

How to Present Results/Analysis

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Outline



What's the **purpose** of the Result Section?



How to **structure** the Result Section?



How to design results visualizations (**table and figures**)?



How to **write** the results?

What's the purpose of a Result Section?

Academic Research (**Scientific paper**, not journalist paper)

Thesis, dissertation, journal paper, conference paper, essay, and research report

Main purpose:

Report the KEY findings of your study

from analysis to the reader/reviewer

- *Reported in written text, tables, graphs, and other illustrations*
- *Contextual analysis of the data by tying it back to the research question/claims*

What's the purpose of a Result Section?

A narrative/story that walks the reader through your findings in a systematic way

- *Provide validity, establish the reliability*
- *Informing decisions*
- *Sharing insights*

Accomplish the narrative with **tables/figures**

- *No raw data, need to do selection*
- *Summary, reduce non-trivial ones*




Challenges

- Relevance to your research questions/objectives
- Ensuring **clarity**
 - Use simple, standard and consistent terms
- Avoiding information overload
- Ensure Engagement

Context

- In a place after Method Section, could in Sections of :
 - Experiment
 - Results
- OR
- Results and Discussions
- Take page limit into account

Parts of a Research Paper

- Abstract
- Introduction
- Literature Review
- Methodology
- Results and 
- Discussions
- Conclusion

Step1: Ask Key Questions from Reader Perspective

- Key questions the Reader/Reviewer may ask?
 - Is this method effective for the investigated task?
 - Does it perform better than others?
 - If better, what element makes it better?
 - If it's a system, how well does it work in different conditions/scenarios?
 - Generalization
 - Sensitivity to some coefficient
 - Independent to some baseline

What to present

Performance Metrics

(**effectiveness** and efficiency, complexity)

Objective/fitness/loss functions

Experimental Settings

- Dataset(s) (if real-world data, may need to introduce data preparation or preprocessing here)
- Training/test split or cross-validation
- Parameters
- Hardware/software environment
- Baseline/comparison methods
- EC: how many independent runs, >+30
- Statistical significance tests

What to present

Training Performance

- Best
- Worst
- Mean and/or median
- Standard deviation
- Statistical significance tests
- Convergence curves
 - For EC: Average of the best-of-so-far across 30 runs on each generation

Testing / Generalisation Performance

- Best
- Worst
- Mean and/or median
- Standard deviation
- Statistical significance tests
- Convergence curves (e.g. regression)

Training results mostly for discussions with supervisors

What to present

Computational cost

- Training time
- CPU/GPU usage
- Memory usage
- FLOPs, latency

Ablation Study:

- with and without each new component
- Verify the assumptions

Learnt Models

- Model size
 - Tree depth, layers, number of parameters
- Visualize the models

(Optional) Further analysis:

- Sensitivity Analysis
- Transferability
- Robustness analysis

Structure Your Results Section

- Comparisons with Others:
 - Baseline work/paper
 - Works that are related to the same task
 - Latest (Within 5 years and including current year if possible,)
- Ablation Study
 - Addition: A ; $A+B$; $A+B+C = I$
 - Deduction I ; $I-C$; $I-C-B$;
- Key Parameter Impact
 - Sensitivity
 - Consistency



- Figures
- Tables

Values
Patterns
Trends
Comparisons

Tables & Figures

	A	B	C
CATEGORY 1	15%	22%	42%
CATEGORY 2	40%	36%	20%
CATEGORY 3	35%	17%	39%
CATEGORY 4	30%	29%	58%



- Backbone of the results
 - Prepare the table and figure first
 - Then write round them.
 - Put figures and tables after or next to where it is introduced

*Readers will first access tables/figures and images before reading the entire paper, So, **make it shining***

Table 2. Multivariate analysis of risk factors of Coronary Artery Disease ← Table Title or Caption

	Odds Ratio	95% CI	P - value
Diabetes	4.59	1.99 – 10.62	<0.001
Dyslipidaemia	9.72	4.59 – 20.64	<0.001
Hypertension	2.47	1.24 – 4.93	0.010
Male Gender	3.90	1.65 – 9.19	<0.001

CI = Confidence Interval ← Footnote

Notice the demarcating horizontal lines separating the different parts of the table
 Notice the fullstop in the Title after 'Table 2'
 The decimal points line up vertically

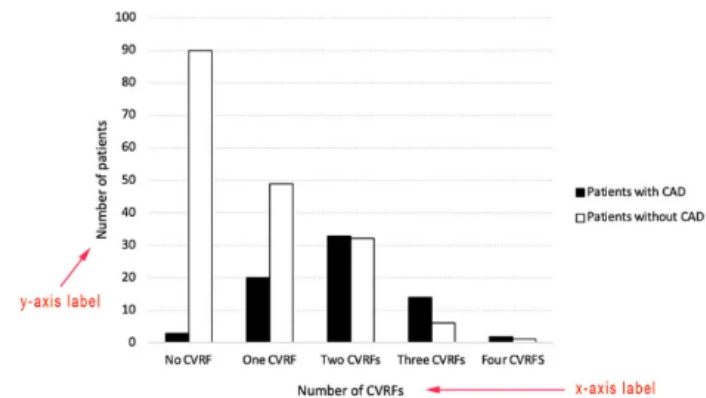


Figure 3. Number of risk factors per patient in the general study population and among patients with CAD. ← Figure Title or Caption
 CVRF(s) = Cardiovascular Risk Factor(s), CAD = Coronary Artery Disease

Tables: A Good Example

Model	Method	batch_size=1				batch_size=full			
		2-hop	3-hop	4-hop	avg.	2-hop	3-hop	4-hop	avg.
LLAMA2-7B-CHAT	ROME [♣] (Meng et al., 2022a)	35.4	20.3	16.2	23.9	4.2	2.5	0.7	2.5
	MEMIT [♣] (Meng et al., 2022b)	27.3	13.5	8.2	16.3	5.7	2.8	1.1	3.2
	IKE [◇] (Zheng et al., 2023)	80.8	63.8	50.9	65.2	13.5	5.7	2.6	7.3
	MeLLO [◇] (Zhong et al., 2023)	54.9	34.7	30.2	39.9	29.9	9.2	3.1	14.1
	Structural Editing (ours)	100	100	100	100	91.5	90.7	56.8	79.1
GPT-3.5-TURBO-INSTRUCT	IKE [◇] (Zheng et al., 2023)	78.5	76.2	73.4	76.0	17.3	9.6	6.7	11.2
	MeLLO [◇] (Zhong et al., 2023)	72.6	48.7	40.5	53.9	47.8	20.2	16.8	28.3
	Structural Editing (ours)	100	100	100	100	98.9	97.7	95.8	97.4

Table 1: Experimental results (accuracy; %) on MQUAKE-2002 for multi-hop editing tasks (2, 3, 4-hop). We evaluated both open-source and closed-source LLMs across ME, ICE methods, and our STRUEDIT. Methods marked with [♣] belong to ME, while those marked with [◇] belong to ICE. The best editing result on every LLM is highlighted in **bold** font.

Tables: A Good Example

TABLE I: Quantitative comparisons of scene renderings. The **best**, **second best** and **third best** are color coded.

Method	RMSE↓			si-RMSE↓			Angular Error↓			PSNR↑			Direction Error(EM)↓
	Diffuse	Matte	Mirror	Diffuse	Matte	Mirror	Diffuse	Matte	Mirror	Diffuse	Matte	Mirror	
Ours	0.0442	0.0725	0.2013	0.0137	0.0483	0.1681	4.9183	5.6870	8.1843	19.2100	14.5614	11.5288	37.2519
[Diffusionlight24]	0.4442	0.6668	1.3284	0.0144	0.0474	0.1614	7.6209	7.0411	9.0972	17.8318	14.2345	11.1097	41.4768
[Everlight23]	0.2498	0.2769	0.4208	0.0142	0.0481	0.1458	7.1028	7.9265	11.5477	17.9055	11.7161	10.5180	48.8809
[Stylelight22]	1.0032	1.4486	4.4873	0.0195	0.0554	0.1705	11.4044	8.8890	11.6123	15.4046	13.0387	10.1361	48.3677
[EMlight21]	0.2271	0.3792	0.8796	0.0160	0.0530	0.1700	5.8425	6.8001	9.1938	17.5049	13.5130	11.2134	47.9858
[Lighthouse20]	0.6759	0.6096	0.6988	0.0170	0.0478	0.1659	13.9577	15.2644	17.2770	14.3295	11.6442	9.6109	78.1626
[Gardner19]-1	0.5195	1.0614	7.5599	0.0141	0.0520	0.1692	7.2110	7.9834	10.0169	18.3480	13.1601	10.9108	41.3316
[Gardner19]-3	1.2667	2.6667	6.5356	0.0159	0.0525	0.1694	5.6685	6.1403	8.0655	17.5926	14.0318	11.2429	39.1761
[Garon19]	0.3054	0.3188	0.4328	0.0145	0.0484	0.1664	9.1062	10.6744	13.4358	17.3152	12.9709	10.3064	63.5759
[Gardner17]	2.0415	3.8463	7.6111	0.0205	0.0554	0.1703	9.1304	10.5045	12.8008	15.9703	13.4371	10.9669	57.2132

Importance of Figures



Enhance the reproducibility and transparency

By providing a clear and detailed visual representation of the data of methods and results of the research articles.



Make information more compact

Figures can have a higher information density than text or tables, which makes them a valuable tool for summarizing large amounts of data in a single visual.



Improve readability

Figures allow authors to convey complex research results in a visual format, which is an effective way to communicate complex results that may be difficult to explain in writing.



Make a paper more engaging and memorable

Figures, together with abstract and tables, are the first items many readers of academic articles will read to get a sense of the key results.

Tricks - Tables vs. Figures

1

If you can't present your data and your text in one or two lines, consider putting it in a figure or a table

2

If you want to illustrate the trends and patterns in the data, consider figure

3

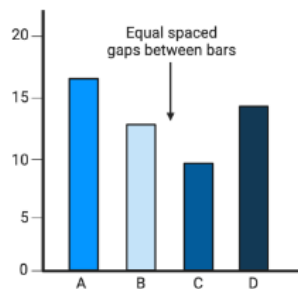
If you want to show the actual values or presents a lot of numerical information, consider table

Designing Results Visualizations

- Choose the right visuals
 - Bar charts: Comparisons.
 - Line charts: Trends over time.
 - Pie chart: Occupancies
 -

Bar Chart

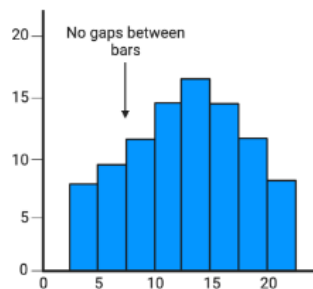
Shows comparison of 2+ categories



X-axis: categories
Y-axis: numerical values

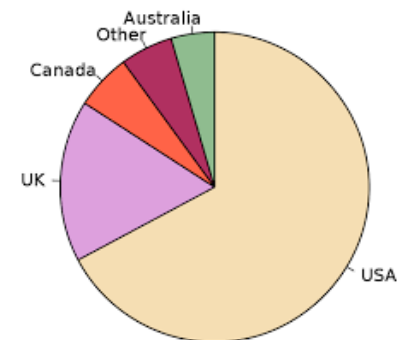
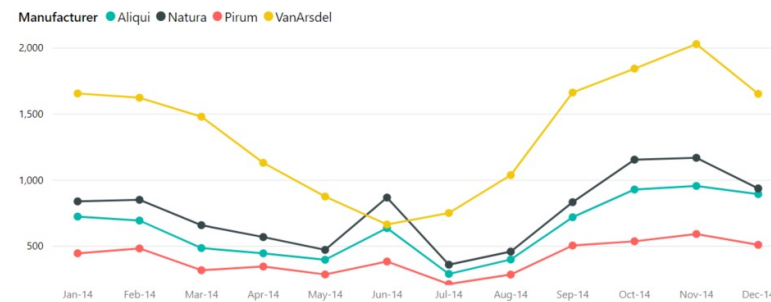
Histogram

Shows frequency distribution of data



X-axis: intervals of continuous number
Y-axis: numerical values

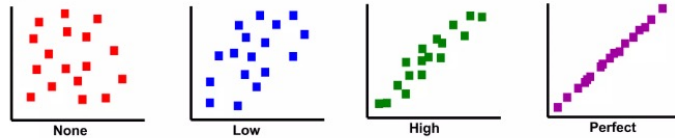
Total Units by Month and Manufacturer



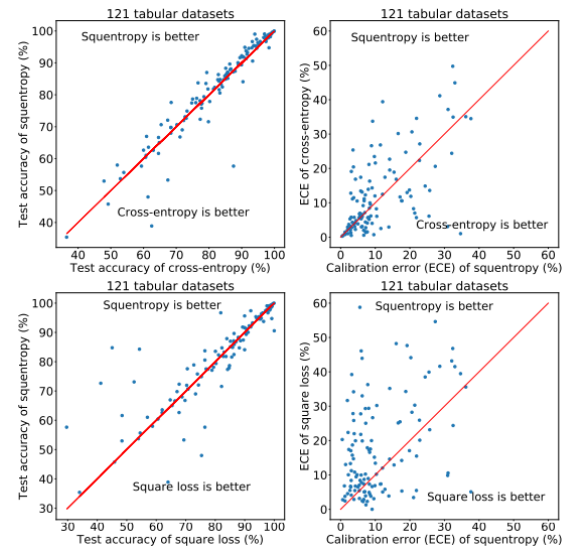
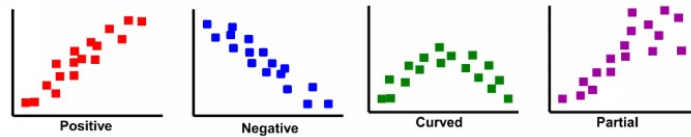
Designing Results Visualizations

- Choose the right visuals
 - Scatter plots: Relationships between variables.

Degrees of correlation:

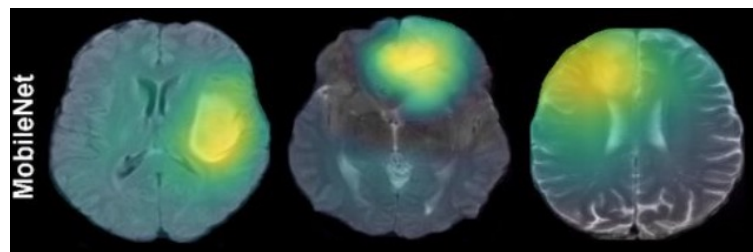
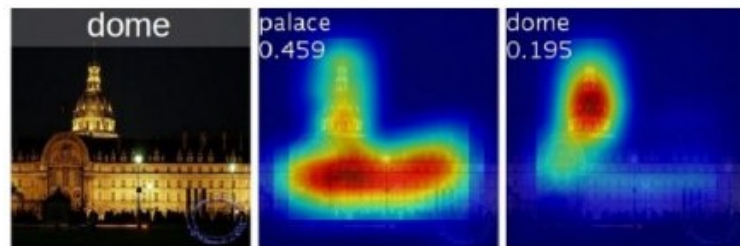


Types of correlation:

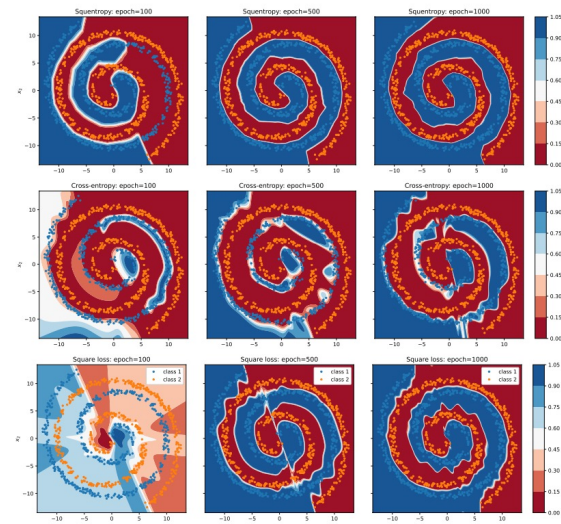


Designing Results Visualizations

- Choose the right visuals
 - Heatmaps: Density or intensity.



Active area of object detection.



Decision boundary along different epochs for test samples.



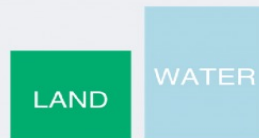
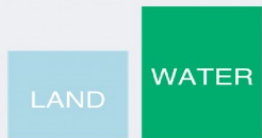
Design Principles

- Keep it simple: *Avoid clutter*
- Use colors effectively: *Highlight important trends or differences*
- Label clearly: *Provide titles, axis labels, and legends*
- Annotate critical points
- Use callouts or arrows to direct attention
- Aesthetic/Harmonization (layouts, colors)

RULES

INTUITIVENESS

Use intuitive colors. When choosing them, consider what associations do they evoke. If possible, use colors that audience will associate with your data anyway.



MODERATION

Use colors in moderation. For a simple dataset, a single color is preferable. Use color as a strategic tool to highlight the important parts of your visual.



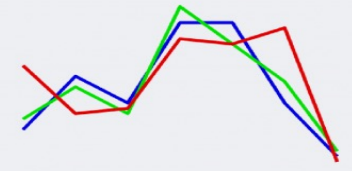
CONSISTENCY

Use colors consistently. Change colors if you want your audience to feel the change for the specific reason, but never simply for the sake of novelty.



CLARITY

Use colors to make the data easier to read. Make sure your audience will be able to distinguish between the items shown in the visualization.



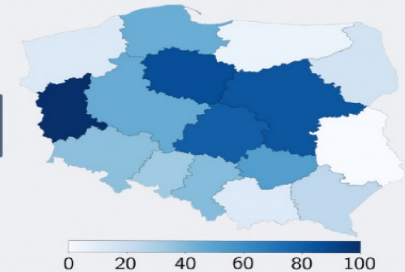
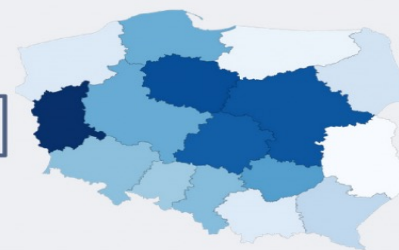
CLASSIFICATION

Don't use a gradient color palette for categories. And the other way round - different colors for same measurement.

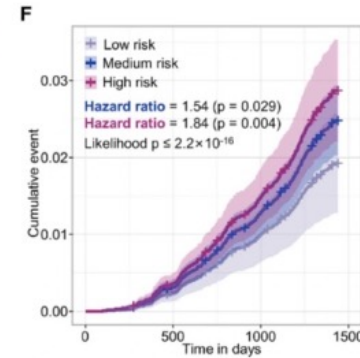
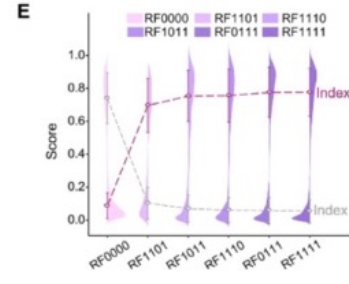
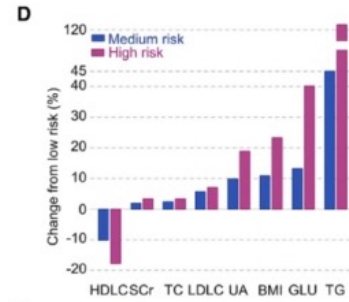
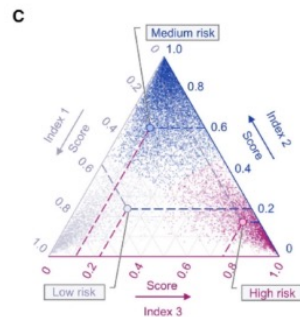
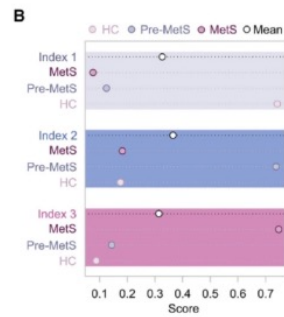
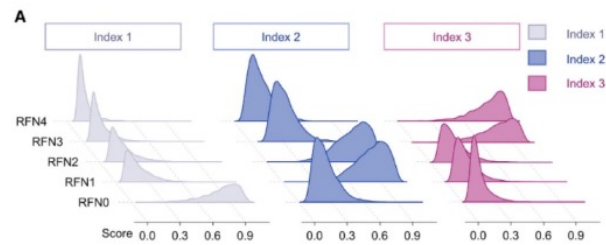


EXPLAINABILITY

Make sure to explain to your audience what exactly used colors mean. Remember to create a color key.

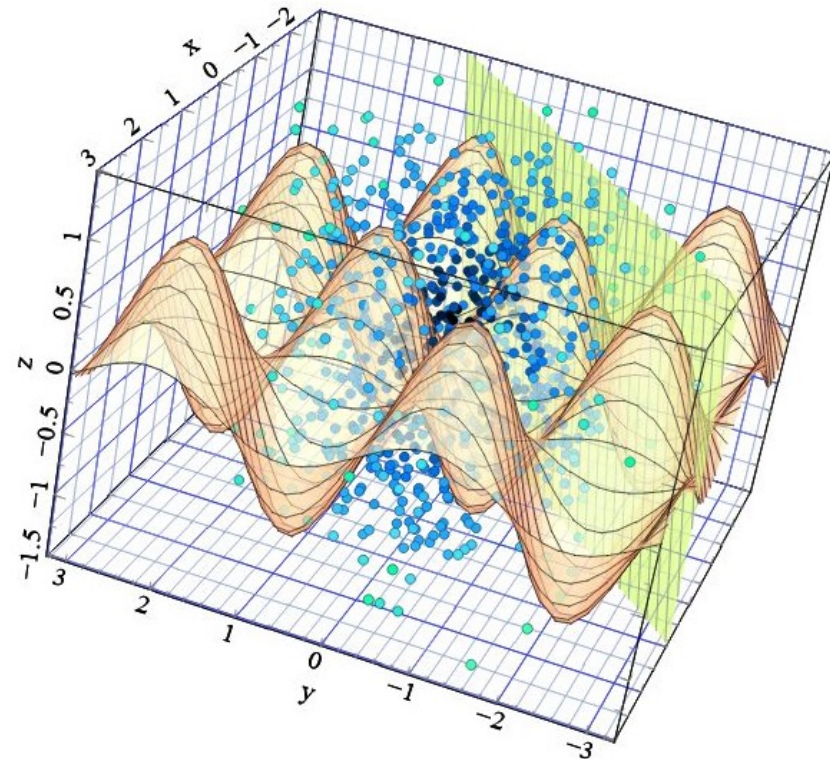
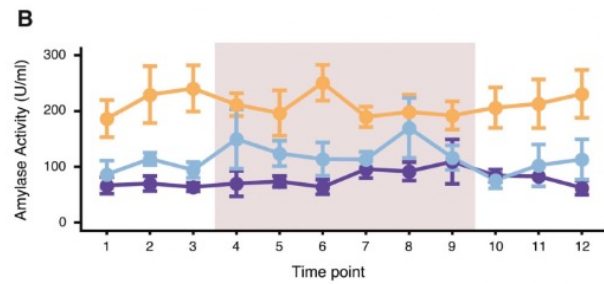
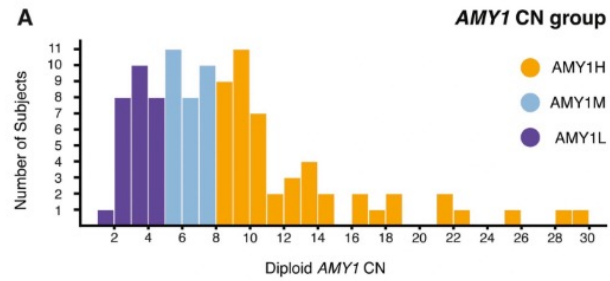


Great Examples



Variable	HR (95% CI)	Adjust P
Medium risk	1.54 (1.05-2.28)	0.029
High risk	1.85 (1.22-2.79)	0.004
Pre-MetS	1.43 (0.98-2.09)	0.063
MetS	1.63 (1.08-2.44)	0.019

Great Examples

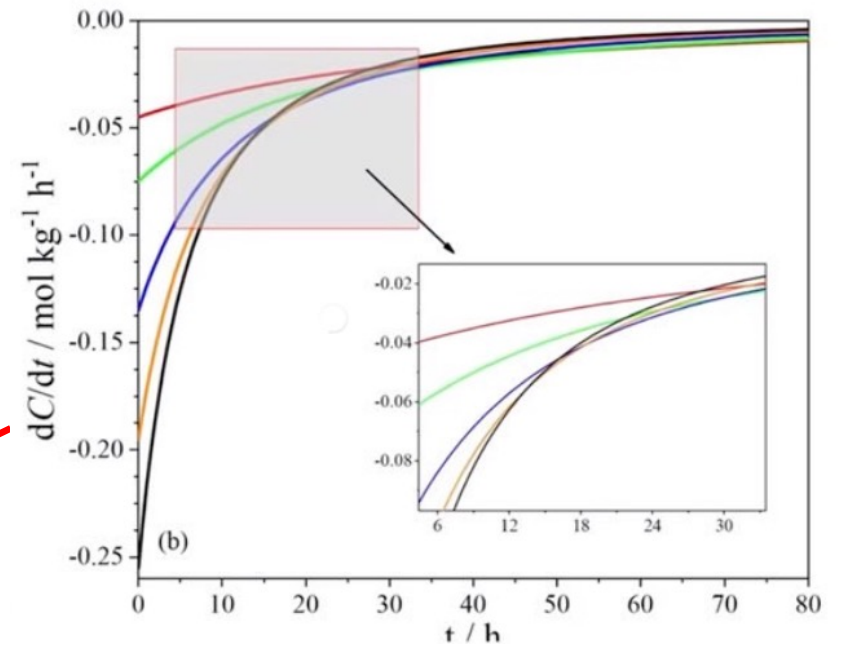


Design principles

- Don't let reviewers/audience to play "Hide and Seek" --- *Label them*



Indicate



Zoom in



Tools

- Microsoft PowerPoint
- Microsoft Visio
- Adobe Photoshop/Illustrator
- **Python: Matplotlib**
- **LaTeX**
- **MATLAB**
- **About colours:** an online tool called “I want HUE” to generate colour set

Writings

- First, contextualization, link to your research questions
- Second, put findings in a structured way
- Third, a closing paragraph to summarize key findings.