

Writing Papers

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Graduate Skills Seminar

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Getting ahead entails good ideas communicated well

- **Success in research** = good results + good communication about your results
- **Success in business** = good ideas + good follow-through + good communication about your work
- **Good communication** =
 - “Elevator pitch” for professional conversations
 - Good presentations
 - Good writing
 - Conferences, journals, proposals, reports, white papers, etc.

Writing as a Communications Vehicle

*Writing exists in a cultural context. Know your professional culture and how it communicates. Your writing should be in the same style as others in your group and should be **optimized for your reader.***

- **Why are you doing this?** (What purpose does your paper serve?)
 - Raising awareness for your work?
 - Building your credibility as an expert?
 - Documenting work for the scholarly record?
- **Who is your audience?**
 - Specialists? Stakeholders? The public?
- **What is your story?**
 - What is important about it?
 - What is noteworthy/memorable about your approach?

Writing as a Creative Process

Writing advances your technical understanding. Many details and the overall story are refined when you write things up. (Especially true for your thesis and grant proposals ...)

- **Writing can help organize the way you think about your results**
 - You may have created the results in an exploratory way but usually write them up as part of a well-structured plan
- **Writing can help put your work in context**
 - You'll discover a lot about your work by setting it in context with others
- **Writing may lead you to additional work**
 - Do you need to do more in order to present strong results?
- **It's important to have extended time periods to “get in the zone” when you're writing**

Writing is a skill you keep getting better at

- If your paper doesn't get accepted ... **DON'T GIVE UP**
- “Bounce”/improve the work!
 - Get over it, look at the reviews, and improve the piece
 - Get more results if needed
 - Send it somewhere else (or for another round)
- **Not getting accepted doesn't necessarily mean that the work is bad** (original PageRank paper rejected from SIGIR in 1998 ...)

Heilmeier's Catechism (from Wikipedia)

George Heilmeier was former Director of DARPA (Defense Advanced Research Projects Agency), former CTO of Texas Instruments, former President of Bellcore, and former CEO of SAIC. **Heilmeier's Catechism** is a set of questions credited to Heilmeier that anyone proposing a research project or product development effort should be able to answer:

- **What** are you trying to do? Articulate your objectives using absolutely no jargon.
- **How** is it done today, and what are the limits of current practice?
- **What's new** in your approach and why do you think it will be successful?
- **Who cares?**
- If you're successful, what difference will it make? (**value proposition**)
- What are the **risks and the payoffs**?
- How much will it **cost**?
- **How long** will it take?
- What are the midterm and final "exams" to check for success? (**milestones, metrics of success**)

Targeted Writing

- Conference Papers
- Journal Papers
- Op-eds

Writing Conference Papers

- **Audience:** Specialists in your general area (e.g. programming languages, data mining, HPC)
 - In peer-reviewed conferences, first you need to get accepted by the **Review Committee**
- **Review committees:**
 - **Have a lot of papers to read in a short period of time -- You need to “sell them” early**
 - Make your results compelling and clear on the first page
 - Make your paper easy to skim (graphics, organization, line spacing, font)
 - **Are looking for new results that advance the state of the art**
 - Make the innovative aspects of your paper clear up front
 - **Are often looking for “hot” topics**
 - Can you relate your results to a community / national priority or new area?

Writing Conference Papers – Structure

- The structure of your paper is dependent on conference and area. **Read “best papers” from your target conference as a model.** (Best papers in many conferences at http://jeffhuang.com/best_paper_awards.html)
- **Generic format**
 - Introduction
 - (Related work)
 - Approach
 - (Related work)
 - Results
 - (Future Work)
 - Conclusion
 - References

Increasing number of conferences may expect you to **cite your data.**

Get in the habit of doing it.

Writing Conference Papers – More Detail 1

1. Abstract

- 1-2 paragraphs summarizing the paper and results. Should be **well-written and broadly understandable**.

2. Introduction

- ~1 page – should tell reviewer everything they need to know about what you are doing and why it is important.
- **This is the time to catch the reader and make a positive first impression. Spend the extra time to make this compelling, exciting and interesting.**

3. Related work

- **Generously include work that's relevant, especially from likely reviewers**
- Diplomatically describe why their work doesn't solve your problem (“Berman's work focused on networks in which communication costs are zero. Our work focuses on networks in which communications costs are positive and vary dynamically”)
- Related work is sometimes positioned later in the paper.

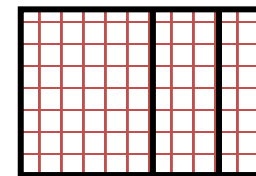
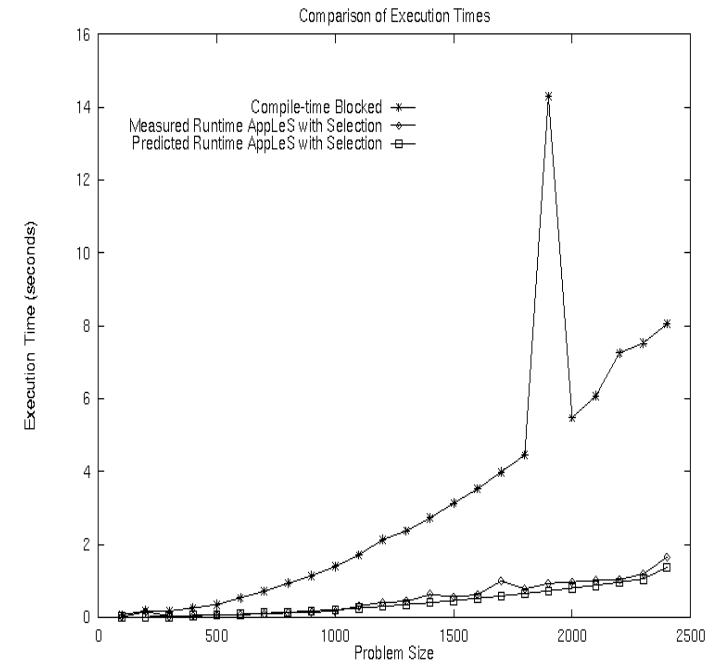
Writing Conference Papers – More Detail 2

4. Approach

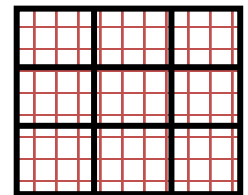
- Clearly describe the problem you're solving and your approach to solve it: methods, experiments, theorems, etc.
- Provide enough detail to make your approach **credible** and **reproducible**

5. Results

- Make the work visually accessible and interesting. Well-described graphs and visuals (tables, etc.) can be great additions
- Provide insight into the trends in your data and what they imply with respect to the problem and the area.



Run-time
AppLeS
Partitioning



Compile-time
Blocked
Partitioning

Writing Conference Papers – More Detail 3

6. (Future Work)

- What needs to be done next?
- This can help increase the interest and motivation for the work you've already done.
- Sometimes not included.

7. Conclusion

- .5 page? Should be as self-contained as possible, compelling, and less than a page: What did you do, how did you do it, what are the results, why should we care.
- **After the introduction, this will likely be the second most read section.**

8. Acknowledgements

- People who helped who are not authors. Be generous.

9. References

- Be relevant and generous. Use the standardized reference formats for your community.

Writing Journal Papers

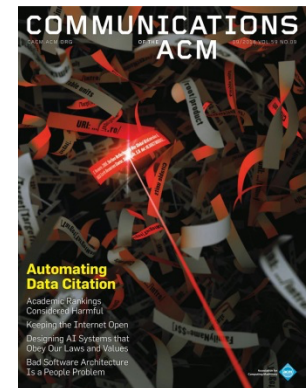
- **Journal papers are the archival record of your work. This is the place for comprehensive detail and thorough description of what you have done.**
- **Audience:** Specialists in your specific area (e.g. exascale programming environments) and in the general area (e.g. HPC)
- **Journal papers**
 - Should include enough details so that results can be reproduced when possible
 - Should provide detailed methodology and charts and graphs of results
 - Should include data citations so paper is “self-contained”
 - Should stand up if read “with a fine toothed comb”

Writing Journal Papers – Organization

- Organization of the paper is dependent on journal and area. **Read other papers from the journal as a guide.**

- **Generic format**

- Introduction
- Related work
- Approach
- Results
- Future Work
- Conclusion
- References



Writing Journal Papers – More Detail 1

- **Use the same basic structure for journal and conference papers.** All guidelines about clear and compelling writing in conference papers apply.
- **In a Journal paper, you have more room and are expected to go into greater detail.**
 - Reviewers expect to spend more time on these and provide detailed feedback to you.
 - Write the paper assuming that every detail will be gone through with a fine-toothed comb.
- **Differences between Journal and Conference Papers**
 - **Introduction** -- you have a bit more room than a page. In a 20 page paper, you can spend 2+ pages motivating the problem and your solution.
 - **Related work** – You can go more into detail about what other people have done and where your work fits in. Remember that you need to **both show that your work is different and not put down other's research**

Writing Journal Papers – More Detail 2

- Differences between Journal and Conference Papers:
 - **Approach** – Provide a detailed methodology that could be reproduced. Provide enough detail about parameters, hardware, software, data, versions **so that someone else could reproduce your results** with the same setup if possible.
 - **Results** – **Explain your results and their significance thoroughly.** Why did the graph spike? Under what circumstances was one method better than another?
 - **Future Work** – Include future approaches and problems that this work could support. Spend < 1 page on this.
 - **Conclusion** – Make this self-contained and clear. Spend < 1 page on this.
 - **References** – Can include even more refs. Be generous and thorough.

Journal papers can be dense but still need to be understandable ...

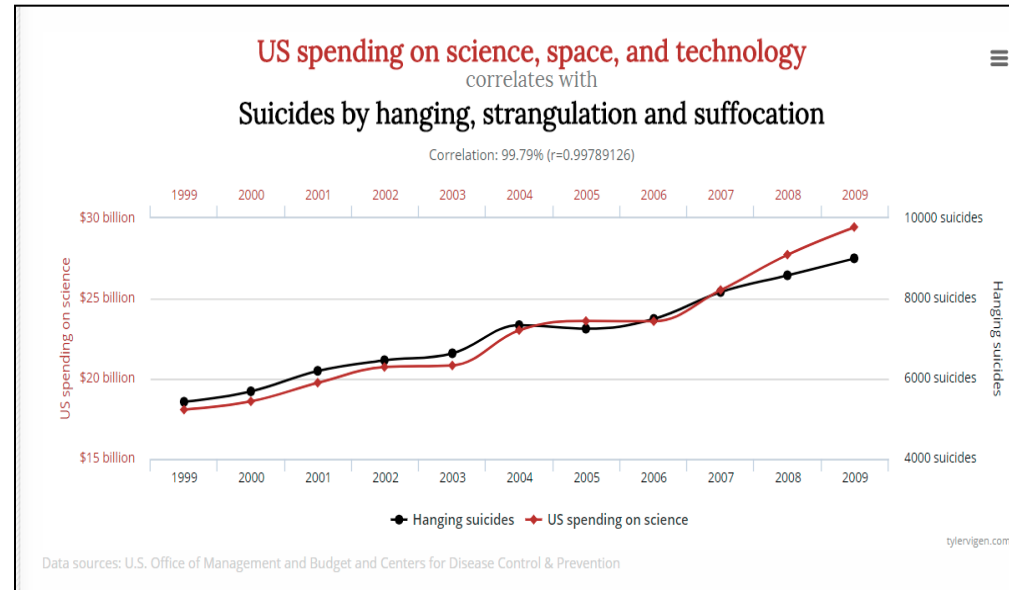
- <https://datascience.codata.org/articles/10.5334/dsj-2018-019/>
- <https://cacm.acm.org/magazines/2018/4/226372-realizing-the-potential-of-data-science/fulltext>

Optimizing your chances of success (conference and journal papers) 1

- **Make the paper easy / fun to read**
 - **Use graphics** to compellingly convey the message
 - Use font / spacing / italics and bolding / section organization / color to make the paper fun to read
 - **Don't jam every possible space and use super-small font**
 - **Do multiple drafts** until you get it to a level that will promote your success
- **Present your work professionally**
 - **Use “we”** vs. “I”, even if there is only one of you
 - **Don't oversell nor undersell.** Study how other authors subtly promote the importance of their work without sounding arrogant (the “humblebrag”!).
 - **Look at “Best Paper” recipients** in your conference or highly ranked journal articles for good examples of writing and results
 - **Do not plagiarize** – if you want to refer to something explicitly or implicitly, cite the work and give credit to the authors.

Optimizing your chances of success 2

- **Be careful about correlation vs. causality:**
 - Many phenomena happen together without a causal relationship



From <http://www.tylervigen.com/spurious-correlations>

- **Strive to make your work reproducible:**
 - Include enough detail about methods, hardware, software, parameters, etc. so that someone could conceivably reproduce your results.
 - Share code and data when possible. Issues about what to share and what is competitive advantage still under discussion
<https://web.stanford.edu/~vcs/papers/RoundtableDeclaration2010.pdf>
- **Use “Red-team” reviewers:**
 - Pick knowledgeable and trustworthy colleagues to read and critique your paper.
 - **Revise the paper** based on their reactions and their comments on strengths and weaknesses.

Optimizing your chances of success 3

- **Don't "thumb your nose at the giant"**
 - Pay attention to page length. If there are page limits (e.g. in conferences), don't just make things smaller to fit in.
 - Be generous with related work – include relevant potential reviewers
 - Don't dis others
- **Cite your data:**
 - **Provide a publicly accessible place for your data** – ingesting your data in a public or institutional repository is best if the Journal does not provide repository services.
 - **Give your data a DOI** and create a citation for your data.
 - Use community practice / standards to refer to your data. (<https://www.rd-alliance.org/group/data-citation-wg/outcomes/data-citation-recommendation.html> provides a community approach that includes dynamically changing data sets). Include relevant metadata.

Op-eds: A written elevator pitch ...

- An **Op-ed** is a short written piece that expresses your opinion.
- **Audience:** General public / non-specialists
- **Publication venue:** Newspaper, magazine, etc.
- **Purpose:** Persuasively get your point of view across
- **Op-eds (and blogs) can have tremendous influence on community and stakeholders**
 - Can establish you as an expert
 - Can get your point of view into the national discourse
 - Can be useful to your company, project or community
- **Writing Op-eds can help train you as a persuasive communicator**

Op-Eds give your opinions a voice

SEARCH

The New York Times


EDITORIAL Promises, Promises From AT&T


DAVID BROOKS The Epidemic of Worry

DAVID LEONHARDT Dear Republican Voters

The Opinion Pages

Struggling to Serve at the Nation's Richest University

 **Rosa Ines Rivera**
ON CAMPUS OCT. 24, 2016



Karyn Lee/Pratt Institute

Cambridge, Mass. — I've been at [Harvard University](#) for 17 years, but I've never been in a classroom here. I'm a cook in the dining halls. I work in the cafeteria at the T.H. Chan School of Public Health, where every day I serve


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I Had My DNA Picture Taken, With Varying Results



Log in to see what your friends are sharing. Log in with Facebook on.nytimes.com. Privacy Policy | What's This?

What's Popular Now

Surgars Who Took on F.B.I. Abandon Shadows

Run Run Shank, Merie Mogil Stora as Creator of King To Game, Utes at 106

MOST EMAILED RECOMMENDED FOR YOU

- In Defense of DNA Testing (2 Letters)
- Brazing for Carp in Great Lakes, but Debating Their Presence
- A New Test for Malaria, No Blood Required
- LETTERS: Weighing the Value of Mammograms
- OBSERVATORY: Mutant Petunias Sing the Blues
- NEWS ANALYSIS: Why Everyone Seems to Have Cancer
- DOT EARTH: Ford, Genes and the Feeling of Risk

Kira Peilart, 28, had her DNA tested by three direct-to-consumer companies, and the results didn't agree.

By KIRA PEILART
Published: December 30, 2013 | 421 Comments

I like to plan ahead; that much I know about myself before I plunged into exploring my genetic code. I'm a healthy 28-year-old woman, but some nasty diseases run in my family: [secondary heart disease](#), [rheumatoid arthritis](#), [Alzheimer's](#) and [breast cancer](#).

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Home / Magazine Archive / February 2017 (Vol. 60, No. 2) / Social and Ethical Behavior in the Internet of Things / Full Text

DEPARTMENTS

Social and Ethical Behavior in the Internet of Things

By Francine Berman, Vinton G. Cerf
Communications of the ACM, Vol. 60 No. 2, Pages 6-7
10.1145/3036898
Comments

VIEW AS: [Icons for print, mobile, etc.] SHARE: [Icons for email, social media, etc.]




Last October, millions of interconnected devices infected with malware mounted a "denial-of-service" cyberattack on Dyn, a company that operates part of the Internet's directory service. Such attacks require us to up our technical game in Internet security and safety. They also expose the need to frame and enforce social and ethical behavior, privacy, and appropriate use in Internet environments.

Social behavior and appropriate use become even more crucial as we build out the "Internet of Things" (IoT)—an increasingly interconnected cyber-physical-biological environment that links devices, systems, data, and people. At its best, the IoT has the potential to create an integrated ecosystem that can respond to a spectrum of needs, increasing efficiency and opportunity, and

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ARTICLE CONTENTS:

Introduction
What Policy Will Be Needed for the IoT?
Toward a Framework for Thinking About Principles and Policy for the IoT
References
Authors

Op-Eds provide evidenced opinions

Not all Op-Eds are like this, but many good Op-Eds have this structure:

- **Lede** – *Lead-in around a news hook or personal experience*
- **Thesis** – *your position (explicit or implied)*
- **Argument** – *should be based on evidence (stats, news, reports, expert quotes, scholarship, history, experience). Arguments often presented as a series of points.*
- **Criticism pre-emption** – *take the lead in acknowledging the flaws in your argument and address potential counter-arguments*
- **Conclusion** – *circle back to lede?*

Lede Options

- Current news
- Dramatic or personal anecdote
- Reference to popular culture or twist on conventional wisdom
- Anniversary of an event
- Major new study

Op-Ed Tips (also great tips for any “elevator pitch” type of communication)

- **Write in a way that generic smart people can relate to**; don't assume they know your discipline.
- **Don't use buzzwords or talk “inside baseball”** without explaining things.
- **Make it short and compelling** -- Pay attention to publication word count – op-eds are often less than 1000 words
- **The final version may be reviewed and/or edited** – what you send in may not be the final draft
- **Do your homework** – everyone will read this
- **Be prepared for feedback** – comments, tweets, etc.

Keep at it

- Writing is a useful skill no matter what job you have
- Good writing takes **effort**. Better writing takes **practice**. You will keep improving your writing throughout your career.
- If you don't get accepted ... **Don't give up**
 - “Bounce”/improve the work!
 - Get over it, look at the reviews and improve the piece
 - Get more results if needed
 - Ask for help from your network
 - Send it somewhere else (or for another round)
- *Good reference for all of these concepts with additional details at http://www.cs.ucr.edu/~eamonn/Keogh_SIGKDD09_tutorial.pdf*