

# Academic Communication

## *in (Astro)Physics*

### Lecture 1: Introduction

General Principles of Academic Writing  
Good Writing Habits

# Some housekeeping first...

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Class Meeting Time & Place:

~~11:00 am – 1:00 pm, room G41~~

Lectures: Tuesdays ~~10:00am-12:00pm, Room G40~~

~~1:00 pm – 3:00 pm, room G40~~

Writing Clinics: Thursdays ~~10:00am-12:00pm, Room G40~~

# Grading

To pass:

- 1) **Minimum attendance** – do not miss more than 3 classes  
*(unless there are special circumstances)*

AND

- 2) **Grade above 50%** from:

Short weekly homework		25%
Assignment 1: read a paper and write a short summary	11 May	25%
Assignment 2: write a proposal	25 May	15%
Assignment 3 <sup>4</sup> : oral presentation based on assignment 1	3 July	20%
Assignment 4 <sup>3</sup> : make a conference poster	22 June	15%

# Lecture Plan

Apr 8	Introduction	Tobias Westmeier
Apr 15	Good Style I	
Apr 22	<i>Easter break</i>	
Apr 29	Good Style II	
May 6	Good Style III	
May 13	Persuasive Writing I	Connor Bottrell
May 20	Persuasive Writing II	
May 27	Academic Journal Papers I	Luca Cortese
Jun 3	Academic Journal Papers II	
Jun 10	Academic Journal Papers III	
Jun 17	Figures & Tables	
Jun 24	Presenting Skills I	Tobias Westmeier
Jul 1	Presenting Skills II	

# Introductions...

Tell me/the class a bit about yourself:

- where are you from?
- why did you decide to do a PhD?
- what is your PhD research about?
- what is your mother tongue?
- what do you like to read? Who are your favourite authors/book?  
(doesn't have to be English language)
- what was the most difficult thing you ever had to write?
- what is the best science article you ever read? And why?
- what do you hope to learn in this course?

# Today's lecture

- Motivation: why it is important to write/communicate well
- The goal of scientific writing
- Basic guidelines to become a good writer
- Practical advice on creating good writing habits

# What does an astrophysicist do?

A lot of communicating, especially writing!!!

Peer review committees for grants, observing time, jobs

Writing papers

Preparing and giving talks

Referee papers

Contacting collaborators: email, zoom, slack etc

Research: observe, data analysis, code, run simulations, etc.

Supervising students

Preparing lectures and teaching

Writing grant applications

Writing recommendation letters

Attending seminars, conferences

Writing job applications

Other 'non-research' workplace duties

Outreach: talks, media interviews, blog posts, etc.

**‘Clear communication is a requirement, not an option, for a good scientist.’**

Angelika K. Hofmann

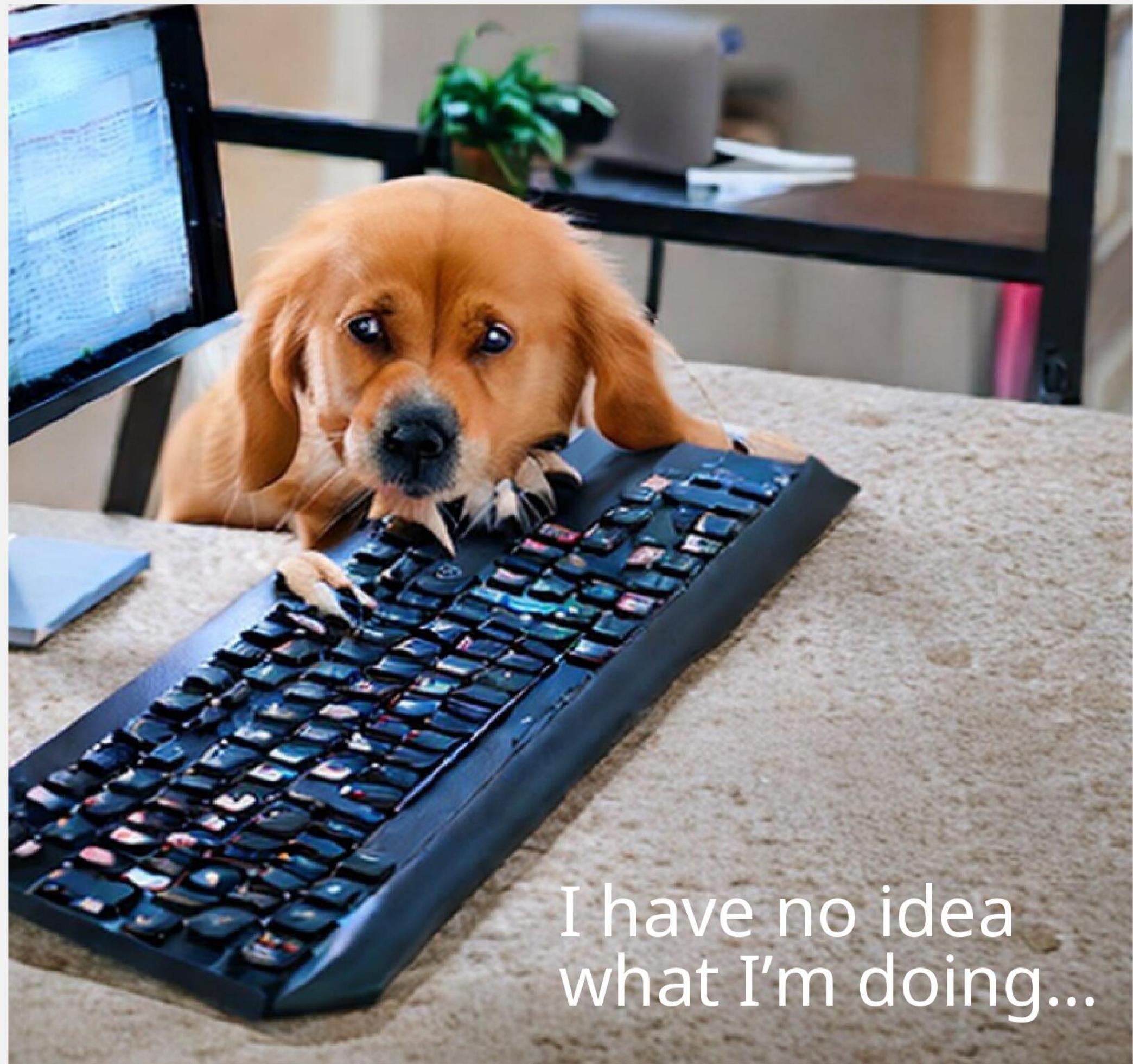
*Scientific Writing and Communication*

**‘As a scientist, you are a professional writer.’**

Joshua Schimel

*Writing Science*

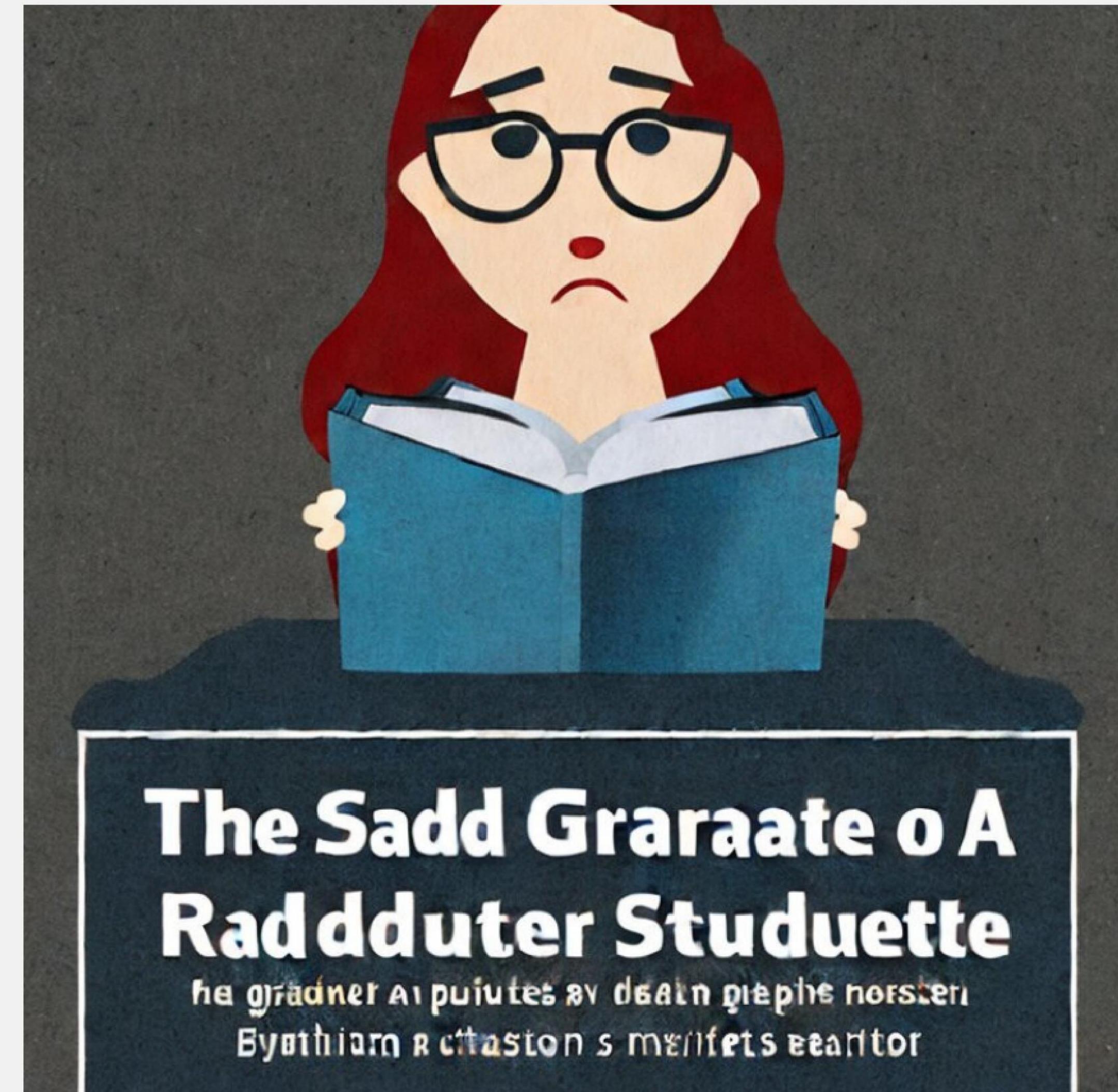
**...and yet, we most (if not all) of us have never received any formal training in writing!**



I have no idea  
what I'm doing...

The sad story of a grad student reading a paper...

Do you dread  
reading the  
literature?



Do you dread reading the literature? Why is it often so boring and difficult?  
Because most of it is poorly written.

It is a sad commentary [...] that many of the ‘crank’ papers submitted to *Nature* are actually better written — from a purely stylistic point of view — than many of the professional papers.

Leslie Sage, senior editor of physical sciences at *Nature*

The standard of writing in current scientific journals has reached an all-time low, in terms of both poor grammar and imprecise communication.

Harold Heatwole, editor of *Integrative and Comparative Biology*

[Scientific writing] is unnecessarily dry, difficult to read, obscure, and ambiguous.

David Porush, *A Short Guide to Writing About Science*

## Inheritance of poor writing habits

To improve scientific writing we must break the chain of transmission of complex writing style from senior to junior scientists

Amin Bredan

The purpose of a writer is to be read

The purpose of a writer is usually to be read by peers

peers  
usually

The purpose of a writer to read worthy unless evidence  
is per se be by colleagues the suggests otherwise

otherwise per se  
this is  
given that not  
read unless the full in fact  
writer to be by worthy majority consideration  
is principally colleagues of evidence suggests  
the when always  
the case

# A century-old tradition of bad writing...

Science has made huge advances during the past century, but the quality of scientific writing has remained more or less abysmally bad.

Generations of editors, reviewers and readers have struggled to understand complex, exaggerated and often pompous prose that does little to enhance the reader's understanding but aims to demonstrate the scholarly prowess of the author.

The causes go beyond an inadequate command of the English language: they are rooted in long-standing practices that value pretentiousness over clear communication.

These practices are passed down from senior to junior scientists, which explains why scientific writing remains generally poor despite regular criticism.

# A note on non-native English speakers

I am often asked if papers authored by people for whom English is not their first language are at a disadvantage in the peer review process. The emphatic answer is “no” – it is exceedingly rare that an author’s weak grasp of English is relevant to either referees’ assessment of the science or to an editorial decision. In fact, two of the worst written papers I have seen in my time at *Nature* came from native-English speakers based at a major UK university.

Leslie Sage, editor at *Nature*

Being a non-native English speaker means you need to pay special attention to your grammar, spelling, and vocabulary. But native speakers can write terribly too! There is more to writing well than language skills as we will see in this course.



**Let's get into it:  
GOOD WRITING**

## Let's start with the basics...

### What is the goal of scientific writing?

“Publish or perish” is about surviving, not succeeding.

You don’t succeed as a scientist by getting papers *published*. You succeed as a scientist by getting them *cited*.

Success is defined not by the number of pages you have printed but by their **influence** — peers understand your work and use it to motivate their own.

Joshua Schimel, *Writing Science*

The goal of scientific writing is to communicate concisely and clearly.

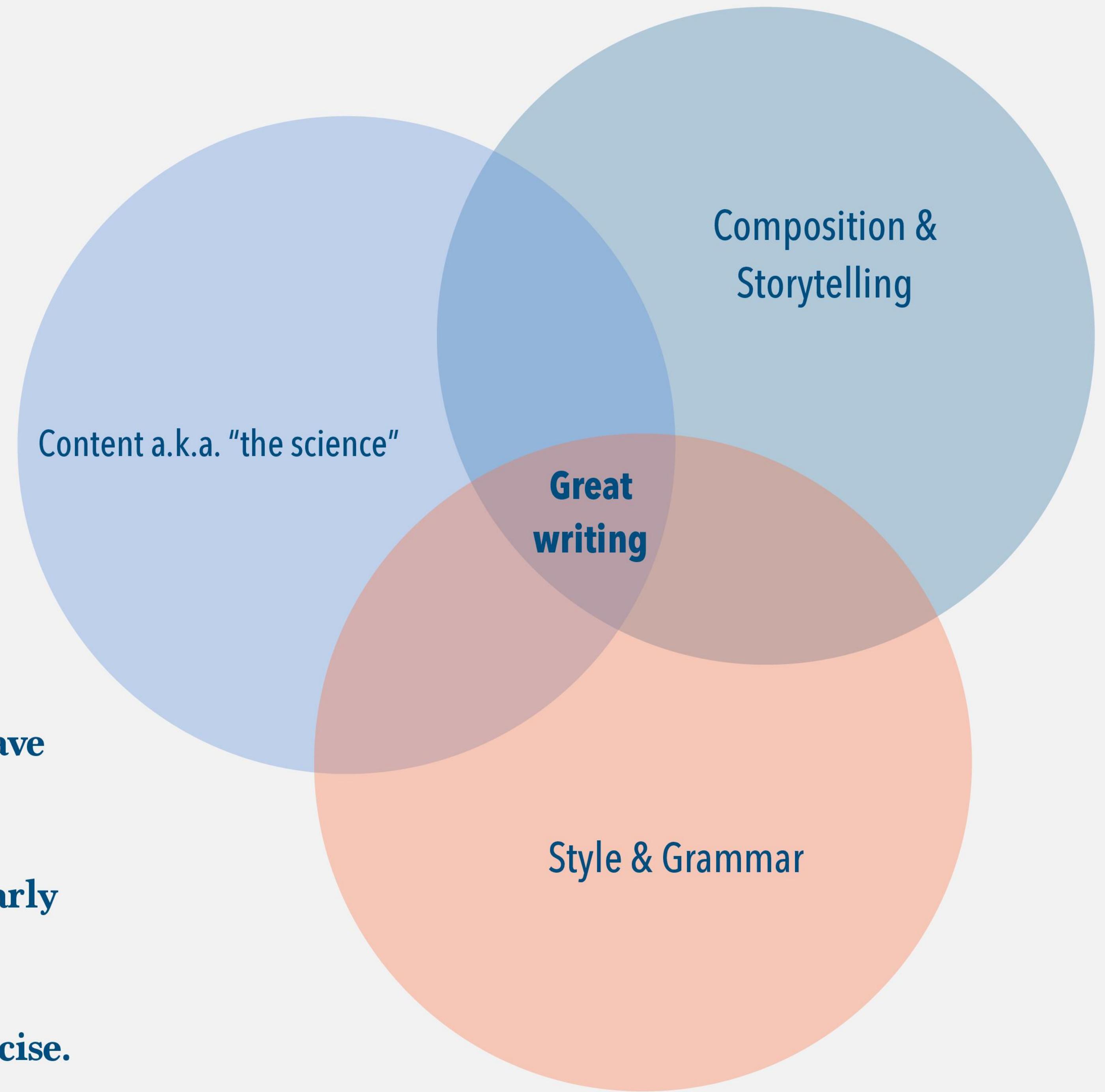
The reader needs to follow our train of thought and understand the message.

It is the writer’s job to make the reader’s job easy.

**Of course, the science is key. But if it is poorly communicated the science will have no impact, be misunderstood, etc.**

**Great writing communicates an idea clearly and effectively.**

**Great writing is elegant, stylish, and concise.**



# Become a good scientific writer/ communicator

- Understand the scientific method
- Strive to communicate your findings clearly
- Be ethical
- Become media literate
- Understand how readers go about reading (next lectures)
- Distinguish between scientific writing and science writing
- Read and practice lots
- Develop good habits

# Communication is embedded in the scientific method

Without clear communication even the best results in science mean little.



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## Let's read some excerpts from a published astrophysics paper...

In view of the physical role played by dust particles in the process of star formation, it can be regarded as a minor perversity of nature that, by virtue of their strong interaction cross section with stellar photons, the very same particles strongly inhibit and distort our view of the resulting stellar populations, thus preventing a straightforward confrontation of theories for star formation in galaxies with observations.

[67 words]

Arguably, the most fundamental and challenging of these problems is the determination of the geometry of the dust-bearing structures in the ISM, since knowledge of this is a pre-requisite to obtaining a self-consistent solution embracing the amplitude and geometry of the stellar populations and the optical properties of the grains.

[50 words]

Dust grains play an important role in star formation. However, because of their strong UV/optical cross-sections, they also attenuate the light emitted by stellar populations, which prevents us from directly comparing observations with our theories for star formation in galaxies.

[41 words]

A significant challenge is that to obtain a self-consistent solution to the radiative transfer of stellar light through the ISM, we need to know the spatial distribution of the stars, as well as the optical properties of the dust grains, and their spatial distribution.

[44 words]

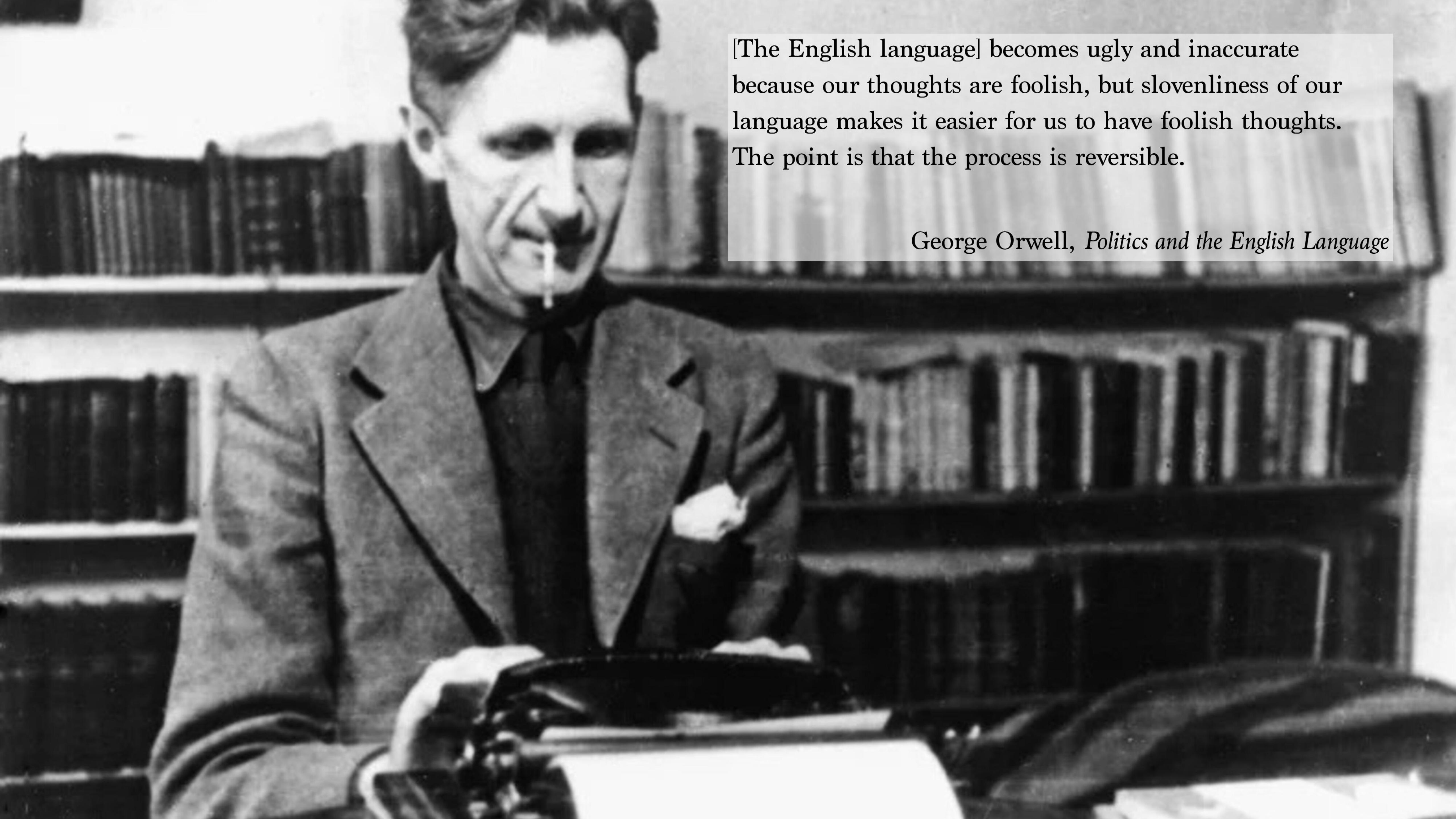
## More examples from another published astrophysics paper...

[This is first sentence of the introduction]

Studying the processes governing the formation and evolution of galaxies, deep optical and infrared (IR) surveys have determined that most of the star-forming galaxies up to  $z \sim 5$  exhibit a correlation between their stellar mass ( $M_\star$ ) and star formation rate (SFR), which is alluded to as main sequence (MS; e.g. Noeske et al. 2007; Salim et al. 2007; Drory & Alvarez 2008).

The main goal of this paper is understanding the implications of the starburst event in terms of the stellar population properties of galaxies above the MS. For that purpose, we aim at determining such properties at intermediate ( $z \sim 1$ ) redshift, an epoch when dSFGs practically dominate the production of stars in the Universe (e.g. Le Floc'h et al. 2005; Pérez-González et al. 2005; Casey, Narayanan & Cooray 2014). We use a FIR-selected sample to ensure that we constrain the peak of the dust emission in an accurate manner, and thus we select bonafide starburst galaxies. These  $\sim 100$  dusty starbursts are introduced making publicly available their UV- to-FIR photometry. Combining these multiwavelength data, we fit observed UV-to-FIR SEDs with self-consistent models that consider the obscuration of starlight and dust emission with energy-balance techniques.

We are grateful with the anonymous referee for improving the manuscript contents.



[The English language] becomes ugly and inaccurate because our thoughts are foolish, but slovenliness of our language makes it easier for us to have foolish thoughts. The point is that the process is reversible.

George Orwell, *Politics and the English Language*

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# Ethics in science also extends to scientific writing and communication

- ensure accuracy and truth
- ensure mutual respect, fairness, and trust
- hold scientists accountable

## Examples of scientific misconduct and unethical behaviour:

fabrication and falsification

plagiarism

stealing someone else's idea or data

submitting or publishing the same papers in different journals

including someone who has not contributed to the project as author on a paper

asking for personal favours in exchange of authorship or a grade

exploiting students and postdocs

misrepresenting facts on a CV

We also strive to avoid...

human errors

sloppiness

miscalculations

bias

disparities of method and interpretations

negligence



# Academic Integrity

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- Academic Integrity is defined in the [University Policy on Academic Integrity](#) as “acting with the values of honesty, trust, fairness, respect and responsibility in learning, teaching and research”. UWA expects the highest degree of academic integrity from all students.
- Penalties for academic misconduct vary according to the seriousness of the case, and may include the requirement to do further work or repeat work; deduction of marks; the award of zero marks for the assessment; failure of one or more units; suspension from a course of study; exclusion from the University; non-conferral of a degree, diploma or other award to which the student would otherwise have been entitled.
- For more information about academic integrity and the levels of academic misconduct please see the [University Policy on Academic Integrity](#).
- For more information on understanding ethical scholarship and the University’s expectations of academic integrity at UWA revisit [Academic Conduct Essentials on LMS](#).
- For further assistance, please visit the [STUDYSmarter Plagiarism Portal](#).
- In accordance with the University Policy on Academic Integrity, the use of Artificial Intelligence (AI) is permitted as an educational/study tool. It may only be used in any assessment within a unit where approval has been granted by the unit coordinator. Improper use of AI-generated material, as set out in the Academic Integrity policy, in assessments may lead to the occurrence of academic misconduct.

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# Become media literate

**It is imperative to verify information when you compose your documents.**

- do not rely on references on other articles, subjective opinions, unsupported facts, non peer-reviewed reports, or web sources;
- do not report your opinion as fact. Rather, clearly identify your opinion and conclusions (e.g., “*our findings indicate that...*”, “*a possible model of X could be...*”).

Find Astrophysics reputable peer-review journal articles (ApJ, MNRAS, A&A, Nature, etc) on arXiv and NASA/ADS (but beware some are posted before peer-review!)

Always read critically/use your judgement. Do not repeat something that is said on another paper without verifying.

## Astrophysics (since April 1992)

For a **specific paper**, enter the identifier into the top right search box.

- **Browse:**
  - new (most recent mailing, with abstracts)
  - recent (last 5 mailings)
  - current month's astro-ph listings
  - specific year/month:  
2022  all months  Go
- **Catch-up:**  
Changes since: 15  01 (Jan)  2022  , view results without  abstracts  Go
- **Search within the astro-ph archive**
- **Article statistics by year:**  
2022 2021 2020 2019 2018 2017 2016 2015 2014 2013 2012 2011 2010 2009 2008 2007 2006 2005 2004 2003 2002 2001 2000 1999 1998 1997 1996 1995 1994 1993 1992

## Categories within Astrophysics

- **astro-ph.GA – Astrophysics of Galaxies** (new, recent, current month)  
Phenomena pertaining to galaxies or the Milky Way. Star clusters, HII regions and planetary nebulae, the interstellar medium, atomic and molecular clouds, dust. Stellar populations. Galactic structure, formation, dynamics. Galactic

asars. Gravitational lens systems. The

nt month)

l parameters, primordial element

Groups, superclusters, voids,

genesis, leptogenesis, inflationary models,

ical gravitational radiation

planets, comets, asteroids, meteorites.

month)

romy and bursts, X-rays, charged

cretion systems, jets, microquasars,

current month)

Methods for data analysis, statistical

lar systems, stellar astrobiochemistry, binary stars of planetary nebulae.

iation from stellar systems

Field	Search Term	Description
author	author:"Kreidberg, Laura"	
first author	author:"^Suyu, Sherry H."	
abstract + title	abs:"dark energy"	
year	year:2000	
year range	year:2000-2005	
full text	full:"super Earth"	
publication	bibstem:ApJ	
citations	citations(abstract:JWST)	?
refereed	property:refereed	?
astronomy	collection:astronomy	?
exact search	=body:"intracluster medium"	
institution	inst:CfA	
author count	author_count:[1 TO 10]	
record type	doctype:software	

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# Scientific writing vs science writing



Technical writing by scientists for other scientists, e.g., peer-review journals, grant proposals, review articles.



Non-technical writing about science for a general audience.

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# Learn to write: read + practice

- **READ LOTS! The best writers are avid readers!** Not just professional journal papers.
- **Collect examples of especially good writing** whenever you come across them. Go over them in an attentive manner, so that they become your guides. Reread and make notes of passages you especially admire.
- **Beware of plagiarism, blatant copying, and appropriation (i.e., be ethical).** Be honest and upfront about whose work you emulate – and thank them for inspiring you!
- Good writing takes lots of practice!

# Create a reading habit

- read the abstracts on the **arXiv daily**
- we don't always have time to read lots of papers in depth – **learn to skim** efficiently and quickly:
  - 1) **Read the title** and try to predict the type of information you expect to see.
  - 2) **Look at the name of the author.** What you know about the writer will help you predict and evaluate the content.
  - 3) **Check the date** and use it to help you assess the content.
  - 4) **Read the abstract** to find out what the researchers did and/or what they found.
  - 5) **Look quickly at the first paragraph** without trying to understand all the words.
  - 6) **Look quickly at the first sentence of each paragraph** without trying to understand all the words.
  - 7) **Look quickly at each figure/table** and read its title to try and find out what type of visual data is included.
  - 8) **Read the last paragraph** especially if it has a subtitle like "Summary" or "Conclusion".
- read **important papers in depth** (sometimes multiple times, and take notes!); e.g.
  - papers connected to your research, especially if you cite them!
  - reviews: not only your immediate field (ARA&A)
  - well-written, highly-cited papers: to learn the science and pay attention to the writing

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## Writing is:

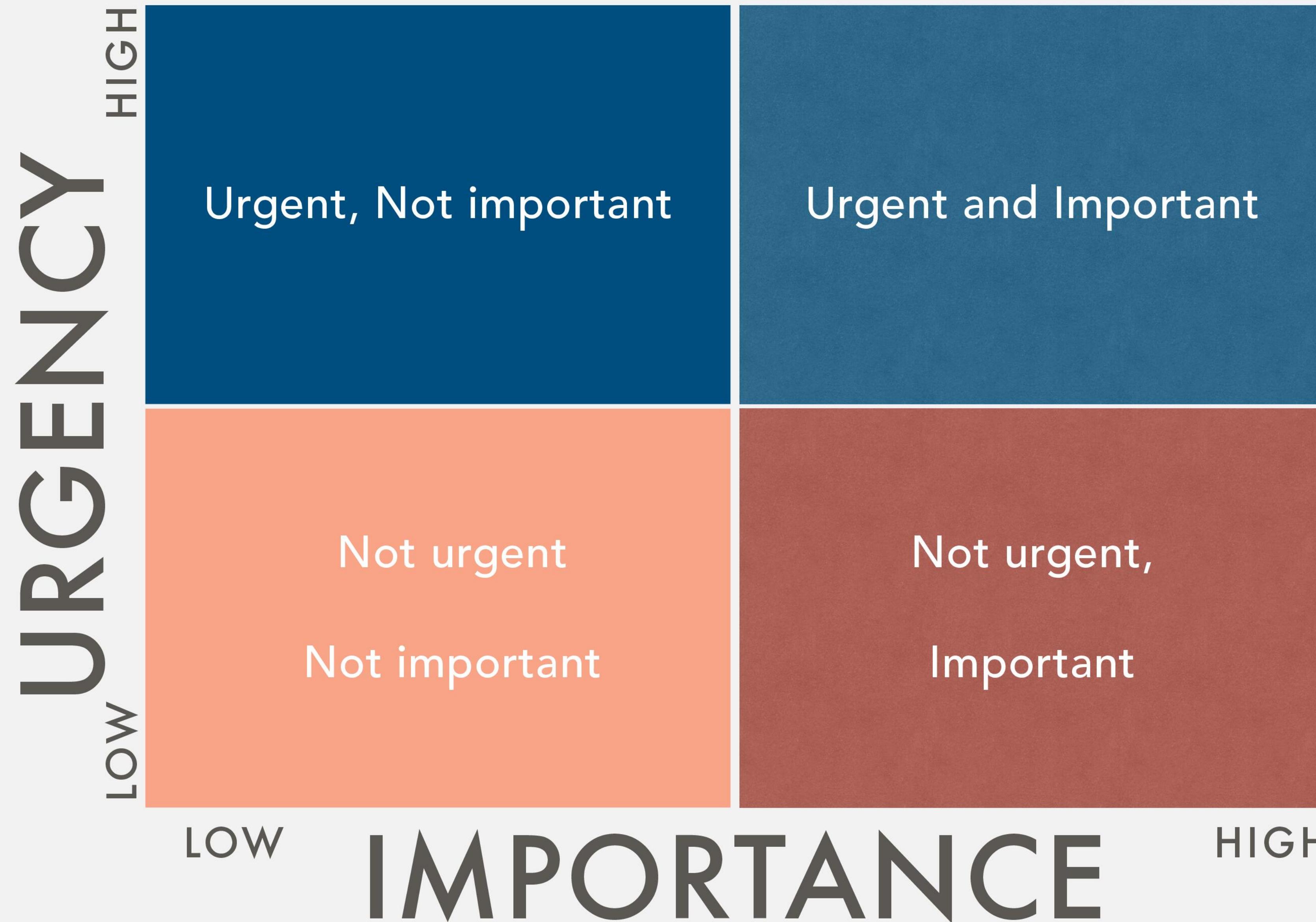
- critical to scientists
- hard work
- time-consuming
- a learned skill
- a creative endeavour
- something you get better at with lots of practice!

**Writing is time  
consuming:**

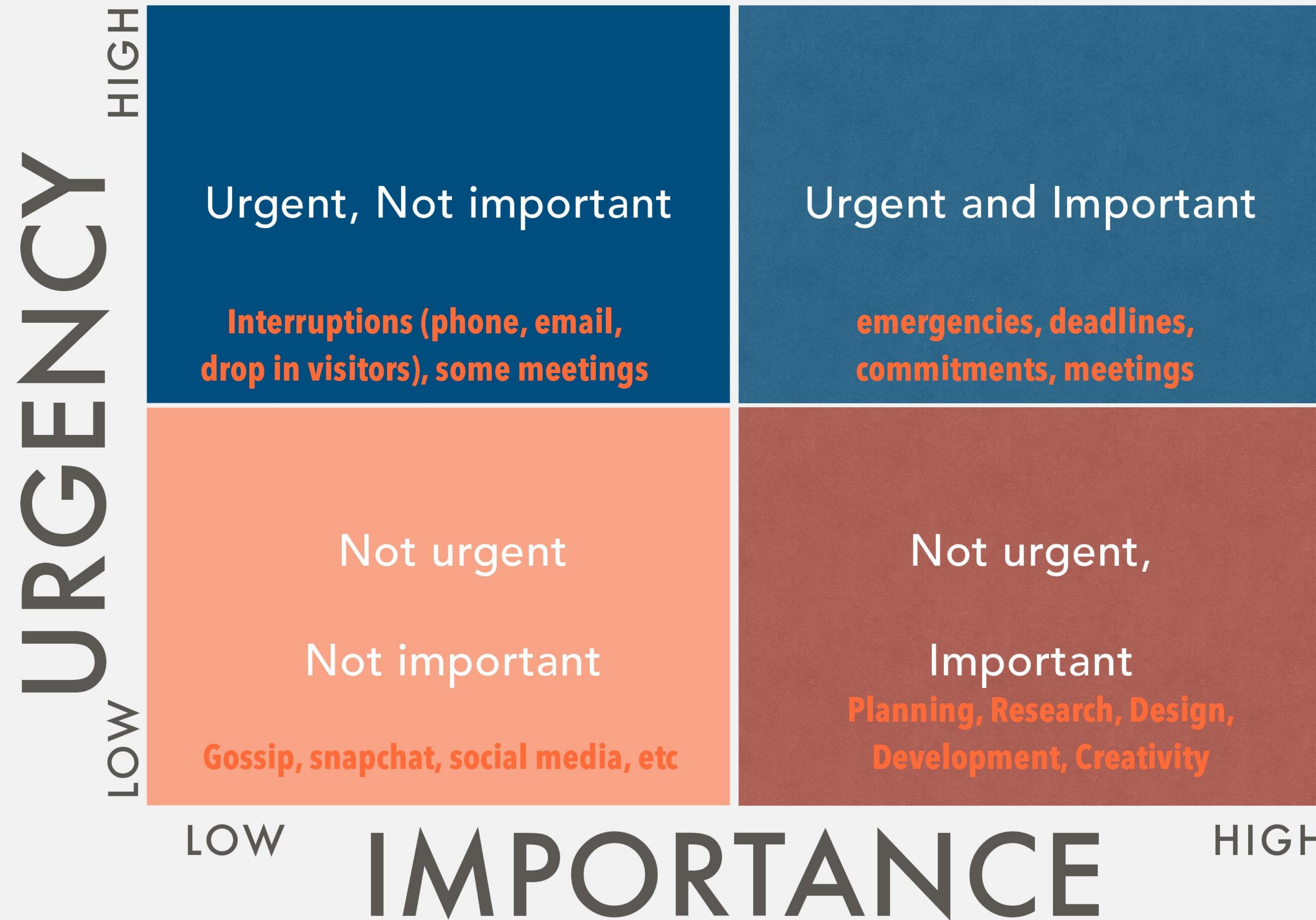
**let's think about our time  
management...**

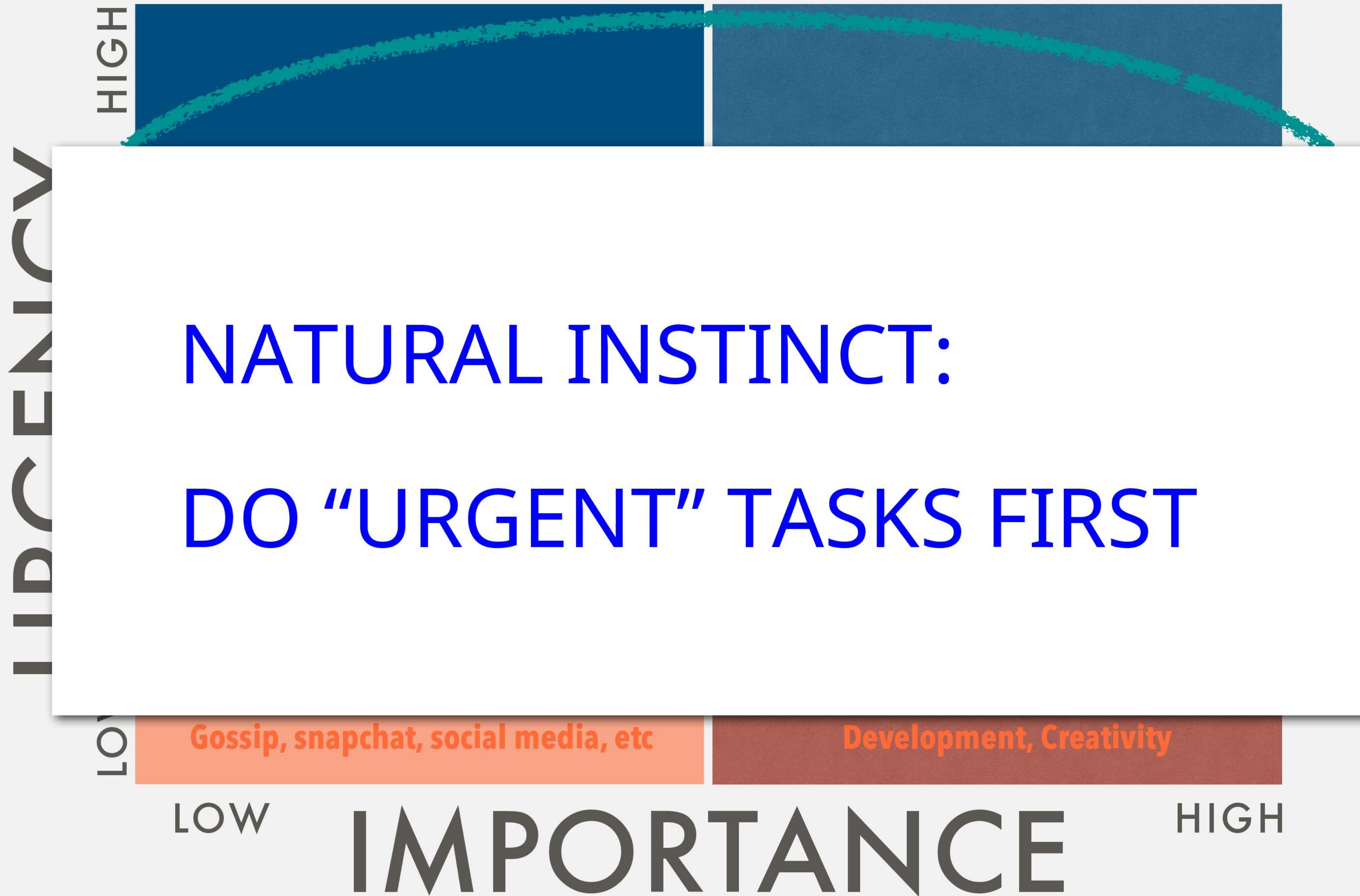


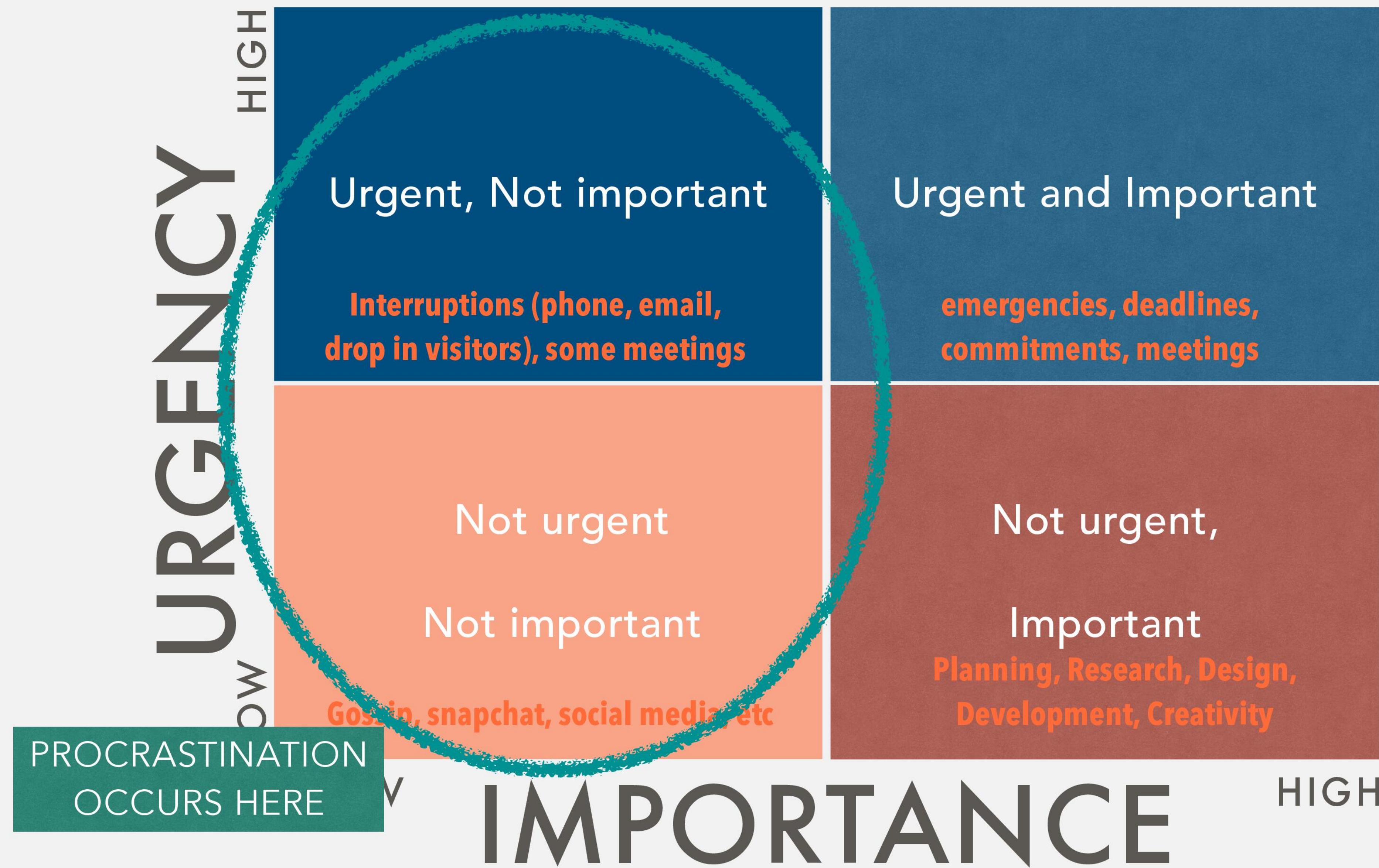
# The Eisenhower Matrix a.k.a. Priority Matrix

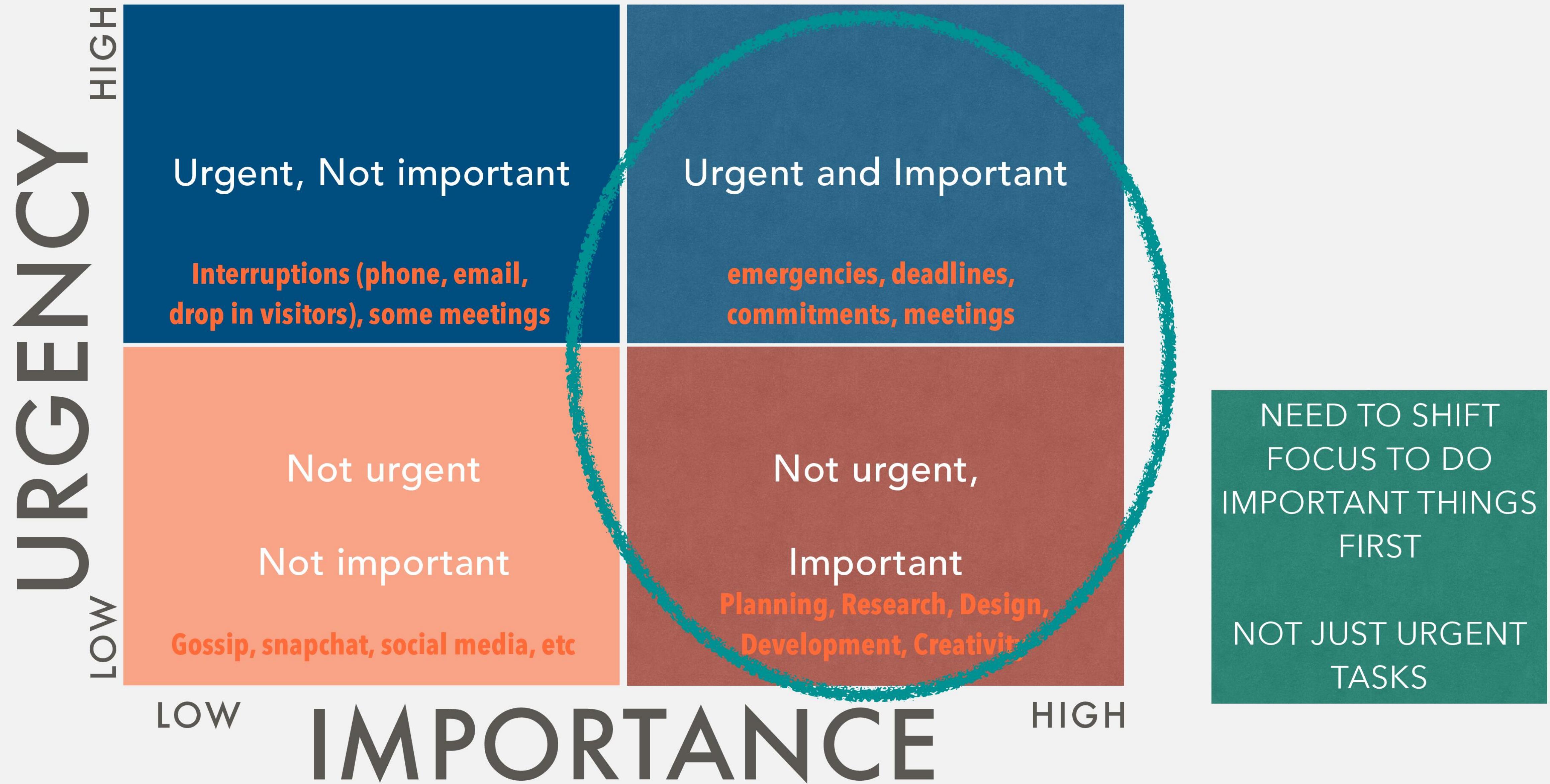


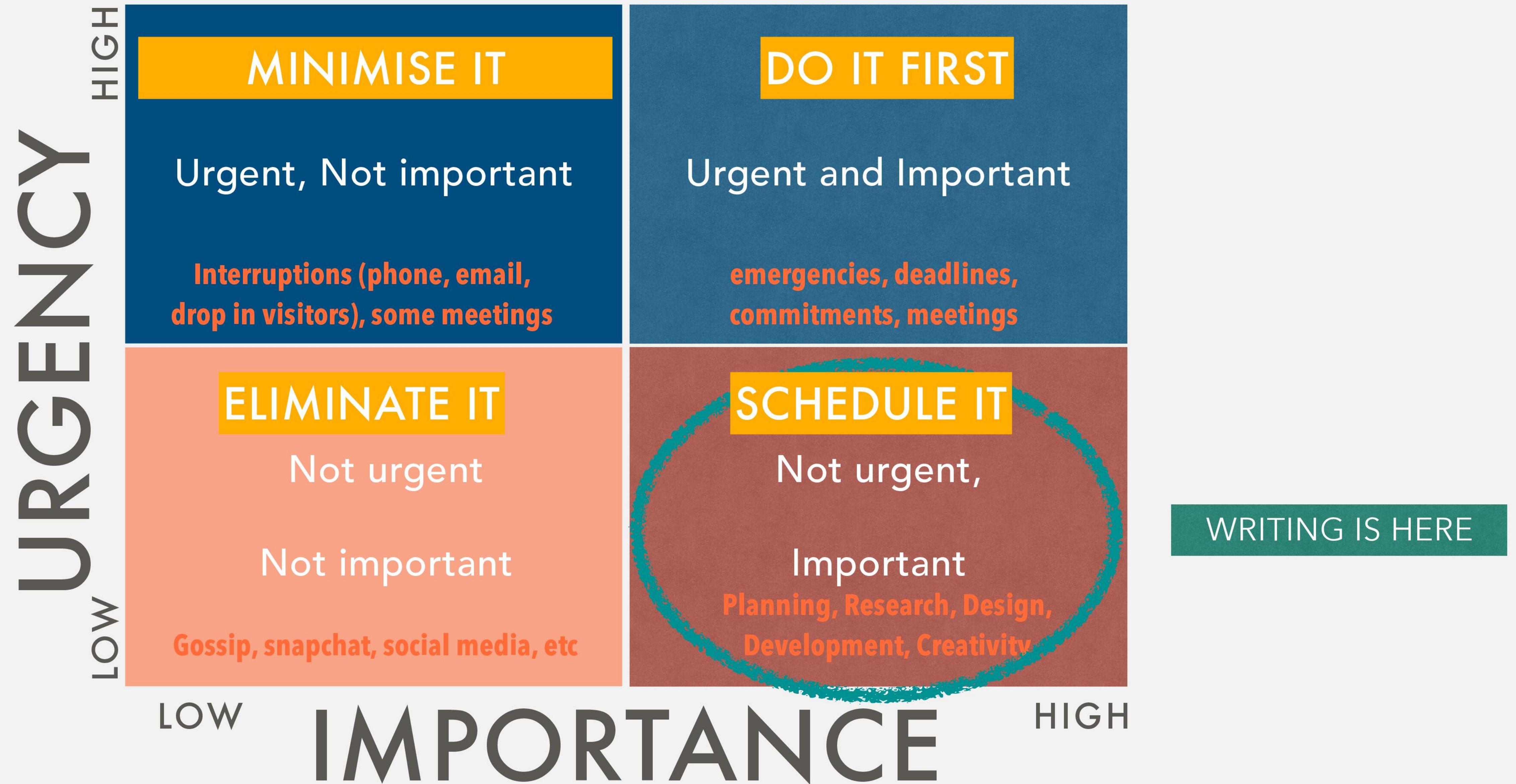
Where do you think  
writing goes?











# How to write a lot: advice from psychology / behaviour science

From *How to Write a Lot*, by Paul J. Silvia

# Specious barriers to writing a lot

- “I can’t find the time to write”

## Make a schedule and stick to it

Instead of finding time, allot time.

Prolific writers make a schedule and stick to it.

Schedule times that are usually free of other commitments (meetings, lectures, seminars, etc.)

Choose times when you are most energised and focused.

Get rid of all distractions during your scheduled writing time.

Always write during your scheduled time, but you can also write outside that time too. Once you get in the habit, it'll be easier for you to sit down and write.

# Specious barriers to writing a lot

- “I can’t find the time to write”
- “I need to do some more analyses first”; “I need to read a few more articles”

**Do whatever you need to do during your writing time**

You need to crunch more statistics? Do it in your writing time.

You need to make a plot? Do it in your writing time.

You need to read more literature? Do it in your writing time.

Writing is more than just typing words; any action that is instrumental in completing a writing project counts.

Use your scheduled time to do these things. You’ll no longer feel stressed about finding time to read those papers or do those analyses, because you know when you’ll do it.

# Specious barriers to writing a lot

- “I can’t find the time to write”
- “I need to do some more analyses first”; “I need to read a few more articles”
- “I need a better desk/computer/printer”

Stop making excuses!

Unproductive writers often bemoan the lack of “their own space”. You can always find a quiet spot if you really need one (you don’t need a lot: just a chair and a table for your laptop).

Bad internet access? Ideal for writing, no distractions! The best kind of self-control is to avoid situations that require self-control.



# Specious barriers to writing a lot

- “I can’t find the time to write”
- “I need to do some more analyses first”; “I need to read a few more articles”
- “I need a better desk/computer/printer”
- “I write best when I’m inspired to write”

## Writing begets writing

Waiting for inspiration to write doesn’t work: people end up not writing enough, stressing about finding time to complete half-finished projects, or sacrificing their personal time.

Research has shown that writing begets writing, and writing begets creative ideas – so the more you write, the more inspired you will be to write!

Successful professional writers are prolific because they write regularly, usually every day.

## Set goals

**Goal setting is part of the writing process.** It's a good idea to devote a writing session to developing and clarifying your goals.

Examples:

- revising and resubmitting a paper
- starting a new manuscript
- writing a conference presentation
- developing a grant proposal

**Write your goals down** somewhere. What do you want to write?

Break the goals into smaller units and set a concrete goal for each day of writing.

Examples:

- print the draft I finished yesterday, read it, and revise it
- add missing references and then reconcile citations and references
- write the first three paragraphs of the discussion

# Motivational tools

# Motivational tools

## Set priorities

Setting priorities among your project goals will take the stress out of managing several projects at once.  
Of all these projects, what should I write first?  
**Go back to the urgent/important matrix.**

Examples:

- projects with deadlines (telescope proposals, thesis reports, etc)
- research papers
- miscellaneous writing

# Motivational tools

## Monitor your progress

Research on self-regulation shows that it isn't enough to set a goal and make it a priority: people must monitor their progress toward the end goal.

Why is this important?

- 1) watching your progress keeps your goals salient, which prevents them from slipping away
- 2) behavioural research shows that self-observation alone can cause the desired behaviour
- 3) monitoring your writing will help set better goals. After a while, you'll be able to make realistic estimates of how long it will take to write something. Better goal setting, in turn, leads to more productive writing.

## Writing groups

Writing groups/buddies help in motivation because of support and peer-pressure. We know this from psychology:

# Motivational tools

- group provides positive reinforcement for the desired behaviour and punishment for not behaving properly;
- group can provide insights and suggestions to people struggling to change their unproductive ways;
- analysing successes and failures as a group enables people to evaluate their action strategies.

# What about writer's block?



Writer's block is a good example of a dispositional fallacy: a description of behaviour can't also explain the described behaviour.

**Writer's block is nothing more than the behaviour of not writing.**

**The cure for writer's block is writing.**

Just as aliens only abduct people who believe in alien abductions, writer's block strikes only writers who believe in it.

Scheduled writers don't get writer's block. Prolific writers follow their writing schedule regardless of whether they feel like writing.

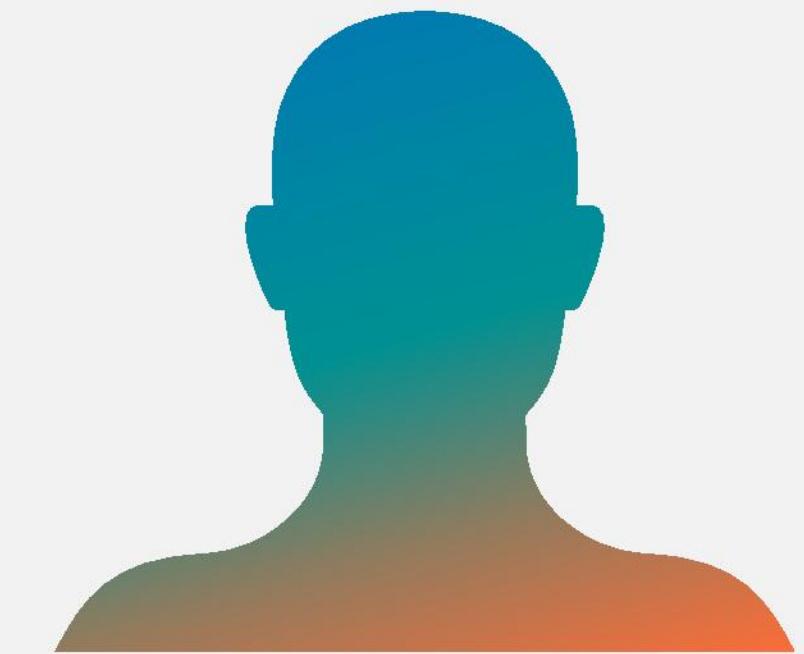
# Good writing habits



SCHEDULE  
WRITING TIME



SET GOALS  
&  
MONITOR YOUR PROGRESS



FIND A WRITING  
PARTNER OR GROUP

# Discussion

- Any questions?
- Tips you'd like to share with the class?