

WEBINAR:

Public calls applications and scientific writing

- How to write scientific publications
- Overview of *Horizon Europe* programme
- Increasing the quality of your public call applications

Prof. Dario Farina, Imperial College London, UK
Juan Pérez, CIT-UPC, Spain

Hybrid neuroscience based on cerebral and muscular information for motor rehabilitation and neuromuscular disorders



HybridNeuro focuses on development of Hybrid Neural-machine Interfaces, which record cerebral and muscular signals, and aims to improve the objectivity, precision and personalisation of monitoring and rehabilitation of neuromuscular disorders, such as stroke.

Hybrid neuroscience based on cerebral and muscular information for motor rehabilitation and neuromuscular disorders

Our mission:

- 1 Exploratory research project for development of Hybrid Neural-machine Interfaces
- 2 Summer schools
- 4 Workshops
- 8 Webinars
- 1 Biomedical Signals Data Repository
- 1 Massive open online course (MOOC) on Hybrid Neuroscience
- 1 International HybridNeuro Hub
- 12 National/international events

Visit us at:

<https://www.hybridneuro.feri.um.si>

<https://twitter.com/hybridneuro>





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Imperial College
London



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FREE REGISTRATION

Travel & accommodation costs
to be covered by participants

Summer school on Hybrid Neural Interfaces

July 8th-12th 2024, Maribor, Slovenia

- Surface & intramuscular HDEMG
- Identification of neural codes
- EEG & functional brain connectivity
- Corticomuscular coupling
- Movement augmentation
- Hybrid Neural Interfaces in practice
- Keynote lectures
- Practical examples
- Student 2 student explanations
- Present your project
- Ask top experts
- Active consultations



Scientific writing

WEBINAR: Public calls applications and scientific writing, 22nd April 2024

Prof. Dario Farina

Neuromechanics and Rehabilitation Technology, Bioengineering Department
Imperial College London, UK



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The ABC of science communication



The ABC of science communication is that it should be:

- **A**ccurate and **A**udience-adapted
- **B**rief
- **C**lear

“Write with precision, clarity and economy. Every sentence should convey the exact truth as simply as possible.”

Instruction to Authors

Ecology

Writing papers is all about communication...



- **Who are you addressing**

Scientists who are specialists in your field of research, a wider group of scientists, fellow students, or public audiences?

- **Why is your message important?**

Why are you communicating it?

- **What are your main findings or “take-home” messages?**

What are you going to present – new research results or a review of a topic? What prior knowledge, expectations and questions might your audience have? What technical language do they understand?

- **How can you best deliver your message and satisfy the audience’s needs?**

- How will the audience use its new knowledge?

Getting started in writing

- **Analyze your aims and your audience**

Think of the questions: Who? Why? What? How?

- **Make tables and figures of interesting results**, and decide what messages to communicate

Think of captions that can help the figures and tables in telling their story

- **Make a general outline of how to deliver the messages**

The IMRaD structure



Whereas popular papers usually have a free structure, a majority of scientific papers are structured along the following lines:

- **Title/Title Page (6-12 words)**
- **Abstract**
- **Introduction**
- **Methods and Materials**
- **Results**
- **Discussion**

In different scientific communities, numerous variations of the IMRaD structure coexists.

Purpose of main paper sections

Section	Intends to tell the reader
Title	What the paper is about
Abstract	Short summary that can “stand alone”
Introduction	The problem, what is known, what is not known, and the objective
Materials & Methods	What you did
Results	What you found
Discussion	How to interpret the results
Conclusions	Possible implications and the impact
Acknowledgements	Contributors other than authors
References	How to find the papers referred to
Supplementary material	Appendices

Checklist

Before you start with the first draft

- ✓ **Complete the scientific work (!)**
- ✓ **Decide author(s), Journal**
- ✓ **Read your publisher's Instructions to Authors**
- ✓ **Brainstorm, make notes under the IMRaD headings**
- ✓ **Select material illustrations, diagrams, etc.**

Checklist

First draft:

Prepare a nice title page

Write the Methods and Results sections (with figures)

Write the Introduction

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Write Appendices

Get colleagues to check (esp.) the Methods section

1 **NeuroMechanics: Electrophysiological and Computational Methods to**
2 **Accurately Estimate the Neural Drive to Muscles in Humans *In Vivo***

3

4 Arnault H. Caillet¹, Andrew T.M. Phillips², Luca Modenese^{3,#*}, Dario Farina^{1,#,*}

5

6 1.Department of Bioengineering, Imperial College London, UK

7 2.Department of Civil and Environmental Engineering, Imperial College London, UK

8 3.Graduate School of Biomedical Engineering, University of New South Wales, Sydney, Australia

9

10

11 * d.farina@imperial.ac.uk (DF) l.modenese@unsw.edu.au (LM)

12 #These authors have equal contributions and share the senior authorship

13

14 **Conflict of interests:**

15 The authors declare no competing financial interests.

16

17 **Funding resources.**

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20 “Neural Commands for Fast Movements in the Primate Motor System” (NU-003743). Luca Modenese
21 is supported by a Scientia Fellowship from the University of New South Wales, Australia. The funders
22 had no role in study design, data collection and analysis, decision to publish, or preparation of the
23 manuscript.

24

- Should convey the **concise information** on the topic of the study
- May be of different styles
- Here are some variations on a theme, all suitable as titles:

THE EFFECT OF ARM POSITION ON MYOCONTROL

DOES ARM POSITION INFLUENCE MYOCONTROL ?

MYOCONTROL AND ARM POSITION: IMPLICATIONS FOR CLINICAL USE OF ADVANCED PROSTHESES

- Sometimes it is possible to include the principal result or conclusion in the title:

CHANGES IN ARM POSITION DECREASE THE ACCURACY OF MYOCONTROL

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- Explain why each procedure was done, i.e., what variable were you measuring and why?
e.g. We assumed 1 ms as the minimal distance between detected spikes since this is below the absolute refractory period of neural cells
- Experimental procedures and results are narrated in the past tense (what you did, what you found, etc.). Do not mix tenses in the Methods.
e.g. The skin temperature was measured every 5 min
- Mathematical equations and statistical tests are part of this section along with the actual experimental work.
- If any of your methods is fully described in a previous publication (yours or someone else's), you can cite that instead of describing the procedure again in detail.

Results

- Data may be presented in figures and tables, but this may not substitute for a verbal summary of the findings. The text should be understandable by someone who has not seen your figures and tables.
- Results may be extremely boring to read and non-informative without a proper description
- Example:

Incorrect: The results are given in Figure 1.

Correct: Temperature was directly proportional to metabolic rate (Figure 1).

- Finish the full Results text as well as all figures and tables (with final graphics) before continuing the writing of the other sections.

Results

- **All results** should be presented, including those that do not support the hypothesis.
- Statement made in the text must be supported by the results contained in figures and tables.
e.g.: Temperature was directly proportional to metabolic rate (FIG. 1)
- The result of statistical tests are usually presented in parentheses following a verbal description.
e.g.: The classification accuracy of EMG was greater in able-bodied subjects than in amputees ($P < 0.05$)

Tables and Figures

Tables:

- Do not repeat the information in a table that you are depicting in a graph or histogram.

Figures:

- These comprise graphs, histograms, and illustrations, or drawings and photographs.
- Figures submitted for publication must be “photo ready”
i.e., they will appear just as you submit them (e.g. copying and pasting from Matlab without proper editing results in poor quality figures and should be avoided)
- The selection of font sizes, colors and design is key for readability.
- Check author guidelines in each journal to match the requirements (format, font sizes, etc.).

Tables, Figures, and Statistics

Some journals now have strict policies about figures and data representation

The Journal of
Physiology

https://jp.msubmit.net/cgi-bin/main.plex?form_type=display_requirements

- *Figure presentation*

If $n \leq 30$, all data points must be plotted in the figure in a way that reveals their range and distribution. A bar graph with data points overlaid, a box and whisker plot or a violin are examples of acceptable formats.

- *Data*

Data summaries should be presented as mean (SD) with a clear statement of n ; and presented in the main text, figures and their legends and tables. Standard Deviation (SD) without ' \pm ' must be used instead of Standard Error of the Mean (SEM).

- Authors must provide a *Data Availability Statement* for all article types in which new data are reported. **Some journals require to make data and algorithms publicly available.**

Why? To increase reproducibility, accessibility, and impact

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- The introduction of a paper should provide answer to the following questions:

WHY?	is the topic of interest?
WHAT (1) ?	is the background on the previous solutions, if any?
WHAT (2) ?	is the background on potential solutions?
WHAT (3) ?	was attempted in the present effort?
WHAT (4) ?	will be presented in this paper? (this can be hypothesis-driven)

Checklist

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Discussion

The Discussion should contain at least:

- The **relationship between the results and the original hypothesis**, i.e., whether they support the hypothesis, or cause it to be rejected or modified.
- An **integration of your results with those of previous studies** in order to arrive at explanations for the observed phenomena.
- **Possible explanation for unexpected results** and observations.

- Trends that are not statically significant can still be discussed if they are suggestive or interesting but cannot be made the basic for conclusions as if they are significant.
- Avoid redundancy between the Results and the Discussion section. Do not repeat detailed description of the data and results in the Discussion.

E.g.[Incorrect] [In Discussion] We also found that ANN and the SVM resulted in similar classification errors (23% - 31% for ANN and 23% - 30% for SVM) that were not significantly different...

- End the Discussion with a summary of the principal points you want the reader to remember (take-home messages).

Checklist

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Abstract

- The abstract is a one or two paragraph condensation (150-300 words) of the entire work described completely in the article.
- The abstract should be a self-contained unit capable of being understood without the benefit of the text. It should contain these four elements:
 1. The purpose of the study (the central question).
 2. A brief statement of what was done (Methods).
 3. A brief statement of what was found (Results).
 4. A brief statement of what was concluded (Discussion, in part).
- Check journal guidelines! Some journals have specific structured abstracts with sub-sections.

Checklist

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- ✓ Prepare a nice title page
- ✓ Write the Methods and Results sections (with figures)
- ✓ Write the Introduction
- ✓ Write the Discussion and Conclusion
- ✓ Write an Abstract
- ✓ **Make lists of Acknowledgement and References**
- ✓ **Write Appendices**
- ✓ **Get colleagues to check (esp.) the Methods section**

Checklist

Further drafts(repeat as necessary):

- ✓ **Grammar and spelling checks**
- ✓ **Style checks – readability**
- ✓ **Get co-authors and other colleagues to read**
- ✓ **Logic checks – does it all make sense**

Checklist

Before sending for publication check:

- ✓ **Typography consistency (incl. acronyms),**
- ✓ **Layout and appearance**
- ✓ **Illustrations, figure, diagrams, etc. in the right place**
- ✓ **Check your publisher's Instruction to Authors again**
- ✓ **Acknowledgements confirmed**
- ✓ **Reference checked**

Where to submit your paper?

Two main categories of peer reviewed publications:

- **Conference proceedings.** Conference typically offer fast publication time (less than a year). Conference publication are typically short-lived and have less impact and lower rejection rates than archival journals (exceptions, e.g. computer science).
- **Archival Journals.** Journals can have very long turn-around times (sometimes up to 1-3 years) and often tough rejection rates. Journal publications are supposed to live “forever” and typically have higher impacts.
- Often a preliminary version of the full study is published as a conference abstract/paper and is followed by a Journal publication on the complete study (be careful at “saving” sufficient new material when publishing long conference papers, e.g. IEEE).

Where to submit your paper? Preprints



- **Preprints are drafts of research papers available before peer review.**
- **Why publishing preprints:**
 - Rapidly sharing the latest research advances with the community and receive feedback.
 - Open research: draft research papers publicly and free accessible for everyone.
 - Impact: Most preprints have a digital object identifier (DOI) so they can be cited.
- **Some of the most popular preprint servers:**
 - **arXiv:** biorXiv, MedrXiv, ChemRxiv, techRxiv
 - OSF Preprints
 - Research Square

Where to submit your paper? Preprints



Cons of publishing preprints:

- **Lack of Peer Review:** Preprints have not been rigorously evaluated by experts, potentially containing errors or flawed methodologies.
- **Misinformation Risk:** Unverified findings can mislead the public or influence policy decisions.
- **Publication Issues:** Some journals reject papers previously published as preprints, limiting your options for final publication.
- **Focus on Speed over Quality:** Rushing to publish a preprint might compromise the overall thoroughness of your research.

Selection of a Journal: Why do we care where we publish ?



- Important to ensure that our work has an impact on the field.
- Important to ensure that the work has maximum impact for reputation.
- Important to have an influence in practice (clinical/commercial use).

MAXIMIZE THE PROBABILITY THAT OTHERS WILL USE YOUR WORK

How do we select a Journal ?

- **High scientific quality**
- **High impact**
- **High level readership**
- **Appropriate audience**
- **High potential for citations**

It may not be possible to match all these goals

How do we determine the quality of a Journal?

- Impact factor (IF)
- Reputation in the field
- Other markers of quality

When selecting a Journal, be ambitious but realistic

DORA Principles for Responsible Research Assessment



Do not forget to follow DORA guidelines (many times they are omitted)

- **Focus on Quality, not Quantity:**

- Move away from using publication metrics (e.g., journal impact factor) as the sole measure of research success.
- Consider broader contributions like Broader societal impact, Data sharing or Methodological rigor.

- **Transparency and Open Access:**

- Encourage open access publishing and data sharing to increase accessibility and reproducibility.
- Evaluate research based on its own merit, not the reputation of the journal or author.

- **Reward Collaboration:**

- Recognize the value of collaborative research efforts, not just single-authored papers.
- Consider team dynamics and contributions from all researchers involved.

<https://sfdora.org/>

Protect your research! Choose reputable journals

- **What are they?**
 - Deceptive journals that exploit researchers for profit.
 - Mimic legitimate journals but lack rigorous peer review.
- **Red Flags:**
 - Guaranteed rapid publication (often for a fee), poor grammar and website design.
 - Aggressive solicitation of papers (SPAM) and unrealistic scope (publishes research across all fields).
- **Why avoid them?**
 - Damages research credibility.
 - Misleads the scientific community.
- **Tips to Spot Them:**
 - Use trusted resources like DOAJ (<https://doaj.org/>) to find legitimate journals.
 - Check editorial board credentials and be aware of unsolicited invitations to publish.

What happens after we submit ?



1. A senior Editor examines the manuscript and decides if to initiate or not the review process.
2. If the review process starts, 2 to 3 reviewers (in some cases up to 5) are invited by the Editor to write a review report on the manuscript (reviewers remain anonymous to the author).
3. Based on the reviewers' reports, the Editor decides if to Accept, Accept with Minor Revisions, Accept with Major revisions, or Reject the manuscript.
4. If the manuscript is accepted (in one of the above forms), the authors are asked to revise it according to the comments by the reviewers and to submit the revision.
5. The revision is examined by Editor and Reviewers and Accepted, Rejected, or Accepted with Revisions.

Conclusion

- Writing scientific papers is one of the highest level of scientific communication.
- It requires attention to the audience and capacity to deliver messages concisely, clearly, and accurately.
- Scientific papers usually have a structure of the type IMRaD.
- Each part of IMRaD needs to be completed according to rules for best communication.
- The first draft is obtained by completing all parts of IMRaD in the order that is felt most appropriate (I have suggested one).
- All details in a paper needs to be adjusted in order to have an almost perfect product. This is achieved by iterations of reading by all co-authors and other colleagues.
- Selection of the type of publication and publisher is complex and junior researchers may rely for this choice on their supervisors.



Scientific writing

Q & A

Prof. Dario Farina, Imperial College London, UK