Scientific Writing: Pushing it through

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CFAR Mentoring Workshop

You are mentoring a medical student and talking to her about a paper she's taking the lead on during one of your regularly scheduled meetings.

She has been working on an analysis with you and several co-investigators focused on determining the correlates of retention in HIV care among women seen in several US urban clinics. This will be one of her first papers, and as she embarks on this experience, she wants to know your secrets/pearls to getting papers published.

- What wisdom would you like to share with your student?

- What burning questions do you still grapple with as you prepare your own papers for publication?

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

Remember why you are publishing: Altruistic reasons? Moral duty

- Ethical obligation to subjects
- Ethical obligation to society
- Greatest public health impact
- Contribute to knowledge
- To really understand your topic

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

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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:** Perinatology-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

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 your 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.

2014 General Medicine

Rank	Journal	Impact Factor
1	New Engl J Med	55.8
2	Lancet	39.2
3	JAMA	35.3
4	Ann Intern Med	17.8
5	PLOS Med	14.4

2014 Infectious Disease

Rank	Journal	Impact Factor
1	Lancet Infect Dis	19.5
2	Clin Infect Dis	8.9
3	J Infect Dis	6.0
4	AIDS	5.6
5	JAIDS	4.6

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

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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
  - If you are the research mentor, you may need to shield your mentee

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.

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, "grandfather 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

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Acknowledgement

Willi McFarland, MD, PhD

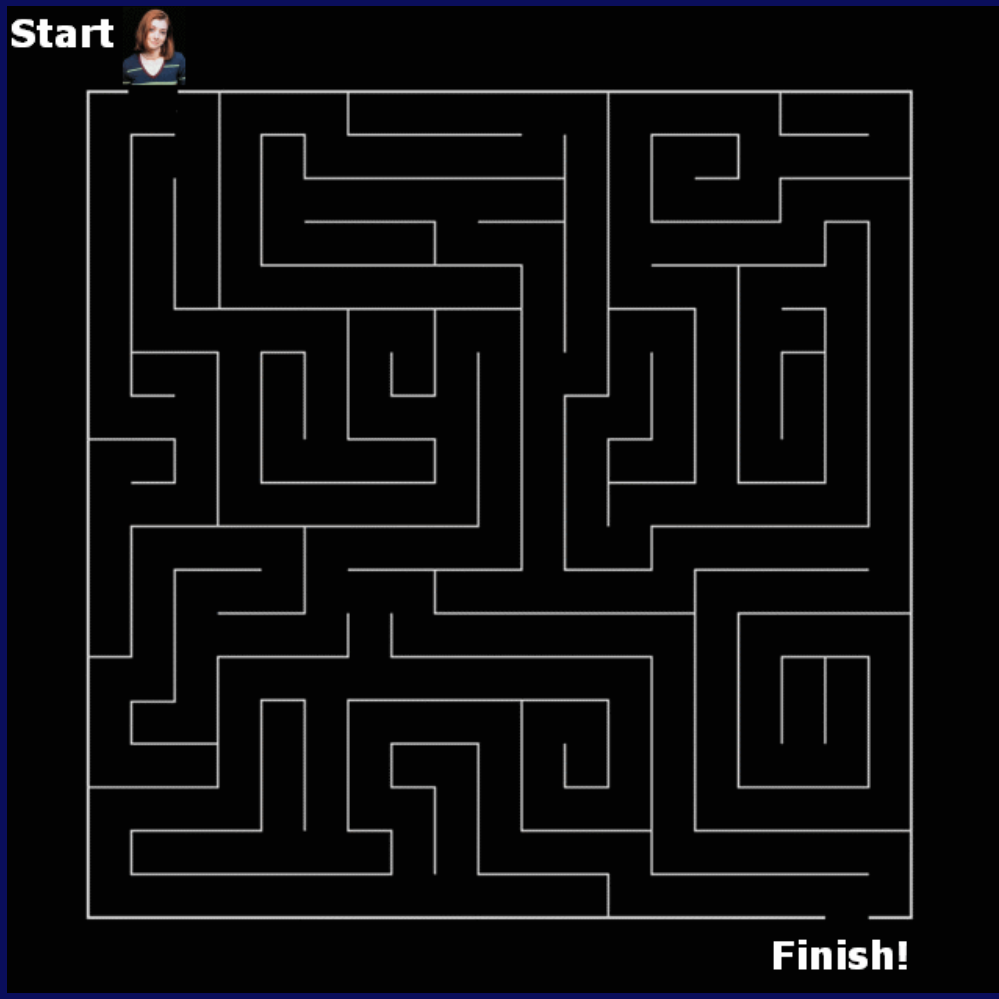
- 20 years
- 300 students
- Over 250 publications using this formula (and counting…)

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

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 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, confouding, complex weighting
   - May need statistical consultation or co-investigator

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

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 prexisting 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 populatoin, eligibility, sampling, recruitment)
  3. **Measurements** (behavioral, laboratory)
  4. **Analysis** (statistics)
  5. **Ethics statement**

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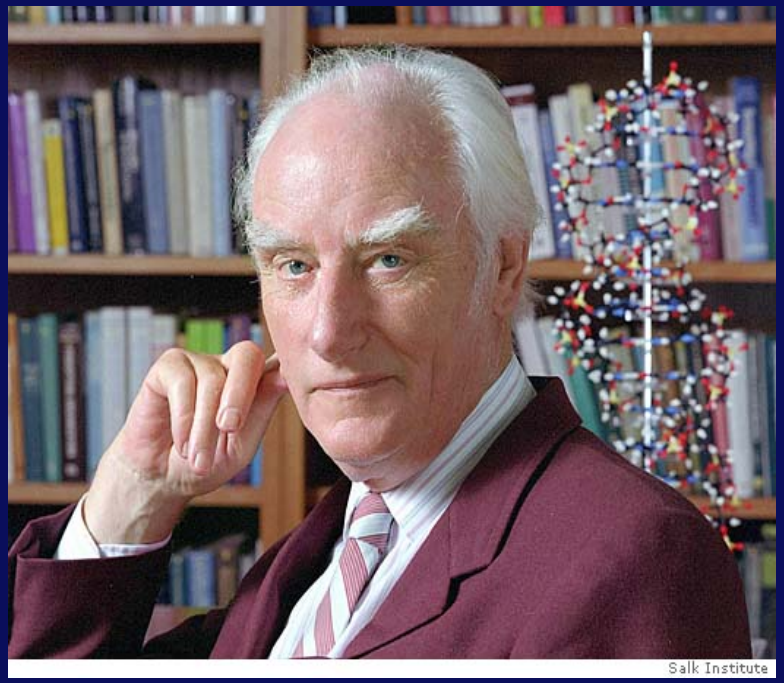
Scientific Writing Reflections: Summing Up

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

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When to write

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

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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

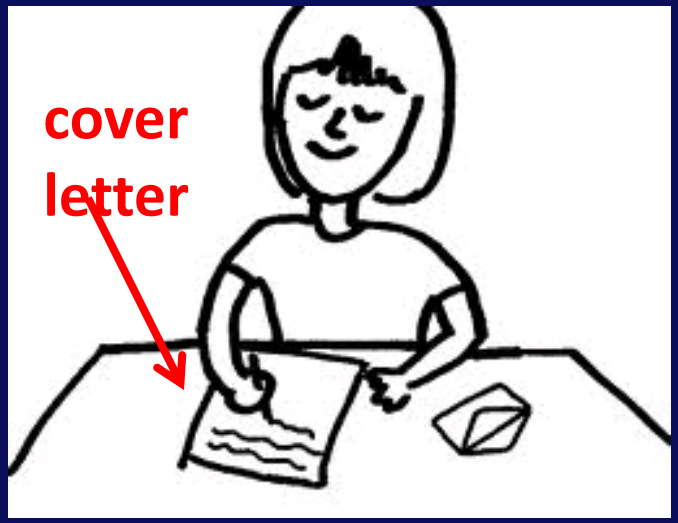
- ✓ Does this article have a clear message?
- ✓ Is it original?
- ✓ Is it important?
- ✓ Is it true?
- ✓ Is it relevant to our readers?

Gavin Yamey, UCSF

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

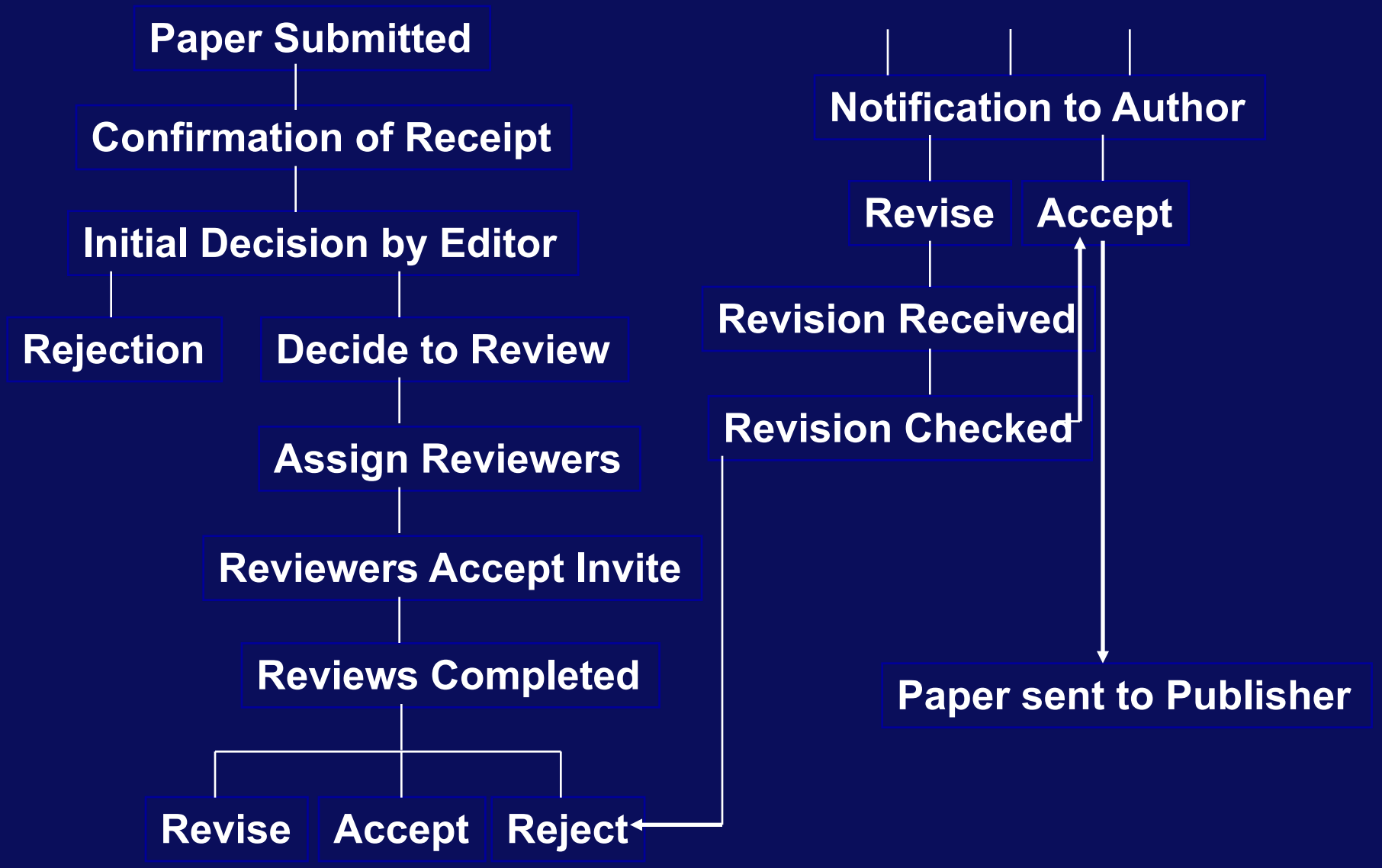
  "We have done the first ever RCT to assess whether drug x can limit neurocognitive decline in patients with dementia"

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



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Don’t get discouraged!

Keep things moving forward!

Questions? Comments?