Turning Ideas into Research

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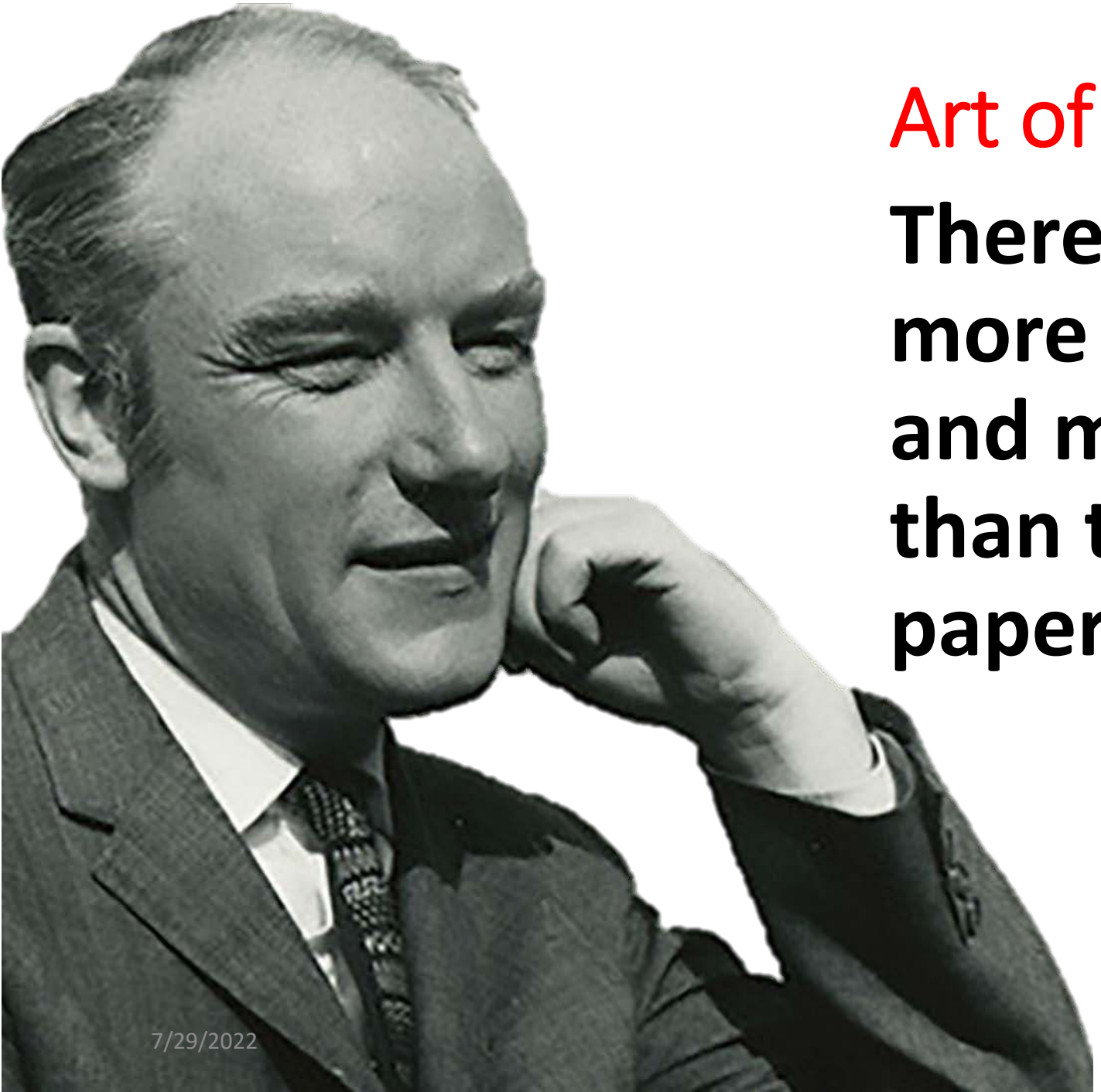


Art of Scientific Writing

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

Francis Crick

Global View of Publication in Medicine

- Thousands of journals published regularly
- Less than 50% are abstracted on MEDLINE.
- Approximately 806 thousand articles indexed by MEDLINE at the National Library of Medicine in 2015
- Over 50% of articles written are never cited by anyone

International Research Publications Facts and Figures

- Over 53 million articled published between 1665-2012
- PubMed Central holds over 2.2 million articles, has a collection of over 20 million citations
- SciVerse Scopus holds over 43 million records, it includes 18,000 peer-reviewed journals (including 1,800 open access journals), 700 trade publications, and 400 book series.

Global View of Publications in Science- Hard Facts

- Over 50% of research papers receive no citation
- 90% readers glance through the content list only
- Only 5% open the journal to review the titles
- Less than 2% scientists read the abstract and introduction
- Less than 1% read rest of the paper!

Bottom Line

So, to get your article read, it must **STAND OUT**

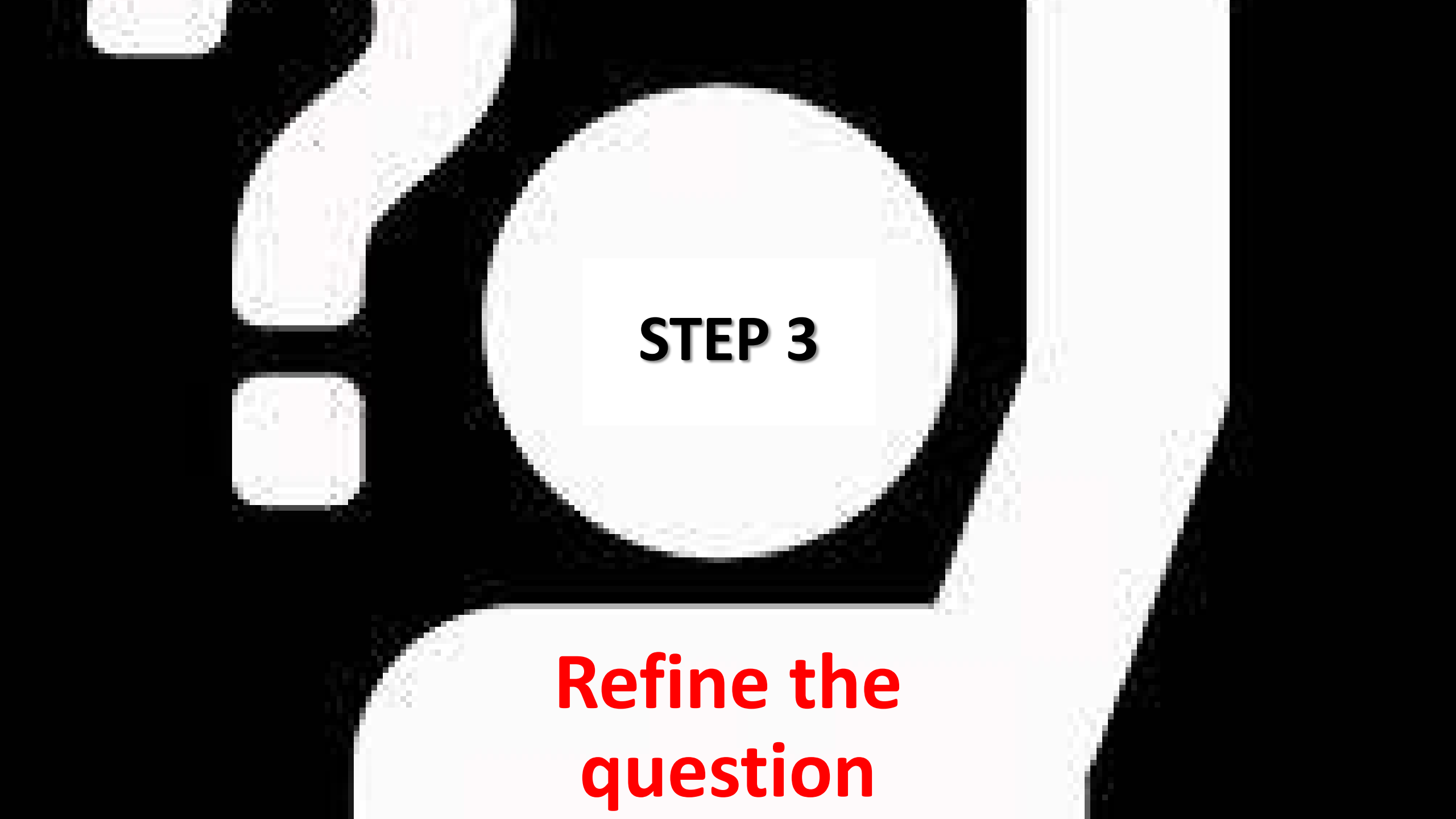
How to go about your (first) research

1. **Plan, Plan, Plan**
2. **“Plans are nothing, planning is everything”- Dwight D. Eisenhower**
3. **Have a mentor**

STEP 1

Have (Develop) an Idea


STEP 2:
Ask a question


STEP 3
Refine the question

STEP 4:

Critical Literature Review

OOPS!!

There are existing works on that idea

Never mind, here are some things you can still do:

- Write a review paper
- Or, better, a metanalysis
- Or, ask another question (Back to step #2)

STEP 5

- Find out how relevant your question is
- Use your peers as a sounding board (Your personal peer review process):
  - Use colleagues, mentor, enemies, cynics


STEP 6
Start Planning

Back to the Crucial Question

- How do you get an idea?
- How do you recognize that case that needs to be reported?
- How does some information perceived, clicked together in your brain to become an idea?

Where do ideas come from?

Where do ideas come from?

- Ideas come from experience and previous knowledge or facts about the object of study e.g. population
- When you have the knowledge of a population, then you begin to notice patterns
- With patterns, you have two main observations:
  1. Regularities
  2. Anomalies

Regularity

- The observation of regularities is a common origin of new ideas.
- Regularly seeing two things happening in succession leads to suspicions of causality, e.g. You push a switch and a light going on.
- You may then develop an “hypothesis” to explain the regularity. The hypothesis is the **IDEA**
- Though causality can never be proven by the mere observation of regularities
- But observing regularities can start your train of thought

Anomalies

- An anomaly (or irregularity) strikes our mind, because it defies our expectations.
- If we had developed a hypothesis to explain the original regularity
- The anomaly is a “refutation” of the hypothesis.
- It forces us to think about other explanations, and these lead to new hypotheses that we then try to test

Anomalies

Thus, the researcher may start from previous knowledge and experience; which, when are challenged by anomalies, he/she seeks new explanations for….

More on Anomalies

An interesting way to discover anomalies is to enter a new field of research; since you have other background experience than the people already in the field, you see things that they take for granted but that strike you as odd – at the same time, you may also see new explanations for these anomalies

Sources of new Ideas

- **Review existing practice:** the current practice is not as good as it could be…

- **Challenge accepted ideas:** much of health care is based on accepted practice rather than research evidence
- **Look for conflicting views**: which indicate either that there is not enough evidence, or that some practitioners are misinformed

Sources of new Ideas

- **Investigate geographical variation:** reflecting on the reasons [for geographical variation] can be a fruitful source of research questions

- **Identify Cinderella topics**: important areas of health care are often overlooked

- **Let loose the imagination:** look for wild or impossible ideas, free the mind from the constraints of conventional wisdom

How to get new Ideas

1. Build on experience:

- your own experience,
- that of close colleagues with whom you can freely discuss your research ideas, and
- that of a good mentor, because young researchers might not yet have much experience.

An essential strategy for a young investigator is to apprentice himself to an experienced senior scientist who has the time and interest to work with him regularly

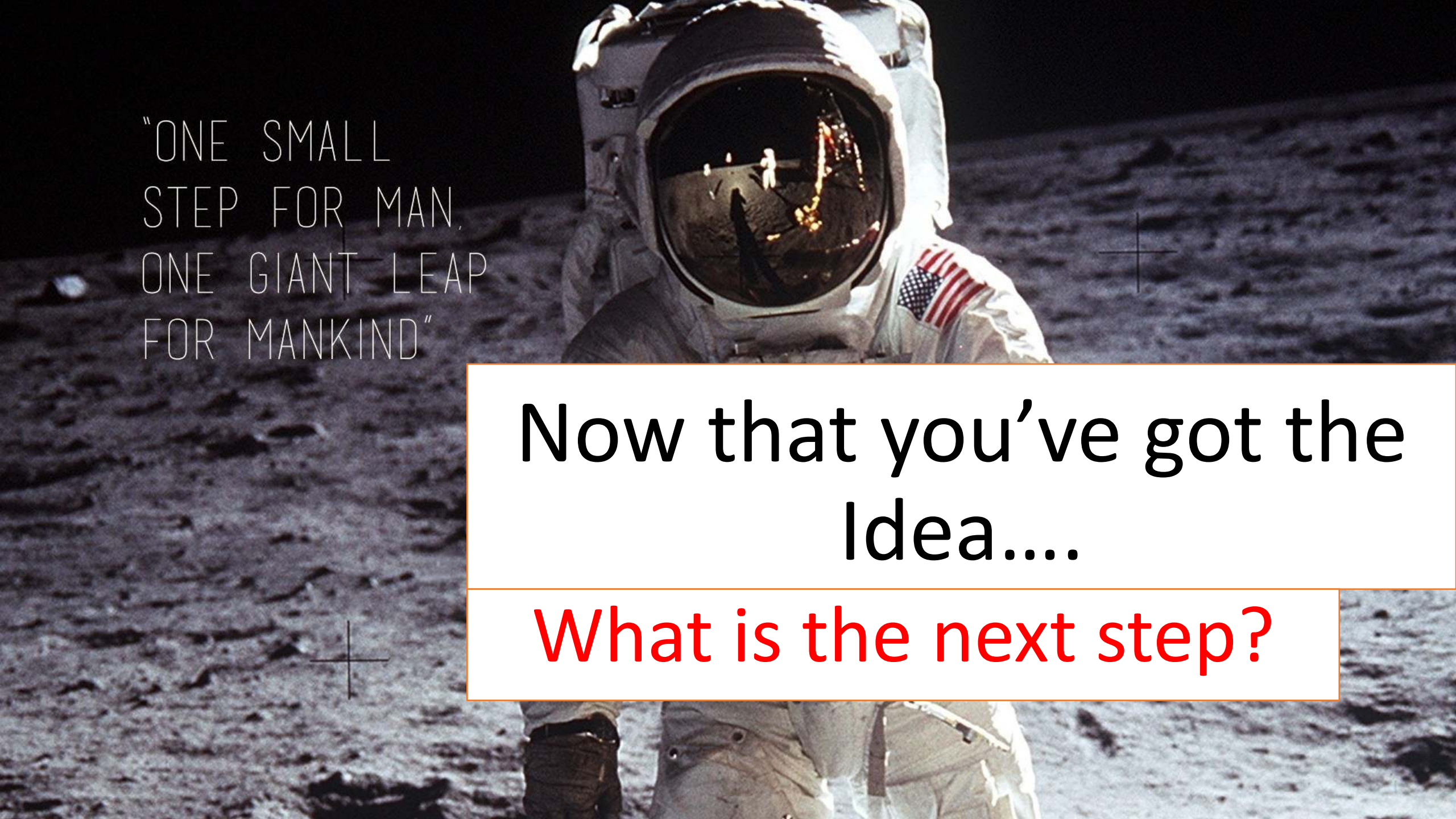
How to get new Ideas

2. Be alert to new ideas:

- By reviewing the medical literature and attending journal clubs, national and international conferences, and seeking informal conversations with other scientists and colleagues
- A skeptical attitude about prevailing beliefs
- Careful observation of patients, which has historically been one of the major sources of case reports and descriptive studies
- Your experiences in teaching; having to explain something may make you aware of gaps in your knowledge; questions by patients and colleagues may similarly identify things that we do not fully understand or ignore
- Keep the imagination roaming

Keeping Track of Ideas

- Keep Logs: Important to developing your ideas!
- Software to help you do this includes note taking apps like Microsoft One Note, Google Keep, Evernote or a Journal (diary) app



Now that you've got the Idea….

What is the next step?

Turning your ideas into research question

- **First find what is known about the idea** – Literature review
  For example, there may be an existing knowledge on the frequency of a problem e.g. Incidence of Road Traffic Injuries (RTI) in your setting

- **Then look for what is unknown** – Literature review, limitations and discussion sections are important for this.
  For example, you might want to ask the questions:
  - Does alcohol increase mortality of RTI?
  - What might affect mortality from RTI?
  - What preventive measures are more likely to work for RTI?

You have your research question

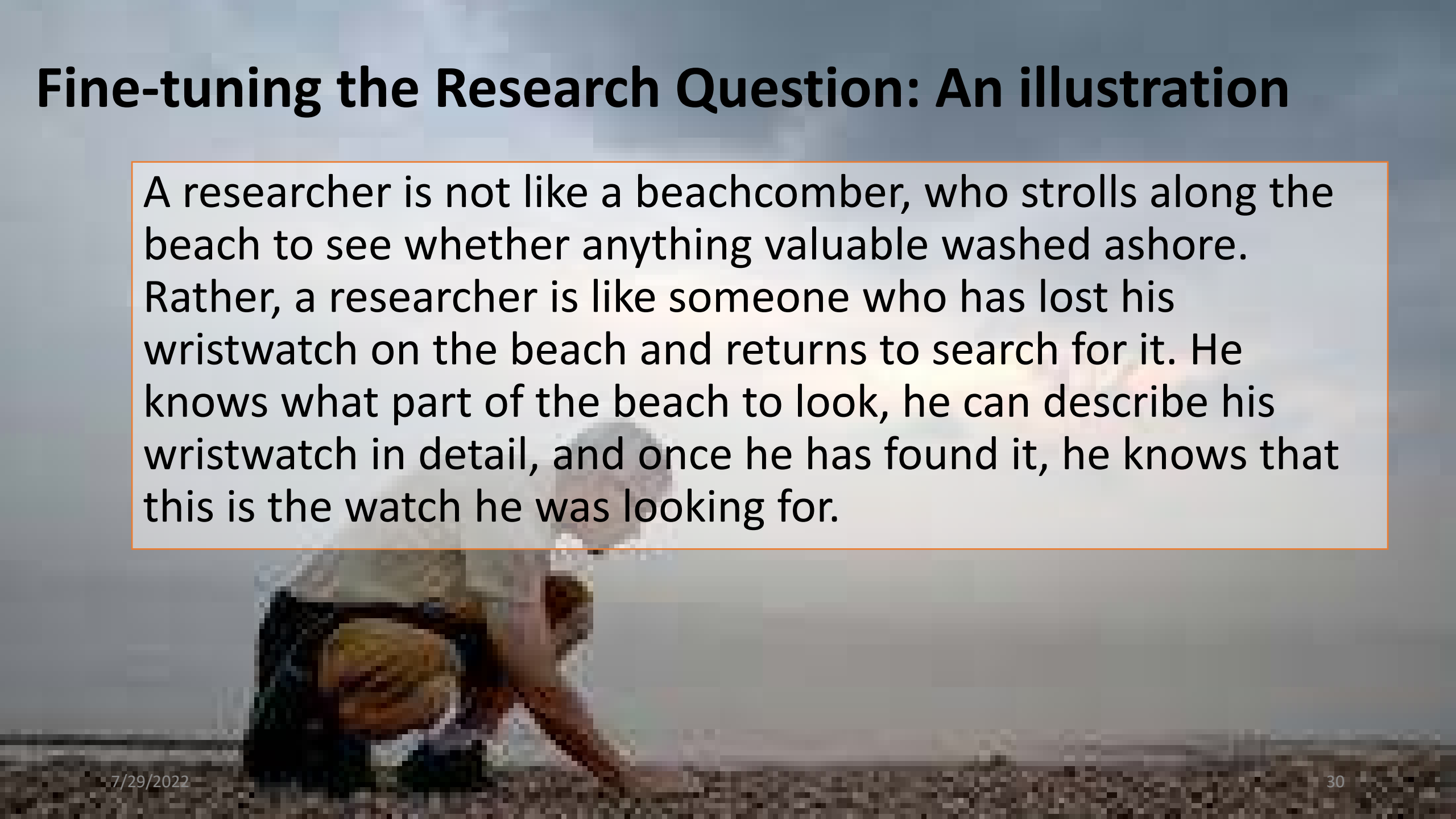
What is the next step?

Sharpening the research question: Fine-tuning

- Process of cutting away anything that is unnecessary, so that only the essence remains
- You have to refine your research question into something that is interesting, yet feasible.
- To do so, you have to know clearly where you are heading (have a pre-conceived idea)

Fine-tuning the Research Question: An illustration

A researcher is not like a beachcomber, who strolls along the beach to see whether anything valuable washed ashore. Rather, a researcher is like someone who has lost his wristwatch on the beach and returns to search for it. He knows what part of the beach to look, he can describe his wristwatch in detail, and once he has found it, he knows that this is the watch he was looking for.



Fine-tuning the Research Question

A good researcher should be like a good clinician, who first wants to learn from the patient: "**What is the chief complaint**?", that is, which is the problem that you want to study. Next, "**What will you do with the answer**?"

The latter question is not just about the potential conclusions of the research paper, but more importantly, their meaning. What is the intended effect (or impact) of the findings?

Fine-tuning the Research Question

Try to describe exactly the knowledge gap that you want to fill (i.e., the watch that you lost at the beach).

- Is it about etiology, about pathogenesis, about prognosis?
- What should change for the benefit of a particular group of patients? Try to be as specific as possible.
- Do your colleagues see these problems and their solutions as you do? – and if not, why don't they?

The Pruning

- Specific schemes have been proposed to guide us from our ideas to Research designs:

- **PICOT** format (Patient, Intervention, Control or Comparison, Outcome and Time) in Clinical trials

- **FINER** (Feasible, Interesting, Novel, Ethical, and Relevant) in proposal writing

- **DAG** diagrams for identifying cofounding factors in epidemiological studies

FINER

FEASIBLE	• Adequate number of subjects • Adequate technical expertise • Affordable in time and money • Manageable in scope
INTERESTING	Getting the answer intrigues investigator, peers and community
NOVEL	Confirms, refutes or extends previous findings
ETHICAL	Amenable to a study that institutional review board will approve
RELEVANT	• To scientific knowledge • To clinical and health policy • To future research

FINER criteria outline the important aspects of the question in general

PICOT

PATIENT	What specific patient population are you interested in?
INTERVENTION	What is your investigational intervention?
COMPARISON GROUP	What is the main alternative to compare with the intervention?
OUTCOME	What do you intend to accomplish, measure, improve or affect?
TIME	What is the appropriate follow-up time to assess outcome

PICOT is a useful format to use in the development of a specific research question

Turning Research Questions to hypothesis

- A hypothesis is a statement that can be proved or disproved.
- A research question can be made into a hypothesis by changing it into a statement.
- For example, the research question "**Does alcohol increase mortality of RTI**?" can be turned into the hypothesis "**Alcohol increase mortality of RTI"**

Getting the Null Hypothesis

- A null hypothesis (abbreviated H0) is a hypothesis to be disproved.
- An hypothesis can be turned into a working null hypothesis simply by adding "**not**", e.g.

Hypothesis	Null Hypothesis
Alcohol increase mortality of RTI	Alcohol does **not** increase mortality of RTI

Deriving the objective

- Study objectives define the specific aims of the study
- Study objective is an **active** statement about how the study is going to answer the specific research question.
- Objectives can (and often do) state exactly which outcome measures are going to be used within their statements

Research Question	Objective
Does alcohol increase mortality of RTI?	The study will look at how alcohol (measured by Blood Alcohol Content) affect the mortality of RTI

An example from literature

The following is an example from the literature about the relation between the research question, hypothesis and study objectives:

- **Study:** Warden SJ, Metcalf BR, Kiss ZS, et al. Low-intensity pulsed ultrasound for chronic patellar tendinopathy: a randomized, double-blind, placebo-controlled trial. *Rheumatology* 2008;47:467–71.
- **Research question:** How does low-intensity pulsed ultrasound (LIPUS) compare with a placebo device in managing the symptoms of skeletally mature patients with patellar tendinopathy?
- **Research hypothesis:** Pain levels are reduced in patients who receive daily active-LIPUS (treatment) for 12 weeks compared with individuals who receive inactive-LIPUS (placebo).
- **Objective:** To investigate the clinical efficacy of LIPUS in the management of patellar tendinopathy symptoms.

Pilot studies: Should you do it?

- Ideally every study should have a protocol
- Every protocol should be tested
- The process of testing the protocol is called “pilot study”
- Pilot studies are not done to know the likely direction of the results; instead, the aim is to see whether you will be able to perform the procedures of your study – and ultimately whether that really is the study you want to do.

Pilot studies save us from embarrassment

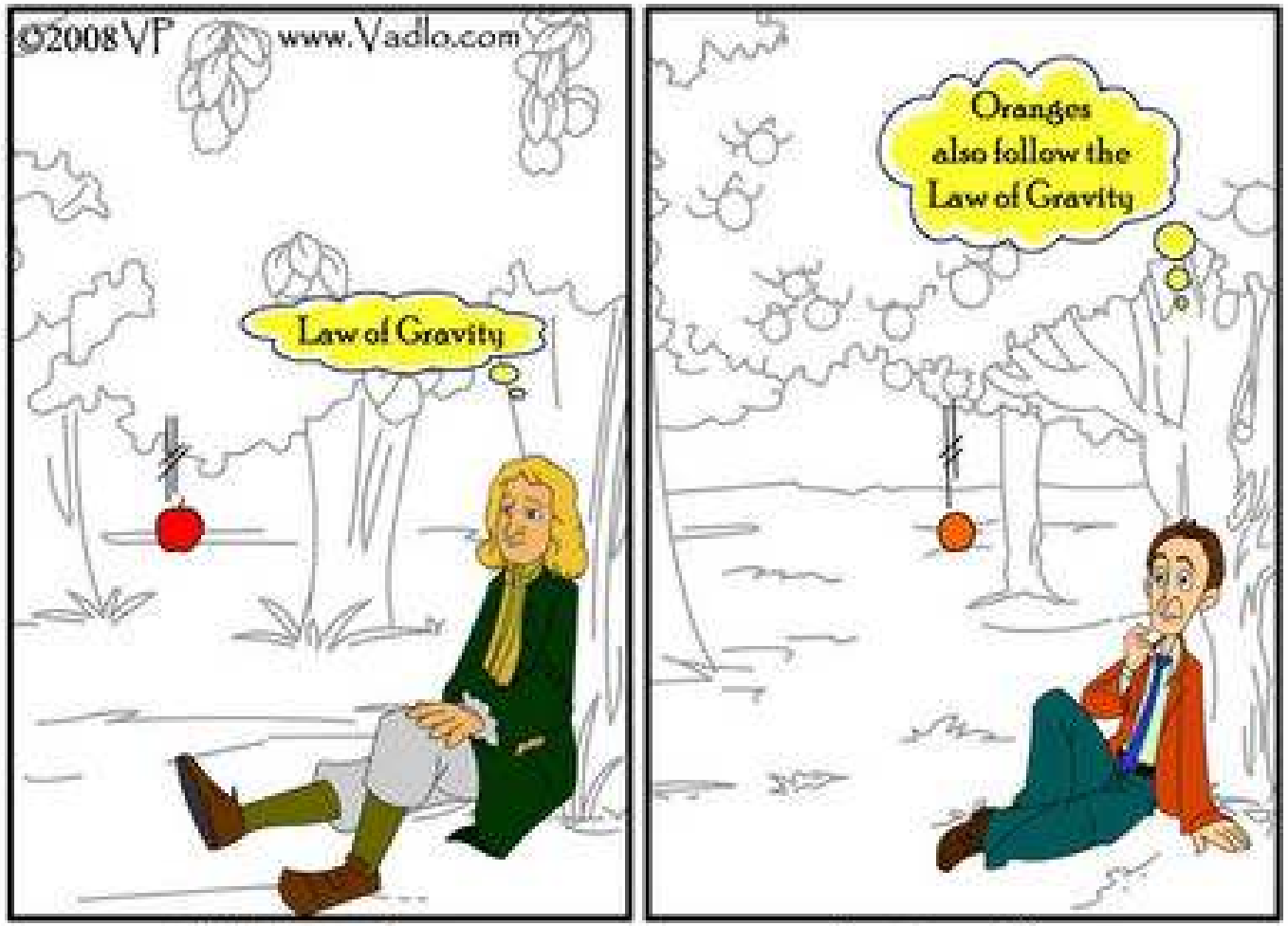
After Pilot Test, what next?

Start your Research, of Course

After the Research, what next?

Start Writing your Manuscript, of Course

You want to Publish in High Impact Journals? It's the idea which matters



High Impact Paper *Low Impact Paper*

Why Publishing Research Articles is Important?

Ideally it is

- to communicate and share the new discoveries in science to improve the quality of life and for providing better healthcare.
- Make contributions to society

More often is

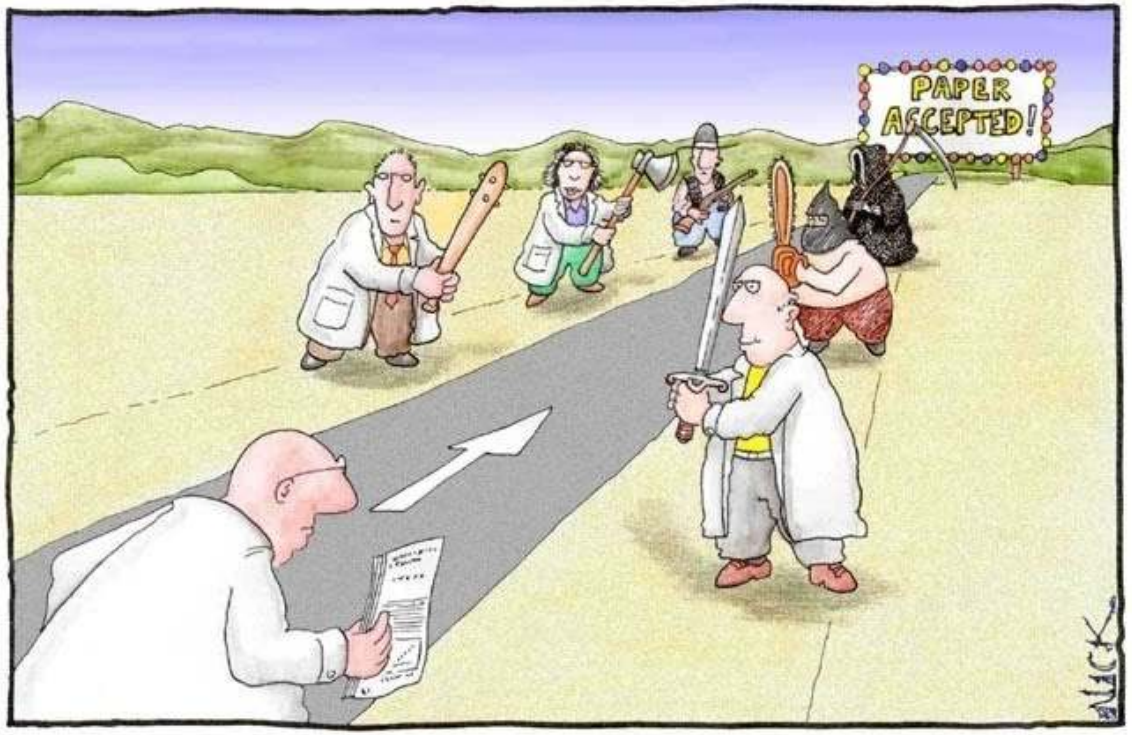
- to get promotion
- to get the research funding/grants
- to improve the scientific impact of institute/individual
- recognition by peers

What is Peer Review Process?

•Exciting the reviewer's mind is far more important then exciting the reader's mind.

•It is likely that no one will ever read your paper more thoroughly than the reviewer.

•Suggest referees that appreciate your work (political)



Most scientists regarded the new streamlined peer-review process as 'quite an improvement.'

Writing is a critical step in science although scientists are not trained to write.

Even very creative experiments and novel results will have dull impact if the manuscript is not written well.

Four Questions of Manuscript Writing

What is the?	INTRODUCTION
What did you do?	METHODS
What did you find?	RESULTS
What does that means?	DISCUSSION

Components of a manuscript

Section	Purpose
Title	Clearly describes contents
Authors	Ensures recognition for the writer(s)
Abstract	Describes what was done
Key Words	Ensures the article is correctly identified in abstracting and indexing services
Introduction	Explains the problem
Methods	Explains how the data were collected
Results	Describes what was discovered
Discussion	Discusses the implications of the findings
Acknowledgements	Ensures those who helped in the research are recognised
References	Ensures previously published work is recognised
Appendices (some journals)	Provides supplemental data for the expert reader

How Important is the Title?

- Most published articles are not cited- the title play a vital role
- Construction of an article title has a significant impact on citation frequency.
- According to Jacques and Sebire, there was a strong association between increasing title length and citation rate.

*J R Soc Med Sh Rep 2010;1:2. DOI 10.1258/shorts.2009.100020

Abstract- *Most Critical Part of Paper*

- Should be informative, indicative and reflects the main ‘story’ of the article.
- The only chance you have to get the reader’s attention.
- Should be crisp, concise and accurate.
- Gives the quick idea of the contents (Stand alone).
- What and how was done
- Provide a brief conclusions

Results

- Use descriptive headings that concisely state the results.
- Data representation-concise and accurate.
- Short and easy to understand
- Consistent with the abstract and introduction
- Give tables and figures where needed
    - With sufficient information so that minimum text is required.
    - Don’t repeat information in graphics and text.

Results

- Appropriate numbering of figures and table mentioned in the text.
- Use significant figures where required.
- Avoid speculations and over discussion.
- Avoid using words such as proves, confirmed, removed all doubts, etc. Remember science is dynamic and ever changing.

Discussion

- Hardest section to write, but it is also the most important.

- Use sections that concisely summarize the interpretation of the results.

- Answer the question posed in introduction

- Correlation of your finding with the existing knowledge

- Explain discrepancies between new results and previously reported results.

Discussion

- What is new without exaggerating.
- Conclusion/summary, perspectives, implications.
- Research limitations and need for future research.
- Theoretical implications and possible practical applications.

Conclusion

- Identify key findings and application

- Should **NOT** be a summary of the work done- abstract is doing fine with that.
- Consistent with result and introduction
- Easiest way is to use your research objective as the basis of the conclusion

Objective	Conclusion
The study will look at how alcohol (measured by Blood Alcohol Content) affect the mortality of RTI	The study found that patients who have alcohol BAC level above 5% were more likely to die from RTI than patients with lower alcohol BAC.

References

- Cite current and key pertinent references
- Reference citations must be accurate and complete
- Read the references
- Use correct style for journal
- Use Reference managers…..If you are not doing this, you are wasting your time

Final Step is Revision and Proofreading

Revision and Proofreading

What it involves:

- Effectiveness of the study
- Supporting information
- Order and flow of the article
- Must be leaving reader with a new question

Revision, Revision, Revision

- After writing the first draft, at least a dozen revision are usually needed to improve to the text.
- All authors must be involved in this process
- All authors must read the first draft. Give them timeline...

Proofreading

- Grammar and spelling errors
    - Consistent verb tense
    - Vocabulary
    - Tighten the sentences
    - spell-check
    - Punctuation
    - typos
- Technical terms
    - Scientific symbols
    - Reaction scheme
    - Chemical structures/name
    - references

Some Jargons to avoid

Jargon	Preferred use
a considerable amount of	much
on account of	because
a number of	several
Referred to as	called
In a number of cases	some
Has the capacity to	can
It is clear that	clearly
It is apparent that	apparently
Employ	use
Fabricate	make

Day, RA. "How to write and publish a scientific paper," 5th edition, Oryx Press, 1998.

Right to Authorship

- According to the International Committee of Medical Journal Editors (**ICMJE**), all four of the following conditions must be met:
  i. Substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data
  ii. Drafting the article or revising it critically for important intellectual content
  iii. Final approval of the version to be published
  iv. Agreement to be accountable for all aspects of the work; ensure that questions related to the accuracy or integrity of any part of the work are investigated and resolved

All who are listed should be qualified and all who are qualified should be listed

On my way out….

Random Advices

Divide and Conquer!!!!!!

- Divide and work on.....

- If you get stuck on a particular section, just skip to a different section that is easiest to write.
- *It means the easiest first and the most difficult latter.*

Avoid Common errors

- Keep track of singular and plural forms
  - Remember data is the plural of datum!
  - Hence, “these data suggest…”

- Keep track of tense
  - Most experiments and procedures will be described in the past tense

More on tense

- A good way to separate what you have shown from what others have reported is to mix tenses in your writing
  - This is common in a discussion section

- For example:

  The protein ***was*** non-functional after modification of the terminal residue. This result ***is*** consistent with those from other groups (references) and ***indicates***….

Writing the paper

- Read the instructions to authors
- What sections should the text be divided into?
- Often:
  - Title
  - Abstract
  - Introduction
  - Methodology
  - Results
  - Discussion
  - References
  - Figure legends

What do you do first?

This is what *I* do

- On a 1000 mile journey, the hardest thing is the first step.
  - Make the first step easy!

- The methodology is often easiest to write as is simply descriptive.
  - Order this in the same way as you will present your results

The next step

- I usually write the results text next
- This is also descriptive as you simply *describe* your data (figures and tables)
  - “These data show that something is higher/faster/larger than something else ($p<0.001$)”.
- A common error is to add discussion and interpretation to this section
  - This leaves nothing for the discussion section!

Finally

- I usually then write the introduction
  - Details why you did you did the study (not what you found)
- Then the discussion interprets your results and places into context with the literature.
  - End with a nice ‘take home’ message in the final paragraph


E seun
danke
謝謝
ngiyabonga
teşekkür ederim
спасибо
dank je
thank you
gracias
tapadh leat
hvala
mauruuru
obrigado
-bedankt
dziękuję
mochchakkeram
go raibh maith agat
sagolun
sukriya
kop khun krap
arigatô
takk
dakujem
grazie
merci
Imela
Nagode

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