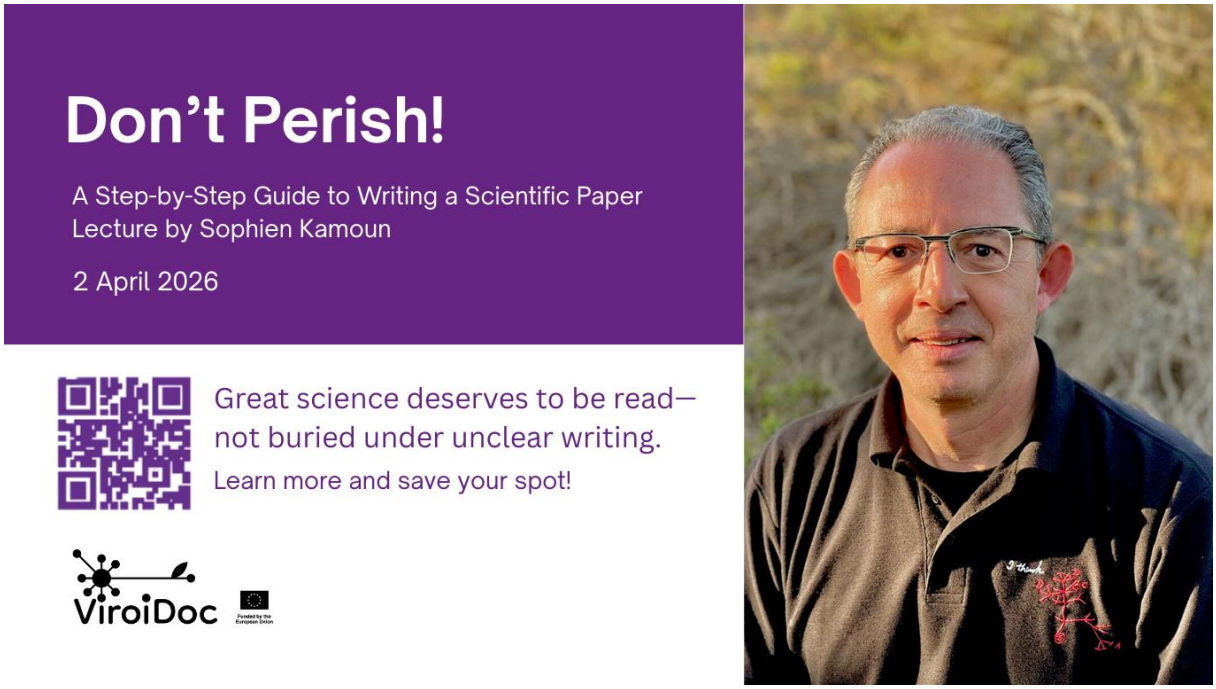
Don’t Perish! A Step-by-Step Guide to Writing a Scientific Paper



Overview

In this comprehensive workshop, Sophien Kamoun guides participants through the entire process of writing and publishing scientific papers, emphasizing that publishing is essential for communicating knowledge and advancing academic careers. He stresses that writing is primarily about constructing a clear, logical, and compelling story, encouraging the use of AI tools as tutors rather than ghostwriters.

Kamoun advocates integrating publication planning with ongoing research by developing storylines and outlines early, which helps prioritize experiments and focus literature reviews. He recommends creating shared folders for collaboration and stresses defining the unknown, main findings, and implications concisely to form the paper's backbone.

The workshop covers detailed guidance on writing each paper section: results should be written after finalizing figures; introductions are best drafted after results to tailor background; discussions offer creative freedom to relate findings to prior work and explore implications; abstracts are constructed last by extracting key sentences; and titles should be assertive and informative to attract readers.

Kamoun highlights the importance of preprinting to disseminate work rapidly and using social media threads to engage broader audiences. He underscores writing the methods section clearly for reproducibility and archiving code and data with permanent DOIs. Continuous reading and iterative editing are vital for improving writing skills, with AI tools serving as valuable assistants.

He advises clarity, simplicity, and active voice in writing, encourages reusing previous writing as templates, and cautions against passive voice. Responsible AI use is emphasized, with authors maintaining intellectual engagement. When choosing journals, authors should consider audience breadth and journal fit, while being wary of predatory publishers.

Finally, Kamoun offers practical advice on dealing with editors and reviewers, interpreting editorial language, and responding professionally to feedback. The session concludes with encouragement to celebrate publishing achievements and continued engagement with the scientific community.

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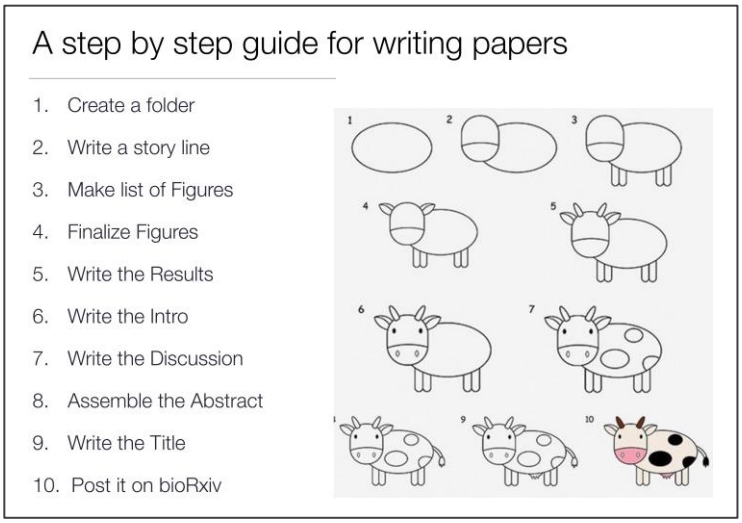
Detailed Summary

Importance of publishing

Sophien Kamoun emphasizes that scientists are in the business of knowledge, and publishing is the primary medium to communicate scientific findings. Publishing not only archives knowledge permanently but also advances academic careers, making it a critical final step in research projects.



- Sophien Kamoun states that publishing is essential because it communicates knowledge and archives it permanently via DOIs.
- He highlights that publications serve as academic currency for recruitment, promotion, and grants.
- Publishing is likened to scoring a goal in football, representing the culmination of research efforts.

Writing scientific papers

The workshop focuses on constructing scientific papers by prioritizing structure, logic, and storytelling over writing skills. Kamoun reassures non-native English speakers that clarity of story and logic is more important than perfect language and encourages using tools like chatbots to assist writing.

- Kamoun clarifies that writing a paper is about assembling a coherent story, not just writing well.
- He emphasizes the importance of storytelling and logical structure over language proficiency.
- He suggests leveraging AI tools to improve storytelling and writing.

Integrating research and publication planning

Kamoun advises integrating publication planning with ongoing research by developing storylines and outlines early. This approach helps prioritize experiments, identify missing data, and transform literature review and discussions, making the research process more focused and efficient.

- Kamoun recommends writing storylines and outlines while conducting experiments.
- He explains that early storyline development helps prioritize experiments and literature searches.
- This integration transforms conversations with colleagues and enhances research focus.

Creating a shared folder for paper development

An organizational tip is to create a shared folder for each paper to collect ideas, relevant literature, and drafts. This centralized repository facilitates collaboration among co-authors and helps capture spontaneous ideas using note-taking apps or mobile devices.

- Kamoun stresses the importance of a shared folder for all paper-related materials.
- He shares his personal practice of capturing ideas on his phone and adding them to the folder.
- The folder acts as a sandbox for authors to interact and organize information.

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Developing the storyline

Developing a clear storyline is the most challenging and creative part of writing a paper. It involves defining the unknown, the main findings, and the implications in concise sentences. The storyline guides the structure and content of the paper and should be iteratively refined.

- Kamoun calls the paper outline a 'storyline' to emphasize storytelling.
- He advises writing the unknown, finding, and implications as single, clear sentences.
- The storyline is iterative and may take months to develop and refine.

List of figures and assertive titles

Kamoun recommends creating a list of figures early, each with an assertive title that states a single main finding rather than describing the experiment. This practice clarifies the paper's message and helps organize results logically.

- Each figure should have an assertive title stating the main finding.
- Figures should be split if they contain multiple findings to avoid confusion.
- Avoid numbering figures early to maintain flexibility in story structure.

Separating storyline from research history

Scientific papers should not necessarily follow the chronological order of research. Kamoun encourages disconnecting from the project's history to tell a clearer, more compelling story that may differ from how the research was conducted.

- Kamoun cites Sir Peter Medawar's idea that scientific papers are a form of 'fraud' in that they don't recount research history literally.
- He advises focusing on the best way to communicate findings rather than the historical sequence.
- An anecdote illustrates how reframing the story can lead to a more impactful paper.

Framing the paper broadly

Authors should attempt to frame their research questions and findings in a broader context to attract a wider audience beyond their immediate field. This approach enhances the paper's relevance and impact.

- Kamoun encourages framing the unknown in a way that appeals to readers outside the specific field.
- Broad framing can make the paper more interesting and impactful.
- Not all papers will suit broad framing, but it is a valuable exercise.

Orthogonal replication and triangulation

Kamoun stresses the importance of validating findings through independent, orthogonal methods to ensure robustness. Multiple lines of evidence strengthen the paper's conclusions and increase its scientific reliability.

- Orthogonal replication involves confirming results with different experimental approaches.
- Kamoun advises killing experiments that cannot be validated orthogonally.
- Robust science that stands the test of time relies on multiple independent validations.

Preparing publication-quality figures

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Figures and tables must be clear, well-quantified, and aesthetically pleasing. Kamoun recommends learning from exemplary papers, avoiding misleading graphs like bar charts without data points, and using modern data visualization techniques to honestly represent variability.

- Kamoun emphasizes the importance of clear, quantified, and attractive figures.
- He discourages using bar graphs without showing data distribution.
- Learning from well-designed figures in published papers is encouraged.

Writing the results section

Writing results should begin only after finalizing figures and tables. Each results paragraph should start with a brief rationale, describe the experiments focusing on the main findings first, include controls or secondary findings, and conclude with an assertive statement summarizing the key result.

- Kamoun advises writing results after figures are finalized for accuracy.
- Each results paragraph should include rationale, main findings, controls, and a concluding statement.
- Providing rationale helps readers understand why experiments were conducted.

Writing the introduction section

Kamoun recommends writing or finalizing the introduction after completing the results to tailor background information to the findings. The introduction should describe the unknown, provide necessary background, introduce the experimental system, and summarize the study's findings in a structured manner.

- Kamoun advises drafting the introduction after results to know what background readers need.
- The first paragraph should describe the unknown or problem addressed.
- The last paragraph summarizes the study's findings briefly.
- Intermediate paragraphs provide background and context for understanding the results.
- He suggests using AI tools to identify missing information in the introduction based on the results.

Writing the discussion section

The discussion is a creative section where authors relate findings to existing knowledge and explore implications and future directions. Kamoun encourages framing discussion paragraphs around specific questions and distinguishing clearly between findings and their broader implications. A discussion of future directions is an opportunity for the authors to establish intellectual leadership.

- Kamoun describes the discussion as a less constrained, creative part of the paper.
- He emphasizes relating findings to previous work and discussing implications.
- Authors should frame paragraphs as questions and answer them to overcome writer's block.
- Distinguishing findings from implications helps clarify the paper's contribution.
- He cites classic examples like the DNA double helix paper to illustrate the power of implications.

Writing the abstract and title

Kamoun suggests writing the abstract last by extracting key sentences from the paper that answer why the work was done, what was found, and the implications. The title should be an assertive, informative statement conveying the main finding to attract readers effectively.

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- Kamoun copies key sentences from the paper to construct the abstract.
- He highlights the importance of the title as a 'billboard' that many more people read than the full paper.
- Titles should be assertive and informative, stating the main finding rather than vague descriptions.
- A good title increases the paper's visibility and impact.

Preprinting and social media promotion

Kamoun advocates for publishing preprints to disseminate work rapidly, establish priority, and invite community feedback without jeopardizing journal publication. He also encourages creating social media threads to share the paper's story broadly and engage wider audiences.

- Preprinting allows immediate dissemination and scooping protection.
- Preprints do not prevent subsequent journal publication.
- Publishing preprints is liberating and reduces stress.
- Social media threads can attract much larger audiences than the paper itself.
- Kamoun's lab treats social media promotion as seriously as the paper preparation.

Writing the methods section and data sharing

Kamoun notes that the methods section is often mechanical and can be written anytime, ideally following the order of results for clarity. He stresses the importance of reproducibility, citing prior methods, detailing modifications, and archiving code and data with permanent DOIs to comply with FAIR principles.

- Methods should be clear, precise, and concise to enable reproducibility.
- Writing methods can be done anytime and is less about storytelling.
- Archiving code with a DOI (e.g., via Zenodo) is better than citing a mutable GitHub link.
- FAIR principles guide data and code sharing requirements.
- Methods details can be published separately on protocol platforms if complex.

Reading and writing skills development

Kamoun emphasizes continuous reading to improve writing and critical thinking, recommending reading one paper a day and using AI tools to summarize literature. He advocates using chatbots as tutors to improve writing style and editing skills rather than as ghostwriters.

- Reading extensively builds knowledge and writing skills.
- AI tools can help summarize papers and focus on relevant aspects.
- Chatbots should be used as writing tutors, not as co-authors.
- Asking chatbots why they suggest changes helps learning.
- Critical reading and saving good material are important practices.

Writing style and editing

Kamoun advises clarity and simplicity in writing, avoiding passive voice and bloated text. Good writing is primarily good editing; authors should produce drafts quickly and then iteratively refine them. He encourages deleting unnecessary content and using AI tools for editing feedback.

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- Clarity is key; the paper is not a mystery novel.
- Avoid passive voice to provide clear information.
- Less is more; avoid bloated, confusing writing.
- Produce drafts quickly and focus on editing to improve.
- Use chatbots to get editing suggestions and improve style.

Reusing previous writing and tense usage

Kamoun encourages authors to reuse their previous writing as templates to ease the writing process, noting that scientific writing is not creative literature. He clarifies tense usage: results are written in simple past tense, while published knowledge is in present tense.

- Reusing old writing as a starting point is acceptable and efficient.
- Scientific writing differs from creative writing; templates help.
- Results sections use simple past tense.
- Published knowledge is described in present tense.
- Avoid passive voice to maintain clarity.

Using AI tools responsibly

Kamoun highlights AI tools can be viewed as virtual colleagues for feedback and writing assistance but warns against relying on them to write entire sections. Authors must critically evaluate AI suggestions and remain intellectually engaged with their work.

- AI tools provide detailed feedback and help improve clarity.
- They should be used as virtual colleagues, not co-authors.
- Blindly asking AI to write sections is discouraged.
- Authors must verify and decide on AI-generated content.
- Responsible AI use fosters learning and better writing.

Choosing publication venues and authorship

Kamoun advises selecting journals based on the paper's relevance to broad or specialist audiences and personal preference for journal content. He cautions about predatory journals and refers to external resources for authorship guidelines, acknowledging the complexity of the topic.

- Decide if the work targets broad research leadership or specialists.
- Choose journals accordingly to maximize impact.
- Consider journal fit and personal preference.
- Be aware of predatory journals.
- Authorship issues require dedicated discussion beyond this workshop.

Dealing with editors and reviewers

Kamoun encourages authors to respond rationally and professionally to editorial decisions and reviewer comments, recognizing that editors often communicate indirectly. Understanding editorial language helps interpret decisions and plan responses effectively.

- Authors should analyse reviewer comments objectively.

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- Making a rational case can influence editorial decisions.
- Editors often use indirect language; 'no' may mean 'maybe'.
- Understanding editor communication aids in managing rejections.
- Professionalism is key in responding to feedback.

Tips & tricks

- Focus on having one main finding per paper to avoid bloated manuscripts and ensure clarity and impact.
- Quantify and report data accurately, including variation and controls, rather than relying on representative images or binary data, to enable reproducibility and confidence in follow-up work.
- Prepare rational and clear responses to editors and reviewers, especially when addressing negative decisions, by analysing comments objectively and making a strong case when appropriate.
- Use note-taking apps (e.g., Bear) to capture and tag ideas related to the paper immediately as they come, ensuring easy retrieval and organization later.
- Review the results and figures to identify any important topics or controls that need to be introduced in the introduction to ensure reader understanding.
- Develop the storyline of the paper early during the experimental phase by writing down the unknown, main finding, and implications in single clear sentences.
- Highlight key sentences throughout the manuscript that answer why the work was done, what the unknown is, and what was found, then compile and organize these into the abstract.
- Write results in simple past tense and published knowledge in present tense, avoiding passive voice to provide clear and direct scientific communication.
- Publish the paper as a preprint on a server like bioRxiv to disseminate work rapidly, establish priority, invite community feedback, and reduce publication delays.
- Decide on the journal for submission by assessing whether the work targets broad research leadership or specialist audiences, considering journal fit and avoiding predatory journals.
- Avoid numbering figures early in the process; instead, label figures descriptively to maintain flexibility in story organization.
- Edit manuscripts thoroughly, focusing on clarity and simplicity, using AI tools to improve style and understanding, and delete unnecessary content to enhance readability.
- Write the discussion section with a clear structure of four to six paragraphs, starting with a summary of findings, relating them to previous work, and exploring implications and future directions.
- Craft the paper title as an assertive statement that clearly communicates the main finding to attract and inform readers effectively.
- Prepare a list of figures with assertive titles that state the main finding of each figure, ensuring each figure corresponds to a single clear result.
- When encountering writer's block in the discussion, frame paragraphs as questions and answer them to maintain flow and creativity.

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- Produce publication-quality figures and tables with clear quantification, appropriate statistics, and visually appealing design, learning from well-presented examples in the literature.
- Use previous writings and templates as starting points for new manuscripts or figure legends to streamline the writing process and maintain consistency.
- Archive code and data by freezing GitHub repositories into DOI-assignable versions via platforms like Zenodo to ensure permanent, citable resources for reproducibility.
- Create a dedicated folder on the shared server or Dropbox for the paper and share it with all co-authors to collect and organize all project-related information and ideas.
- Develop a social media thread summarizing the paper with personal insights and accessible explanations to broaden the audience and increase impact.
- Write the methods section with clear, precise, and concise details following the order of the results, citing prior methods and noting modifications to ensure reproducibility.
- Use AI chatbots as a tool to review the introduction against the results, asking for missing information or gaps to improve completeness and clarity.
- Draft the introduction after completing the results section, structuring it into four to six paragraphs that cover the unknown, background, experimental system, and a summary of findings.
- Continuously read scientific literature critically and use AI tools as tutors to summarize and improve understanding, thereby enhancing writing and research quality.
- Engage colleagues not involved in the project to review and challenge the storyline and figure list to gain fresh perspectives and avoid being stuck in the project's historical mindset.
- When writing the results section, include a brief rationale sentence explaining why each experiment was done, followed by the main findings, controls, and a concluding assertive statement.
- Only start writing the manuscript text after finalizing all figures and tables to ensure accuracy and alignment between text and data.
- Plan and perform orthogonal replication experiments early to independently validate key findings using different methods, ensuring robustness and reproducibility.
- Use AI tools as collaborative colleagues to provide feedback and suggestions on drafts, but always critically evaluate and verify their input to maintain scientific accuracy.

About the presenter

Sophien Kamoun is a Senior Scientist at The Sainsbury Laboratory and Professor of Biology at the University of East Anglia. Internationally recognized for pioneering work on plant diseases and immunity, he has developed genomics and molecular approaches that transformed understanding of eukaryotic plant pathogens and opened new paths to combat major crop diseases.
A champion of open science, Kamoun promotes preprints, transparent peer review, and open data to accelerate discovery. He is a Fellow of the Royal Society and recipient of major honours including the Kuwait Prize and the Linnean Medal. He co-founded Resurrect Bio and GetGenome, initiatives advancing innovation and equitable access to genomics worldwide.
For more than 25 years, he has delivered the “Don’t Perish” workshop to help early-career scientists communicate their work clearly and publish papers that matter.

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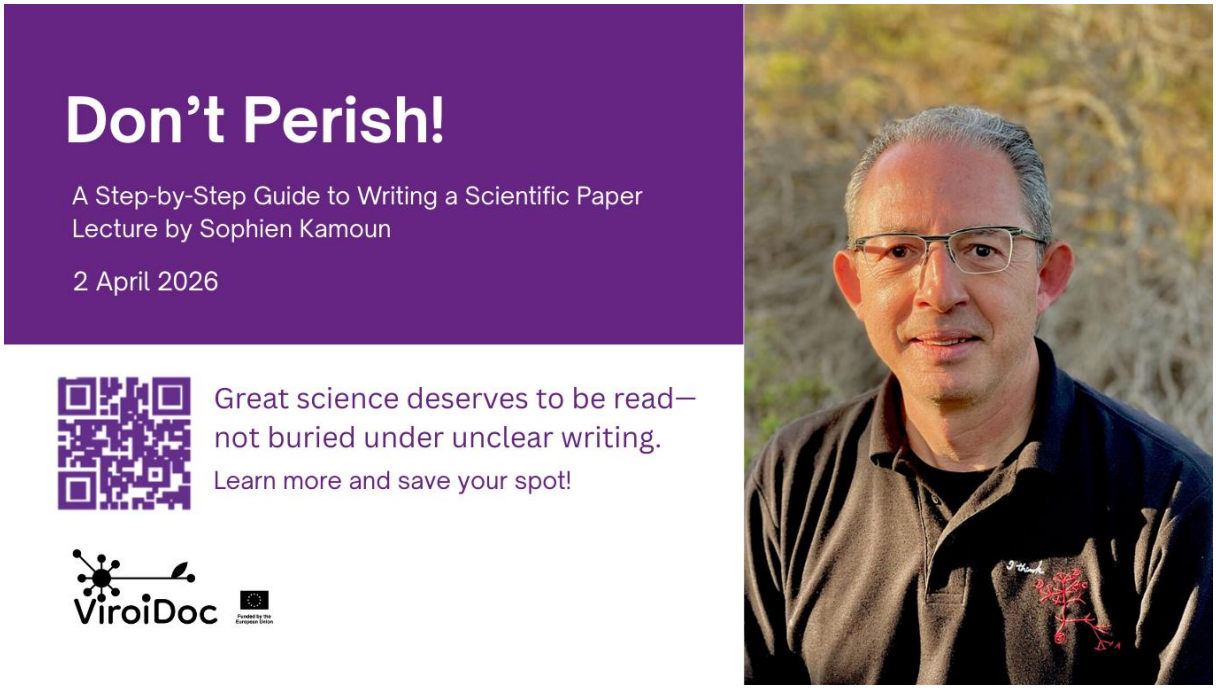

Session Overview

The meeting featured Professor Sophien Kamoun leading a detailed Q&A session on scientific writing and publishing, moderated by Sabina Berne and supported by Tanja Kos and the ViroiDoc doctoral candidates. Key topics included determining when research is ready for publication, designing experiments to support a coherent storyline, and integrating data into convincing manuscripts. Kamoun emphasized focusing on the quality and conclusiveness of findings rather than volume or journal prestige, encouraging flexibility in narrative development as results evolve.

Discussions addressed handling contradictory results as opportunities for new hypotheses, prioritizing logical storytelling over strict chronological order, and the personal choice of writing in native languages supported by AI tools. The impact of preprints on writing standards was explored, highlighting the need for internal review and staged publishing. Data management strategies and literature search techniques were shared, including the use of tools like Zotero and AI summarization.

Balancing clarity with complexity in technical writing was underscored, with recommendations to use concise text and clear figures while placing detailed information in supplementary sections. Kamoun expressed critical views on mandatory AI acknowledgments, advocating ethical and productive use of such tools. Strategies for responding to reviewer comments were discussed, emphasizing thoughtful engagement and leveraging positive feedback. Finally, characteristics of high impact journals were outlined, focusing on addressing significant unknowns and framing research for broad relevance. The session concluded with encouragement to view scientific writing as a collaborative, evolving journey requiring practice and reflection.

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Detailed Summary

Deciding when to publish research

Linh Thi Thuy Le asked about determining the right time to publish a solid paper versus continuing research for higher impact. Professor Kamoun emphasized focusing on the quality and significance of the main finding rather than the volume of data or journal prestige. He advised drafting clear statements of the unknown and the finding to assess publication readiness.

- Sophien Kamoun advised focusing on the main finding's quality over quantity.
- He recommended drafting concise sentences capturing the unknown and the finding.

Designing experiments for storyline

Teodora Stojkovska inquired about how to design experiments to ensure a coherent storyline in the final paper. Kamoun explained that the storyline evolves with results; initial experiments shape the story, but it is revised as new data emerges. He encouraged flexibility and iterative development of the narrative throughout the research process.

- Sophien Kamoun stated that storylines are dynamic and evolve with data.
- He emphasized starting to shape the storyline when interesting results emerge.
- Kamoun noted many storylines never lead to publication but are valuable exercises.

Integrating experiments into manuscripts

Sabina Berne and Professor Kamoun discussed how to connect multiple experiments into a coherent manuscript. Kamoun stressed the importance of high-quality, well-controlled experiments that stand on their own. He warned against data dumping and advised prioritizing orthogonal replication and solid conclusions over volume.

- Kamoun criticized papers with poorly controlled, inconclusive experiments.
- He recommended drafting a paper outline to identify necessary figures and results.
- Kamoun highlighted the value of orthogonal replication to strengthen conclusions.

Handling contradictory results

Lena Michailidou asked about managing results that contradict initial hypotheses. Kamoun encouraged viewing such results as opportunities to discover new insights. He distinguished between failed experiments (inconclusive or technical failures) and conclusive experiments that disprove hypotheses, which are still valuable and publishable.

- Kamoun expressed excitement about data that challenges hypotheses.
- He defined failed experiments as inconclusive rather than contradictory results.
- Kamoun advised revising hypotheses based on conclusive contradictory data.

Narrative order vs chronology in papers

A question arose about whether to prioritize chronological order or logical flow in scientific storytelling. Kamoun advised prioritizing logical flow and framing for clarity, while ethically disclosing important information. He emphasized that scientific papers are communication tools, not historical records, and framing affects reader understanding.

- Kamoun recommended prioritizing logical storytelling over strict chronology.
- He stressed ethical disclosure but acknowledged selective framing is acceptable.

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- Kamoun likened scientific storytelling to cultural storytelling traditions.

Writing in native language vs English

João Colaço asked if drafting papers in one's native language helps in creating the story. Kamoun responded that it depends on individual comfort. He encouraged continuous notetaking and writing in any language, leveraging AI tools for translation and refinement later, emphasizing the importance of active writing throughout the research process.

- Kamoun said writing in native language is a personal choice.
- He advocated continuous notetaking and writing to capture ideas.
- Kamoun highlighted AI tools as aids for translation and editing.

Impact of preprints on writing

Teodora Stojkovska asked how posting preprints affects writing first drafts. Kamoun noted that preprints raise the bar since the community sees the work before formal review. He recommended internal review and using AI tools for feedback. He also described publishing in stages, for instance releasing computational parts first, then adding experimental data.

- Kamoun stated preprints require higher quality due to public exposure.
- He suggested using AI tools for internal review before posting.
- Kamoun described stepwise preprint publishing to incorporate additional data.

Data Management practices

Lena Michailidou inquired about organizing data management for accessibility during writing. Kamoun explained that researchers maintain multiple folders: a paper folder with drafts and figures, and separate technical folders for raw data. He showed lab tables tracking projects, experiments, priorities, and statuses to maintain organization and facilitate feedback.

- Kamoun described separating paper drafts from raw data folders.
- He shared lab tables listing projects, experiments, and priorities.
- Kamoun emphasized prioritization to manage workload effectively.

Literature search and reference tools

Sabina Berne asked about tools for managing references. Kamoun recommended Zotero for reference management. He described his approach to literature search combining forward (keyword-based) and reverse (citation-based) searches. He uses AI tools like Claude cowork to summarize PDFs and extract key findings, improving literature review efficiency.

- Kamoun recommended Zotero for reference management.
- He uses both forward and reverse literature searches.
- Kamoun employs AI to summarize and analyse collected PDFs.

Balancing clarity and complexity

A question addressed balancing clarity with complexity in technical writing. Kamoun advised using high-quality figures and concise text aligned with figures. He suggested placing detailed technical information in methods or supplementary materials. He noted that displaying bloated figures can be confusing to readers.

- Kamoun recommended concise text paired with clear figures.

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- He suggested relegating technical details to methods or supplements.
- Kamoun emphasized clarity without sacrificing necessary complexity.

Acknowledging AI tools in writing

A question about acknowledging AI tools in scientific writing elicited Kamoun's critical view of current publishing policies. He argued that using AI is akin to using editing services and should not require special disclosure. He emphasized ethical use of AI tools to enhance productivity without cutting corners.

- Kamoun criticized mandatory AI acknowledgments as unnecessary.
- He compared AI use to traditional editing services.
- Kamoun stressed personal ethical responsibility in AI usage.

Responding to reviewer comments

Sabina Berne asked how to handle reviewer comments, especially negative ones. Kamoun advised taking time to process reviews, highlighting positive feedback first, then addressing criticisms. He encouraged arguing and standing ground when justified, using positive reinforcement and constructive dialogue; the session concluded with encouragement to view scientific writing as a collaborative, evolving journey requiring practice and reflection.

Keep reading:

Don't Perish! A Step-by-Step Guide to Writing a Scientific Paper: 2026 Edition

10 things you should know about preprints

When to preprint?

Authorship — Let's talk about it!

What's a failed experiment?

Death by Statistics

Death by statistics — When one replicate is enough

About the presenter

Sophien Kamoun is a Senior Scientist at The Sainsbury Laboratory and Professor of Biology at the University of East Anglia. Internationally recognized for pioneering work on plant diseases and immunity, he has developed genomics and molecular approaches that transformed understanding of eukaryotic plant pathogens and opened new paths to combat major crop diseases.
A champion of open science, Kamoun promotes preprints, transparent peer review, and open data to accelerate discovery. He is a Fellow of the Royal Society and recipient of major honours including the Kuwait Prize and the Linnean Medal. He co-founded Resurrect Bio and GetGenome, initiatives advancing innovation and equitable access to genomics worldwide.
For more than 25 years, he has delivered the "Don't Perish" workshop to help early-career scientists communicate their work clearly and publish papers that matter. He regularly blogs on Medium about career advice and various topics.

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