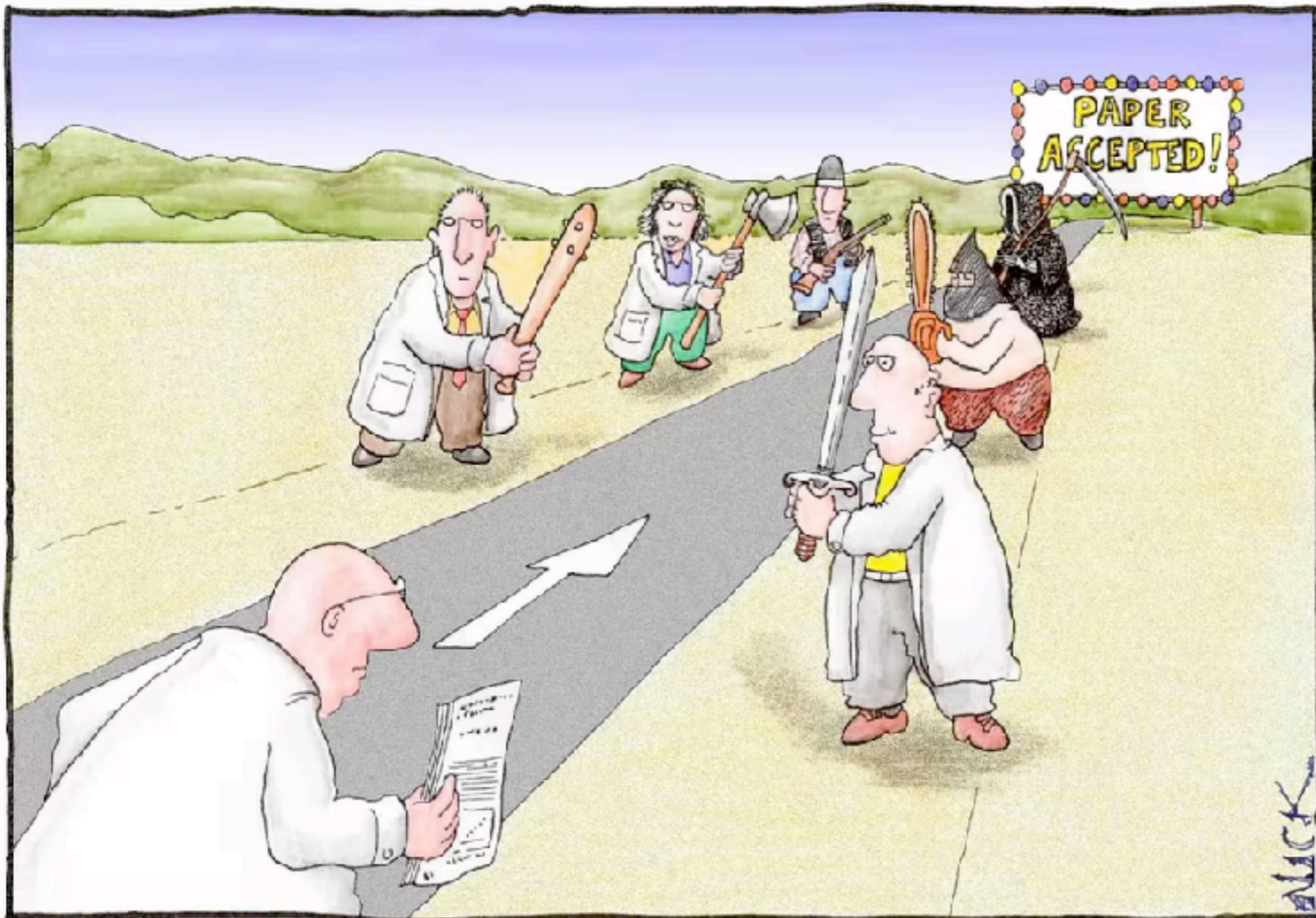


Scientific Writing

Thierry Dudok de Wit

Laboratoire de Physique et Chimie de
l'Environnement et de l'Espace



Nick Kim, Massey University

Why this course ?

In 2020

>34'000 journals

>4'000'000 articles published

this number increases by 4%/year

<http://www.nsf.gov/statistics/>

The pillars of science : what we take for granted



What characterises scientific publications as opposed to other types of publications (journals, etc) ?

The pillars of science : what we take for granted



- **Independence** and **freedom** of research (at least, in our academic world)
- **Open** communication: conferences, seminars, publications, ...
- **Peer** review (refereeing) with critical evaluation.
- **Repeatability** of work and compatibility with other results.

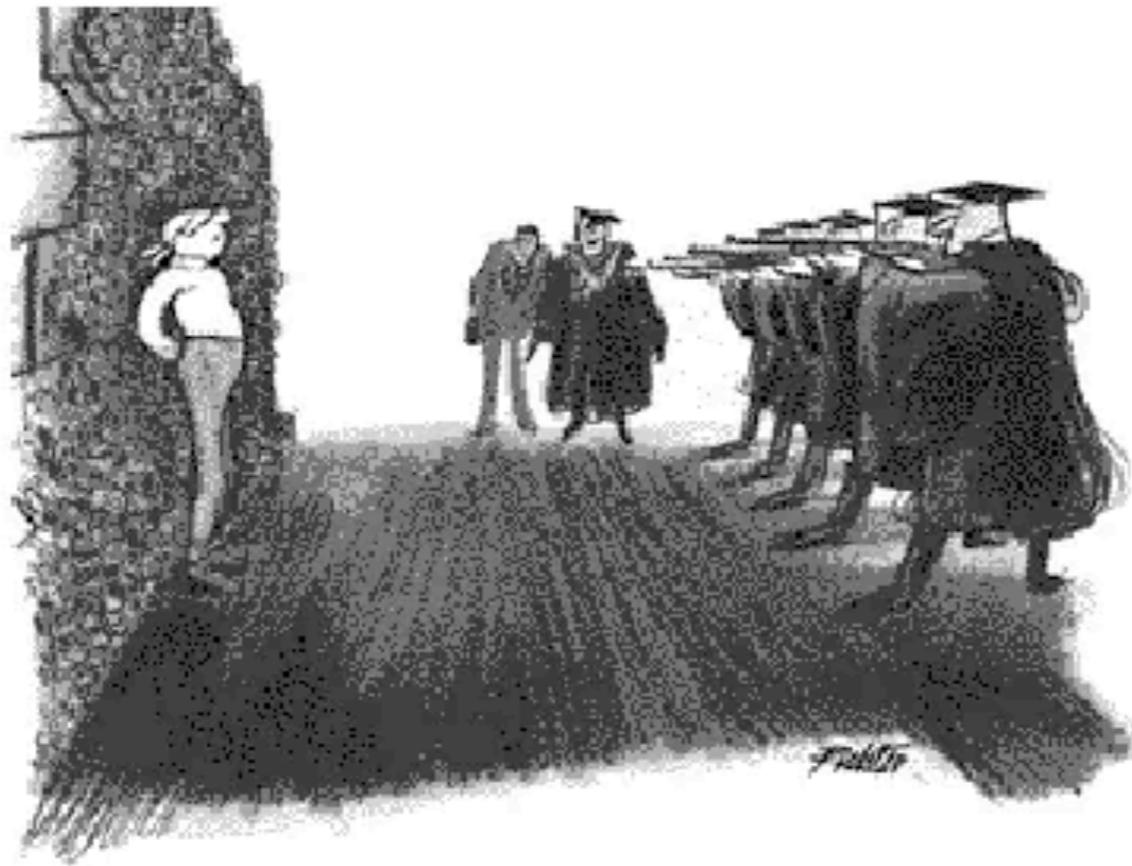
after S. Solanki (2011)

The dress code behind publishing

- Your publications can be properly read/understood only if you conform to a common writing style.
- The whole system (peer review, dissemination, ...) relies on **mutual trust**.



Publish or Perish

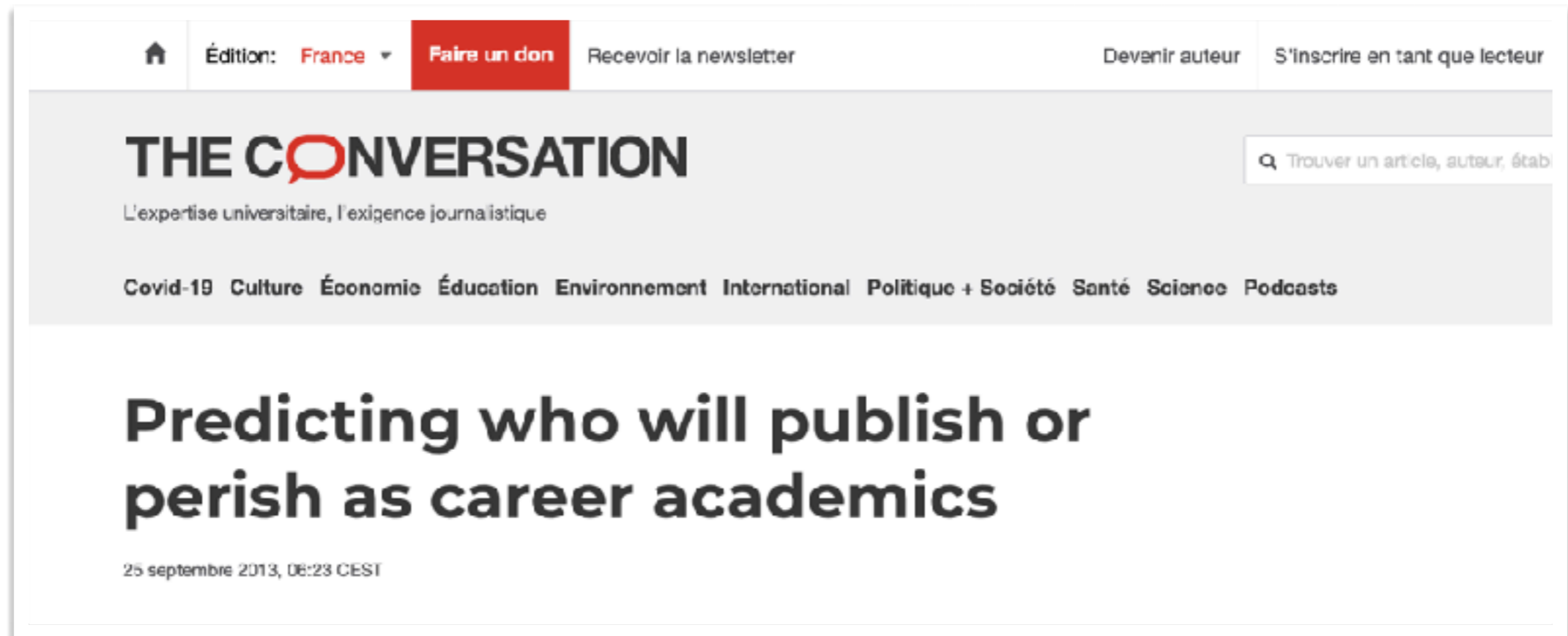


“Good publication is not just a matter of life and death, it is much more serious than that.”

Robert Day

- You will be increasingly often **evaluated**
- The number & quality of your publications is the most frequent evaluation criterion

How about you ?



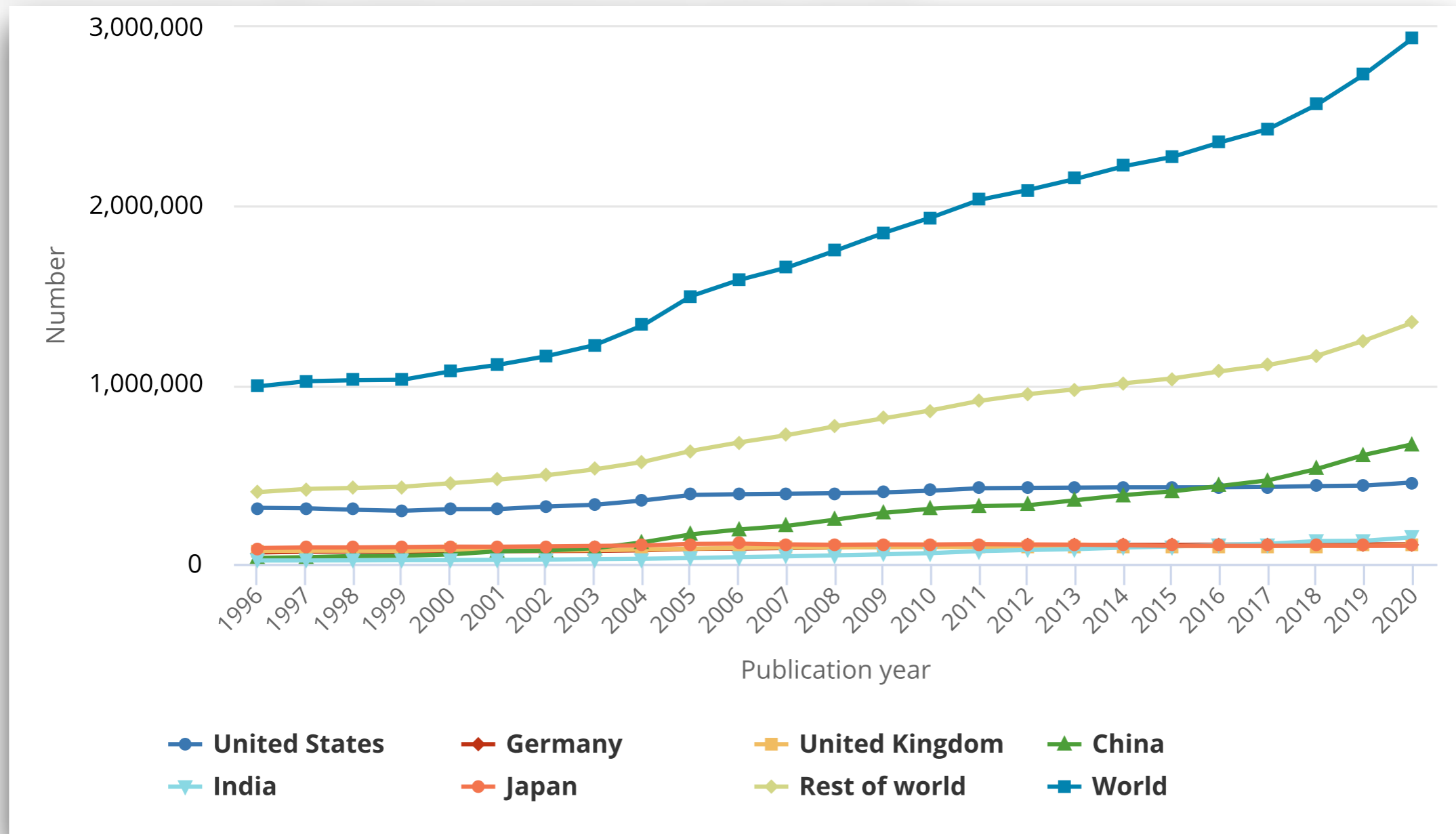
<https://theconversation.com/predicting-who-will-publish-or-perish-as-career-academics-18473>

- Start publishing as soon as possible !
- Especially if you're a woman and if English is not your native language

- How many articles should you publish during your thesis ?
- How many as a first author ?
- How many articles per year should you publish as a senior researcher

How many publications in science & engineering ?

S&E articles, by selected region, country, or economy and rest of world: 1996–2020



<https://nces.nsf.gov/pubs/nsb20214/publication-output-by-country-region-or-economy-and-scientific-field>

Syllabus of this course



■ Four instructors

■ Jean-Louis Rouet (ISTO/UFR Sciences)

`jean-louis.rouet@univ-orleans.fr`

■ Pascale SOLON (SCD, Bibliothèque Univ.)

`arnaud.moizard@univ-orleans.fr`,

`delphine.maillart@univ-orleans.fr`

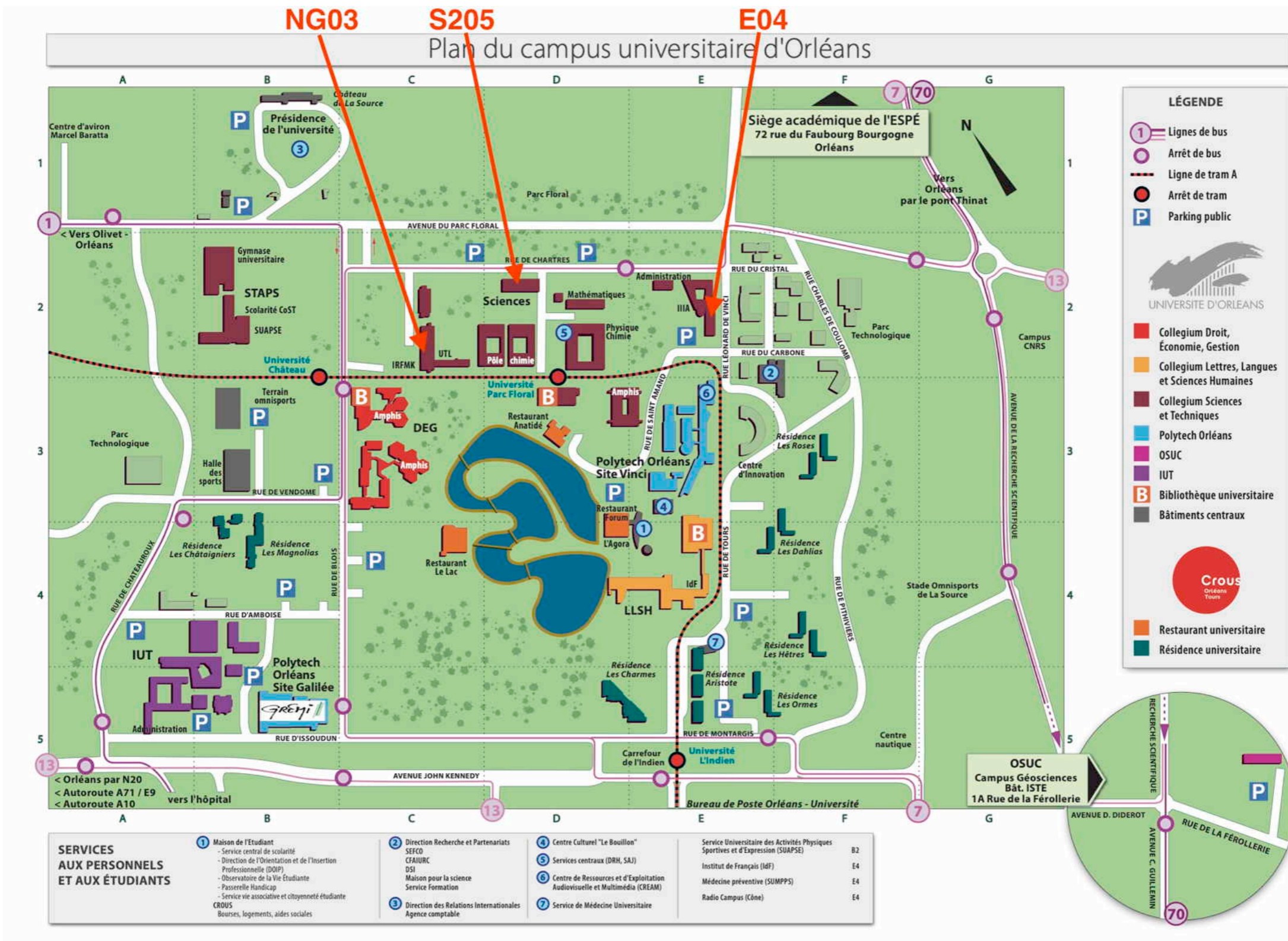
■ Thierry Dudok de Wit (LPC2E/OSUC)

`ddwit@cnrs-orleans.fr`

■ Language : broken English

■ Location: see on Celene

Where ?



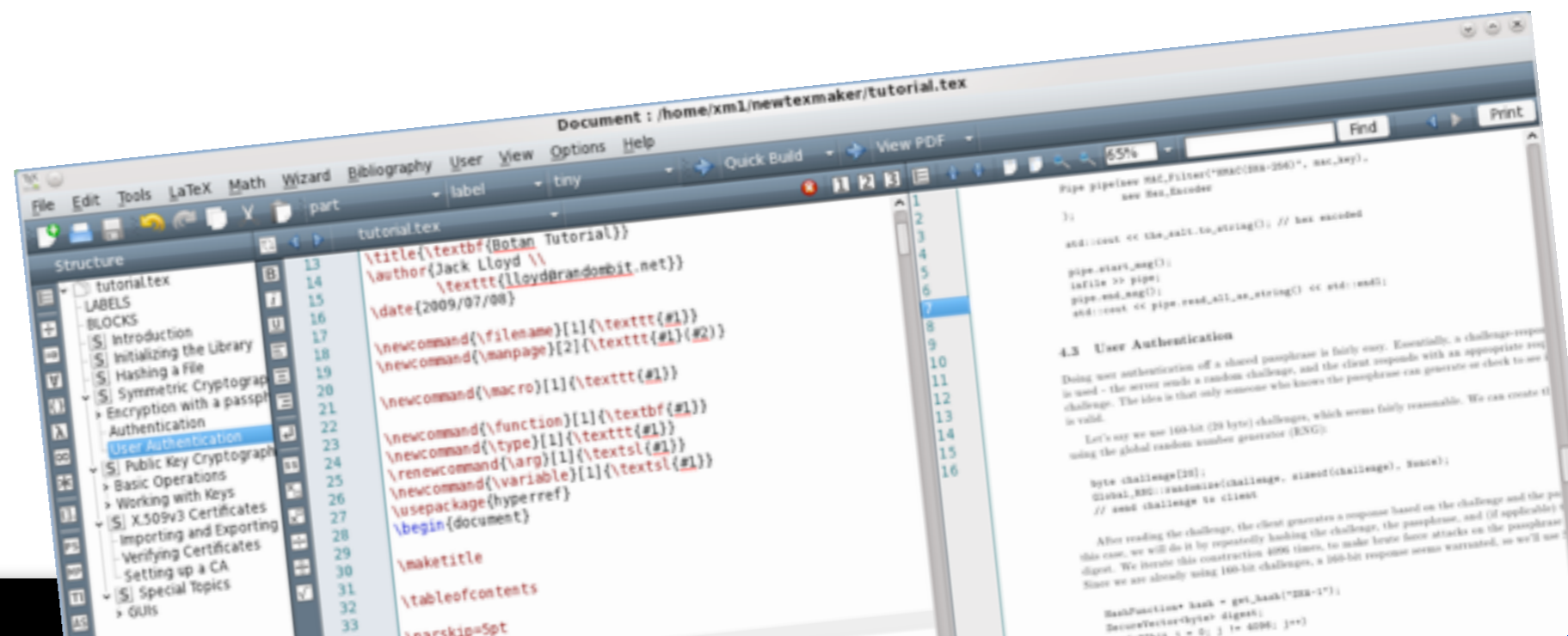
- Writing a good scientific document (T. Dudok de Wit)
- Different types of documents (T. Dudok de Wit)
- Basics of LaTeX : Styles and typography (J.-L. Rouet)
- Documentary research and how to organise references (P. Solon)
- Open science, ethical aspects (P. Solon, T. Dudok de Wit)
- The submission and revision process (T. Dudok de Wit)

Mandatory to validate this course

- Attend the course (attendance sheet)
- Submit a **short article** (3-6 pages) by mid-May
 - follow rules of scientific publishing
 - LaTeX preferable but not mandatory
- Submit a **peer review** by the end of May
 - review the article of one of your colleagues
 - anonymous

Practical issues

- **bring your own laptop** if you can
- LaTeX editing with cross-platform editor **TeXmaker** (<http://www.xmlmath.net/texmaker/>)
- Recommended LaTeX packages
 - on Windows : MikTeX (<http://miktex.org>)
 - on LINUX : TeXlive (<http://www.tug.org/texlive/>)
 - on OSX : MacTeX (<http://www.tug.org/mactex/>)



What we will **NOT** discuss

- Oral communication (how to give a talk)
- Non-scientific writing (poetry, ...)
- Making posters
- Specifics of publishing in social sciences, medicine, etc.

- All relevant documents are on CELENE

<https://celene.univ-orleans.fr/course/view.php?id=2338>



Whenever you see such a box

= take home message

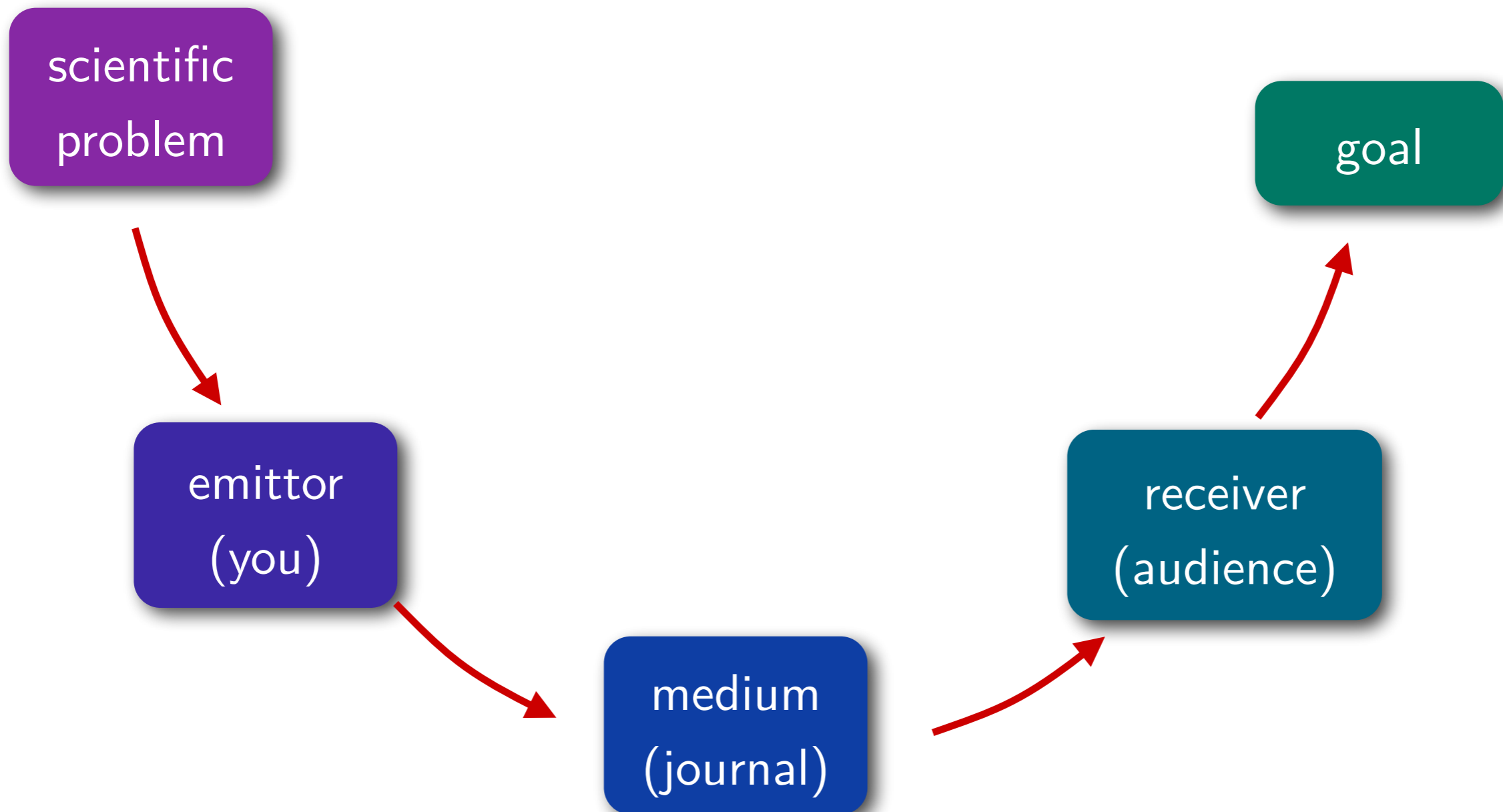
Setting your priorities straight



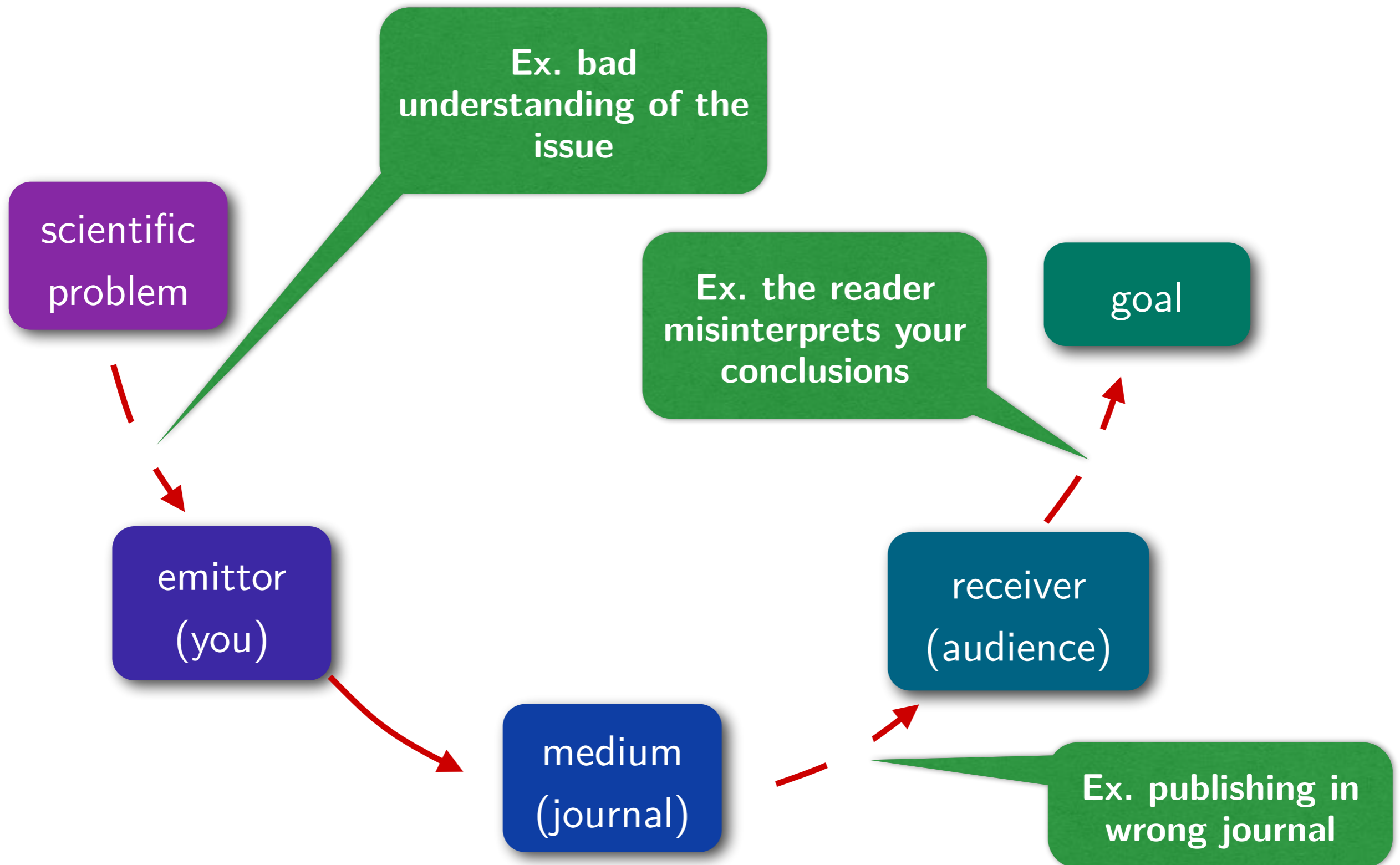
Quizz : why should I publish ?

- **Audience** : who am I writing for ?
- **Message** : what do I want to communicate ?
- **Objective** : why should I communicate on this ?

Communication chain



Breaking the communication chain



Take home message

Any rupture will break the full chain

**Take home message: are all links
working ?**

Levels of perception



Levels of perception

Although consistently active, every few thousand years, Mount Vesuvius erupts in spectacular style with stunning fireworks. The last time it did so, in ad 79, it consumed the city of Pompeii in the flames. To protect the observatory, it was decided to build it far enough from the summit to be safe from ejected debris and high enough on a knoll to avoid the lava flows.

- What different styles can you detect ?

3 levels of communication

1. Conceptual

- ideas, reasoning, analysis, ...
- conveys the reasoning
- *e.g. I understand what you mean*

2. Factual

- facts, feelings,
- tells about your role
- *e.g. I measured these quantities...*

3. Emotional

- feelings, belief, emotions, ...
- allows you to share your feelings
- *e.g. I'm impressed by the way you...*

Which ones are most important for a scientific article ?

3 levels of communication

- These 3 levels correspond to our 3 entities of perception
 - **spirit** (conceptual, rational) : I **understand** what you write
 - **body** (factual, sensitivity) : I **gather the facts** you mention
 - **heart** (emotional, feelings) : I **adhere** to what you say

You need a mixture of all three levels
to communicate properly

3 levels of communication



Scientific communication should be factual and objective
- but not completely devoid of emotion

What is the main level of ... ?

- As a consequence, we pursued the investigation by...
- By lowering the combustion temperature we found...
- Many have wondered before why this occurs so often...
- Note in particular the unusual strength of...
- This inspiring study led to a remarkable result...
- According to this result, we cannot distinguish...
- This result comes as a surprise, because of the large...

- **Jargon :**

“atmospheric deposition of anthropogenically-derived acid substances”

- **Euphemism :**

“The rat lost its integrity”

- **Inflated language :**

“a three-dimensional biopolymer composite”

Avoid stale language (“langue de bois”)

Le comité propose de considérer cet objectif comme un enjeu majeur et de l'arrimer à des outils clairement établis dans les règles du nouveau programme pour en garantir une opérationnalisation effective.

Language course at ENA

Canonical structure of an article



What are the key parts of an article ?

Canonical structure

- Title
- Author(s)
- Summary / Abstract
- Plain language summary
- Keywords
- Introduction
- Methods
- Results
- Discussion
- Conclusion
- Acknowledgements
- References

Canonical structure

- Title
- Author(s)
- Abstract
- Keywords

- Introduction
- Methods
- Results
- Discussion
- Conclusion

- Acknowledgements
- References
- Supplementary material

Front matter

Main body (IMRAD)

Ending

Canonical structure

- Title
- Author(s)
- Abstract
- Keywords
- Introduction
- Methods
- Results
- Discussion
- Conclusion
- Acknowledgements
- References
- Supplementary material

Introduction
Methods
Results = IMRAD
and
Discussion

- The IMRAD structure is **universal**
- Readers can therefore locate immediately what they are looking for = they know how to find their way

If you do not follow this plan
= your communication will not be efficient

1. Title



What makes a good title ?

- Title = first (and often sole) contact with your audience

Your title must inform the person and encourage him/her to read your article

A good title is...

- concise (ideally < 15 words)
- catchy
- sells the main outcome rather than the method
- specific = it tells right away what this work is about
- matches the editorial policy of the journal
- avoids acronyms and jargon
- does not have to be a sentence, but must be syntactically correct

Which title ?

- You are a spectroscopist who has carried out a detailed study of star clusters. You have just written an article about star formation, showing that the distribution of novel stars (protostars) in these molecular clouds does not match the standard model.
- Read the next titles and determine which ones are better – and **why** they are better

Which title ?

1. Spectroscopic observations of the Eagle, Orion and Carina nebulae
2. Protostar distribution and the formation of massive new stars: testing the cluster-assist model
3. Can patterns of protostar distribution within molecular clouds distinguish between competing models of massive star formation ?
4. Detailed images of protostar neighbourhoods do not support the cluster-assist model of massive star formation
5. On the observation of protostellar masses

A good title...

■ must readily inform what the article is about

- The false positive rate of Kepler and the occurrence of planets
- Re-evaluating Hot Jupiter WASP-12b: An Update
- Mission to the Trojan Asteroids: lessons learned during a JPL Planetary School mission design exercise
- Activity in the lunar surface: Transient Lunar Phenomena
- Asteroid Belts in Debris Disk Twins: VEGA and FOMALHAUT
- The future of VLBI
- Subspace Least Square Approach for Drift Removal with Application to Herschel Data
- A hybrid SPH/N-body method for star cluster simulations
- The Hipparcos parallax for Polaris
- Exploring the circumstellar environment of the young eruptive star V2492 Cyg
- Structure of Spin Polarized Strange Quark Star in the Presence of Finite Temperature
- Waiting Times of Quasi-homologous Coronal Mass Ejections from Super Active Regions
- gamma Doradus pulsation in two pre-main sequence stars discovered by CoRoT
- Double-detonation explosions as progenitors of type Ia supernovae
- The Effect of Irradiation on the Jeans Mass in Fragmenting Self-Gravitating Protostellar Discs

Titles : examples

BEFORE : On the accurate estimation of scaling exponents in the observational study of scale-invariant phenomena in finite time series

AFTER : Pseudo-nonstationarity in the scaling exponents of finite-interval time series

Some poor titles

Regional development in eastern Uganda, 1975-95

Spatio-temporal analysis of plasma fluctuations

**Magnetohydrodynamic Simulation of a Sigmoid
Eruption of Active Region 11283**

Was Jane Austen ever in love?

Burning down the pagoda in order to roast the pork

**On the application of Exploratory Data Analysis for
characterization of cryospheric data sets**

Some better titles

Wavelet analysis of turbulence reveals the multifractal nature of the Richardson cascade

Pattern formation outside of equilibrium

Climate: How unusual is today's solar activity?

Will Comet ISON (C/2012 S1) Survive Perihelion?

Learning the parts of objects by non-negative matrix factorization

How about these titles ?

**You Probably Think This Paper's About You:
Narcissists' Perceptions of Their Personality and
Reputation**

**Children and Mini-Magnets: An Almost Fatal
Attraction.**

**Snakes on a spaceship - An overview of Python in
Heliophysics**

**The mouth, the anus and the blastopore - open
questions about questionable openings**

No solar hiding place for greenhouse skeptics