Managing Research

Outline

How to...

- Come up with research ideas
- Choose research topic
- MSc vs PhD
- Stay updated with new research
- Read papers efficiently
- Work with your supervisors
- Decide to start writing
- Connect with your research community

How to come up with research ideas?

Subjective thoughts for this point in time

1. Narrow down
2. Specialize
3. Document into your tool-box
4. Read more broadly
5. Find a new idea

How to come up with research ideas?

Subjective thoughts for this point in time

1. Narrow down
2. Specialize
3. Document into your tool-box
4. Read more broadly
5. Find a new idea

Narrow Down

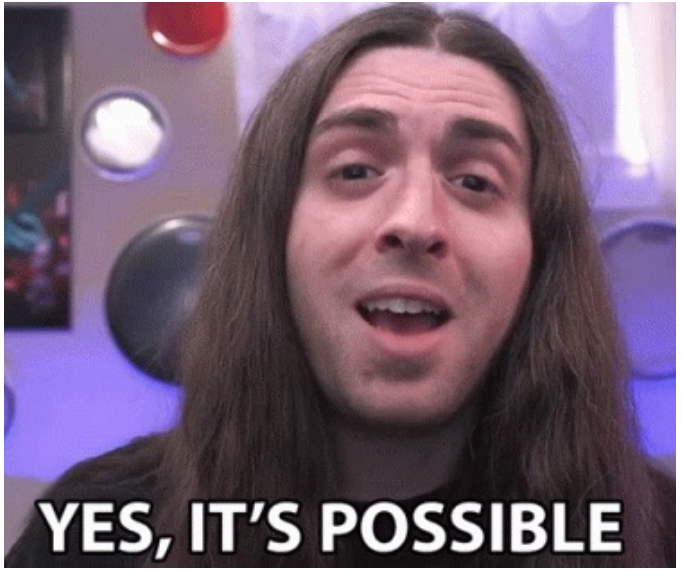
Choose a *specific* topic

1. Is it **important**?

Narrow Down

Choose a *specific* topic

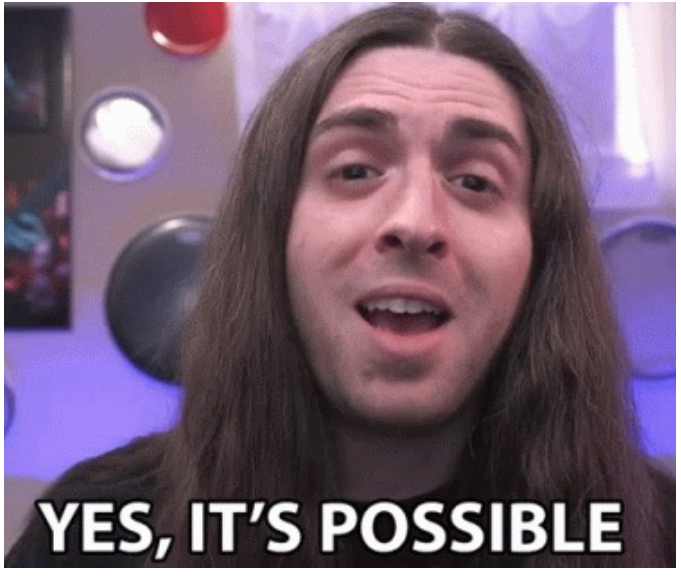
1. Is it **important**?
2. Is it **feasible**?



Narrow Down

Choose a *specific* topic

1. Is it **important**?
2. Is it **feasible**?
3. Play to yours and your supervisors strengths



Narrow Down

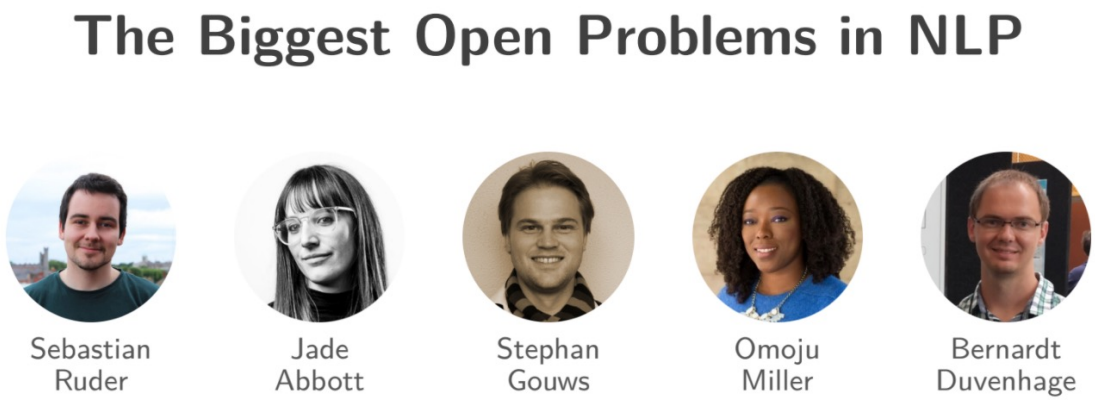
Choose a *specific* topic

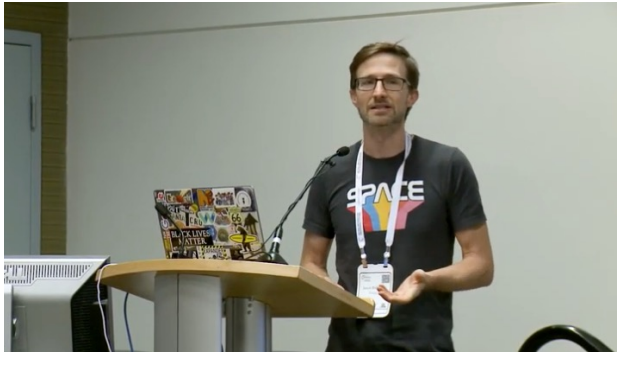
1. Is it **important**?
2. Is it **feasible**?
3. Play to yours and your supervisors strengths

If you do not work on an important problem, it's unlikely you'll do important work. It's perfectly obvious.
Richart Hamming, "You and Your Research"

Narrow Down

How to know what's important? Listen to leading researchers talks





[Sebastian Ruder's session link], [Jason Baldridge's talk], [Thomas Wolf's talk]

Narrow Down

Be aware of red & blue oceans

- *“Blue Ocean” problems are safe, in “Red Ocean” problems you have more competition*

reference

How to come up with research ideas?

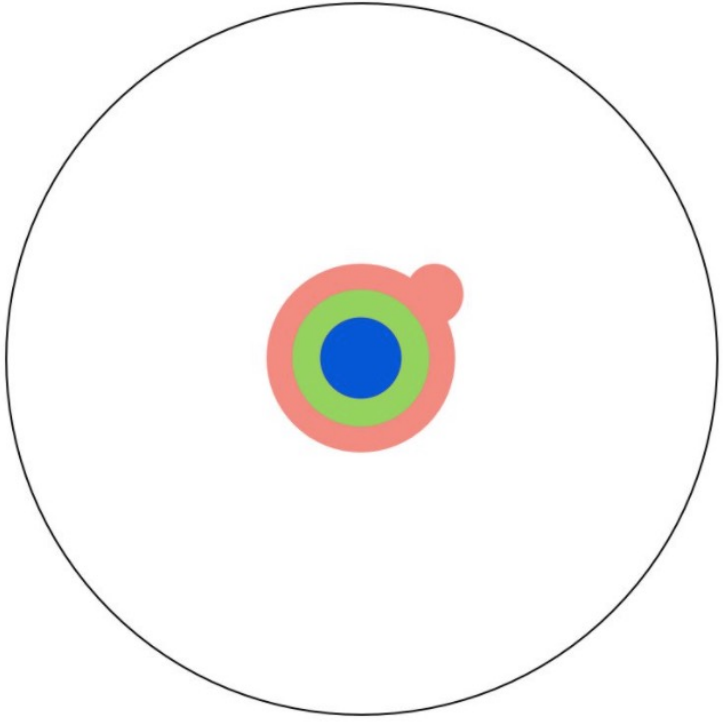
Subjective thoughts for this point in time

1. Narrow down
2. Specialize
3. Document into your tool-box
4. Read more broadly
5. Find a new idea

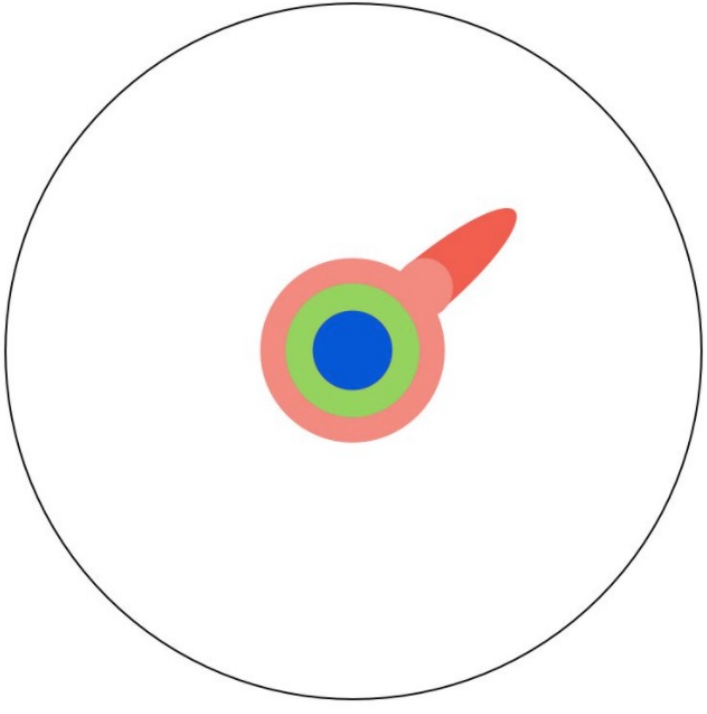
Specialize

Read a lot about your topic

With a bachelor's degree, you gain a specialty:



A master's degree deepens that specialty:

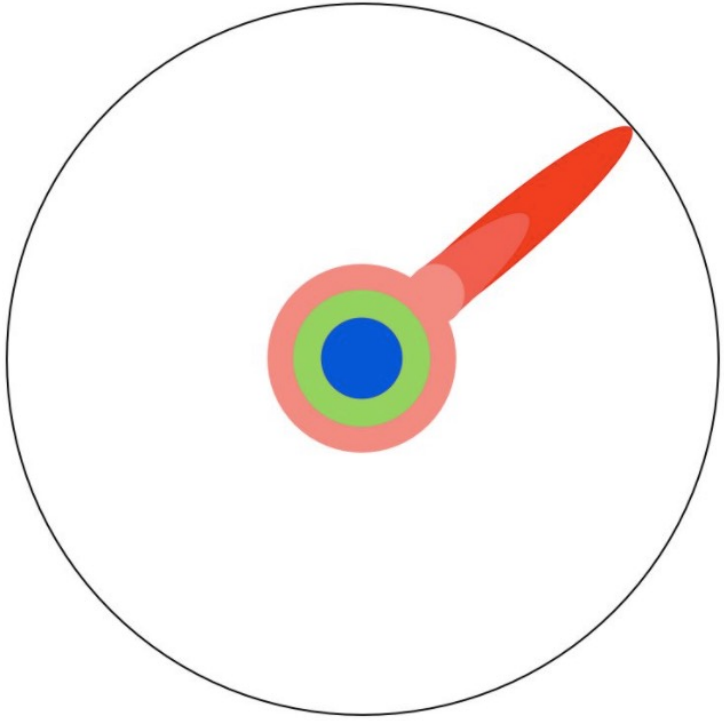


https://matt.might.net/articles/phd-school-in-pictures/

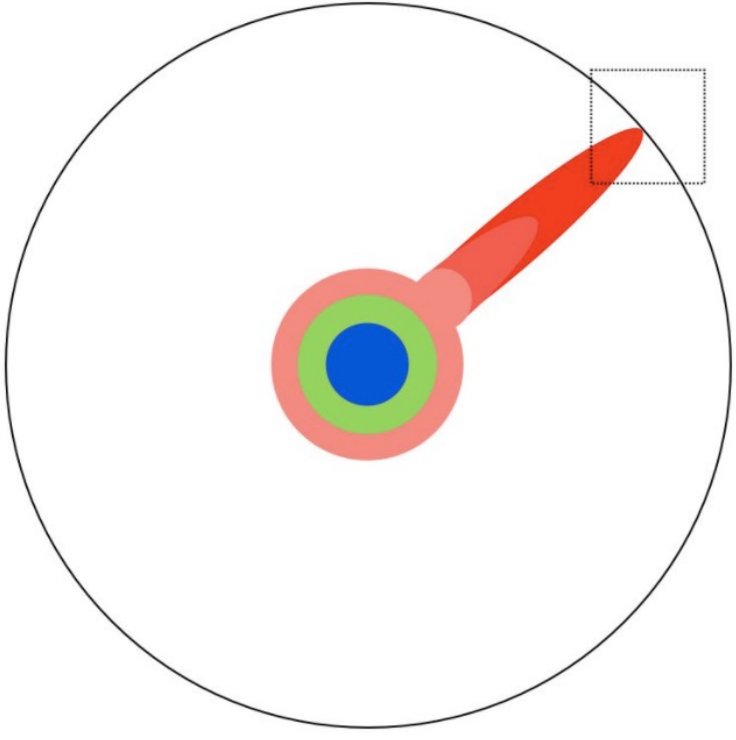
Specialize

Read a lot about your topic

Reading research papers takes you to the edge of human knowledge:



Once you're at the boundary, you focus:



https://matt.might.net/articles/phd-school-in-pictures/

Detour - PhD vs. MSc

	MSc	PhD
Time	2 years	4 years
Focus	Implementation (?) Single project **How** to research	Innovation Multiple projects **What** to research
Projects risks	Preferably low risk	It's ok to have high risk
Who to work with?	Mainly your advisor	Grow your network of collaborators, go to internships, etc
Extra requirements	~24 Points in courses Overhead of starting research	~12 points in courses
Future Work	Machine Learning Engineer, Research Engineer, Research Scientist	Academia (very competitive), Industry Research Labs

Specialize

How to manage reading?

Specialize

How to manage reading?

1. Understand what was done in the field so far (Possible to read reviews). [1]
2. *Start from a seed of papers (**or people!**)*

[1] Uri Berger

Specialize

How to manage reading?

1. Understand what was done in the field so far (Possible to read reviews). [1]
2. *Start from a seed of papers (**or people!**)*
3. Then, repeat:
   - *Track new citations*
   - *Skim new papers, add to "papers pool" if interesting*
   - *Do it fast.* **Distinguish exploration time and times working on current projects**


6 New Citations for Papers You Follow Inbox ×

Semantic Scholar <do-not-reply@semanticscholar.org> Unsubscribe 11:35 PM (3 minutes ago)

to me

New Papers Matching Multiple Alerts

Cites LXMERT: Learning Cross-Modality Encoder Representations from Transformers • Cites GQA: A New Dataset for Real-World Visual Reasoning and Compositional Question Answering

Logically at the Factify 2022: Multimodal Fact Verification

Jie Gao, Hella-Franziska Hoffmann, ... Anil Bandhakavi

This paper describes our participant system for the multi-modal fact verification (Factify)

[1] Uri Berger

Specialize

How to manage reading?

1. Understand what was done in the field so far (Possible to read reviews). [1]
2. *Start from a seed of papers (**or people!**)*
3. Then, repeat:
   - *Track new citations*
   - *Skim new papers, add to "papers pool" if interesting*
   - *Do it fast.* **Distinguish exploration time and times working on current projects**
4. Each conference (NAACL, ACL, EMNLP), read (**or watch!**) the papers most related to your work (< 10)


6 New Citations for Papers You Follow Inbox ×

Semantic Scholar <do-not-reply@semanticscholar.org> Unsubscribe 11:35 PM (3 minutes ago)
to me

New Papers Matching Multiple Alerts

Cites LXMERT: Learning Cross-Modality Encoder Representations from Transformers • Cites GQA: A New Dataset for Real-World Visual Reasoning and Compositional Question Answering

Logically at the Factify 2022: Multimodal Fact Verification

Jie Gao, Hella-Franziska Hoffmann, ... Anil Bandhakavi

This paper describes our participant system for the multi-modal fact verification (Factify)

[1] Uri Berger

Specialize

Why to skim a paper?

- *Most of the papers you will encounter won't benefit your specifically*
  - *If the paper does benefit your project, read all in depth*

Specialize

Why to skim a paper?

- *Most of the papers you will encounter won't benefit your specifically*
  - *If the paper does benefit your project, read all in depth*
- ***Move fast***

Specialize

Why to skim a paper?

- *Most of the papers you will encounter won't benefit your specifically*
  - *If the paper does benefit your project, read all in depth*
- ***Move fast***
- *Train yourself you identify the* ***core contribution***

Specialize

Why to skim a paper?

- *Most of the papers you will encounter won't benefit your specifically*
  - *If the paper does benefit your project, read all in depth*
- ***Move fast***
- *Train yourself you identify the **core contribution***

"A paper is not a random collection of some experiments you ran that you report on. The paper sells a single thing that was not obvious or present before.", Andrej Karpathy [1]

[1] Andrej Karpathy (Director of AI in Tesla, previously OpenAI, CS231n, PhD @ Stanford): A Survival Guide to a PhD

Specialize

How to skim a paper?

- *Persist, you will improve over time*

Specialize

How to skim a paper?

- *Persist, you will improve over time*
- *Can you **TLDR** it in 2-3 sentences?*

Specialize

How to skim a paper?

- *Persist, you will improve over time*
- *Can you **TLDR** it in 2-3 sentences?*
- *What is the problem this paper deals with?*

Specialize

How to skim a paper?

- *Persist, you will improve over time*
- *Can you **TLDR** it in 2-3 sentences?*
- *What is the problem this paper deals with?*
- *What is the main idea of the method they use?*

Specialize

How to skim a paper?

- *Persist, you will improve over time*
- *Can you **TLDR** it in 2-3 sentences?*
- *What is the problem this paper deals with?*
- *What is the main idea of the method they use?*
- *What are their main findings? (Not results)*
  - *Can you relate their work to your project? How?*

Specialize

How to skim a paper?

- *Stop when you can **TLDR** it in 2-3 sentences.*
- *(Continue reading if it's useful for your project)*

Specialize

How to skim a paper?

- *Stop when you can **TLDR** it in 2-3 sentences.*
- *(Continue reading if it's useful for your project)*

1. *Figure 1*

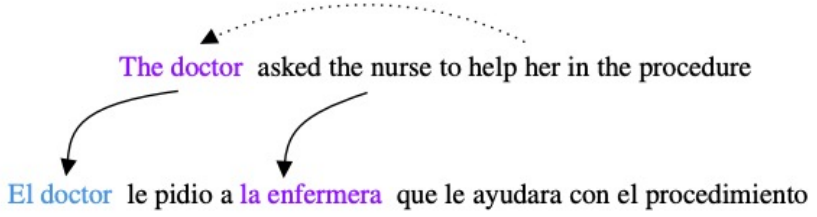


Figure 1: An example of gender bias in machine translation from English (top) to Spanish (bottom). In the English source sentence, the nurse's gender is unknown, while the coreference link with "her" identifies the "doctor" as a female. On the other hand, the Spanish target sentence uses morphological features for gender: "*el* doctor" (male), versus "*la* enfermer*a*" (female). Aligning between source and target sentences reveals that a stereotypical assignment of gender roles changed the meaning of the translated sentence by changing the doctor's gender.

Specialize

How to skim a paper?

- *Stop when you can **TLDR** it in 2-3 sentences.*
- *(Continue reading if it's useful for your project)*

1. *Figure 1*
2. *Other figures if informative enough*

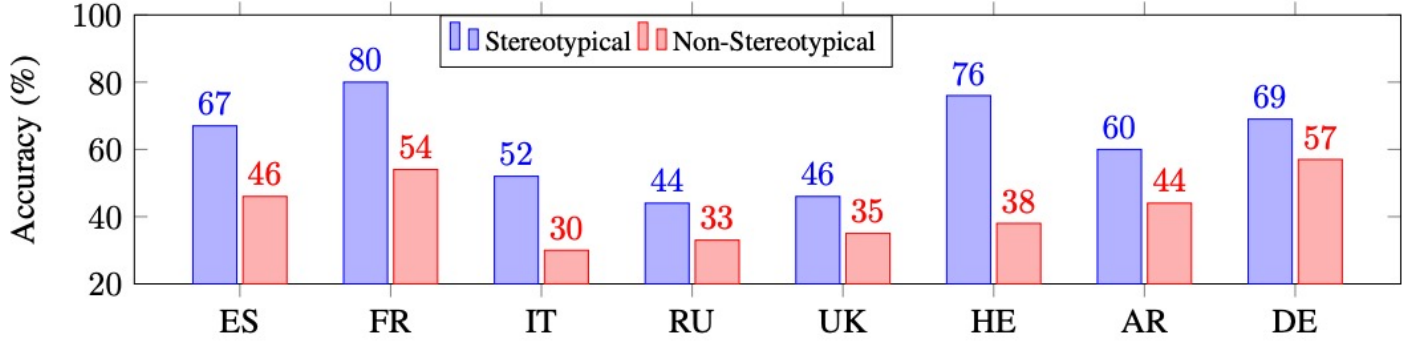


Figure 2: Google Translate's performance on gender translation on our tested languages. The performance on the stereotypical portion of WinoMT is consistently better than that on the non-stereotypical portion. The other MT systems we tested display similar trends.

Specialize

How to skim a paper?

- *Stop when you can **TLDR** it in 2-3 sentences.*
- *(Continue reading if it's useful for your project)*

1. *Figure 1*
2. *Other figures if informative enough*
3. *Abstract*

Abstract

We present the first challenge set and evaluation protocol for the analysis of gender bias in machine translation (MT). Our approach uses two recent coreference resolution datasets composed of English sentences which cast participants into non-stereotypical gender roles (e.g., "The doctor asked the nurse to help *her* in the operation"). We devise an automatic gender bias evaluation method for eight target languages with grammatical gender, based on morphological analysis (e.g., the use of female inflection for the word "doctor"). Our analyses show that four popular industrial MT systems and two recent state-of-the-art academic MT models are significantly prone to gender-biased translation errors for all tested target languages. Our data and code are publicly available at `shorturl.at/dimuD`.

Specialize

How to skim a paper?

- *Stop when you can **TLDR** it in 2-3 sentences.*
- *(Continue reading if it's useful for your project)*

1. *Figure 1*
2. *Other figures if informative enough*
3. *Abstract*
4. *Introduction "In this paper" part*

1 Introduction

Learned models exhibit social bias when their training data encode stereotypes not relevant for the task, but the correlations are picked up anyway. Notable examples include gender biases in visual SRL (cooking is stereotypically done by women, construction workers are stereotypically men; Zhao et al., 2017), lexical semantics ("man is to computer programmer as woman is to homemaker"; Bolukbasi et al., 2016), and natural language inference (associating women with gossiping and men with guitars; Rudinger et al., 2017).

In this work, we conduct the first large-scale multilingual evaluation of gender-bias in machine translation (MT), following recent small-scale qualitative studies which observed that online MT services, such as Google Translate or Microsoft Translator, also exhibit biases, e.g., translating nurses as females and programmers as males, regardless of context (Alvarez-Melis and Jaakkola, 2017; Font and Costa-Jussà, 2019). Google Trans-

Specialize

How to skim a paper?

- *Stop when you can **TLDR** it in 2-3 sentences.*
- *(Continue reading if it's useful for your project)*

1. *Figure 1*
2. *Other figures if informative enough*
3. *Abstract*
4. *Introduction "In this paper" part*
5. *Contributions*

Specialize

How to skim a paper?

- *Stop when you can **TLDR** it in 2-3 sentences.*
- *(Continue reading if it's useful for your project)*

1. *Figure 1*
2. *Other figures if informative enough*
3. *Abstract*
4. *Introduction "In this paper" part*
5. *Contributions*
6. *Result tables*

How to come up with research ideas?

Subjective thoughts for this point in time

1. Narrow down
2. Specialize
3. Document into your tool-box
4. Read more broadly
5. Find a new idea

Document into your toolbox

TLDR stuff that you may want to use in the future

1. It should be ***searchable***
2. The more probability you'll use it - the longer it should be

NAACL 21: Measuring Social Biases in Grounded Vision and Language Embeddings. https://www.aclweb.org/anthology/2021.naacl-main.78.pdf.

TLDR: Measuring social biases in V+L word embeddings.

Contributions:

1. Adapting WEAT and SEAT metrics to V+L, ("Grounded" versions).
2. A new dataset for testing biases in grounded systems (a small collection of men/women V+L pairs with stereotypes).
3. Findings ->.

Findings about social bias:

1. Grounded word embeddings have social biases.
2. Grounded evidence has little impact on social biases. (In other words - currently the image doesn't assist enough overcoming the bias).
3. Biases mostly comes from the language modality.

How to come up with research ideas?

Subjective thoughts for this point in time

1. Narrow down
2. Specialize
3. Document into your tool-box
4. **Read more broadly**
5. Find a new idea

Read more broadly

Exploration

1. Many ideas in deep learning take inspiration from other fields

https://ruder.io/10-tips-for-research-and-a-phd/index.html#1-read-broadly-

Read more broadly

Exploration

1. Many ideas in deep learning take inspiration from other fields
2. Diverse interests ➡️ rich repertoire

https://ruder.io/10-tips-for-research-and-a-phd/index.html#1-read-broadly-

Read more broadly

Exploration

1. Many ideas in deep learning take inspiration from other fields
2. Diverse interests ➡️ rich repertoire
3. Follow important trends in the field

NeurIPS 2021—10 papers you shouldn't miss

2334 papers, 60 workshops, 8 keynote speakers, 15k+ attendees. A dense landscape that's hard to navigate without a good guide and map, so here are some of our ideas!

Top NLP Trends and Predictions 2022: is NeuralSpace set up for the future of NLP?

Felix Laumann Follow

Oct 11 · 6 min read

https://ruder.io/10-tips-for-research-and-a-phd/index.html#1-read-broadly-, 1st screenshot, 2nd screenshot

How to come up with research ideas?

Subjective thoughts for this point in time

1. Narrow down
2. Specialize
3. Document into your tool-box
4. Read more broadly
5. Find a new idea

Find a new idea

HOW!?

Find a new idea

HOW!?

- Once you've mastered the foundational abilities

Find a new idea

HOW!?

- Once you've mastered the foundational abilities
- "The Adjacent Possible"
  - The next big ideas in any field are found right beyond the current cutting edge, in the adjacent space that contains the possible new combinations of existing ideas". [1]

[1] Cal Newport

Find a new idea

HOW!?

- Once you've mastered the foundational abilities
- "The Adjacent Possible"
  - The next big ideas in any field are found right beyond the current cutting edge, in the adjacent space that contains the possible new combinations of existing ideas". [1]
- Connect topics or fields

[1] Cal Newport

Find a new idea

HOW!?

- Once you've mastered the foundational abilities
- "The Adjacent Possible"
  - The next big ideas in any field are found right beyond the current cutting edge, in the adjacent space that contains the possible new combinations of existing ideas". [1]
- Connect topics or fields
- Find literature gaps

[1] Cal Newport

Find a new idea

HOW!?

- Once you've mastered the foundational abilities
- "The Adjacent Possible"
  - The next big ideas in any field are found right beyond the current cutting edge, in the adjacent space that contains the possible new combinations of existing ideas". [1]
- Connect topics or fields
- Find literature gaps
- Use your tool-box

[1] Cal Newport

Find a new idea

Examples

- They implement X. Why don’t they use Y like Z did?

Find a new idea

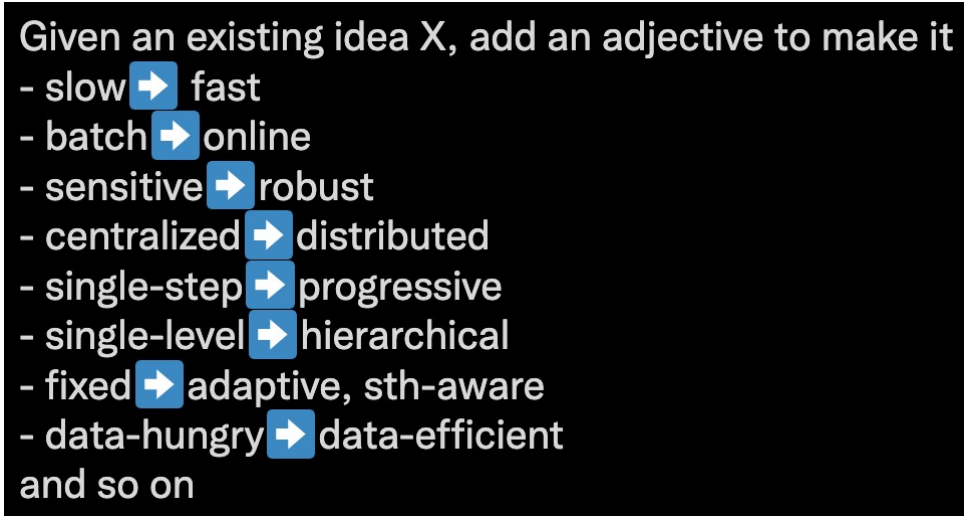
Examples

- They implement X. Why don’t they use Y like Z did?
- The adopted X to Y. But they ignore Z. I know it because of *that paper*…

Find a new idea

Examples

- They implement X. Why don't they use Y like Z did?
- The adopted X to Y. But they ignore Z. I know it because of *that paper*…
- From Jia-Bin Haung:
  - Find a different dimension, Ex: Text / audio / image / video / graph
  - Combine two ideas/problems
  - Add an adjective



https://twitter.com/jbhuang0604/status/1423499766969901057

Working with your supervisors

Working with your supervisors

- Your future employers actually wants your supervisor. He is busy… they hope you are the most similar version they can afford[1]

[1] Cal Newport

Working with your supervisors

- Your future employers actually wants your supervisor. He is busy… they hope you are the most similar version they can afford[1]
- Repeating (weekly?) meetings

[1] Cal Newport

Working with your supervisors

- Your future employers actually wants your supervisor. He is busy… they hope you are the most similar version they can afford[1]
- Repeating (weekly?) meetings
- The meetings are for you [2]
  - It's not a test. Receive feedback.
  - **Leshem**: If you don't need / not ready for the meeting - cancel it
  - **Gabi**: Never cancel a meeting

[1] Cal Newport
[2] Leshem Choshen

Working with your supervisors

- Arrive prepared
  - Prepare the topics and meeting materials up-front
  - Send a sneak peek

Working with your supervisors

- Arrive prepared
  - Prepare the topics and meeting materials up-front
  - Send a sneak peek
- Each critic is another opportunity for you to improve

Working with your supervisors

- Arrive prepared
  - Prepare the topics and meeting materials up-front
  - Send a sneak peek
- Each critic is another opportunity for you to improve
- Write action items for next meeting

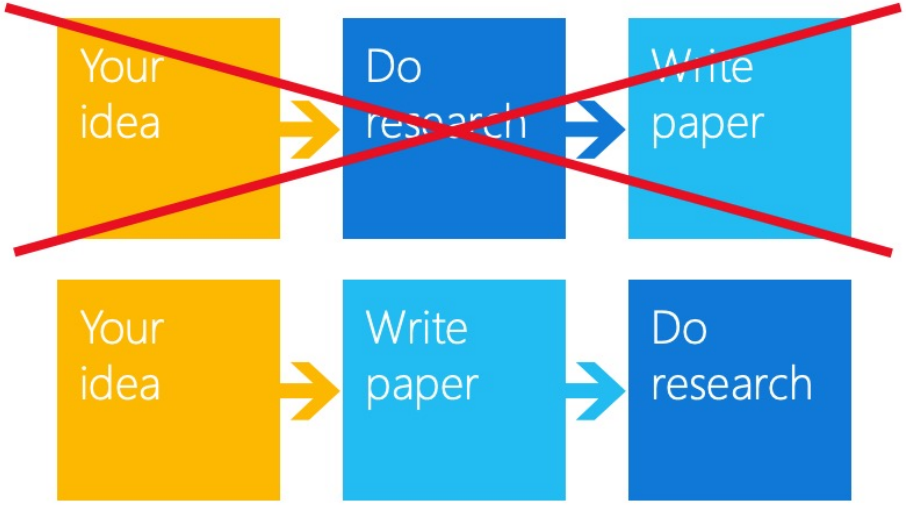
Working with your supervisors

- Arrive prepared
  - Prepare the topics and meeting materials up-front
  - Send a sneak peek
- Each critic is another opportunity for you to improve
- Write action items for next meeting
- Try their suggestions (all of them)

Planning Research Tips

Write > Research

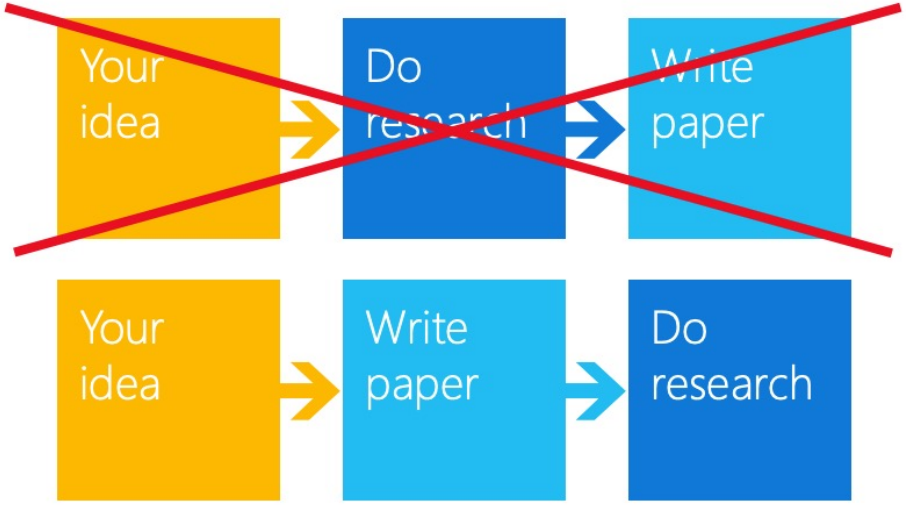
- Don’t wait: write



https://www.microsoft.com/en-us/research/academic-program/write-great-research-paper/ (Thanks Leshem Choshen)

Write > Research

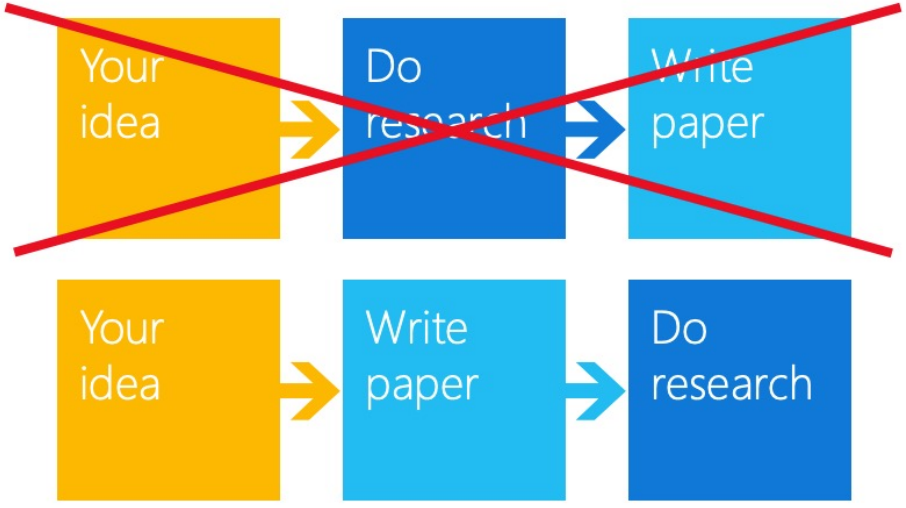
- Don’t wait: write
- Writing papers is a primary mechanism for doing research (not just for reporting it)

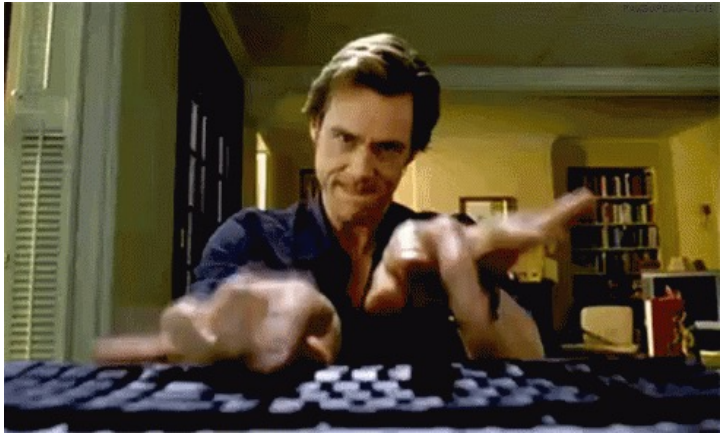


https://www.microsoft.com/en-us/research/academic-program/write-great-research-paper/ (Thanks Leshem Choshen)

Write > Research

- Don’t wait: write
- Writing papers is a primary mechanism for doing research (not just for reporting it)
- Start with:
  - ***Abstract***
  - **Results table** with mock results

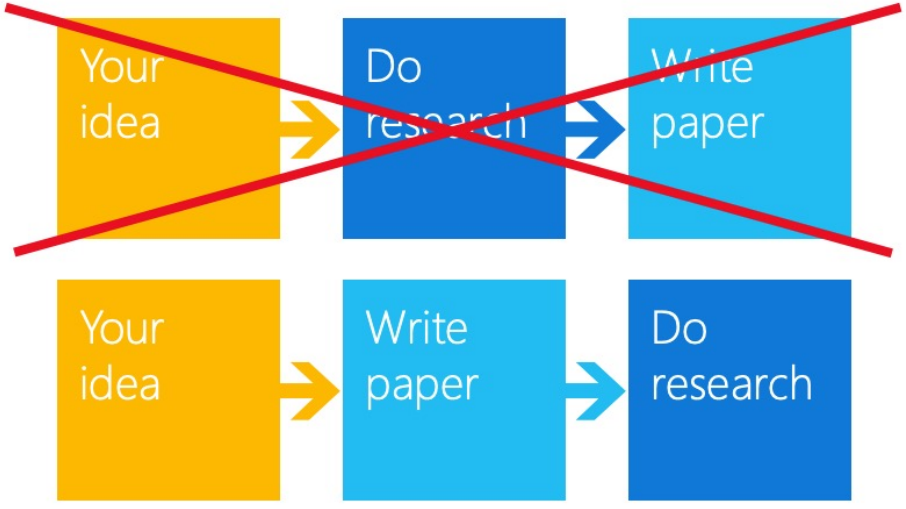


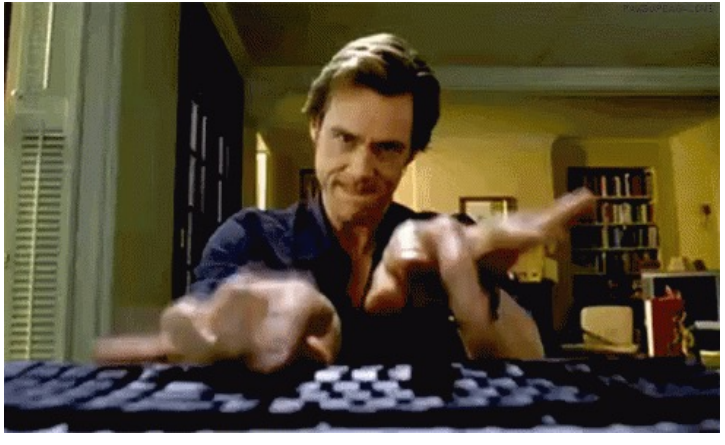


https://www.microsoft.com/en-us/research/academic-program/write-great-research-paper/ (Thanks Leshem Choshen)

Write > Research

- Don’t wait: write
- Writing papers is a primary mechanism for doing research (not just for reporting it)
- Start with:
  - ***Abstract***
  - **Results table** with mock results
- Can you “sell” your abstract?

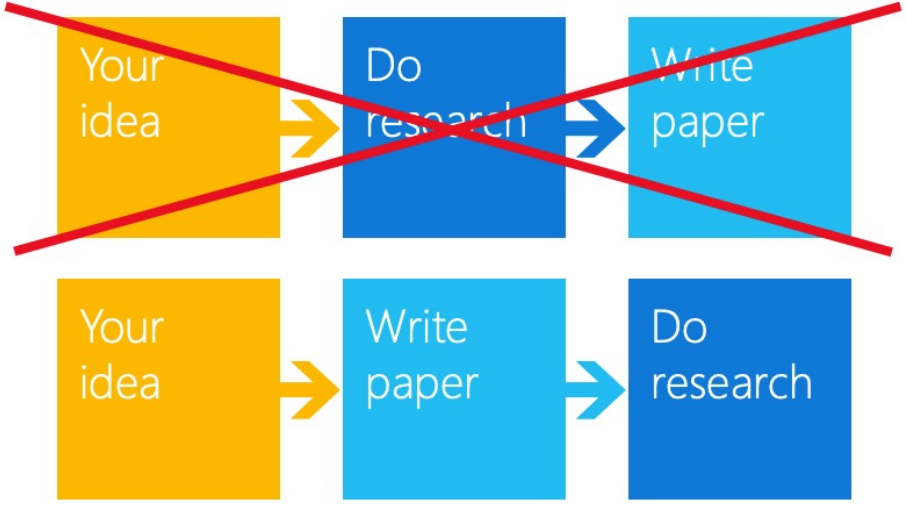




https://www.microsoft.com/en-us/research/academic-program/write-great-research-paper/ (Thanks Leshem Choshen)

Write > Research

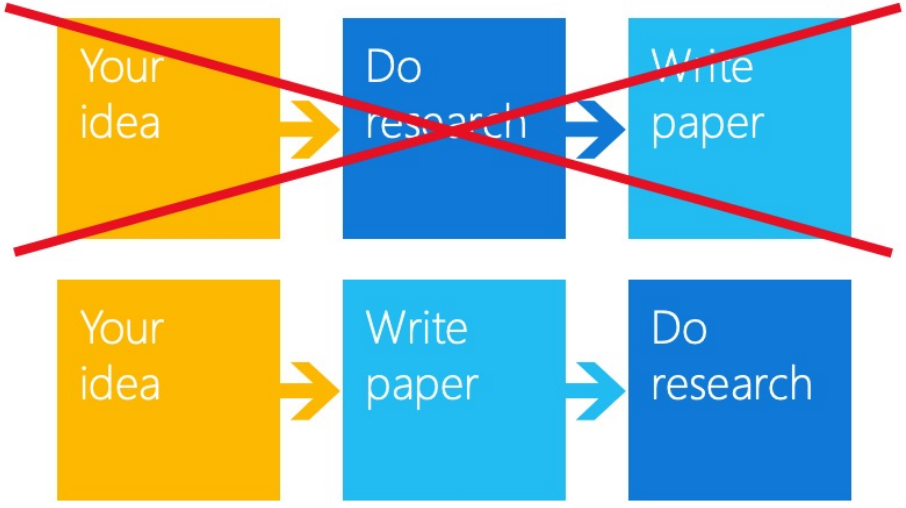
- Don’t wait: write
- Writing papers is a primary mechanism for doing research (not just for reporting it)
- Start with:
  - ***Abstract***
  - **Results table** with mock results
- Can you “sell” your abstract?
- Are the experiments convincing?

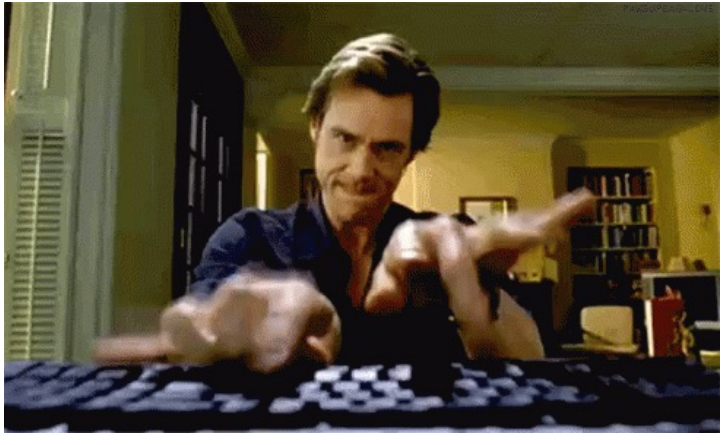


https://www.microsoft.com/en-us/research/academic-program/write-great-research-paper/ (Thanks Leshem Choshen)

Write > Research

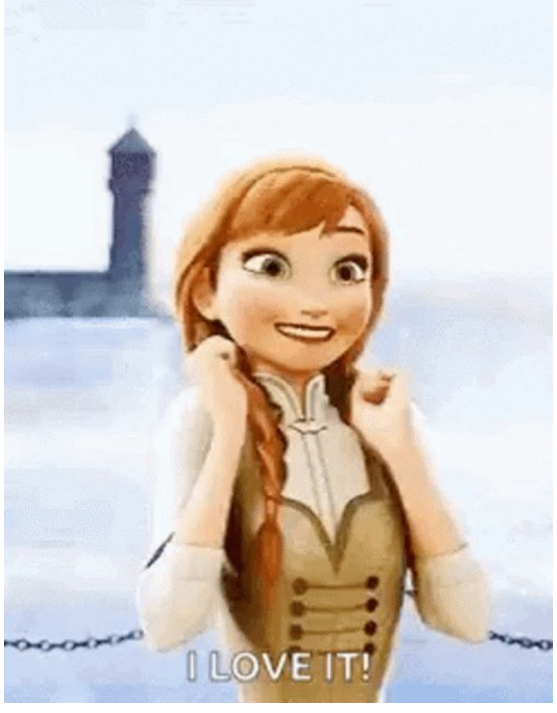
- Don’t wait: write
- Writing papers is a primary mechanism for doing research (not just for reporting it)
- Start with:
  - ***Abstract***
  - **Results table** with mock results
- Can you “sell” your abstract?
- Are the experiments convincing?
- Leave the ***Introduction*** for last





https://www.microsoft.com/en-us/research/academic-program/write-great-research-paper/ (Thanks Leshem Choshen)

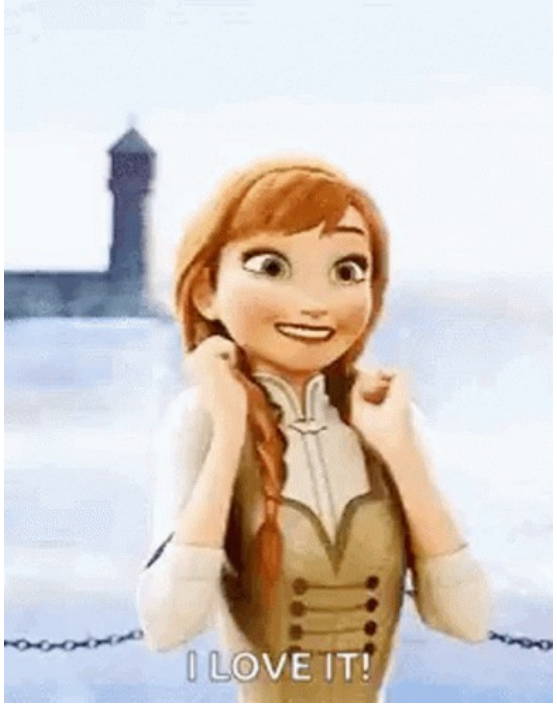
Don’t fall in love with your idea / model / implementation



[1] Gabriel Stanovsky

Don’t fall in love with your idea / model / implementation

We tend to get defensive when someone criticizes our work

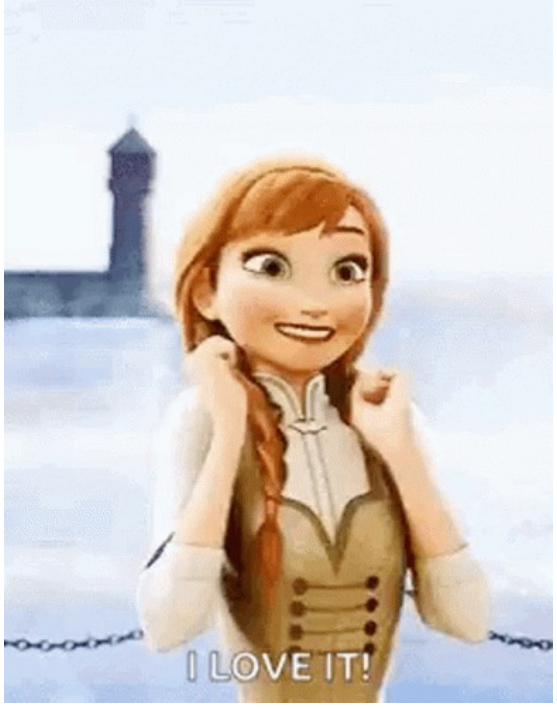


[1] Gabriel Stanovsky

Don’t fall in love with your idea / model / implementation

We tend to get defensive when someone criticizes our work

- It’s criticism for our work, not us

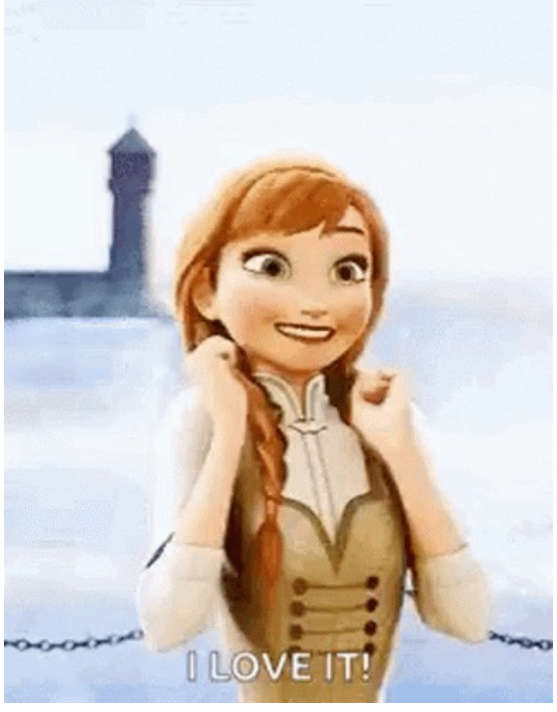


[1] Gabriel Stanovsky

Don’t fall in love with your idea / model / implementation

We tend to get defensive when someone criticizes our work

- It’s criticism for our work, not us
- There will always be criticism

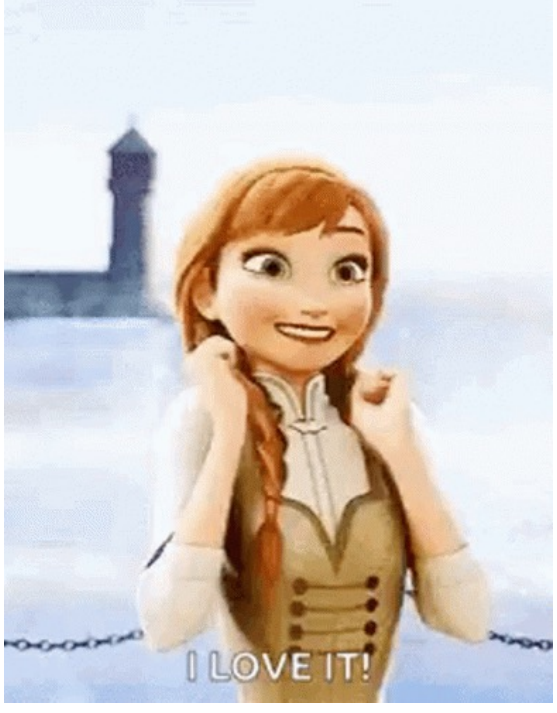


[1] Gabriel Stanovsky

Don’t fall in love with your idea / model / implementation

We tend to get defensive when someone criticizes our work

- It’s criticism for our work, not us
- There will always be criticism
- The sole purpose is to help make the work better

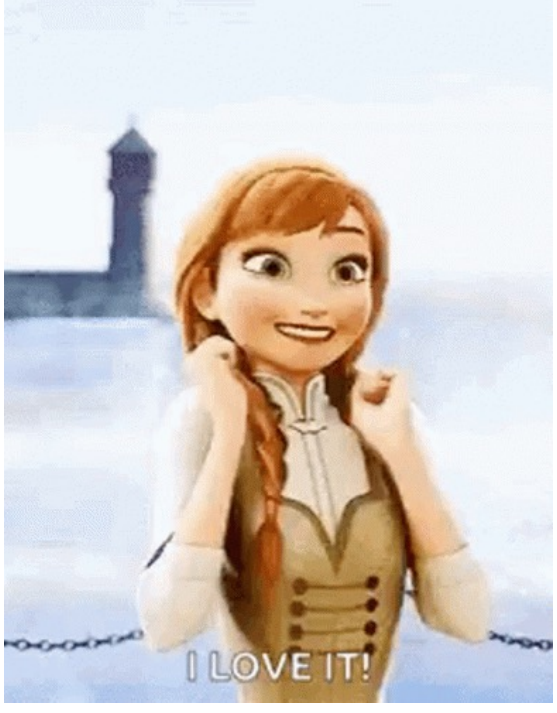


[1] Gabriel Stanovsky

Don’t fall in love with your idea / model / implementation

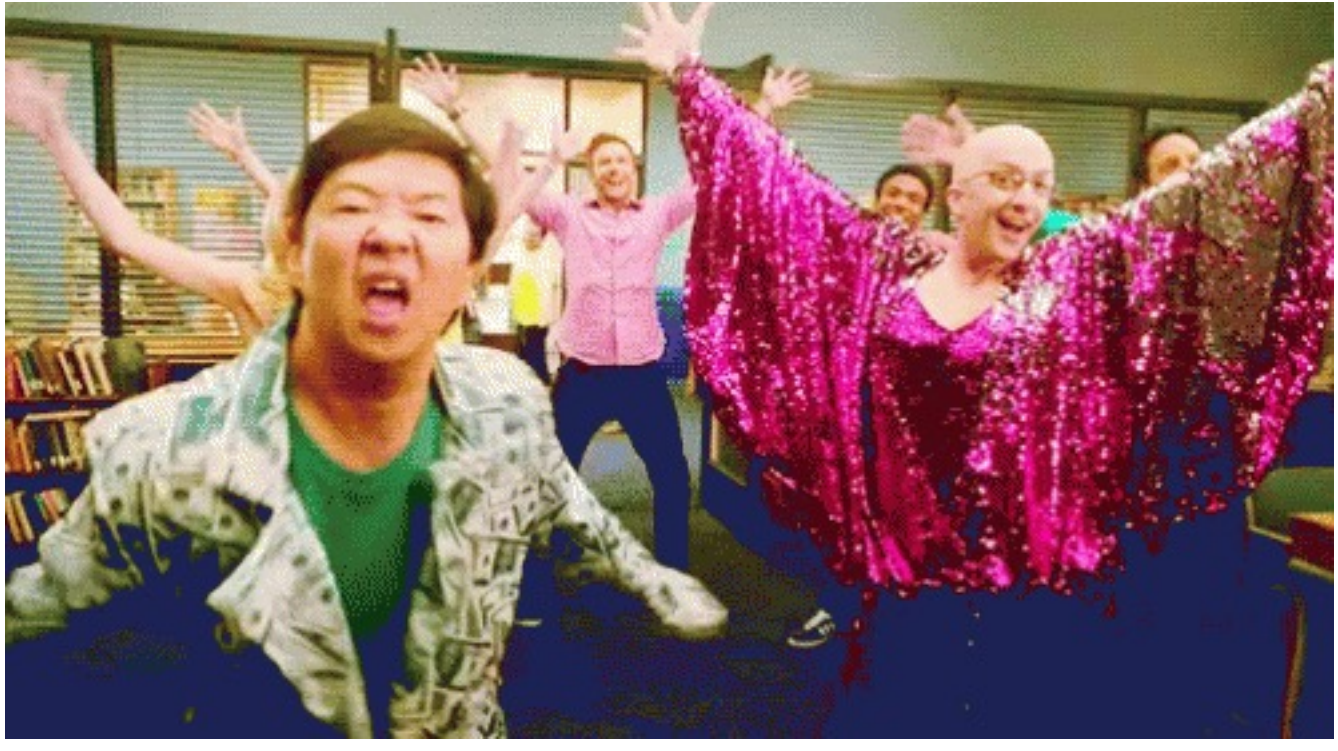
We tend to get defensive when someone criticizes our work

- It’s criticism for our work, not us
- There will always be criticism
- The sole purpose is to help make the work better
- Seek criticism and be open



[1] Gabriel Stanovsky

Connect with your research community



Connect with your research community

- Start a reading group
  - (e.g., #language-and-vision or in-person reading group)

[1] Gabriel Stanovsky

Connect with your research community

- Start a reading group
  - (e.g., #language-and-vision or in-person reading group)
- Research is a collaborative process - your project won't "solve" any problem completely, and that's not the goal.

[1] Gabriel Stanovsky

Connect with your research community

- Start a reading group
  - (e.g., #language-and-vision or in-person reading group)
- Research is a collaborative process - your project won't "solve" any problem completely, and that's not the goal.
- The goal is to make progress which others can use.

[1] Gabriel Stanovsky

Connect with your research community

- Start a reading group
  - (e.g., #language-and-vision or in-person reading group)
- Research is a collaborative process - your project won't "solve" any problem completely, and that's not the goal.
- The goal is to make progress which others can use.

"If I have seen further, it is by standing on the shoulders of giants." – Isaac Newton

[1] Gabriel Stanovsky

Connect with your research community

- Meet with your peers
  - Schedule a coffee

[1] Gabriel Stanovsky

Connect with your research community

- Meet with your peers
  - Schedule a coffee
- Practice presenting your elevator pitch to whoever wants to listen

[1] Gabriel Stanovsky

Connect with your research community

- Meet with your peers
  - Schedule a coffee
- Practice presenting your elevator pitch to whoever wants to listen
- Go to conferences

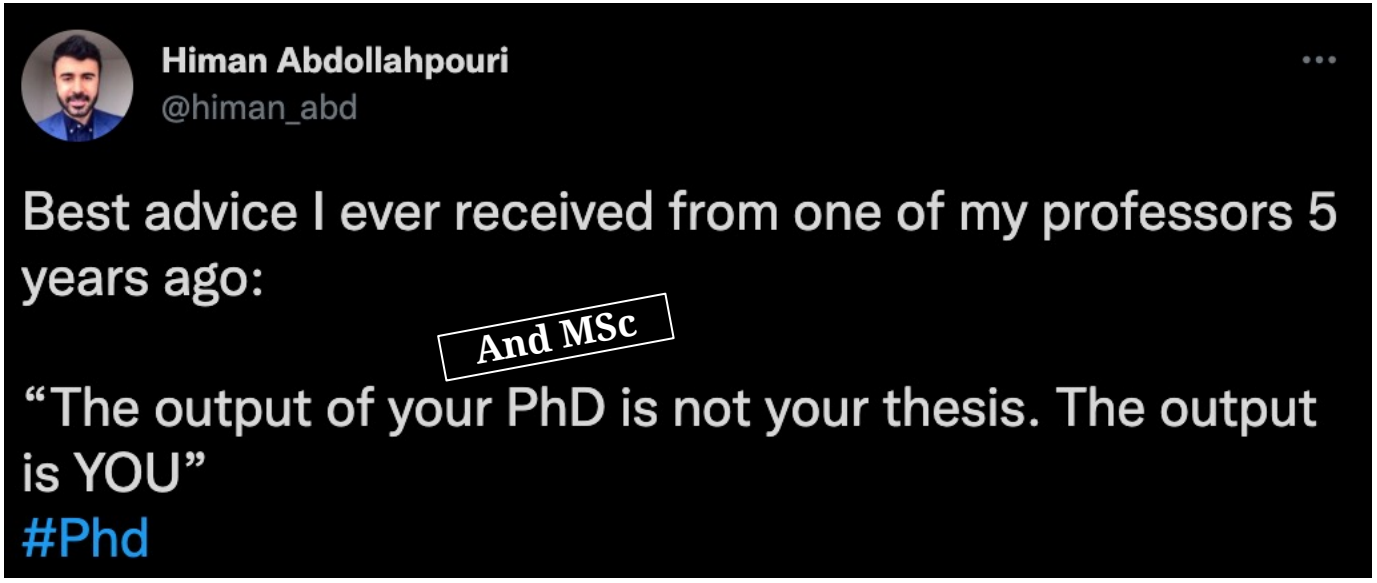
[1] Gabriel Stanovsky

Connect with your research community

- Meet with your peers
  - Schedule a coffee
- Practice presenting your elevator pitch to whoever wants to listen
- Go to conferences

"The idea is like grass. It craves light, likes crowds, thrives on crossbreeding, grows better for being stepped on." – Ursula K. Le Guin

[1] Gabriel Stanovsky



Thank You! 🙏

Take a look on Ronen Tamari’s [“Dark Research” talk]: