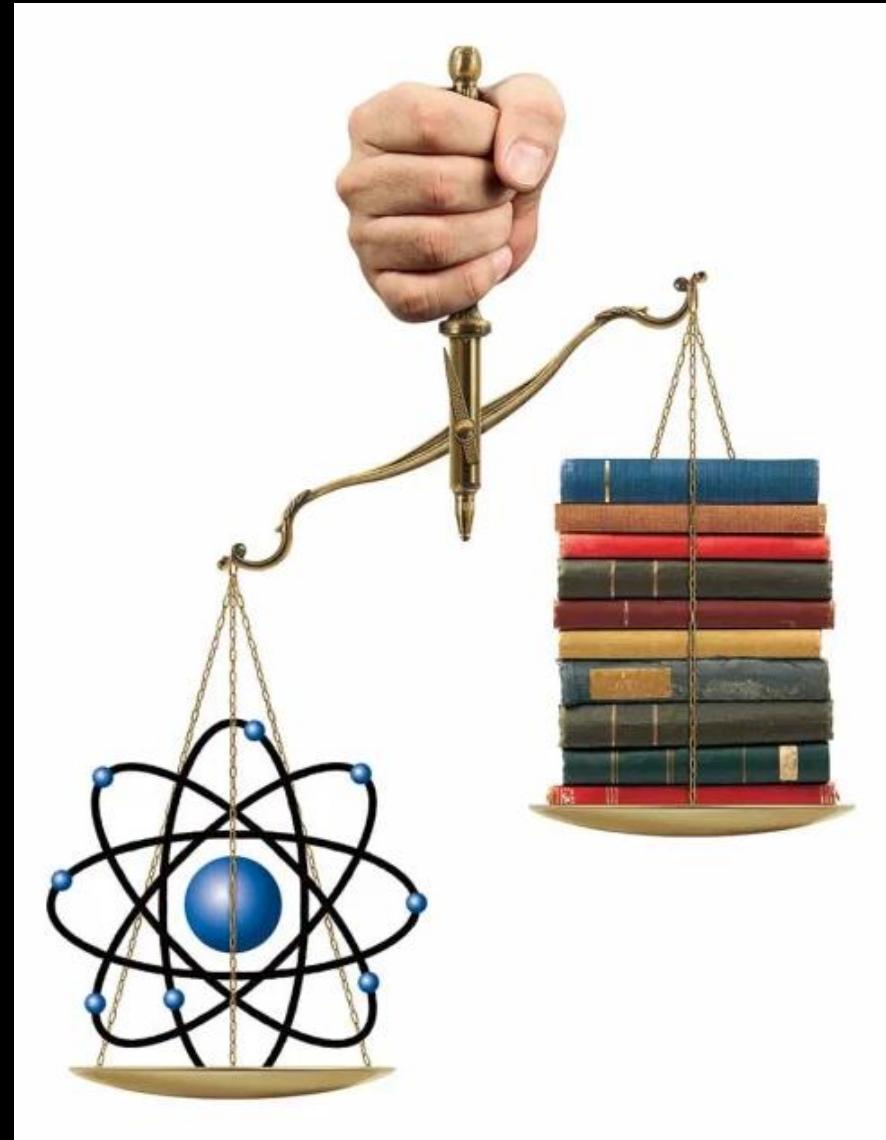


# Writing Papers

Henri Boffin  
ESO







Nothing in science has any value if it  
is not communicated.

— *Anne Roe* —

The Making of a Scientist

AZ QUOTES

Communicating research among colleagues is done by

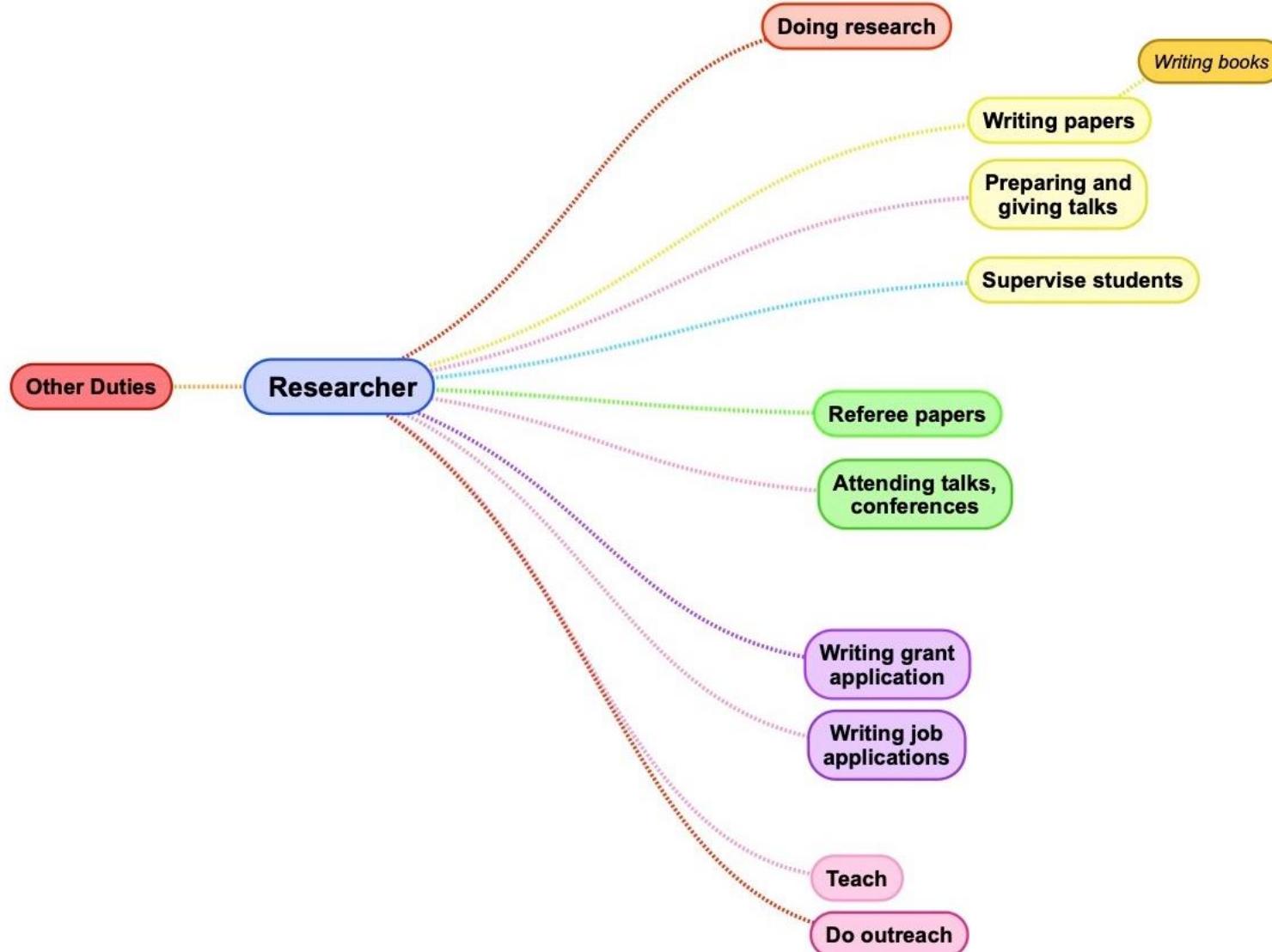
Science visits  
&  
discussions

Talks/posters  
at  
conferences

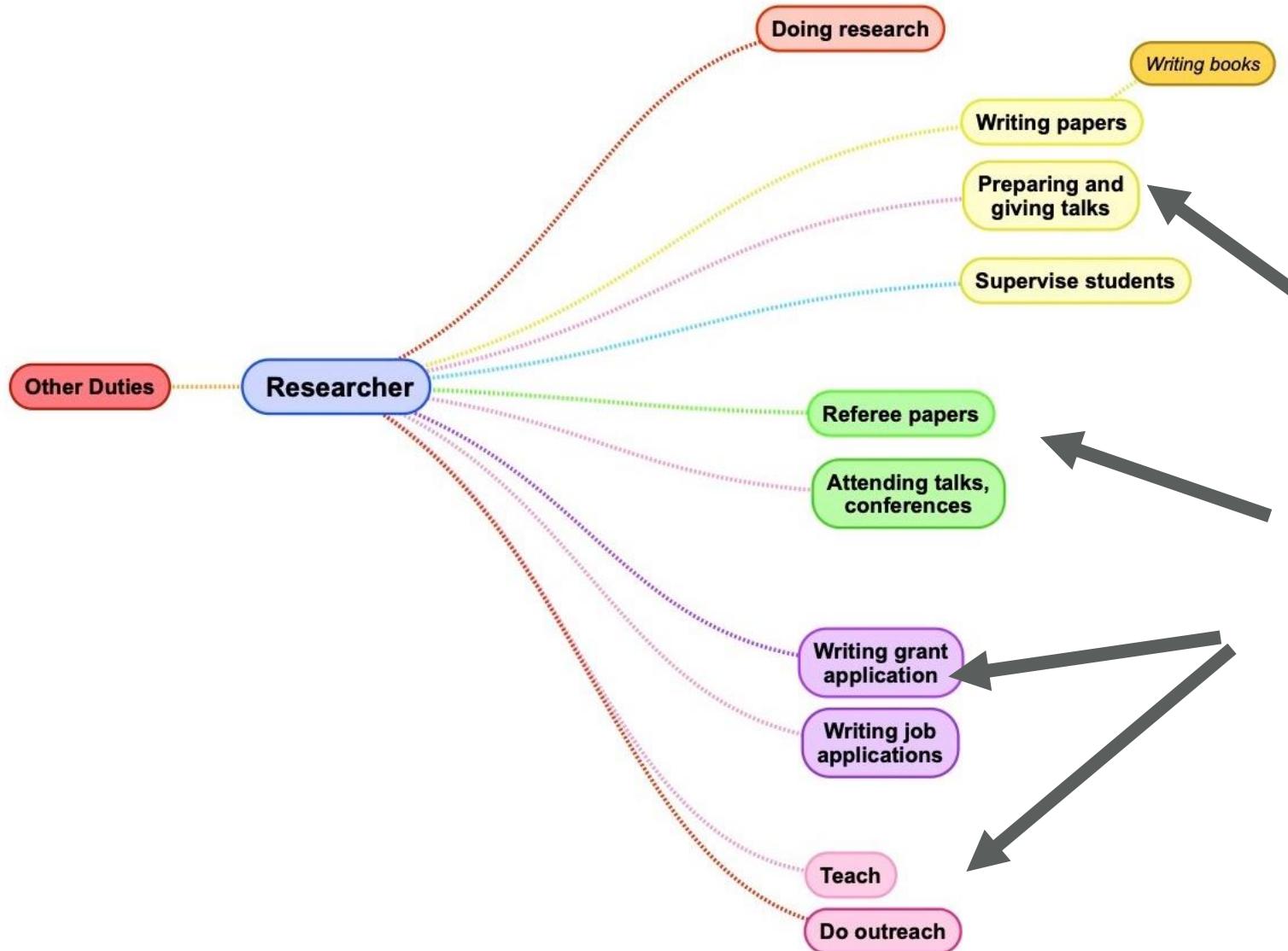
Publishing  
**peer-reviewed**  
**papers**

Web site  
**Press releases**

# What does an astronomer do?



# What does an astronomer do?



A good researcher  
needs to be a good  
communicator!

Writing skills (in English!)  
Presentation skills

# Postdoc publications and citations link to academic retention and faculty success

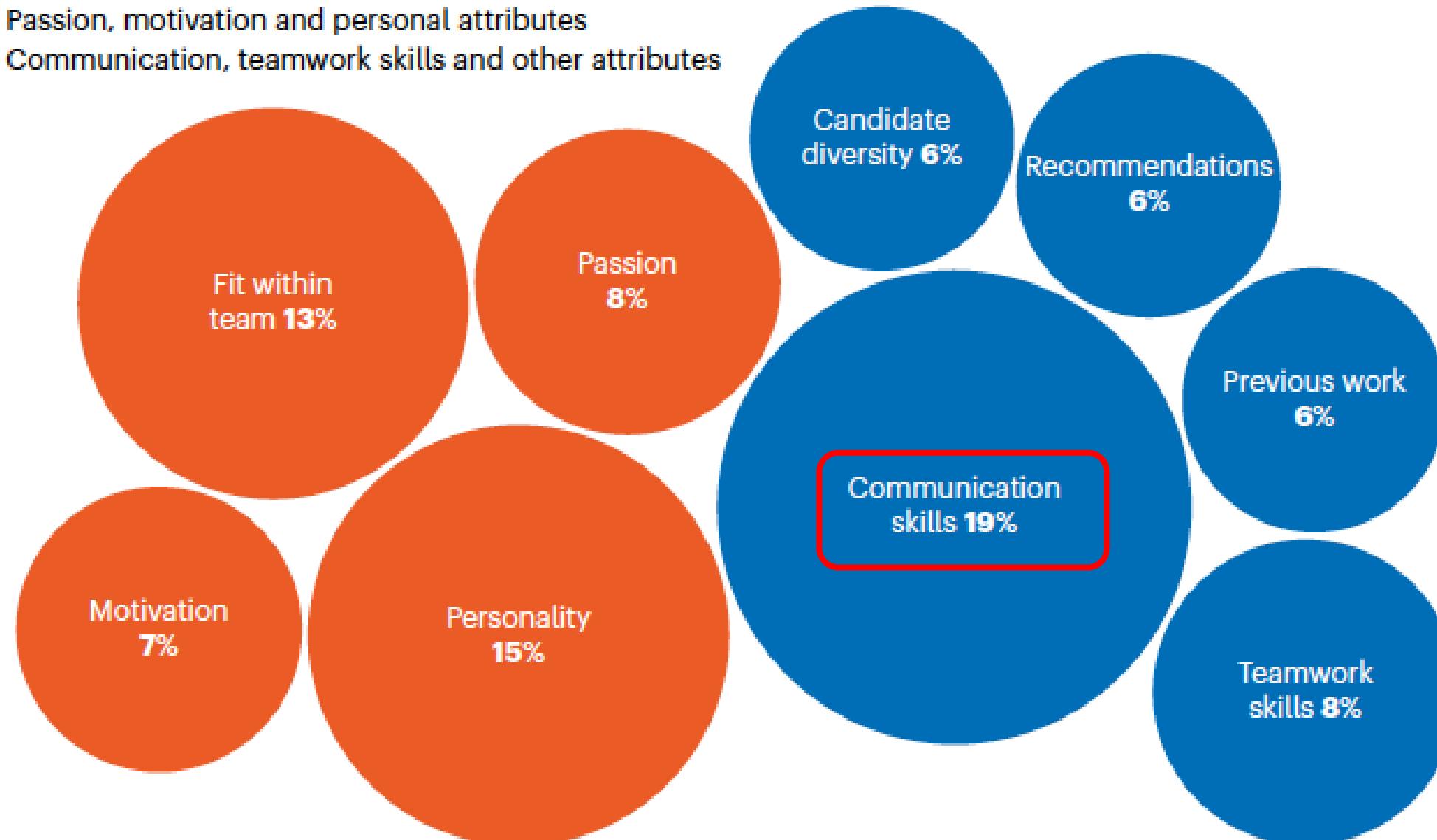
Yueran Duan , Shahan Ali Memon , Bedoor AlShebli   ,  +2, and Talal Rahwan  [Authors Info & Affiliations](#)

Edited by Susan Fiske, Princeton University, Jamaica, VT; received February 6, 2024; accepted December 6, 2024

January 21, 2025 | 122 (4) e2402053122 | <https://doi.org/10.1073/pnas.2402053122>

**If you have two candidates who demonstrated similar levels of technical ability and experience, what factors would help you make the final decision on who to hire?\***

- Passion, motivation and personal attributes
- Communication, teamwork skills and other attributes



\*Hirers were asked to describe, in their own words, what factors would help them decide. The size of the bubble corresponds to the proportion of their answers that fit that category.

As a young professional...

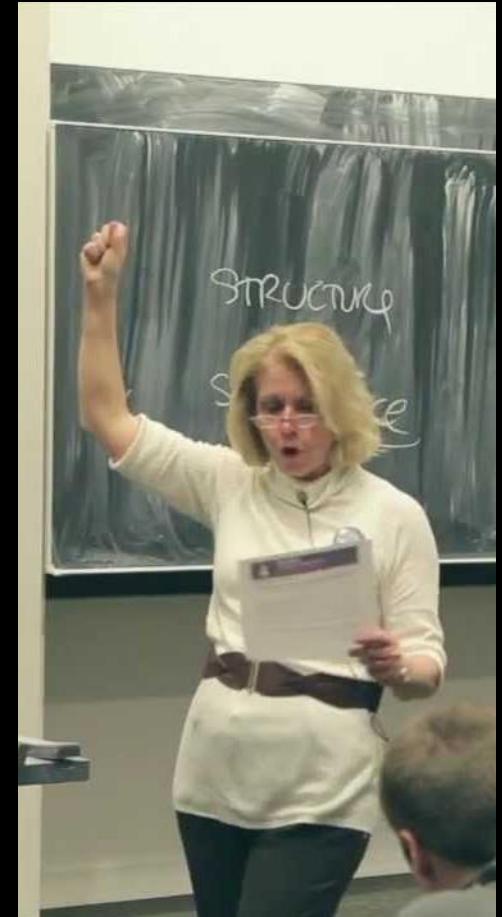
You must be able to **select appropriate research problems**

You have to **finish projects** in a timely manner

You ought to be **giving compelling talks** and **publishing noteworthy papers**

*“Scientists are writers.  
As a scientist, you signed up for the  
job of writer.”*

—Judy Swan

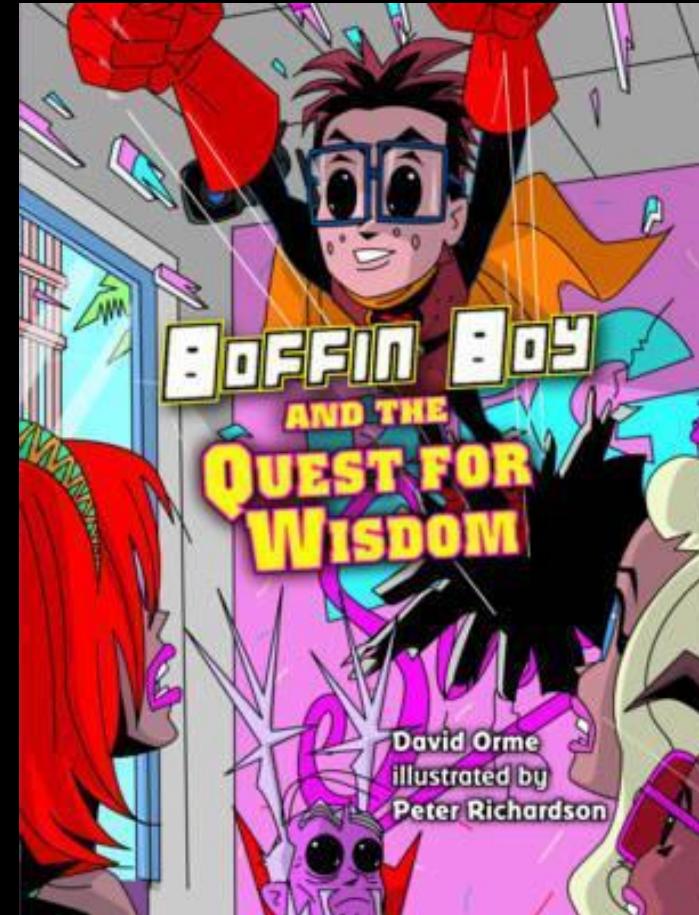


# Writing and communicating your science

Henri Boffin  
ESO



# Boffin?



# *EI Reg* talks beer and binaries with a boffin named Boffin

Astronomer Henri Boffin: Marriage guidance counsellor to the stars

Lester Haines

Mon 10 Feb 2014 // 08:03 UTC

8 



**INTERVIEW** We at *EI Reg* like a good **boffin**, so we're delighted to bring fellow boffophiles a quick interview with **Henri Boffin**, who's staff astronomer at the **European Southern Observatory** (ESO) facility in Paranal, Chile.



A boffin named Boffin: Henri at work in Paranal

# Career

PhD in astrophysics  
binary stars, exoplanets,  
open clusters

Master in Journalism

At ESO



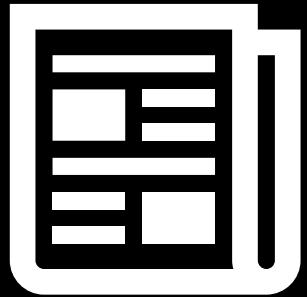
Press officer



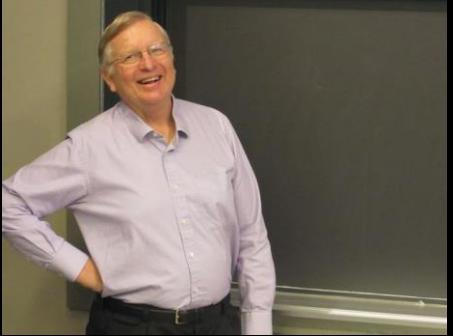
Paranal astronomer



User Support



How to write your papers



*“Your success as a scientist will depend on your ability to speak, your ability to write, and the quality of your ideas, in that order.”*

—P. Winston, MIT

'WRITING, TO ME, IS SIMPLY  
THINKING THROUGH MY  
FINGERS.'

-ISAAC ASIMOV





<https://www.fems.org/news/how-write-paper-about-your-research>

**YEAH, IF THEY WOULD TEACH THIS  
IN SCHOOL**

**THAT WOULD BE GREAT**

# Physicists on Their Own When Learning to Write

---

November 20, 2025 • *Physics* 18, 186

A survey finds that physicists and astronomers often learn to write through improvisation and mentor feedback rather than robust formal training.

Who got a course on scientific writing  
already?

Who published papers already?

The same way you learned how to solve an equation or make an experiment, **you can and should learn to write**

Writing is an art and can be perfected



## The joy of writing a paper

### Why am I doing this?

Tell us, did you enjoy writing your first scientific paper? Or, if you are an enthusiastic newcomer to science, are you looking forward to it? Science is writing. You have probably spent weeks on writing your protocol. Furthermore, it may have taken days to put your standard operating procedures, clinical record forms and analysis plan on paper. Eventually, you may have reserved the next few months to write up your paper. How can one enjoy writing a paper, meant to be read by unknown colleagues somewhere else on the globe? Who are your customers? They could be clinicians, trying to keep up to date, or biomedical scientists searching for the best work in their field of interest.

What is the best approach to writing a manuscript on a biomedical scientific study? Well, the most solid approach, obviously, is to read a textbook on scientific writing. Both of us have Mimi Zeiger on our shelves [1]. But did we actually read the book? We may say we followed a more modern medical concept: an "evidence-based" approach using two simple facts: a) our papers that have been accepted for publication must have had some sense in them; and b) our rejected papers could probably benefit from some improvements. The key reader is the reviewer. In fact, we are primarily writing for our reviewers. The customer-reader comes second. So how should we comply with the expectations of reviewers and editors?

The present paper is meant to give you some guidance by providing a checklist with bullets. This does not pretend to be complete, but rather is an encouragement to spend a bit more time on thinking about writing. It is our experience that this saves a lot of time. Our list is applicable for clinical as well as basic research papers. However, you may skip issues that do not relate to your study.

### What do I need to consider in advance?

Several issues need to be taken into account after deciding to write a paper. The best summary is given by the International Committee of Medical Journal Editors (ICMJE) [2]. The first principle is: the paper should present novel data. Duplicate publication of data is a suicidal boobytrap and must be avoided at all times [3]. Consider the following:

#### The data

- Are these novel or confirmative?
- What are the strengths and weaknesses of the data?

#### The journal

- Is my paper suitable for a specialty journal or a general medical journal?
- Am I heading for a high impact factor journal [4]?
- Is this kind of paper well cited [5]?
- Do I need a fast acceptance?
- Does my institution or granting body require that my paper have open access?

#### The authors

- The decision about authorships should be based on substantial input in drafting the study, generating the data, writing the paper and/or the final responsibility for and approval of the paper [2].
- Avoid ghost and gift authorships.

#### Integrity

- Consider the rules of the journal when providing statements of interest for all authors. Conflicts of interest do have an impact [6].
- Be alert in avoiding any integrity problems such as plagiarism, twisted statistics, suppression of data, manipulation of figures, inadequate citations, etc. [7, 8].

P.J. Sterk<sup>1</sup>  
K.F. Rabe<sup>2</sup>

<sup>1</sup>Dept of Respiratory Medicine,  
Academic Medical Center,  
University of Amsterdam, and  
<sup>2</sup>Dept of Pulmonology, Leiden  
University Medical Center,  
Leiden University, the  
Netherlands

**Correspondence**  
P.J. Sterk  
Dept of Respiratory Medicine, F5-259  
Academic Medical Center  
University of Amsterdam  
P.O. Box 22700  
NL-1100 DE Amsterdam  
The Netherlands  
Fax: 31 206917584  
E-mail: p.j.sterk@amc.nl

*The authors are Chief Editors of  
the European Respiratory Journals*

**Competing interests**  
None declared

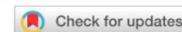
**Provenance**  
Commissioned article,  
peer-reviewed

*Main photograph: University of  
Sheffield Health Sciences Library*

# How to Write a Paper

Mike Ashby  
Engineering Department, University of Cambridge, Cambridge  
6<sup>th</sup> Edition, April 2005





# How to plan your astronomy research paper in ten steps

Nushkia Chamba<sup>ID</sup><sup>1</sup>✉, Johan H. Knapen<sup>ID</sup><sup>2,3,5</sup> and Diane Black<sup>ID</sup><sup>4,5</sup>

Scientific writing is an important skill for a career as a professional astrophysicist. However, very few researchers receive any formal training in how to write scientific research papers of high quality in an efficient manner. This Perspective is the first of a two-part self-help guide to scientific writing to address this skills gap. This part focusses on planning your academic research paper in astronomy. We discuss how to crystallize the ideas that underlie a research project, analyse how the paper can be constructed considering the audience and the chosen journal, and give an overview of the publishing process. Whether you are a student writing your first paper or an experienced author, you may find the ideas presented here useful.



# How to write and develop your astronomy research paper

Johan H. Knapen<sup>ID</sup><sup>1,2,5</sup>✉, Nushkia Chamba<sup>ID</sup><sup>3,5</sup> and Diane Black<sup>ID</sup><sup>4,5</sup>

Writing is a vital component of a modern career in scientific research. But how to write correctly and effectively is often not included in the training that young astronomers receive from their supervisors and departments. We offer a step-by-step guide to tackle this deficiency, published as a set of two Perspectives. In the first, we addressed how to plan and outline your paper and decide where to publish. In this second Perspective, we describe the various sections that constitute a typical research paper in astronomy, sharing best practice for the most efficient use of each of them. We also discuss a selection of issues that often cause trouble for writers from sentence to paragraph structure—the ‘writing mechanics’ used to develop a manuscript. Our two-part guide is aimed primarily at MSc- and PhD-level students who face the daunting task of writing their first scientific paper, but more senior researchers or writing instructors may well find the ideas presented here useful.

# How to prepare competitive proposals and job applications

Received: 3 February 2025

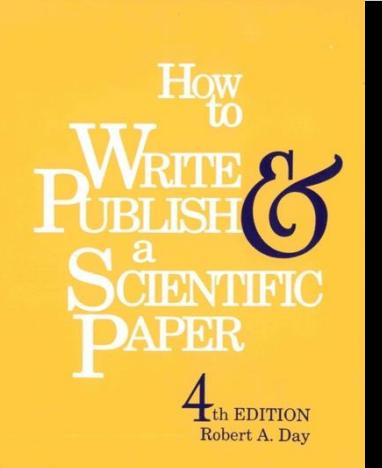
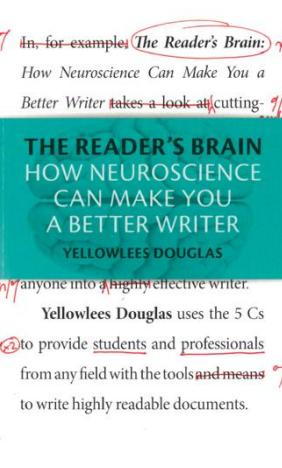
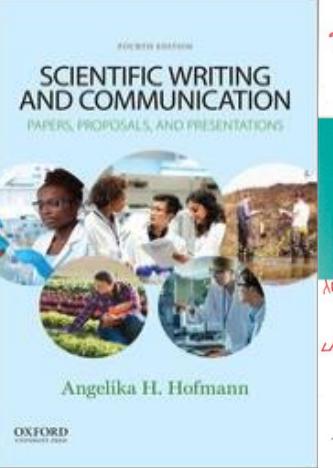
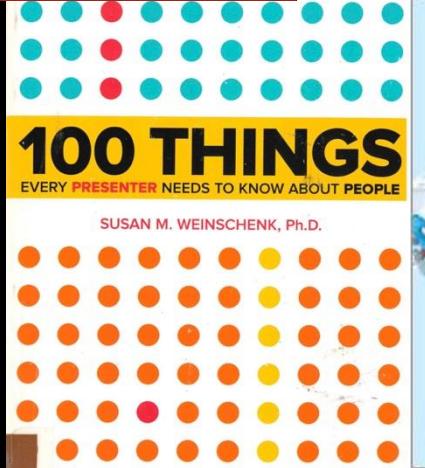
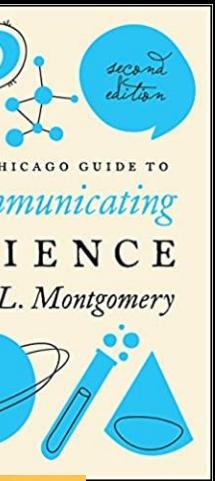
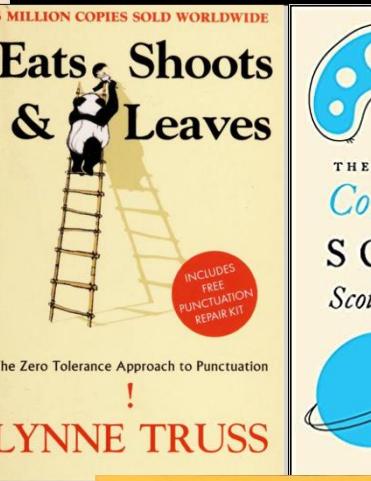
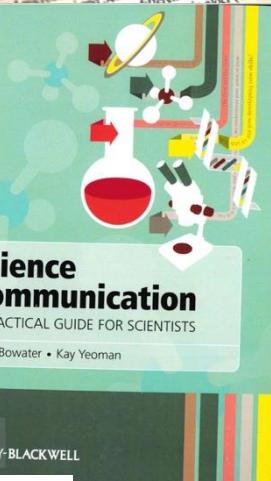
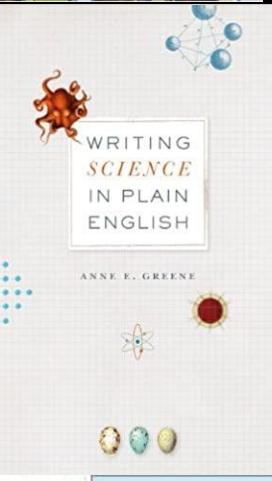
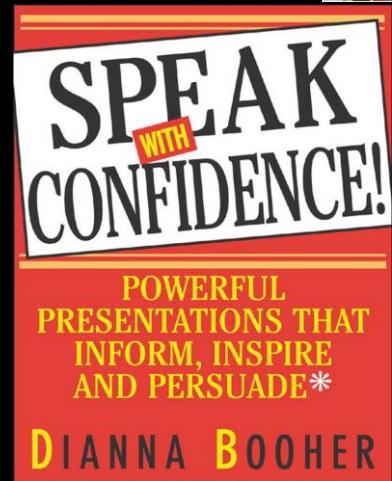
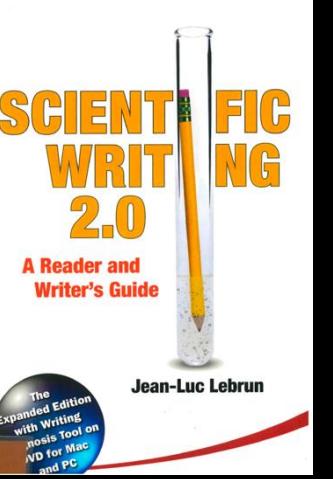
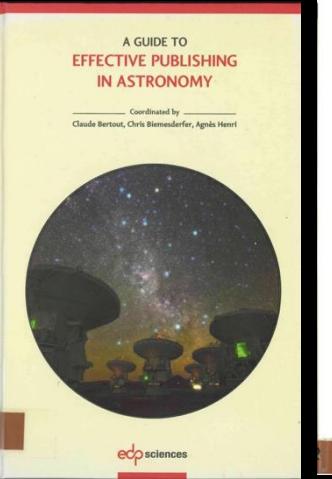
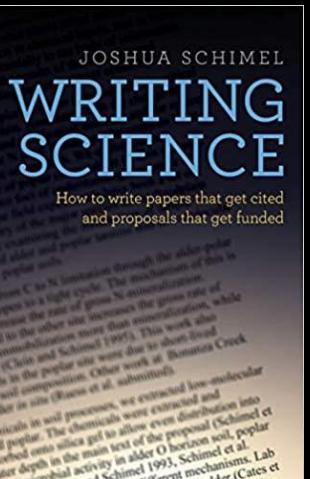
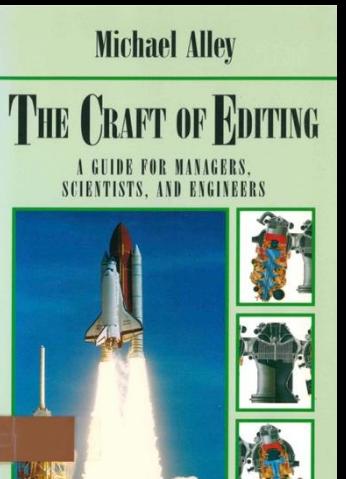
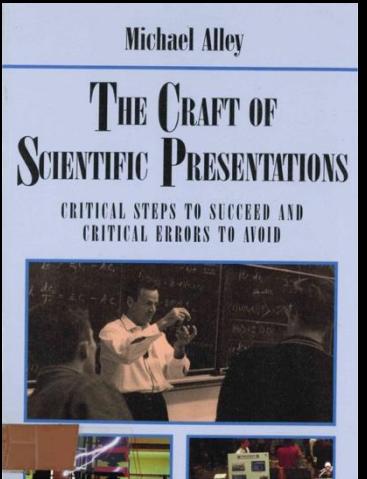
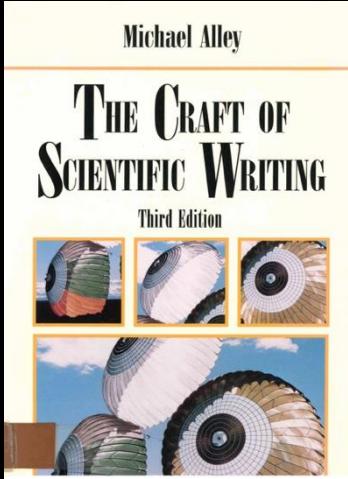
Accepted: 23 May 2025

Published online: 10 July 2025



Johan H. Knapen<sup>ID</sup><sup>1,2</sup>✉, Henri M. J. Boffin<sup>ID</sup><sup>3</sup>, Nushkia Chamba<sup>ID</sup><sup>4</sup> & Natasha Chamba<sup>ID</sup><sup>5</sup>

Writing proposals and job applications is arguably one of the most important tasks in the career of a scientist. The proposed ideas must be scientifically compelling, but how a proposal is planned, written and





Kalyan KS • 3rd+

NLP Researcher | Deep Learning | Transformers | ML4H@Neurl...

1w • Edited •

+ Follow

This is the situation of some of the journals.

#academicchatter #phdlife #phdresearch #phdchatter #researchlife

#phdvoice #phdstudent #research

...see more

## Manuscript submitted



## Manuscript accepted



# **A Renaissance study of Am stars**

## **I. The mass ratio distribution**

H. M. J. Boffin

ESO, Alonso de Córdova 3107, Casilla 19001, Santiago, Chile  
e-mail: [hboffin@eso.org](mailto:hboffin@eso.org)

Received 4 August 2010 / Accepted 20 August 2010

What makes good writing?



Good writing communicates an idea  
clearly and effectively

Good writing is stylish and concise

equipment, and to Dr. G. E. R. Deacon and the captain and officers of R.R.S. *Discovery II* for their part in making the observations.

<sup>1</sup> Young, F. B., Gerrard, H., and Jeavons, W., *Phil. Mag.*, **40**, 149 (1930).

<sup>2</sup> Longuet-Higgins, M. S., *Mon. Not. Roy. Astro. Soc., Geophys. Suppl.*, **5**, 285 (1949).

<sup>3</sup> Von Hoerner, S., Woods Hole Papers in Phys. Oceanogr. Meteorol., **11**, 33 (1950).

<sup>4</sup> Ekman, V. W., *Arkiv. Mat. Astron. Fysik. (Stockholm)*, **2** (11) (1905).

#### MOLECULAR STRUCTURE OF NUCLEIC ACIDS

##### A Structure for Deoxyribose Nucleic Acid

WE wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.). This structure has novel features which are of considerable biological interest.

A structure for nucleic acid has already been proposed by Pauling and Corey<sup>1</sup>. They kindly made their manuscript available to us in advance of publication. Their model consists of three intertwined chains, with the phosphates near the fibre axis, and the bases on the outside. In our opinion, this structure is unsatisfactory for two reasons: (1) We believe that the material which gives the X-ray diagrams is the salt, not the free acid. Without the acidic hydrogen atoms it is not clear what forces would hold the structure together, especially as the negatively charged phosphates near the axis will repel each other. (2) Some of the van der Waals distances appear to be too small.

Another three-chain structure has also been suggested by Fraser (in the press). In his model the phosphates are on the outside and the bases on the inside linked together by hydrogen bonds. This structure as described is rather ill-defined, and for this reason we shall not comment on it.

We wish to put forward a radically different structure for the salt of deoxyribose nucleic acid. This structure has two helical chains each coiled round the same axis (see diagram). We have made the usual chemical assumptions, namely, that each chain consists of phosphate diester groups joining  $\beta$ -D-deoxyribofuranose residues with 3',5' linkages. The two chains (but not their bases) are related by a dyad perpendicular to the fibre axis. Both chains follow right-handed helices, but owing to the dyad the sequences of the atoms in the two chains run in opposite directions. Each chain loosely resembles Furberg's<sup>2</sup> model No. I; that is, the bases are on the inside of the helix and the phosphates on the outside. The configuration of the sugar and the atoms near it is close to Furberg's 'standard configuration', the sugar being roughly perpendicular to the attached base. There

is a residue on each chain every 3-4 Å. in the z-direction. We have assumed an angle of 36° between adjacent residues in the same chain, so that the structure repeats after 10 residues on each chain, that is, after 34 Å. The distance of a phosphorus atom from the fibre axis is 10 Å. As the phosphates are on the outside, cations have easy access to them.

The structure is an open one, and its water content is rather high. At lower water contents we would expect the bases to tilt so that the structure could become more compact.

The novel feature of the structure is the manner in which the two chains are held together by the purine and pyrimidine bases. The planes of the bases are perpendicular to the fibre axis. They are joined together in pairs, a single base from one chain being hydrogen-bonded to a single base from the other chain, so that the two lie side by side with identical z-coordinates. One of the pair must be a purine and the other a pyrimidine for bonding to occur. The hydrogen bonds are made as follows: purine position 1 to pyrimidine position 1; purine position 6 to pyrimidine position 6.

If it is assumed that the bases only occur in the structure in the most plausible tautomeric forms (that is, with the keto rather than the enol configurations) it is found that only specific pairs of bases can bond together. These pairs are: adenine (purine) with thymine (pyrimidine), and guanine (purine) with cytosine (pyrimidine).

In other words, if an adenine forms one member of a pair, on either chain, then on these assumptions the other member must be thymine; similarly for guanine and cytosine. The sequence of bases on a single chain does not appear to be restricted in any way. However, if only specific pairs of bases can be formed, it follows that if the sequence of bases on one chain is given, then the sequence on the other chain is automatically determined.

It has been found experimentally<sup>3,4</sup> that the ratio of the amounts of adenine to thymine, and the ratio of guanine to cytosine, are always very close to unity for deoxyribose nucleic acid.

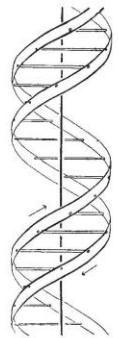
It is probably impossible to build this structure with a ribose sugar in place of the deoxyribose, as the extra oxygen atom would make too close a van der Waals contact.

The previously published X-ray data<sup>5,6</sup> on deoxyribose nucleic acid are insufficient for a rigorous test of our structure. So far as we can tell, it is roughly compatible with the experimental data, but it must be regarded as unproved until it has been checked against more exact results. Some of these are given in the following communications. We were not aware of the details of the results presented there when we devised our structure, which rests mainly though not entirely on published experimental data and stereochemical arguments.

It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material.

Full details of the structure, including the conditions assumed in building it, together with a set of co-ordinates for the atoms, will be published elsewhere.

We are much indebted to Dr. Jerry Donohue for constant advice and criticism, especially on interatomic distances. We have also been stimulated by a knowledge of the general nature of the unpublished experimental results and ideas of Dr. M. H. F. Wilkins, Dr. R. E. Franklin and their co-workers at



This figure is purely diagrammatic. The two diagrams symbolize the two phosphate-sugar chains and the horizontal axis is the fibre axis holding the bases holding the chains together. The vertical line marks the fibre axis.

Papers come in different forms and length

Nobel Prize paper!  
Only 1 page long!

Entirely descriptive  
But very convincing and effective to read

- 1) style is very concise
- 2) frequent use of "we"
- 3) the flow of the argument moves from announcement, dismissal of competitors, main proposal, and explosive finale → a story!

≡ VIEW

Abstract

Citations (7426)

References (10)

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≡ FEEDBACK

## The Luminosity Function and Stellar Evolution.

Show affiliations

Salpeter, Edwin E.

The evolutionary significance of the observed luminosity function for main-sequence stars in the solar neighborhood is discussed. The hypothesis is made that stars move off the main sequence after burning about 10 per cent of their hydrogen mass and that stars have been created at a uniform rate in the solar neighborhood for the last five billion years. Using this hypothesis and the observed luminosity function, the rate of star creation as a function of stellar mass is calculated. The total number and mass of stars which have moved off the main sequence is found to be comparable with the total number of white dwarfs and with the total mass of all fainter main-sequence stars, respectively.

Publication:

Astrophysical Journal, vol. 121, p.161

Short paper (5 pp)

Pub Date:

January 1955

Short abstract

DOI:

[10.1086/145971](https://doi.org/10.1086/145971) ↗

Few references (10)

> 7,700 citations!

A good writer is a good reader

Read, read, read! (in English)

The New Yorker  
The Guardian

New Scientist

PRICE \$8.99

JULY 12 & 19, 2021

THE  
**NEW YORKER**



MF

# Some amazing books



?

How many of you came across a  
paper well written?

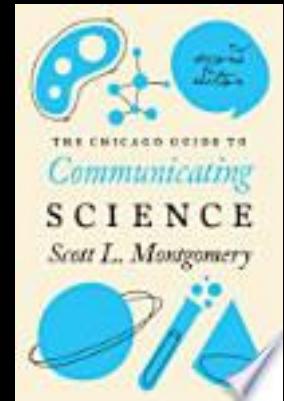
Do you think you know why you liked  
these papers?

## Learn to write

Collect examples  
of especially good  
writing whenever  
you come across  
them

Go over them in  
an attentive  
manner

Reread them  
on a regular  
basis



S. Montgomery

Adopting tricks of the trade from colleagues is done everywhere else in research – why not in writing?

Beware plagiarism, blatant copying, and appropriation

Be honest about whose work you **emulate** and make sure to give credit when reusing material (even when paraphrasing)

“Good Writers are Made, Not Born”

“We’re not **born** excellent writers. **We become good** through **doing, writing, and writing,** and **by reading** others’ work.”

—N.E. Baron, medium.com

Writing process

Prewriting

Drafting

Revising

Editing

Evaluating

(referee)

Publishing

## Writing process

### Prewriting

During research work – keep logbook as detailed as possible

Be convinced you have a result

Decide on co-authors

Decide on the audience

Decide on journal and form

→ Sets the tone, length, structure

# Peer-reviewed scientific journals



+newcomers such as Galaxies, Universe, ...

Plan your research as a series of short, complete projects

Publish a paper after each project

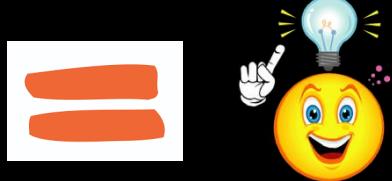
Less likely to be scooped

Get more recognition

People prefer short papers

Short papers are easier to write

# Prewriting



One paper = One idea

Write it down

(not as part of the paper)

## Prewriting

One paper = One idea

1

What is the main message of your paper?

2

Why is this message crucial or important in your field?

3

What 'gap' does it fill in the literature?

4

What impact or outlook does your work have in the field and why should the scientific community care about it for future progress in the field?

Write it down

(not as part of the paper)

# Prewriting

One paper = One idea

Write it down

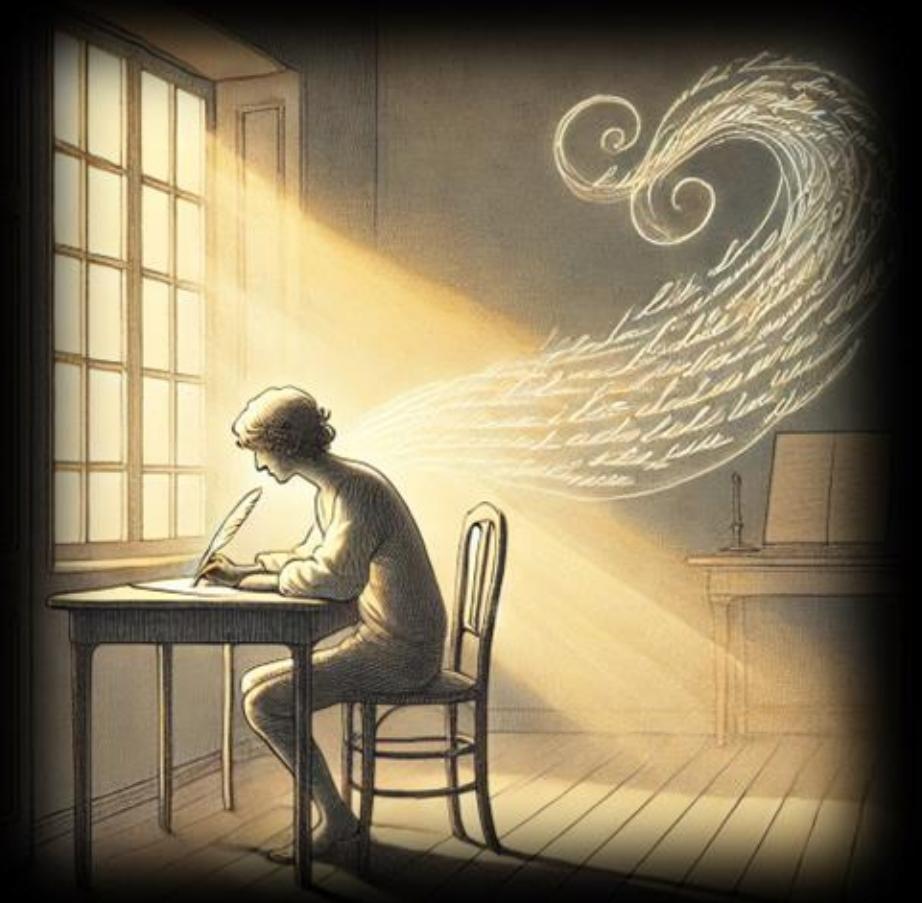
(not as part of the paper)

Discuss with  
colleagues

Write an  
outline of  
the paper –  
make a  
story

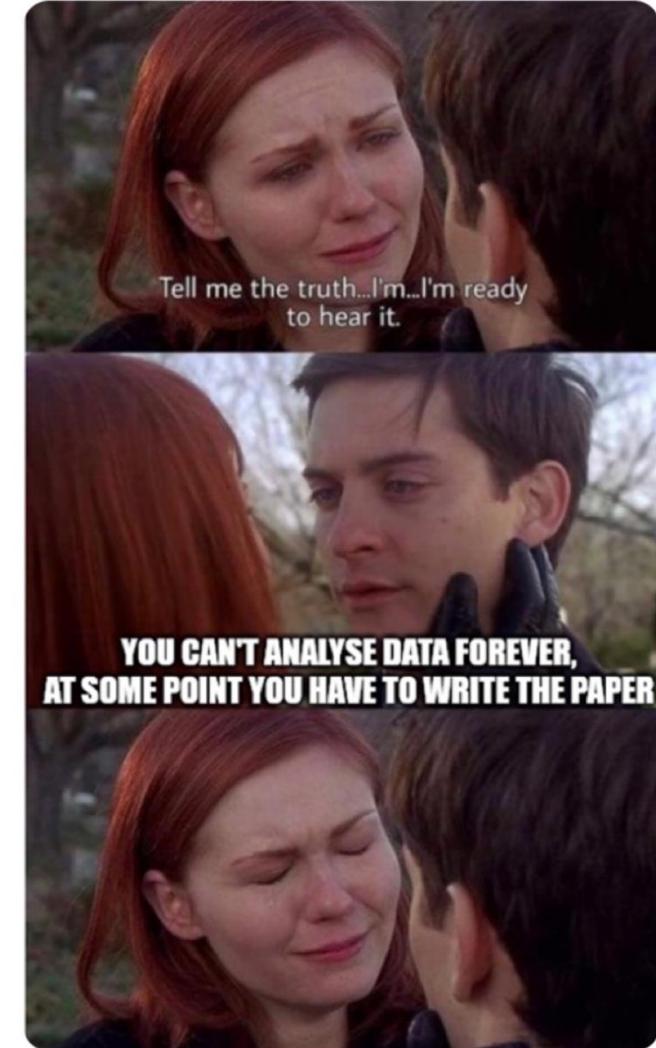
Prepare  
figures and  
tables

“Before you write, learn  
first to think.  
Whatever is well  
conceived is clearly said,  
And the words to say it  
flow with ease.”



Writing process

Prewriting  
Drafting  
Revising  
Editing  
Evaluating  
Publishing

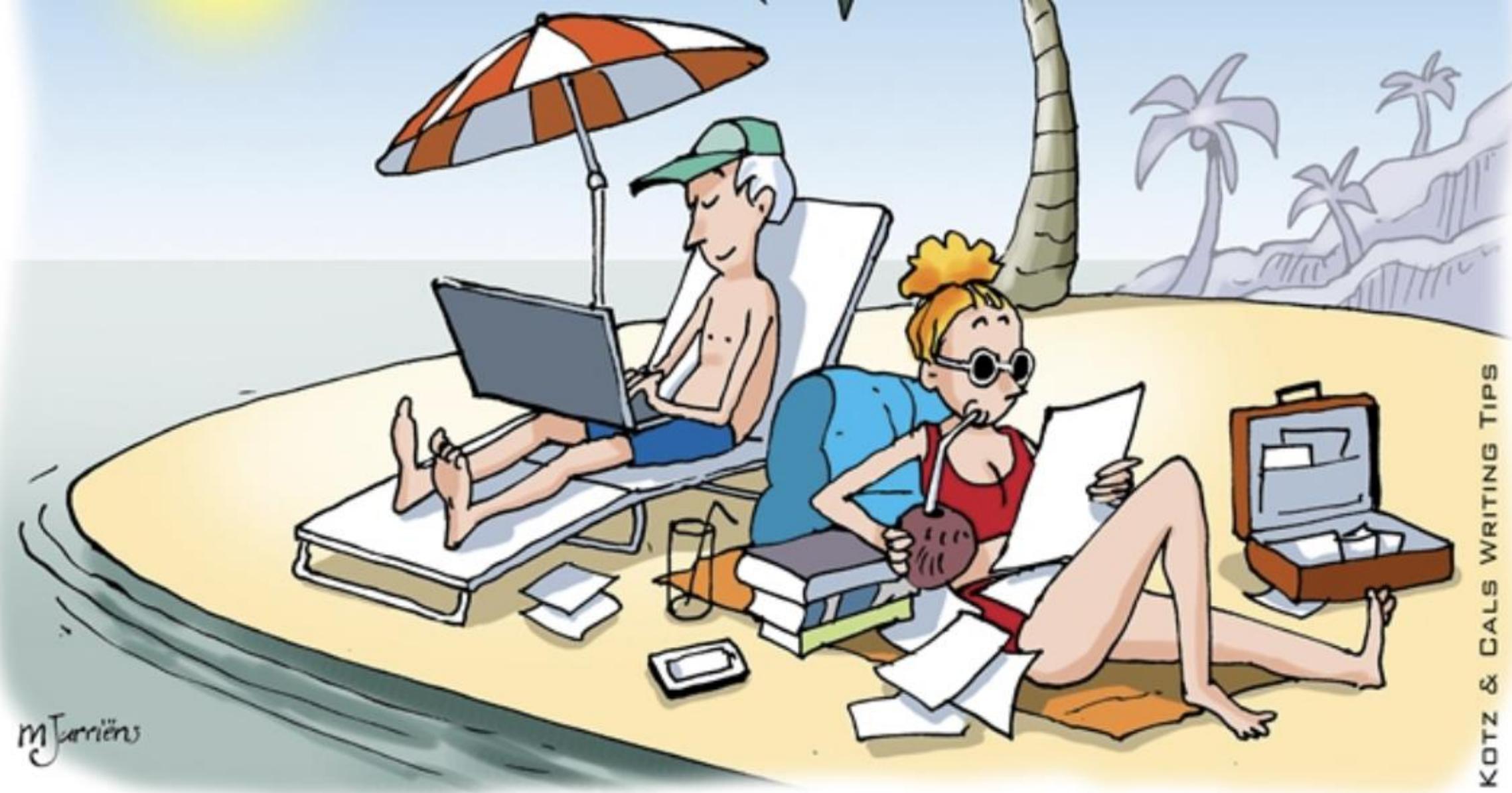


## Writing Process – Drafting

Write quickly  
Do not ponder  
over words;  
keep going;  
leave gaps if  
necessary;  
aim for a natural  
flow

Write in your  
own voice  
Express yourself in  
your own way will  
help you to say  
what you mean  
more exactly;  
If your reader  
can 'hear' your  
voice, reading  
will be easier

Write without  
interruption  
Try to find a time  
and place where  
you can think  
and write without  
distractions



How to get started: choose the optimal environment!

## Writing Process – Drafting

Write without editing

Do not try to get it right the first time

Resist the temptation to edit as you go; you will tend to get stuck and waste time

Keep to the plan of your outline

Use the sentences from your outline to focus on what you want to say

If you find yourself wandering from the point, stop and move on to the next sentence in the outline

25<sup>TH</sup> ANNIVERSARY EDITION

# BIRD BY BIRD



SOME  
INSTRUCTIONS  
ON WRITING  
AND LIFE

**ANNE LAMOTT**

NEW YORK TIMES BESTSELLING AUTHOR OF *ALMOST EVERYTHING*

“**After finishing a rough draft,** I would spend the rest of the day obsessing about getting creamed by a car before I could write a decent second draft. I’d worry that people would read what I’d written and **believe that the accident had really been a suicide.”**

—Anne Lamott

Writing process

Prewriting

Drafting

Revising

Editing

Evaluating

Publishing

*“Writing is non-algorithmic: even when we know what we want to say, it can take lots of iterations to get there.”*

—Andrew Gelman

# Revise

Revision is where you, the writer, become a reader with the power of change.

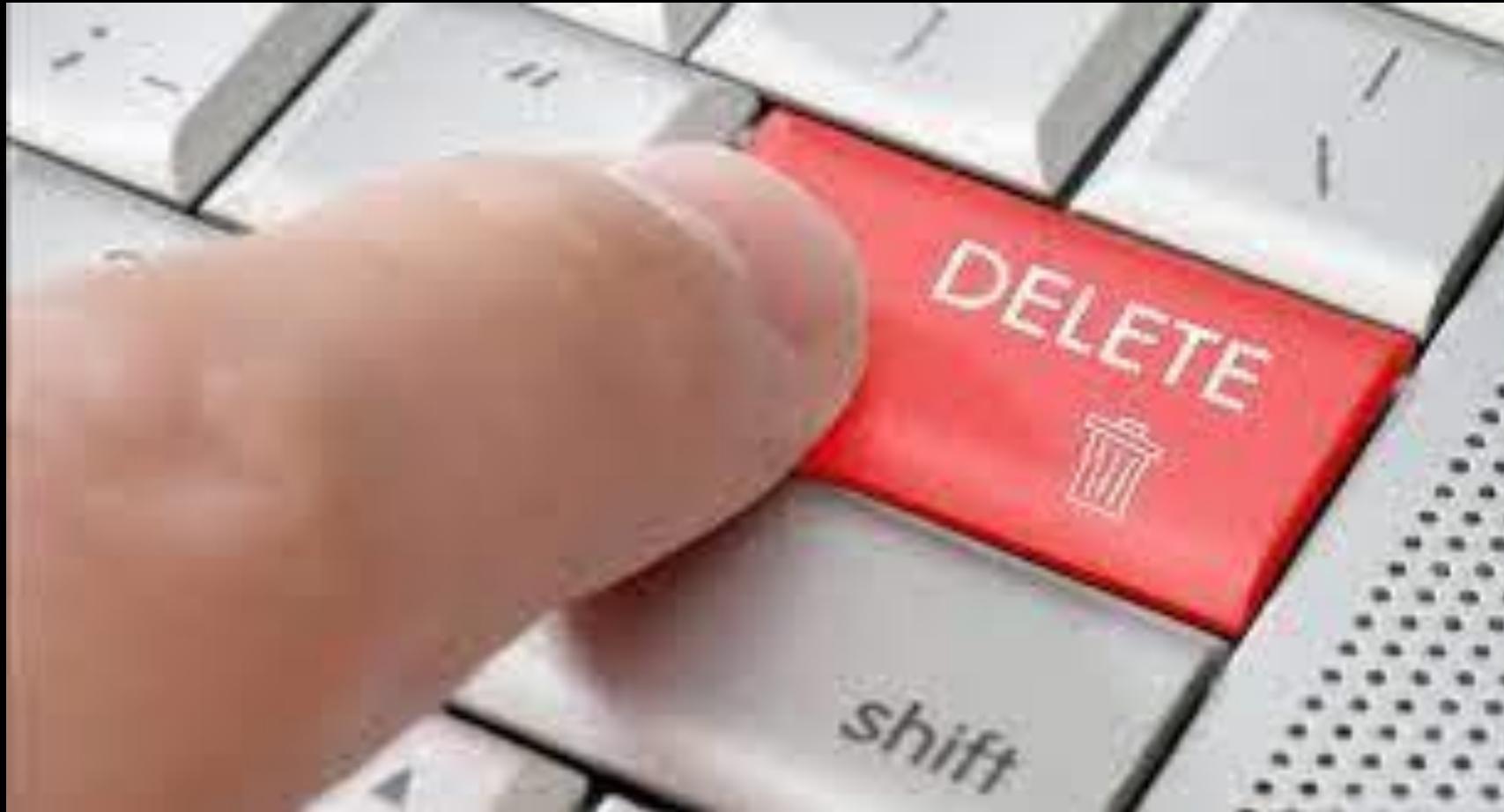
During revision, you should delete what is not needed and add what is missing

Make sure all your sentences and paragraphs make sense

**When you write you tell yourself a story. When you rewrite you take out everything that is NOT the story.**

Stephen King

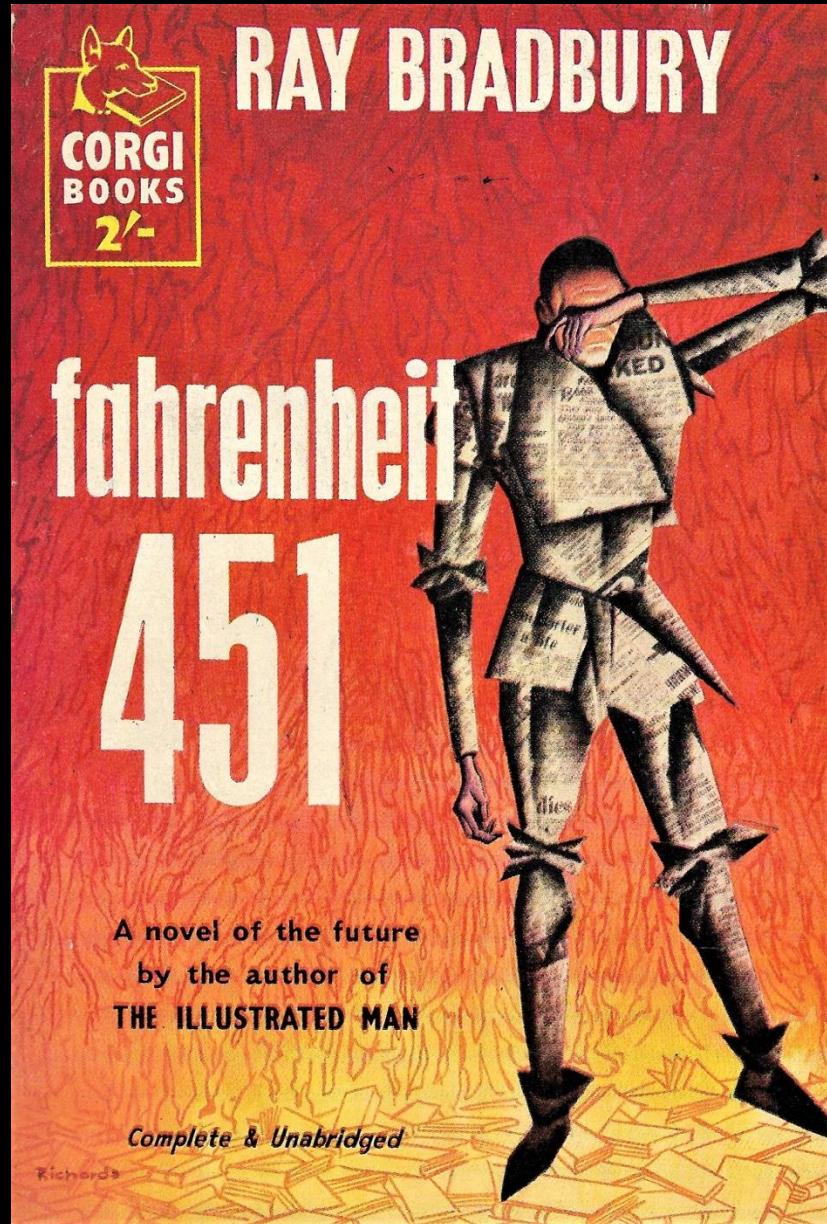
Cut, cut, cut



Don't be afraid  
to cut

It is not because  
you wrote it that  
it must stay

Be concise!



*"All during my early twenties I had the following schedule.*

*On Monday morning I wrote the first draft of a new story.*

*On Tuesday I did a second draft.*

*On Wednesday a third.*

*On Thursday a fourth.*

*On Friday a fifth.*

*And on Saturday at noon I mailed out the sixth and final draft to New York."*

—Ray Bradbury

*Almost all good writing begins with terrible first efforts.  
You need to start somewhere. Start by getting something –  
anything – down on paper. A friend of mine says that the  
first draft is the down draft – you just get it down. The  
second draft is the up draft – you fix it up.*

Anne Lamott



“Hasten slowly, and without  
losing heart,  
Put your work twenty times  
upon the anvil:  
Polish it ceaselessly and  
repolish it;  
Sometimes add, and often  
cross.”

Writing process

Prewriting

Drafting

Revising

Editing

Evaluating

Publishing

## Editing Hints

Read the paper once  
all the way through

Ideally in print form

Reread all the way through  
out-loud or backwards

If you can read this, you have a strange mind too.

It doesn't matter in what order the letters in a word are. The only important thing is that the first and last letter must be in the right place.

# Editing Hints

Read the paper once  
all the way through

Reread all the way through  
out-loud or backwards

Look for  
Passive voice  
Inconsistent verb tenses and subject/verb disagreement  
Improper pronoun references  
Jargon  
Grammar!  
Typos

# Typos!



*It rally doesn't make you seem all that smart if your always making lotsa typos.*

Ginger Carney

## From a letter of motivation



I am extremely exited to have the opportunity to work at the head quarters of the worlds best observatory.

## From a letter of motivation

I am extremely **exited** to have the opportunity to work at the **headquarters** of the **worlds** best observatory.

I am extremely excited to have the opportunity to work at the headquarters of the world's best observatory.

I am extremely excited to **have** the opportunity **to work** at the headquarters of the world's best observatory.

I am thrilled at the opportunity to work at the headquarters of the world's best observatory.

Use right words – Be concise!

Typos aren't always caught by spellchecker

Studying the age through plotting isochrons in a color-magnitude diagram.

Typos aren't always caught by spellchecker

Studying the age through plotting isochrones in a color-magnitude diagram.

Isochron in mathematics  
Isochrone in astronomy

Your spellchecker won't know this!  
(but ChatGPT might!)

## Spellchecker won't spot everything



The animals that normally inhabit the pond were dyeing because it had too much green allergy.

The animals that normally inhabit the pond were dying because it had too much green algae.

## Grammar errors



Migraines strike twice as many women as do men.

Twice as many women as men experience migraines.

**SO, IF YOU COULD JUST EDIT YOUR  
TEXT ONCE MORE**

**THAT WOULD BE GREAT**

# Writing is a process of thinking, drafting and editing

researchers may well find the ideas presented here useful. We include references for follow-up study, or to check details.

**Key words:** Science writing; publishing

**1 Introduction**

Writing papers is key to sharing your research results and advancing your career. Yet most scientists, including astronomers, never receive much training in academic writing. They may consider that writing is not important, or they may even have chosen a career in the sciences to avoid a focus on language and writing skills. To complicate matters, many astronomers are not native speakers of English, so writing a research paper may become a real struggle.

There are numerous books and papers to provide guidance to young writers. Several examples are Ashby (2005) or Sterk and Rabe (2008). Computer science professor Jari Saramäki has published a book (Saramäki, 2018) based on a series of blog posts<sup>1</sup> full of excellent tips for writing papers as well as Master's

*to write!*

*in STEM fields?*

*Top examples? list also*

*connect better to the next paragraph*

*example: "Several examples see Ashby (2005) or Sterk and Rabe (2008)*

*focussed on biomedical and engineering research, and prof - book*

*resources*

*I get that you want to highlight*

*Saramäki's book because*

*it focuses ab. on theses?*

*These papers cover the whole writing process from planning the paper to final editing and polishing, but are focussed on biomedical or engineering research, and may fail to meet the needs of astronomy students. Astronomy professor Christiaan Sterken has written a truly excellent series of book chapters covering in great detail the writing process, graphics, and ethics (Sterken, 2011a,b,c, unfortunately not freely available). Carefully studying good papers from native-speaker groups may also help.*

*The main objective of the current paper is to fill this gap in the knowledge by providing freely available guidelines for beginning writers in astronomy, all over the world. The main target audience consists of Master's or PhD students, but the material may also be of interest to astronomers who are more experienced writers. The information here is based on writing classes given to graduate students by JHK and DB, as well as on the experiences of a young writer (NC).*

*In this paper, we first describe various aspects of getting*

*1 <https://jarisaramaki.fi/> Saramäki (2018).*

*Compiled on: June 9, 2021.*

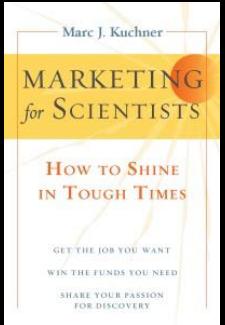
*Draft manuscript prepared by the author.*

Knapen 24



*“Writing is like sculpting.  
At first it is an amorphous blob of  
clay, but after much work and  
great care it turns into something  
wonderful (we hope).”*

# Before starting to write



See also  
Erin McKea

## Invent and own a new word!

*"First distract the target,  
then block his blind jab  
and counter. Then  
discombobulate!"*



FANDANGO  
MOVIECLIPS

Discombobulate: to throw into a state of confusion.

# Recombobulate

To cause to think clearly again;  
to reorient; to put back into  
working order.



P \* L \* U \* T \* O \* E \* D

English word  
of the year  
2006



To be demoted without due cause or reason

P\*L\*U\*T\*O\*E\*D



*"I was captain of the ship for one day, but then I was plutoed."*

Science is made of new words

electron

neuron

bacteria

gravity

black hole

**dark energy**

inflation

quark

pulsar

quasar

big bang

“One could say  
that scientific  
progress is done  
through new  
words!”

M. Kuchner

LETTER

Gaia Enceladus

<https://doi.org/10.1038/s41586-018-0625-x>

# The merger that led to the formation of the Milky Way's inner stellar halo and thick disk

Amina Helmi<sup>1\*</sup>, Carine Babusiaux<sup>2,3</sup>, Helmer H. Koppelman<sup>1</sup>, Davide Massari<sup>1</sup>, Jovan Veljanoski<sup>1</sup> & Anthony G. A. Brown<sup>4</sup>

The *Gaia Sausage* is an elongated structure in velocity space discovered by Belokurov et al. (2018) using the kinematics of metal-rich halo stars. It was created by a massive dwarf galaxy ( $\sim 5 \times 10^{10} M_\odot$ )

# Expansion of Accreting Main-sequence Stars during Rapid Mass Transfer

Mike Y. M. Lau<sup>1,2,3</sup> , Ryosuke Hirai<sup>2,3</sup> , Ilya Mandel<sup>2,3</sup> , and Christopher A. Tout<sup>2,4</sup> 

<sup>1</sup> University of Exeter, The Queen's Building, Stag Hill, EX4 4QH, UK; <sup>2</sup> University of Cambridge, Wilberforce Road, Cambridge CB3 0FZ, UK; <sup>3</sup> Institute of Mathematics and Physics, University of Southern Denmark, Campusvej 57, DK-5230 Odense M, Denmark; <sup>4</sup> Department of Physics, University of Exeter, The Queen's Building, Stag Hill, EX4 4QH, UK

Our results demonstrate that it is possible for accretors to expand mildly despite being fed much faster than the thermally-limited rate.

all the donated mass can be added as long as the inflated envelope remains within the accretor's Roche lobe, much like how a ravenous hamster can accept food much faster than it can ingest by stuffing most of it behind its expanding cheeks.

# Expansion of Accreting Main-sequence Stars during Rapid Mass Transfer

Mike Y. M. Lau<sup>1,2,3</sup> , Ryosuke Hirai<sup>2,3</sup> , Ilya Mandel<sup>2,3</sup> , and Christopher A. Tout<sup>2,4</sup> 

<sup>1</sup> University of Exeter, The Queen's Building, Stag Hill, EX4 4QH, UK; <sup>2</sup> University of Cambridge, Wilberforce Road, Cambridge, CB3 0FZ, UK; <sup>3</sup> Institute of Mathematics and Physics, University of Exeter, Stag Hill, EX4 4QH, UK; <sup>4</sup> Department of Physics, University of Exeter, Stag Hill, EX4 4QH, UK

“hamstars”: stars accreting mass much faster than they may thermally accept.



## Invent a new word

If you have really a  
completely new idea,  
invent a new word!

If you can't justify one,  
then try to define an  
acronym for your  
project

# POPIPlaN: A Deep Morphological Catalogue of Newly Discovered Southern Planetary Nebulae



# Ongoing hierarchical massive cluster assembly: the LISCA II structure in the Perseus complex

A. Della Croce<sup>1,2\*</sup>, E. Dalessandro<sup>2</sup>, A. Livernois<sup>3</sup>, E. Vesperini<sup>3</sup>, C. Fanelli<sup>2</sup>, L. Origlia<sup>2</sup>, M. Bellazzini<sup>2</sup>, E. Oliva<sup>4</sup>, N. Sanna<sup>4</sup>, and A. L. Varri<sup>5</sup>

<sup>1</sup> Department of Physics and Astronomy ‘Augusto Righi’, University of Bologna, via Gobetti 93/2, I-40129 Bologna, Italy

<sup>2</sup> INAF – Astrophysics and Space Science Observatory of Bologna, via Gobetti 93/3, I-40129 Bologna, Italy

<sup>3</sup> Department of Astronomy, Indiana University, Swain West, 727 E. 3rd Street, IN 47405 Bloomington, USA

<sup>4</sup> INAF - Osservatorio Astrofisico di Arcetri, Largo Enrico Fermi 5, I-50125 Florence, Italy

<sup>5</sup> Institute for Astronomy, University of Edinburgh, Royal Observatory, Blackford Hill, Edinburgh EH9 3HJ, UK

# **SWEET-Cat 2.0: The Cat just got SWEETer**

## **Higher quality spectra and precise parallaxes from GAIA eDR3**

S. G. Sousa<sup>1</sup>, V. Adibekyan<sup>1</sup>, E. Delgado-Mena<sup>1</sup>, N. C. Santos<sup>1,2</sup>, B. Rojas-Ayala<sup>3</sup>, B. M. T. B. Soares<sup>1,2</sup>, H. Legoinha<sup>1,2</sup>, S. Ulmer-Moll<sup>4,1</sup>, J. D. Camacho<sup>1,2</sup>, S. C. C. Barros<sup>1</sup>, O. D. S. Demangeon<sup>1,2</sup>, S. Hoyer<sup>5</sup>, G. Israelian<sup>6</sup>, A. Mortier<sup>7,8</sup>, M. Tsantaki<sup>9</sup>, and M. Monteiro<sup>1</sup>

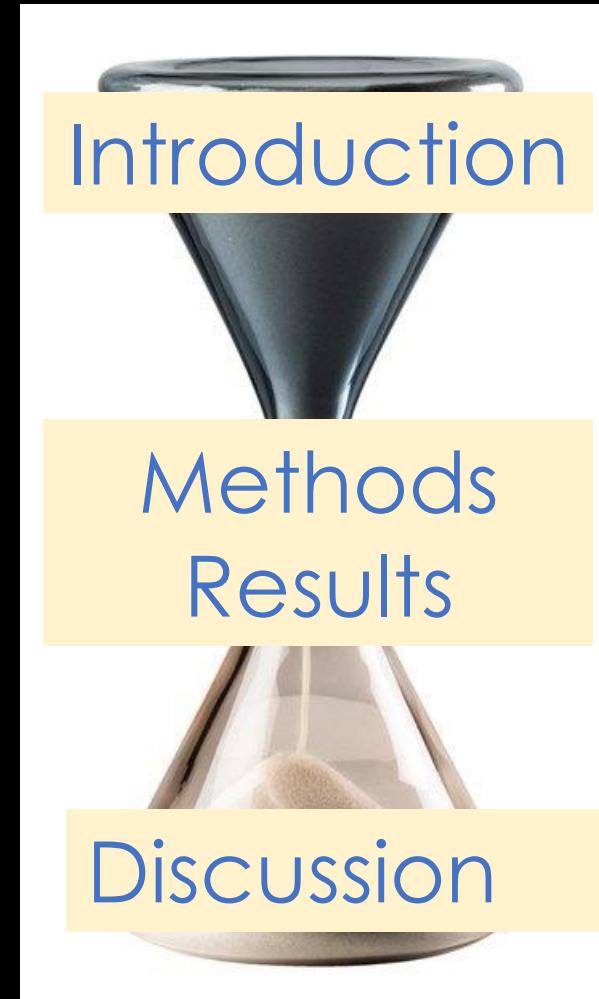


# Writing your paper

# Structure of a Paper

Big picture;  
knowledge gap

Impact and  
outlook



The story: figures,  
results, ...

# Structure of a Paper

IMRaD  
format

Title

Authors

Abstract

Keywords

Acknowledgements

References

Appendices



Introduction

Methods/Observations

Results (includes figures and tables)

Discussion

Conclusion

Order in a paper.  
Not necessarily the  
order in which you  
write it!



# The luminous blue variable HR Carinae has a partner<sup>★</sup>

## Discovery of a companion with the VLTI

Henri M. J. Boffin<sup>1,2</sup>, Thomas Rivinius<sup>1</sup>, Antoine Mérand<sup>1</sup>, Andrea Mehner<sup>1</sup>, Jean-Baptiste LeBouquin<sup>3</sup>, Dimitri Pourbaix<sup>4,★</sup>, Willem-Jan de Wit<sup>1</sup>, Christophe Martayan<sup>1</sup>, and Sylvain Guieu<sup>1,3</sup>

<sup>1</sup> ESO, Alonso de Córdova 3107, Casilla 19001, Santiago, Chile  
e-mail: hboffin@eso.org

<sup>2</sup> ESO, Karl-Schwarzschild-str. 2, 85748 Garching, Germany

<sup>3</sup> Institut de Planétologie et d'Astrophysique de Grenoble (UMR 5274), BP 53, 38041 Grenoble Cedex 9, France

<sup>4</sup> Institut d'Astronomie et d'Astrophysique, Université Libre de Bruxelles (ULB), 1050 Bruxelles, Belgium

Received 16 June 2016 / Accepted 18 July 2016

### 1. Introduction

### 3. Analysis and discussion

### 2. Observations

### 4. Conclusions

*Acknowledgements.* It is a pleasure to thank Steve Ertel for taking the data in January 2015 in delegated Visitor Mode. The archival AMBER observation was obtained under ESO Prog. ID 085.D-0490.

### References

### Appendix A: Additional figures

## When nature tries to trick us

### An eclipsing eccentric close binary superposed on the central star of the planetary nebula M 3-2<sup>★,★★</sup>

Henri M. J. Boffin<sup>1</sup>, David Jones<sup>2,3</sup>, Roger Wesson<sup>4</sup>, Yuri Beletsky<sup>5</sup>, Brent Miszalski<sup>6,7</sup>, Ivo Saviane<sup>8</sup>,  
Lorenzo Monaco<sup>9</sup>, Romano Corradi<sup>10,2</sup>, Miguel Santander García<sup>11</sup>, and Pablo Rodríguez-Gil<sup>2,3</sup>

(Affiliations can be found after the references)

Received 21 June 2018 / Accepted 27 July 2018

#### 1. The bipolar nebula M 3-2

Planetary nebulae (PNe) are thought to be short episodes at the end of the lives of intermediate-mass stars, just before they become white dwarfs. M 3-2 is a well-known example of a

#### 4. Nebular abundances

#### 2. Imaging and stellar photometry

##### 2.1. An intriguing binary

#### 5. Analysis: A clear case of false identity

#### 3. Stellar spectroscopy

#### 6. Discussion and conclusions

# Reading levels

Title (target audience)



Abstract



Main text (specialised audience)



Adapted from

**nature** masterclasses

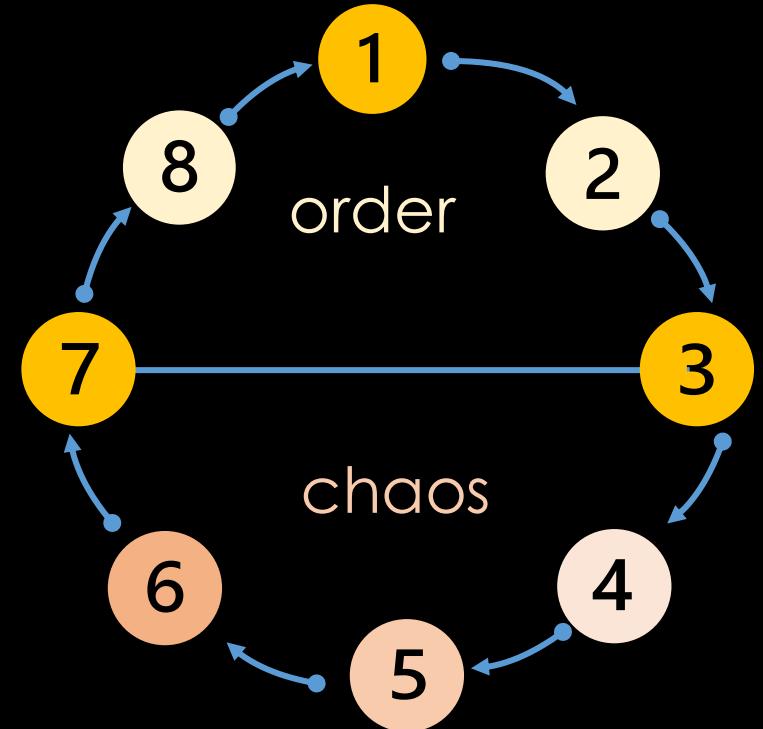


The universe is made of stories, not  
of atoms.

— *Muriel Rukeyser* —

## Story

- 1.. A character is in a zone of comfort,
- 2.. But they want something.
- 3.. They enter an unfamiliar situation,
- 4.. Adapt to it,
- 5.. Get what they wanted,
- 6.. Pay a heavy price for it,
- 7.. Then return to their familiar situation,
- 8.. Having changed



Dan Harmon

## The Matrix: the story

of an everyday guy (1)  
that gets a weird call (2)  
and, upon following it, realizes that reality was an illusion (3).

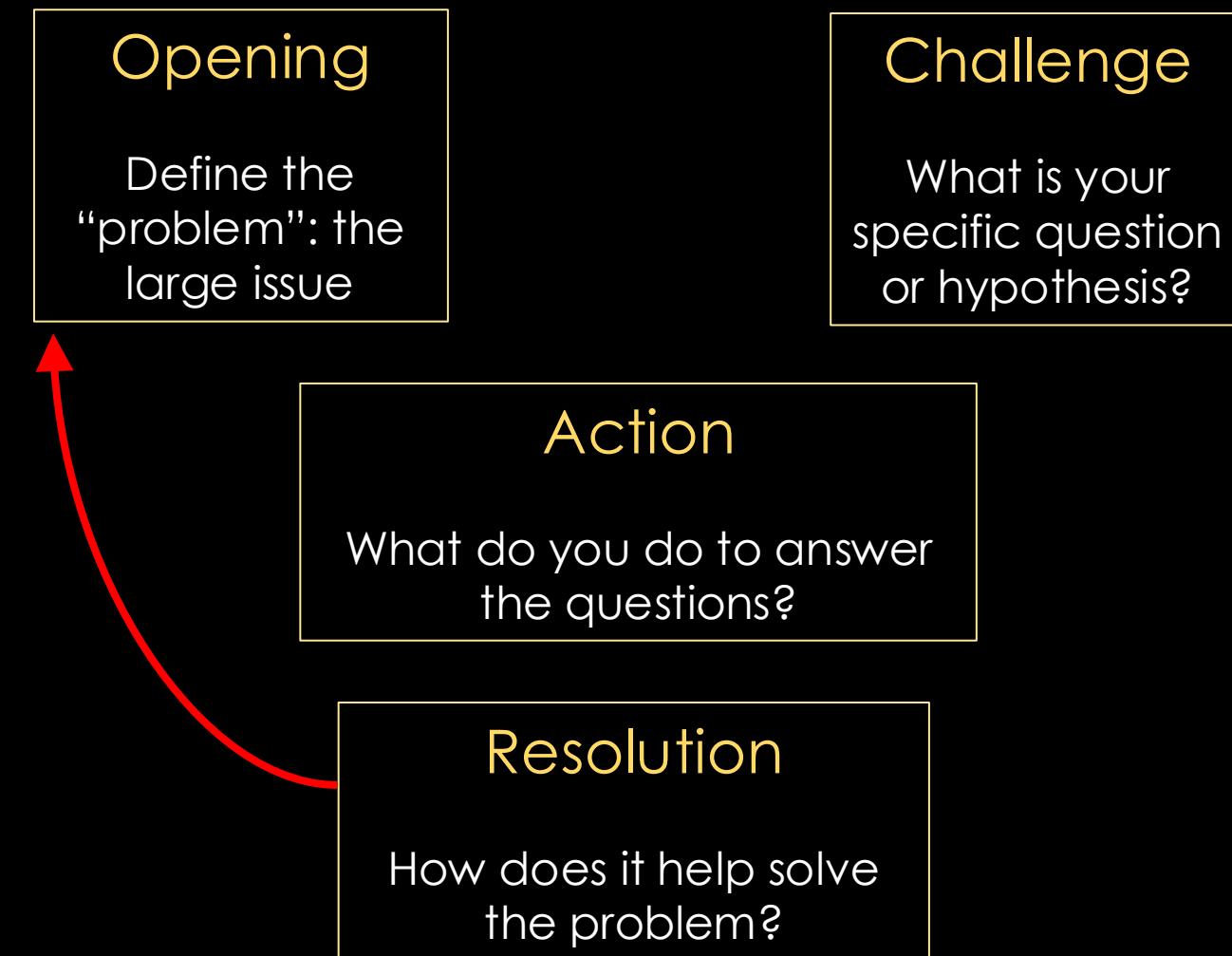
He learns the ropes (4),  
talks to the oracle (5),  
loses his mentor (6),  
goes back (7),  
and saves the day (8).

Dan Harmon

## Applying to our papers

	<b>Story</b>	<b>Your paper</b>
1	A character is in a zone of comfort	Scientists and the current state of research in your field
2	But they want something	Something is not well understood; knowledge gap
3	They enter an unfamiliar situation	We try to solve this problem. <a href="#">Introduction</a>
4	Adapt to it	How did we do it? <a href="#">Methods</a>
5	Get what they wanted	We had a breakthrough! <a href="#">Results</a>
6	Pay a heavy price for it	With the results in hand, you now have to do the hardest part: interpret what they mean. <a href="#">Discussion</a>
7	Then return to their familiar situation	How does this change what we know already?
8	Having changed	The state of research has changed. <a href="#">Conclusion</a>

# Story structure in science: OCAR



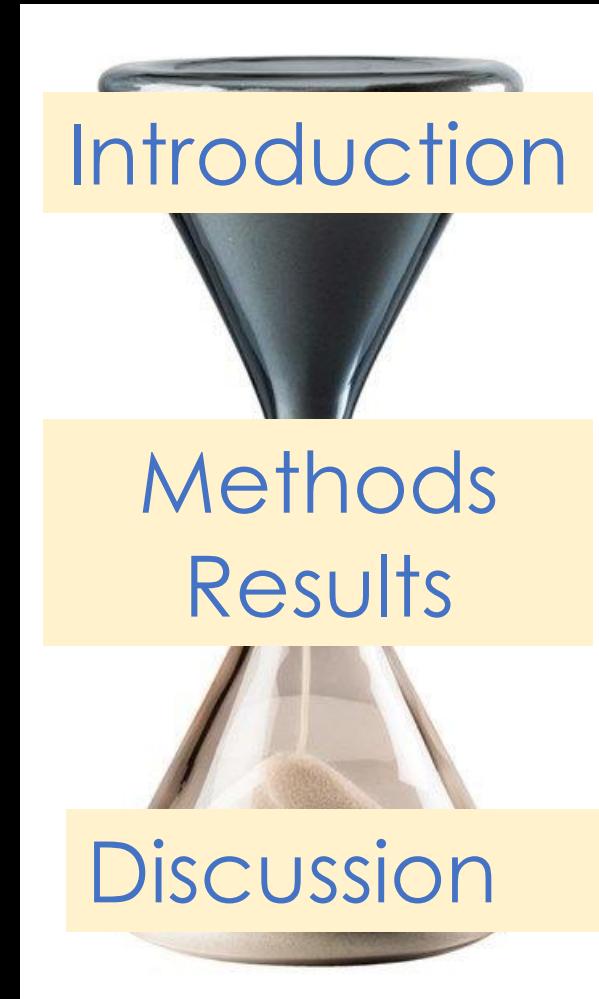
If we (the researchers) are going to be protagonists, then  
we surely can't write our papers in the third person.

We need to use “we” or “I” (if alone) and use the active voice.

# Structure of a Paper

Big picture;  
knowledge gap

Impact and  
outlook



The story: figures,  
results, ...



KOTZ & GALS WRITING TIPS

Introduction: work on that funnel shape!

# Structure of the paper

IMRaD  
format



## The introduction

1. Establishing a territory

2. Establishing a niche

3. Occupying the niche

## 1. Establishing a territory

The text establishes the field to which the new research contributes.

Establish the importance of the field

Make generalisations about the topic

Refer to items of previous research

Explicitly narrow the focus of the work

The monitoring of Earth surface deformation is **indispensable** for the understanding of tectonic and geomorphological processes and the assessment of associated **hazards**. In particular, active landslides **threaten** infrastructure and human settlements as they are sensitive to short- and long-term meteorological change. During the last two decades, remote sensing has become an **important** tool to investigate landslide kinematics. SAR interferometry has proven its ability to provide **highly** precise motion measurements.

Use of **emphatic** words

“In particular” narrows the focus

## 2. Establishing a niche

The text indicates that the work done is in some respect not yet complete.

Refers to existing research to indicate gaps in current knowledge

Raises a question whose answer would extend the current knowledge

### 3. Occupying the niche

The text introduces the new research.

State the purpose of the research

Describe the research done by the authors

Mention the principal findings

No need for an outline!

## Introduction

In writing the literature review, summarise rather than list every possible reference and example

Cite latest review or paper and say “and refs. therein”

Keep the introduction as short as possible

## The introduction

Paragraph 1  
What we know

Paragraph 2  
What we don't know

Paragraph 3  
What we did and the result

## Introduction

Think about it when you begin a project,  
not when you complete it

The reasons that you found the project interesting enough to work on  
provide half the material needed for the introduction

The remaining is a summary of the key results

Write it as you would explain a scientist friend!

## Methods



Give a clear overview of what was done

Give enough information to replicate the study (like a recipe!)

Be complete, but minimize complexity

Break into smaller sections with subheads

Move technical details in Appendix

Give a reference for commonly used methods



Methods: provide a cookbook with the study's ingredients!

# Methods



Report methods in past tense  
("we measured")

Use present tense to describe how data  
are presented in the paper  
("data are summarized as means  $\pm$  SD")

## Results



### Present facts

The output of the experiments, model, or computation

No opinion nor interpretation

Give error bars

Most data belong in figures and tables  
– these should have self-contained captions

## Results

Report results  
pertinent to the  
main question  
asked

Summarize  
the data (big  
picture);  
report trends

Cite figures or  
tables that  
present  
supporting data



KOTZ & CALS WRITING TIPS

Results: present findings without interpretation!

## The Discussion

IMRaD  
format



The purpose of the discussion:

Answer the question posed in the Introduction

Support your conclusion with details (yours, others)

Defend your conclusion (acknowledge limits)

Highlight the broader implications of the work

→ what do my results mean and why should anyone care?

## The Discussion

Things to avoid in the discussion:

Do not simply repeat what is in the Results

Do not try to explain every minor flaw

Do not attempt to explain away every unexpected result

Do not exaggerate or make extravagant claims



Discussion: be frank in acknowledging limitations!



## Conclusion

We are researchers... not finders

What is next for you or others working in your field?

What is the take home message?

1a

1b

1c

1d

Results

Discussion

Results

Discussion 3.1

Discussion 3.2

Discussion 3.3

Result

Discussion

Conclusion

Results & Discussion

Conclusion

## Classic “more research is needed...” conclusion

In summary, we show that X7 alters the expression pattern of extracellular proteases in the “flesh-eating bacterium” *Streptococcus pyogenes*, which causes necrotizing fasciitis.  
If the function of X7 can be fully established, it would likely deepen our understanding of this destructive disease.

Likely the worst possible way to end a paper!

Another classic conclusion...

A proteomic evaluation of hummingbirds under simulated migratory conditions revealed evidence of several stress-associated processes. These results suggest that changes in the hummingbird proteome may provide new insights into the complex physiology of avian systems biology.

Why is this the second worst possible way to end a paper?

A proteomic evaluation of hummingbirds under simulated migratory conditions revealed evidence of several stress-associated processes. These results suggest that changes in the hummingbird proteome may provide new insights into the complex physiology of avian systems biology.

Why is this the second worst possible way to end a paper?

What are these insights? Tell us!

Go back to the original question

# Finding your scientific story by writing backwards

David J. S. Montagnes<sup>1</sup> · E. Ian Montagnes<sup>2</sup> · Zhou Yang<sup>3</sup>

## A. The IMRaD structure

### *Introduction: the problem*

- Background leading to questions
- The questions

### *Methods: how the problem will be solved*

- How the questions will be answered

### *Results: findings that support how the problem is solved*

- Data to answer questions

### *Discussion: impacts of the solution to the problem*

- Reiterate questions
- Answers questions
- Indicate impact of questions
- Indicate way forward

## B. Steps for structuring

### *1. Take-home messages*

- What conclusions arise from the data (look at all the data)?
- What key questions do these conclusions answer?

### *2. Results*

- Write up **only** the Results that relate to your conclusions

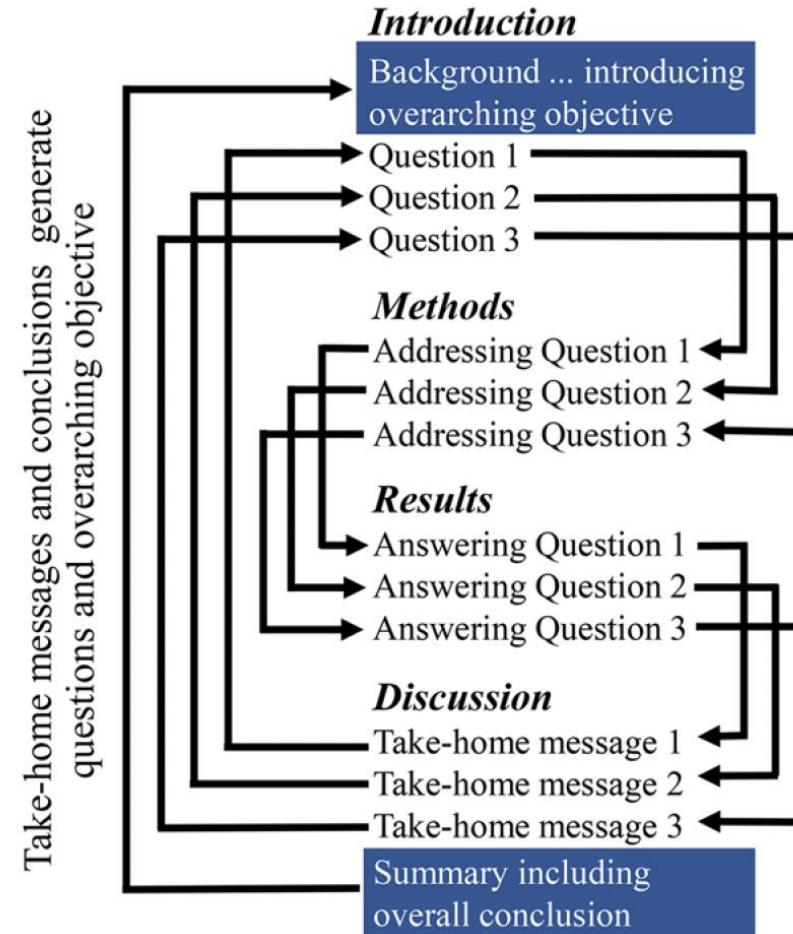
### *3. Methods*

- Write up **only** the Methods that relate to your Results

### *4. Discussion & Introduction*

- Write both sections together
- Focus on developing a final Discussion
- Then move on to the Introduction

## C. Parallel flow of the structure



# Abstract



Overview of the main story  
Gives highlights from each section of the paper  
Limited length (100-300 words, typically)

Stands on its own  
Used, with title, for electronic search engines  
Most often, the only part people read

## The Nature abstract formula

Basic introduction to the field, which is comprehensible to a scientist in any discipline. Detailed background, comprehensible to a scientist in a related discipline. One or two sentences stating the general problem studied in the paper. One or two sentences summarising the main result. (“Here, we show …”) One or two sentences explaining how the main result adds to previous knowledge. One sentence putting the results into a more general context.

## Abstract: an example

Stars are generally spherical, yet their gaseous envelopes often appear non spherical when ejected near the end of their lives. This quirk is most notable during the planetary nebula phase, when these envelopes become ionized. Interactions among stars in a binary system are suspected to cause the asymmetry. In particular, a precessing accretion disk around a companion is believed to launch point-symmetric jets, as seen in the prototype Fleming 1. Our finding of a post-common-envelope binary nucleus in Fleming 1 confirms that this scenario is highly favorable. Similar binary interactions are therefore likely to explain these kinds of outflows in a large variety of systems.

Boffin et al. 12, Science

Introduction to the topic. Problem that is being addressed.  
The research and key results. Context and implications.

# Structured abstracts



## ABSTRACT

**Context.** In the era of gravitational wave astrophysics and precise astrometry of billions of stellar sources, the hunt for compact objects is more alive than ever. Rarely seen massive binaries with a compact object are a crucial phase in the evolution towards compact object mergers. With the upcoming *Gaia* data release (DR3), the first *Gaia* astrometric orbital solutions for binary sources will become available, potentially revealing many such binaries.

**Aims.** We investigate how many black holes (BH) with massive main-sequence dwarf companions (OB+BH binaries) are expected to be detected as binaries in *Gaia* DR3 and at the end of the nominal 5-yr mission. We estimate how many of those are identifiable as OB+BH binaries and we discuss the distributions of the masses of both components as well as of their orbital periods. We also explore how different BH-formation scenarios affect these distributions.

**Methods.** We apply observational constraints to tailored models for the massive star population, which assume a direct collapse and no kick upon BH formation, to estimate the fraction of OB+BH systems that will be detected as binaries by *Gaia*, and consider these the fiducial results. These OB+BH systems follow a distance distribution according to that of the second Alma Luminous Star catalogue (ALS II). We use a method based on astrometric data to identify binaries with a compact object and investigate how many of the systems detected as binaries are identifiable as OB+BH binaries. Different scenarios for BH natal kicks and supernova mechanisms are explored and compared to the fiducial results.

**Results.** In the fiducial case we conservatively estimate that 77% of the OB+BH binaries in the ALS II catalogue will be detected as binaries in DR3, of which 89% will be unambiguously identifiable as OB+BH binaries. At the end of the nominal 5-yr mission, the detected fraction will increase to 85%, of which 82% will be identifiable. The 99% confidence intervals on these fractions are of the order of a few percent. These fractions become smaller for different BH-formation scenarios.

**Conclusions.** Assuming direct collapse and no natal kick, we expect to find around 190 OB+BH binaries with *Gaia* in DR3 among the sources in ALS II, which increases the known sample of OB+BH binaries by more than a factor of 20, covering an uncharted parameter space of long-period binaries ( $10 \lesssim P \lesssim 1000$  d). Our results further show that the size and properties of the OB+BH population that is identifiable using *Gaia* DR3 will contain crucial observational constraints to improve our understanding of BH formation. An additional  $\sim$ 5 OB+BH binaries could be identified at the end of the nominal 5-yr mission, which are expected to have either very short ( $P \lesssim 10$  d) or long periods ( $P \gtrsim 1000$  d).

**Key words.** stars: black holes, binaries: general, astrometry, stars: statistics

# Compare these two abstracts...

## ABSTRACT

We report new near-IR integral field spectroscopy of the central starburst region of the barred spiral galaxy M83 obtained with Cambridge Infra-Red Panoramic Survey Spectrograph (CIRPASS) on Gemini-South, which we analyse in conjunction with GH $\alpha$ FaS Fabry–Perot data, an Anglo-Australian Telescope (AAT) IRIS2  $K_s$ -band image, and near- and mid-IR imaging from the *Hubble* and *Spitzer* space telescopes. The bulk of the current star formation activity is hidden from optical view by dust extinction, but is seen in the near- and mid-IR to the north of the nucleus. This region is being fed by inflow of gas through the bar of M83,

Knapen et al. 2010

## ABSTRACT

Nearly 70 years since its introduction, the effective or half-light radius has become a very popular choice for characterising galaxy size. However, more than size, the effective radius describes the concentration of light in galaxies. For this reason, we aim to demonstrate the undesirable consequence of using the effective radius to draw conclusions about the nature of faint “ultra-diffuse galaxies” when compared to dwarfs and Milky Way-like galaxies. Instead of the effective radius, we propose using the radius corresponding to the gas density threshold required for star formation in galaxies as a physically motivated measure of galaxy size. Considering this new definition of size with the stellar mass density profiles of these galaxies, we conclude that ultra-diffuse galaxies have the same size distribution as regular dwarfs at the 97% confidence level. Our results show that the use of size estimators sensitive to the concentration of light can lead to misleading results.

Chamba, Trujillo, Knapen 2019

## ABSTRACT

We report new near-IR integral field spectroscopy of the central starburst region of the barred spiral galaxy M83 obtained with Cambridge Infra-Red Panoramic Survey Spectrograph (CIRPASS) on Gemini-South, which we analyse in conjunction with GH $\alpha$ FaS Fabry–Perot data, an Anglo-Australian Telescope (AAT) IRIS2  $K_s$ -band image, and near- and mid-IR imaging from the *Hubble* and *Spitzer* space telescopes. The bulk of the current star formation activity is hidden from optical view by dust extinction, but is seen in the near- and mid-IR to the north of the nucleus. This region is being fed by inflow of gas through the bar of M83, traced by the prominent dust lane entering into the circumnuclear region from the north. An analysis of stellar ages confirms that the youngest stars are indeed in the north-west. A gradual age gradient, with older stars further to the south, characterizes the well-known star-forming arc in the central region of M83, and is consistent with a stable scenario where gas inflow into the central regions is facilitated by the galactic bar.

Detailed analyses of the Pa $\beta$  ionized gas kinematics and near-IR imaging confirm that the kinematic centre coincides with the photometric centre of M83, and that these are offset significantly, by about 3 arcsec or 60 pc, from the visible nucleus of the galaxy. We discuss two possible options, the first of which postulates that the kinematic and photometric centre traces a galaxy nucleus hidden by a substantial amount of dust extinction, in the range  $A_V = 3\text{--}10$  mag. By combining this information with kinematic results and using arguments from the literature, we conclude that such a scenario is, however, unlikely, as is the existence of other ‘hidden’ nuclei in M83.

We thus concur with recent authors and favour a second option, in which the nucleus of the galaxy is offset from its kinematic and photometric centre. This is presumably a result of some past interaction, possibly related to the event which lies at the origin of the disturbance of the outer disc of the galaxy. We find some indications for a disturbance in the H $\alpha$  velocity field which would confirm the influence of the  $m = 1$  perturbation in the gravitational potential, but note that further high-quality stellar kinematic data are needed to confirm this scenario.

Too  
long!

## Abstract – what is wrong here?



We report a discovery of new semidetached interacting binary V486 Cen. Based on photometric survey (ASAS-SN, TESS) data and obtained high-resolution spectroscopy we derive nearly circular orbit with  $P_{\text{orb}}=16$  d. We derived stellar parameters and abundances of the primary that show carbon depletion and nitrogen overabundance that is indicative that CNO processed material is exposed due to mass transfer removing the outer layers of the primary.

## Abstract

No context nor  
background!

Grammar!

We report a discovery of new semidetached interacting binary V486 Cen. Based on photometric survey (ASAS-SN, TESS) data and obtained high-resolution spectroscopy we derive nearly circular orbit with  $P_{orb}=16$  d. We derived stellar parameters and abundances of the primary that show carbon depletion and nitrogen overabundance that is indicative that CNO processed material is exposed due to mass transfer removing the outer layers of the primary.

Past and  
present tenses  
are mixed

Convoluted  
sentence!

# Title

Describes the paper's content clearly and precisely including keywords



# Title

Describes the paper's content clearly and precisely including keywords

Is the advertisement for the article

Does not use abbreviations and jargon

Search engines/indexing databases depend on the accuracy of the title – since they use the keywords to identify relevant articles

For a paper, it should never be a question

## Betteridge's law of headlines

*"Any headline that ends in a question mark can be answered by the word no."*

[https://en.wikipedia.org/wiki/Betteridge%27s\\_law\\_of\\_headlines](https://en.wikipedia.org/wiki/Betteridge%27s_law_of_headlines)

## Possible Sources for a Title

A pertinent phrase from the paper

An adaptable quote from another source

A key phrase or idea from the abstract

A relevant answer to a question addressed in the paper

## Various Options for a Title

Summarize the issue addressed in the paper

Example: The Impact of Nitrous Oxide on Lake Ontario's Ecosystem

Use words that surprise or encourage curiosity

Example: Marxist America

Use words or phrases that have double or clever meanings

Example: Love Stinks: Pheromones and Their Influence in Dating Relationships

Take a common phrase and put a spin on it

Example: When Good Writers Go Bad

## Alliterations

Using words that start with the same letter or sound, or rhyme in other ways

“Prepare, promote, produce.”

The Great Gatsby – F. Scott Fitzgerald

Pride and Prejudice – Jane Austen

Love's Labor's Lost – William Shakespeare

The Pickwick Papers – Charles Dickens

Incorporating alliterations into your titles can help people remember your work and it will stick out in people's minds

## Naming consumer products or brands

Dunkin' Donuts

Bed, Bath & Beyond

Coca-Cola

Best Buy

American Airlines

PayPal

American Apparel

# Marvel Universe superheroes' real identities

Bruce Banner

Reed Richards

Sue Storm

Peter Parker

J. Jonah Jameson Jr.

Fin Fang Foom

# Dispersion measure: Confusion, Constants & Clarity

S. R. Kulkarni

## **No swan song for Sun-as-a-star helioseismology: performances of the Solar-SONG prototype for individual mode characterisation**

S.N. Breton<sup>1</sup>, P.L. Pallé<sup>2,3</sup>, R.A. García<sup>1</sup>, M. Fredslund Andersen<sup>4</sup>, F. Grundahl<sup>4</sup>, J. Christensen-Dalsgaard<sup>4</sup>, H. Kjeldsen<sup>4</sup>, and S. Mathur<sup>2,3</sup>

Title

Ideally with the main conclusion in it

**Inner and outer rings are not strongly coupled with stellar bars**

S. Díaz-García<sup>1,2</sup>, S. Díaz-Suárez<sup>1,2</sup>, J. H. Knapen<sup>1,2,3</sup>, and H. Salo<sup>4</sup>

Yes!

**MUSE-AO view of the starburst–AGN connection: NGC 7130\***

J. H. Knapen<sup>1,2,3</sup>, S. Comerón<sup>4</sup>, and M. K. Seidel<sup>3</sup>

No!



## Exercise: writing a title

Read the abstract on the following slide.

Think about an appropriate title for the corresponding paper.

### Hints:

- Does your title describe the main results of the work?
- Is your title accurate but also engaging?
- Make sure to use clear and simple language.

Adapted from

**nature** masterclasses

## Exercise: writing a title

Driven by technological progress, human life expectancy has increased greatly since the nineteenth century. Demographic evidence has revealed an ongoing reduction in old-age mortality and a rise of the maximum age at death, which may gradually extend human longevity. Together with observations that lifespan in various animal species is flexible and can be increased by genetic or pharmaceutical intervention, these results have led to suggestions that longevity may not be subject to strict, species-specific genetic constraints. Here, by analysing global demographic data, we show that improvements in survival with age tend to decline after age 100, and that the age at death of the world's oldest person has not increased since the 1990s. Our results strongly suggest that the maximum lifespan of humans is fixed and subject to natural constraints.

Adapted from

**nature** masterclasses

## Exercise: writing a title

Which title do you think is most appropriate?

**Title A:** Analysis of global demographic data reveals that improvements in human survival with age decline after age 100 and the maximum human lifespan is fixed

**Title B:** Improvements in human survival with age decline after age 100

**Title C:** Human lifespan and longevity

**Title D:** Is there evidence for a limit to human lifespan?

**Title E:** Human lifespan is not limitless

Adapted from

**nature** masterclasses

Exercise: writing a title

Published title:

LETTER

doi:10.1038/nature19793

# Evidence for a limit to human lifespan

Xiao Dong<sup>1,\*</sup>, Brandon Milholland<sup>1,\*</sup> & Jan Vijg<sup>1,2</sup>

Adapted from

**nature** masterclasses



## ChatGPT to the rescue?

1. "The Limits of Lifespan: Evidence for a Maximum Age in Humans"
2. "Reaching the Ceiling: Global Demographic Trends and Human Longevity Limits"
3. "Beyond a Century: Analyzing the Fixed Boundaries of Human Lifespan"
4. "The Age of Extremes: A Closer Look at the Upper Limits of Human Life"
5. "Eternal Youth No More: The Natural Constraints on Human Lifespan Extension"
6. "Aging Unbound? Reevaluating the Limits of Human Longevity"
7. "The Final Countdown: Demographic Insights into Human Lifespan Limitations"
8. "Tapping the Top: The Quest for Understanding Human Lifespan Boundaries"

## Formula from Enago Academy

”

*[Result]: A [method] study of [topic] among [sample]*

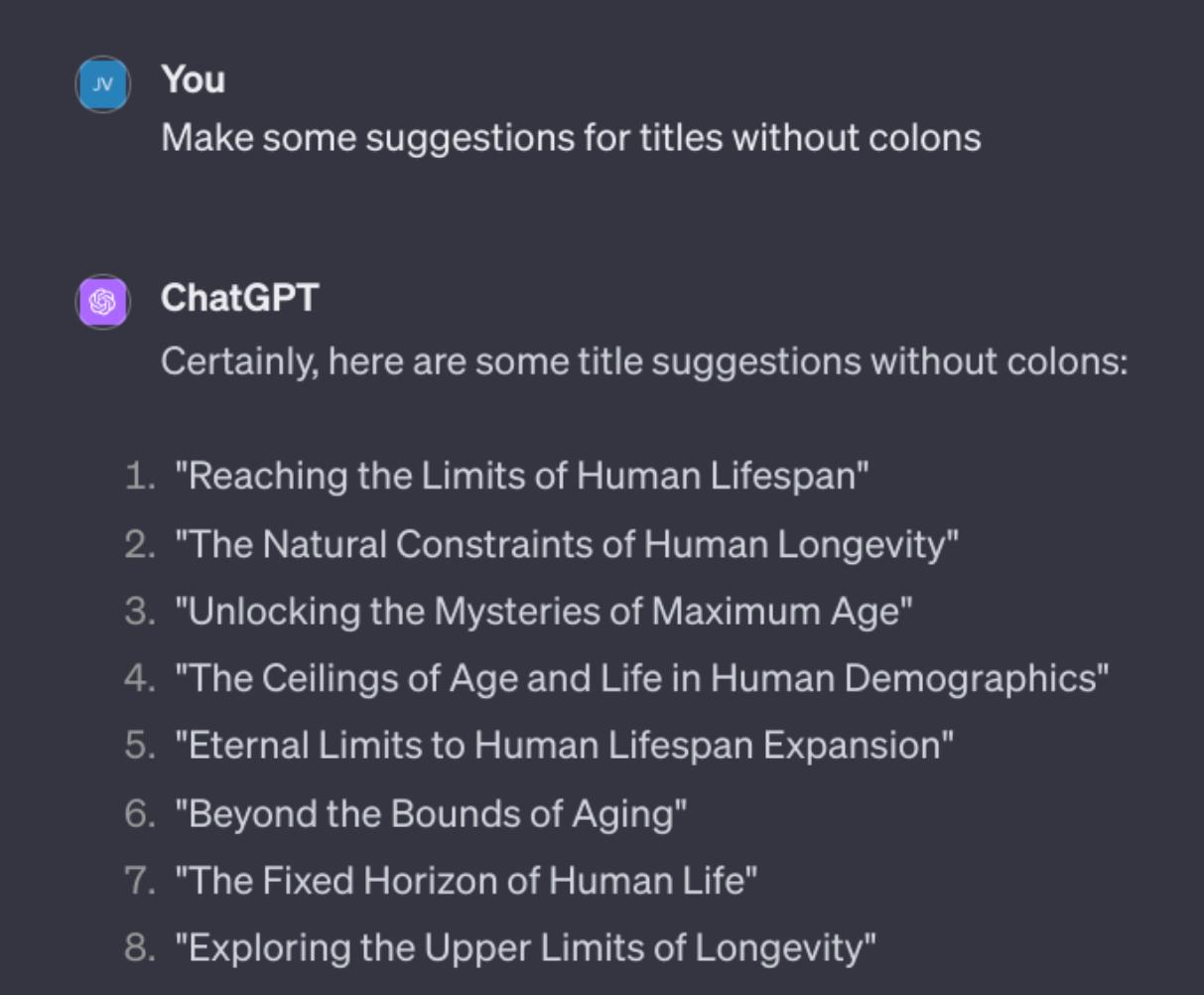
*Example:* Meditation makes nurses perform better: a qualitative study of mindfulness meditation among German nursing students



# ChatGPT to the rescue?

Evidence for a limit to human lifespan

Xiao Dong<sup>1\*</sup>, Brandon Miholland<sup>1\*</sup> & Jan Vijg<sup>1,2</sup>



A screenshot of a dark-themed ChatGPT interface. On the left, a user message from "You" is shown, followed by a response from "ChatGPT".

**You**  
Make some suggestions for titles without colons

**ChatGPT**  
Certainly, here are some title suggestions without colons:

1. "Reaching the Limits of Human Lifespan"
2. "The Natural Constraints of Human Longevity"
3. "Unlocking the Mysteries of Maximum Age"
4. "The Ceilings of Age and Life in Human Demographics"
5. "Eternal Limits to Human Lifespan Expansion"
6. "Beyond the Bounds of Aging"
7. "The Fixed Horizon of Human Life"
8. "Exploring the Upper Limits of Longevity"

[nature](#) > [editorials](#) > article

EDITORIAL | 24 January 2023

## Tools such as ChatGPT threaten transparent science; here are our ground rules for their use

As researchers dive into the brave new world of advanced AI chatbots, publishers need to acknowledge their legitimate uses and lay down clear guidelines to avoid abuse.

[HOME](#) > [SCIENCE](#) > VOL. 379, NO. 6630 > CHATGPT IS FUN, BUT NOT AN AUTHOR

EDITORIAL

f w in g t m

## ChatGPT is fun, but not an author

[H. HOLDEN THORP](#) [Authors Info & Affiliations](#)



# We Drink Good 4.5-Billion-Year-Old Water

Cecilia Ceccarelli<sup>1</sup> and Fujun Du<sup>2</sup>

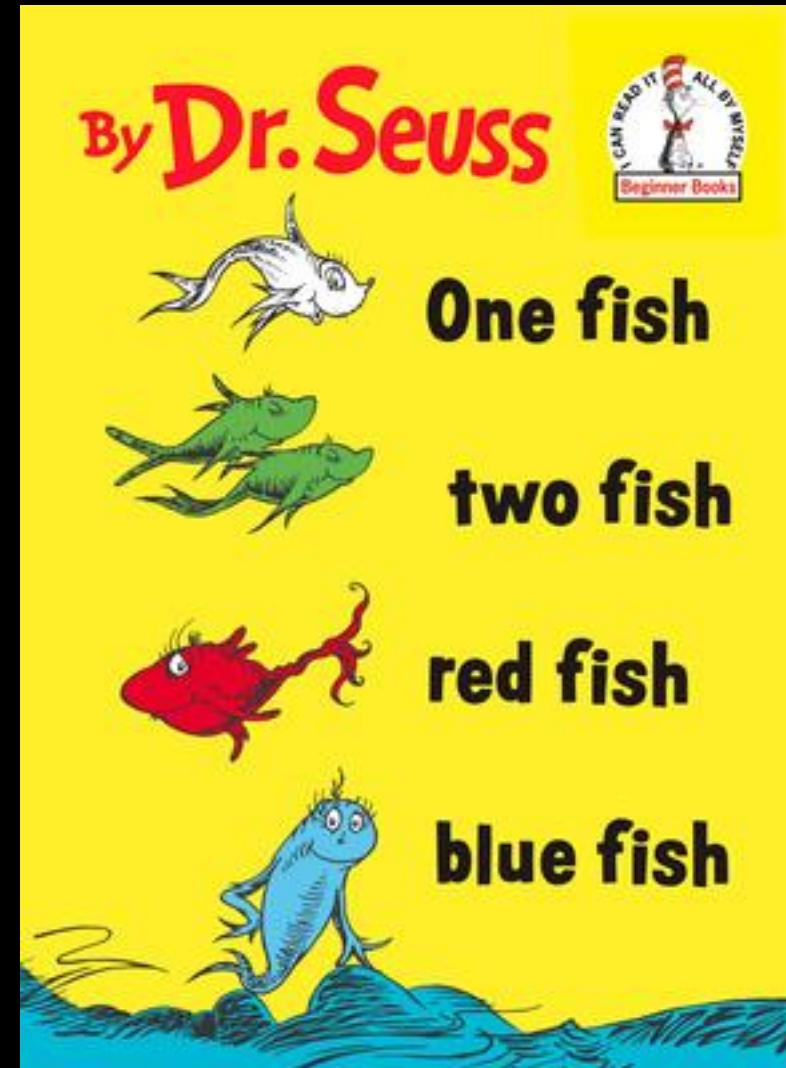
## New Dust Belts of Uranus: One Ring, Two Ring, Red Ring, Blue Ring

Imke de Pater,<sup>1\*</sup> Heidi B. Hammel,<sup>2</sup> Seran G. Gibbard,<sup>3</sup> Mark R. Showalter<sup>4</sup>

We compared near-infrared observations of the recently discovered outer rings of Uranus with Hubble Space Telescope results. We find that the inner ring, R/2003 U 2, is red, whereas the outer ring, R/2003 U 1, is very blue. Blue is an unusual color for rings; Saturn's enigmatic E ring is the only other known example. By analogy to the E ring, R/2003 U 1 is probably produced by impacts into the embedded moon Mab, which apparently orbits at a location where nongravitational perturbations favor the survival and spreading of submicron-sized dust. R/2003 U 2 more closely resembles Saturn's G ring, which is red, a typical color for dusty rings.

Showalter and Lissauer (*1*) reported the detection of two faint rings, R/2003 U 1 (R1) and R/2003 U 2 (R2), outside Uranus's main ring system. R1, the outer ring, peaks at the orbit of the tiny moon Mab, whereas R2 orbits between moons Rosalind and Portia but has no visible source bodies. Using the Keck adaptive optics (AO) system at near-infrared wavelengths, we show that R2 is red.

We averaged in longitude the visible parts of ring R2 to produce radial profiles (Fig. 2). These were modeled (*2*) with a uniform sheet of material that, after convolution with the point spread function, best matched the data. The resulting ring is  $1500 \pm 100$  km wide (*3*). From the radial profiles we derive an "equivalent width" *EW*, defined as the radial integral of *I/F*. For an optically thin ring, *EW* varies inversely



# **If you like C/O variations, you should have put a ring on it**

Nienke van der Marel<sup>1,2</sup>, Arthur Bosman<sup>3</sup>, Sebastiaan Krijt<sup>4</sup>, Gijs D. Mulders<sup>5,6</sup>, and Jennifer B. Bergner<sup>7</sup>

A&A 619, A84 (2018)  
<https://doi.org/10.1051/0004-6361/201833693>  
© ESO 2018

**Astronomy  
&  
Astrophysics**

# **When nature tries to trick us**

## **An eclipsing eccentric close binary superposed on the central star of the planetary nebula M 3-2<sup>★,★★</sup>**

Henri M. J. Boffin<sup>1</sup>, David Jones<sup>2,3</sup>, Roger Wesson<sup>4</sup>, Yuri Beletsky<sup>5</sup>, Brent Miszalski<sup>6,7</sup>, Ivo Saviane<sup>8</sup>,  
Lorenzo Monaco<sup>9</sup>, Romano Corradi<sup>10,2</sup>, Miguel Santander García<sup>11</sup>, and Pablo Rodríguez-Gil<sup>2,3</sup>

[nature](#) > [research highlights](#) > article

RESEARCH HIGHLIGHT | 15 November 2018

# Photobombing stars lead to cosmic false identity

Imposters pose as the source of a bright cloud of gas.

## Summary: Writing your paper

Build up your paper little by little, take breaks if needed

Set realistic goals to make continuous small steps (e.g., one paragraph by coffee time)

Ask for help on what you find hard (supervisors, colleagues, family, friends)

Complain to your friends

Decide when good is good enough and submit!

**"YOUR MANUSCRIPT HAS BEEN ACCEPTED"**



## The Bottom Line: You *Will* Get Published if...

You picked an important research question.

You used the right method to answer it.

You wrote a short, clear account of the study that followed a tight structure and used effective writing to convey your message clearly.

Well done! Just one issue left...



Carlile  
SACREDSANDWICH.COM



Responding to reviewers: don't get frustrated!

Remember the narrow gates of the editor

**The luminous blue variable HR Carinae has a partner<sup>★</sup>**  
**Discovery of a companion with the VLTI**

# WRITERS ON THE SIXTH REWRITE



