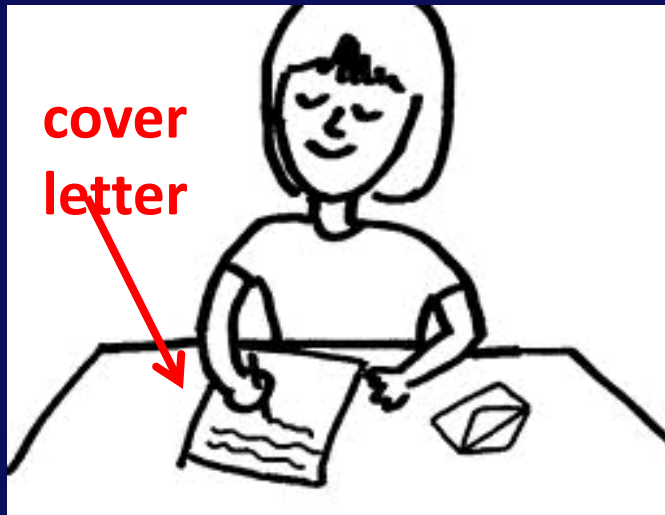


The first thing an editor looks at is... the Title



- Don't waste this 1st chance to sell yourself
- Entice the reader
- Concise, informative
 - ❖ Expository, declarative, a question
- Not overly sensationalized

The second thing an editor looks at is...cover letter



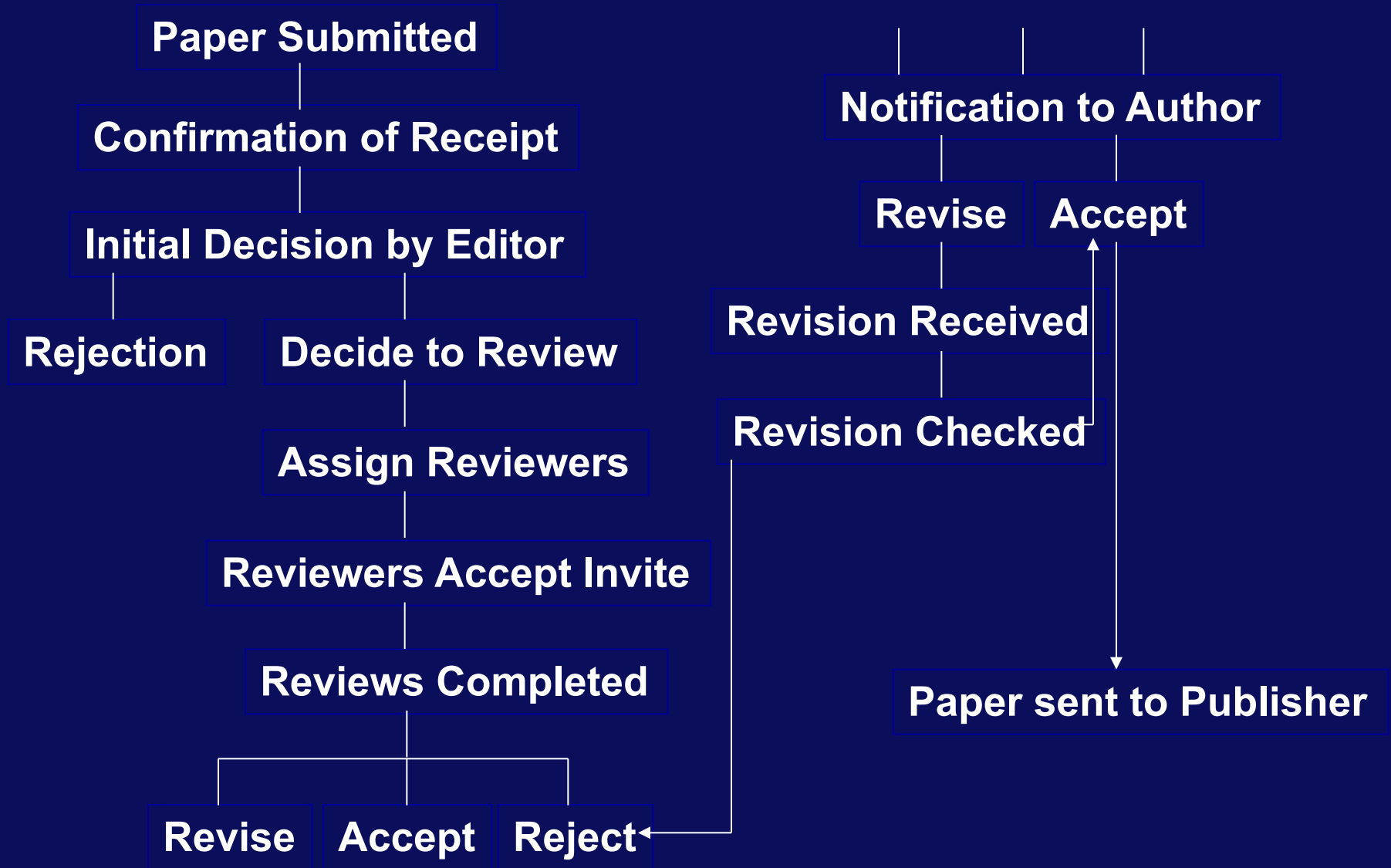
- Terrific opportunity to “sell” your work
- *Don't* write something dull
“Please consider this manuscript for publication in your esteemed journal”
- *Do* tell the editor why they really should take your work seriously
“We have done the first ever RCT to assess whether drug x can limit neurocognitive decline in patients with AIDS-associated dementia”

The third thing an editor looks at is... abstract



- **Important fact:** many journals now base their initial decisions on **your abstract alone**
- Yet many authors write the abstract in a great rush
- Concise, “stand alone” piece, clear message
- *Must* reflect the full paper
 - Why did you do the study? What did you do?
 - What did you find? What did you conclude?
 - (conclusions only for results presented)

Overview of Peer Review Process



The 5 Ws (and an H) in approaching in paper-writing

- **Why** we publish
- **Where** to publish
 - ❖ Journal selection
- **Who** (or with whom) to publish
 - ❖ Authorship
- **What** is the structure for the article
 - ❖ Framework for paper writing
- **When** to write
 - ❖ Timelines and getting to the end
- **How** to communicate
 - ❖ With co-authors, with the journal

Don't get discouraged!





**KEEP
CALM
AND
WRITE
ON**

Questions? Comments?

jonathan.fuchs@sfdph.org

More detail on the 4x4 approach

Find the message and compose backwards from it

1. Tables and Figure
2. Results
3. Discussion
4. Introduction
5. Methods
6. Abstract
7. References

Tables and Figures

Tip: Pass the “Fall on the Ground Test”



Tables and Figures

- **3 tables**
 - ❖ Table 1. Description of study population
 - ❖ Table 2. Bivariate correlates of main outcome
 - ❖ Table 3. Multivariate analysis of main outcome
 - ❖ (Table 4 maybe. Sub-analyses, secondary questions)
- **1 figure (maybe)**
 - ❖ Figure 1. Flow of subjects (e.g., CONSORT Diagram); procedures in study; trends over time; Map; “Cascade”

Results

Results

- **Say in words what the tables and figure say in numbers (highlight salient story)**
- **Follow the sequence of tables and figures**
 - ❖ Go back and forth to get the order exactly the same
- **State in words the most interesting findings in table**
 - ❖ Not all numbers: key characteristics of sample, main outcomes, most important, unexpected
 - ❖ Non-significant findings if relevant

Additional Tips for Results

- **OK to be short**
- **Just the facts of your data**
 - ❖ Compare within your data, not to other studies
 - ❖ No references
 - ❖ Interpret data points as facts - not the meaning, importance, context

Results in 4 Parts

1. **Trust us:** Describe your sample (Table 1)

- ❖ This is a great sample, the right population, here is how it may or may not look like your population
- ❖ Eligible, enrolled, participation rate
- ❖ Demographics

2. **Cool measures:** Primary outcomes (Table 1 or 2)

- ❖ Segue to the most novel and interesting measures
- ❖ Main outcome, other outcomes, laboratory results, novel measures

Results in 4 Parts

- 3. No tricks:** Associations with the main outcome clear on the face of it (Table 2 or 3)
 - ❖ Bivariate analysis
 - ❖ Maybe Figure showing main effect (bivariate)
 - ❖ Pivotal result, make your case crystal clear
- 4. It's solid:** The effect holds up to adjustments (Table 3 or 4)
 - ❖ Multivariate analysis, confounding, complex weighting
 - ❖ May need statistical consultation or co-investigator

Discussion

The Discussion Section

- The meaning, the importance, and context of the facts
- Highlights the health impact of the study
- This is the most creative part
- Opportunity to share your ideas
- Most prone to writer's block

Template for Discussion in 4 parts

- **Mission accomplished!**

- ❖ The elevator test

- **Not only that...**

- ❖ Other, unexpected, secondary findings

- **Mea culpa**

- ❖ Limitations

- ❖ But, redemption!

- **Kumbaya**

- ❖ Public health implications, way forward

Mission Accomplished!

- With the tables/figures, may be the only thing your audience reads
- The message: “Elevator Test”
- Your primary research question
- The answer to the question posed in the introduction (or in title)
- The first sentence of Discussion
 - ❖ **“We found...”**
 - ❖ **“Our study shows...”**
 - ❖ **“Our study provides evidence that...”**

Not only that...

- Relax, now that the message was delivered
- 3 or so additional interesting findings and their meaning
- Unexpected findings (We love these!)
 - ❖ Contradict other studies, conventional wisdom
 - ❖ Disproves your own biases!

Mea Culpa



- “We recognize limitations of our study...”
- **Confess!**
 - ❖ No study is without potential bias
 - ❖ No study is perfectly executed
- **Head off criticism**
- **Redemption now possible!**

Mea Culpa

- **Start with biggest bias or threat to internal validity**
- **Proceed to next most important, and so on**

Mea Culpa... and Redemption!

- How you did your best to address the bias in the design and analysis
- Other evidence that bias is not likely to change your primary conclusion (message is solid!)
- Evidence of other studies
- How you avoided biases of other studies

Kumbaya



Kumbaya

- **Don't end on a negative!**
- **Human nature likes the positive**
- **Science is incremental improvement**

Kumbaya

- **Segue from Mea Culpa “Despite potential limitations...”**
- **Way forward**
- **Public health and clinical implications**
- **Setting the future research agenda**

Introduction

Introduction

- **Write to the message, not the topic**
- **Pose a question: Easier to pose the question you already answered**
 - ❖ **There are infinite unanswered questions**
- **Exhaustive literature searches are a source of procrastination, or insecurity (15 to 20 total is enough!)**
- **You need a filter to get the focus**

Introduction in 4 parts

Think 4 sentences:

1. General situation (known)
2. Specific topic (known)
3. Gap in our knowledge of the topic (unknown – but your message fills it!)
4. What you did to fill the gap

Example of 4 sentence introduction

1. General:

- Replication competent vaccines have been some of the most potent inducers of immune responses and associated efficacy against a wide range of diseases, but few have been tested as an HIV vaccine

2. Specific:

- Vesicular stomatitis virus is a novel vector with little preexisting immunity worldwide— a factor that has been shown to limit vaccine impact

3. Gap:

- No studies have been done to date to establish the safety and preliminary immunogenicity of an HIV vaccine based on VSV

4. How we filled the gap:

- We conducted a phase Ia trial of VSV vaccine in healthy, HIV uninfected adults

Methods

- How you did the study with enough detail for the reader to judge whether the findings you report support your conclusions (message)
- No less
- No more
- Not a protocol!

Methods in 4 parts

- **Points to communicate = headings:**
 1. **Study design** (cross-sectional, longitudinal, RCT)
 2. **Subjects** (setting, target population, eligibility, sampling, recruitment)
 3. **Measurements** (behavioral, laboratory)
 4. **Analysis** (statistics)
 5. **Ethics statement**

4 x 4

1. Introduction

1. Big Picture
2. Specific Issue
3. Gap in knowledge
4. How we fill the gap

2. Methods

1. Overall study design
2. Study subjects
3. Measures
4. Analysis

3. Results

1. Trust me
2. Cool measures
3. No tricks
4. It's solid

4. Discussion

1. Mission accomplished!
2. Not only that...
3. Mea culpa
4. Kumbaya

•4 also as 3 Tables and 1 Figure