

“Doing Science” Workshops

3rd Workshop

Dr. Felix E. Rivera-Mariani

Learning Objectives in the Workshop Series

- Understand the different parts of the “real” scientific method
- Design workable goals through a scientific project
- Analyze the different thought processes towards a scientific goal
- Collect data in formats that are “easy”(or “less difficult”) to analyze
- Answer questions related to our data-collection process
- Value the importance of team-work in the scientific process
- Understand, elaborate, and communicate with a scientific mindset

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Group homework

Key Words

Basidiospores · Human whole blood · Interleukin-1 β · Proinflammatory potency

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Comparison of the Interleukin-1 β -Inducing Potency of Allergenic Spores from Higher Fungi (Basidiomycetes) in a Cryopreserved Human Whole Blood System

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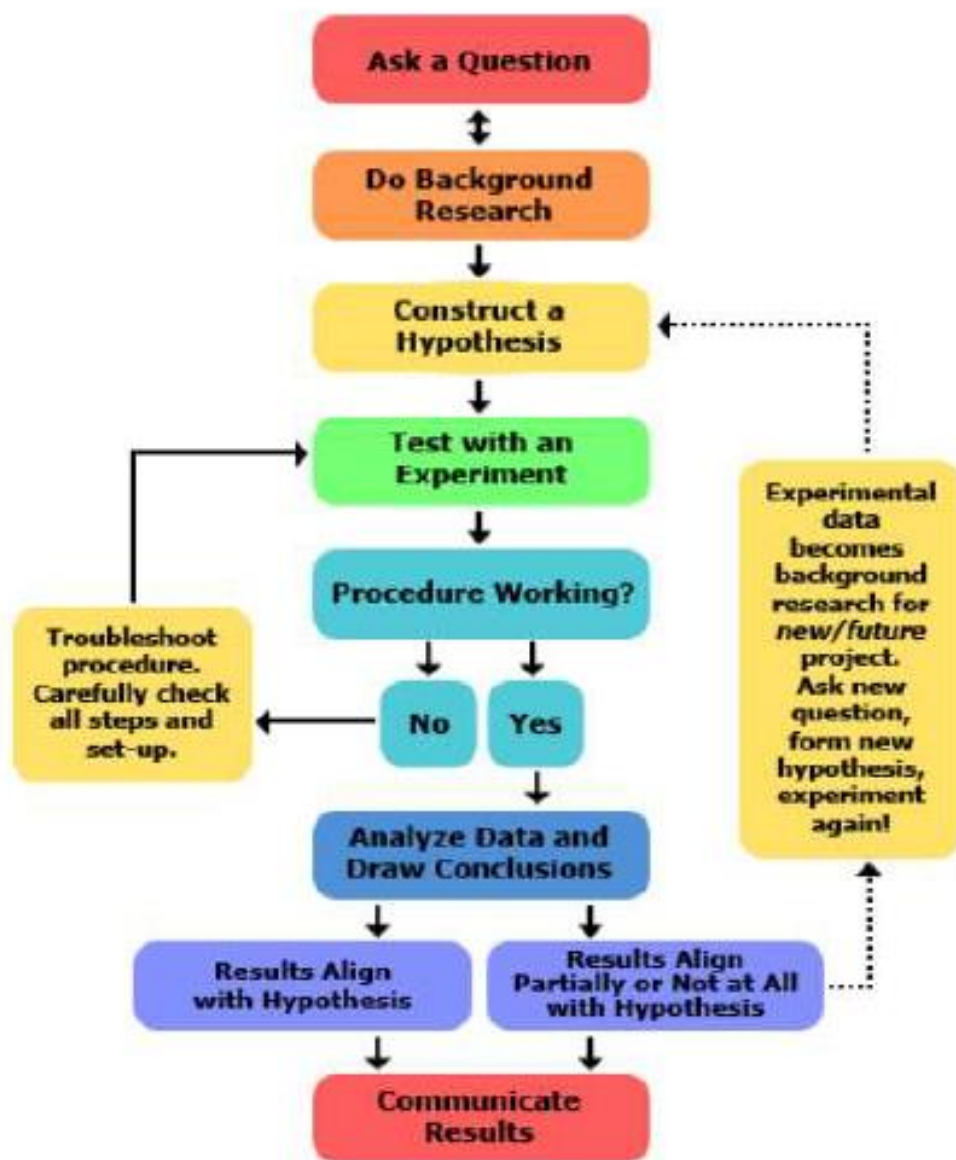
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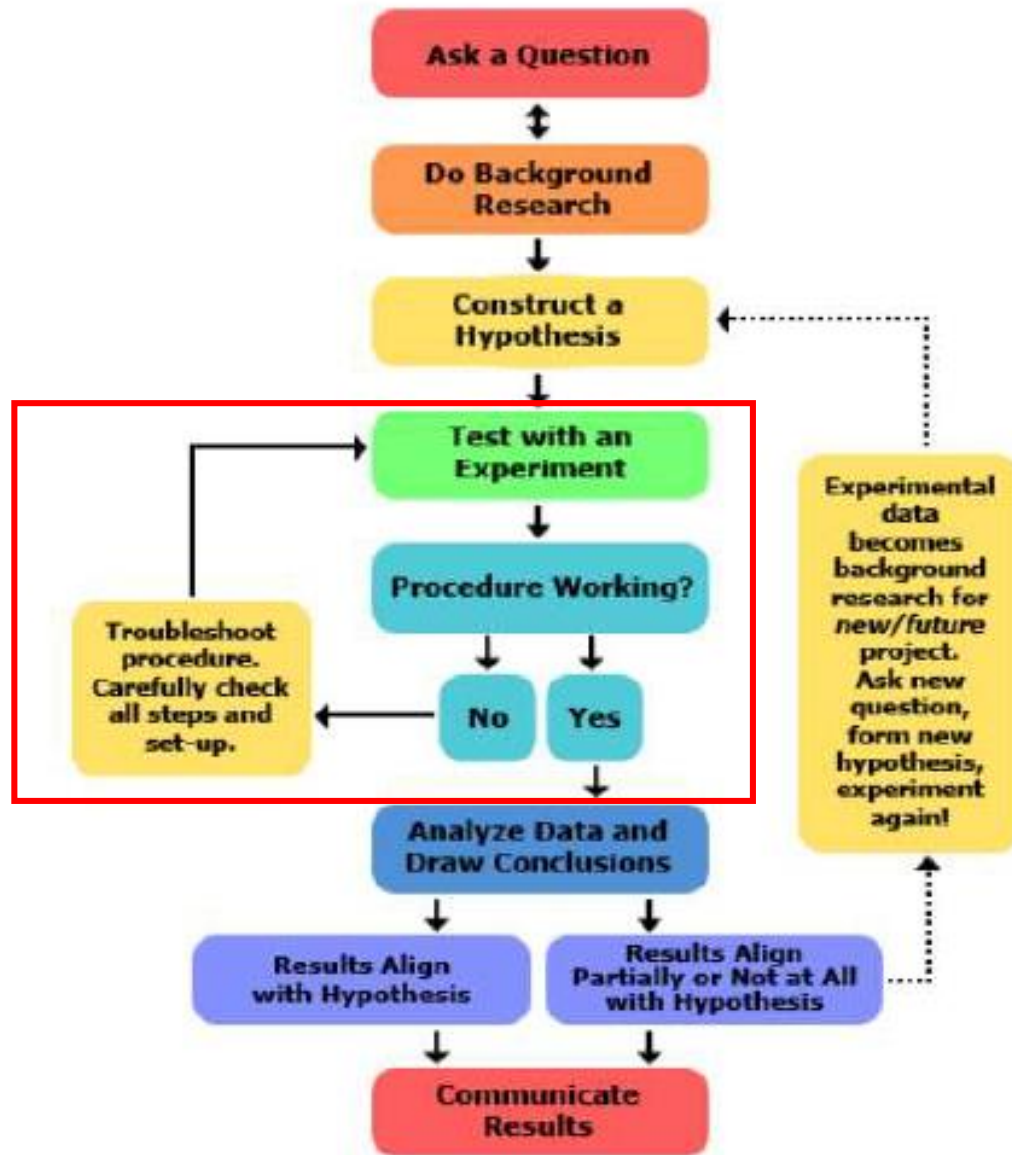
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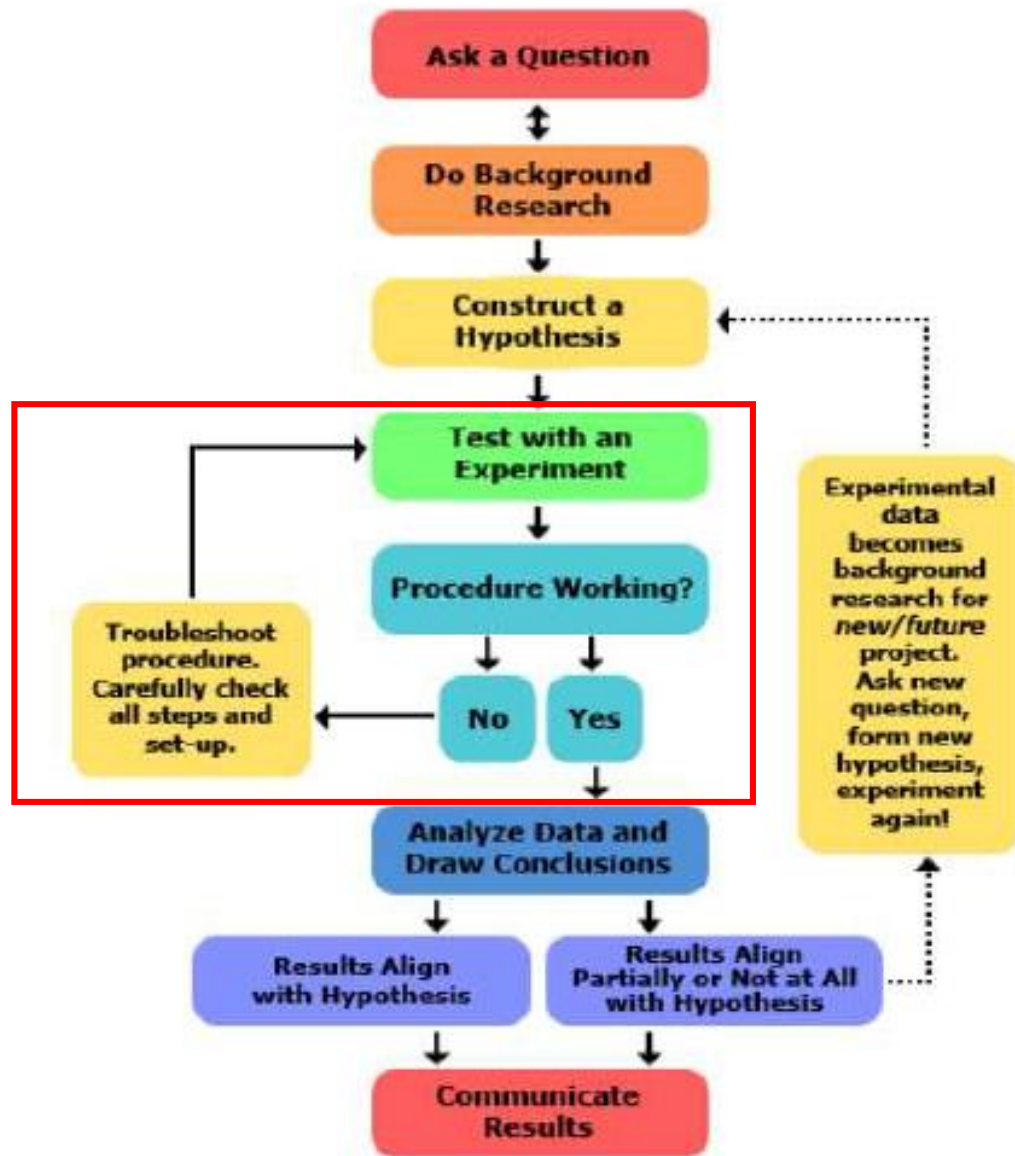
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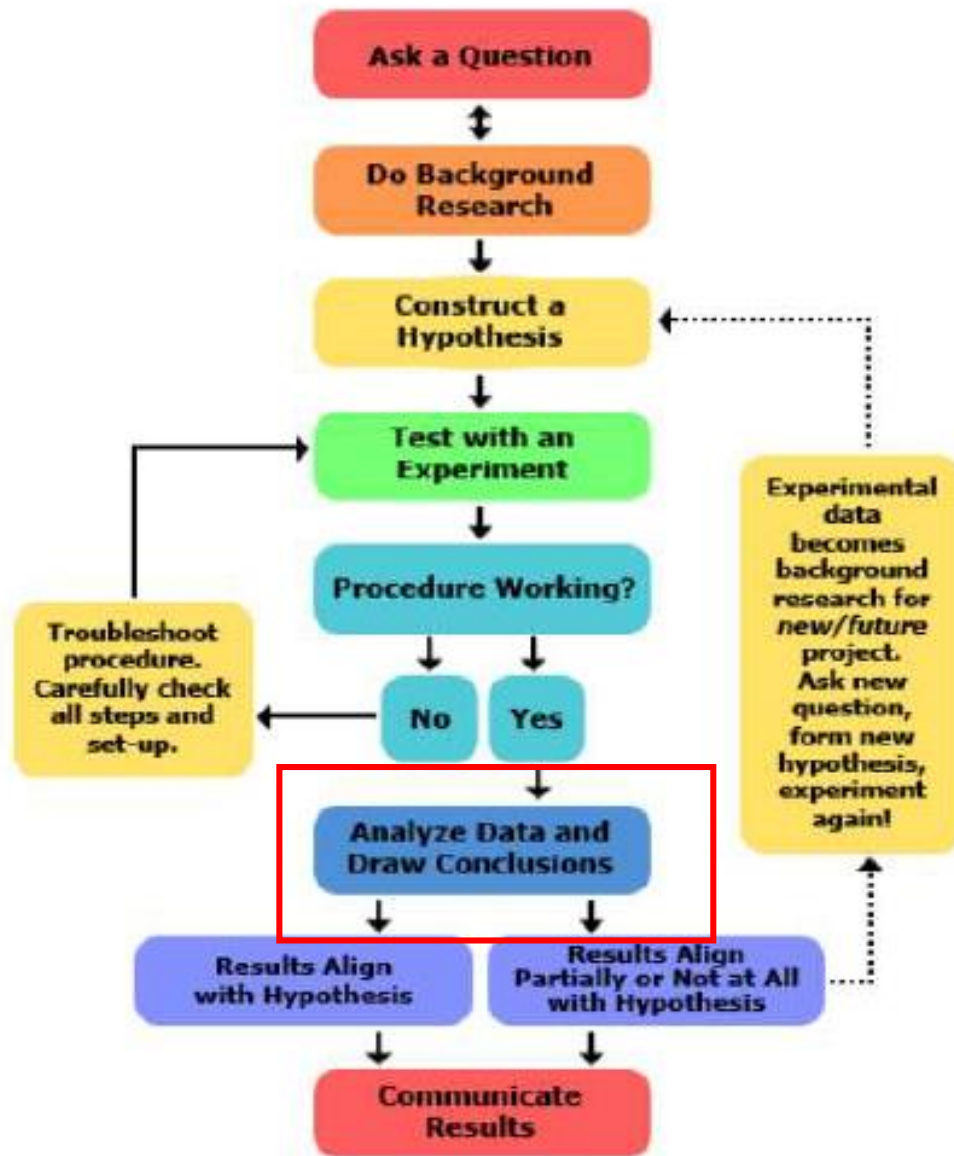




We spend most of the time performing experiments...



...then, we must spend time to properly design the experiments.



Experiments have been completed: let's analyze the data.

Scientific method

1

- Ask a Question

2

- Do Background Research

3

- Construct a Hypothesis

4

- Test with an experiment

Scientific method

3

- Test with an experiment

4

- Analyze the data and draw conclusions

Scientific method

3

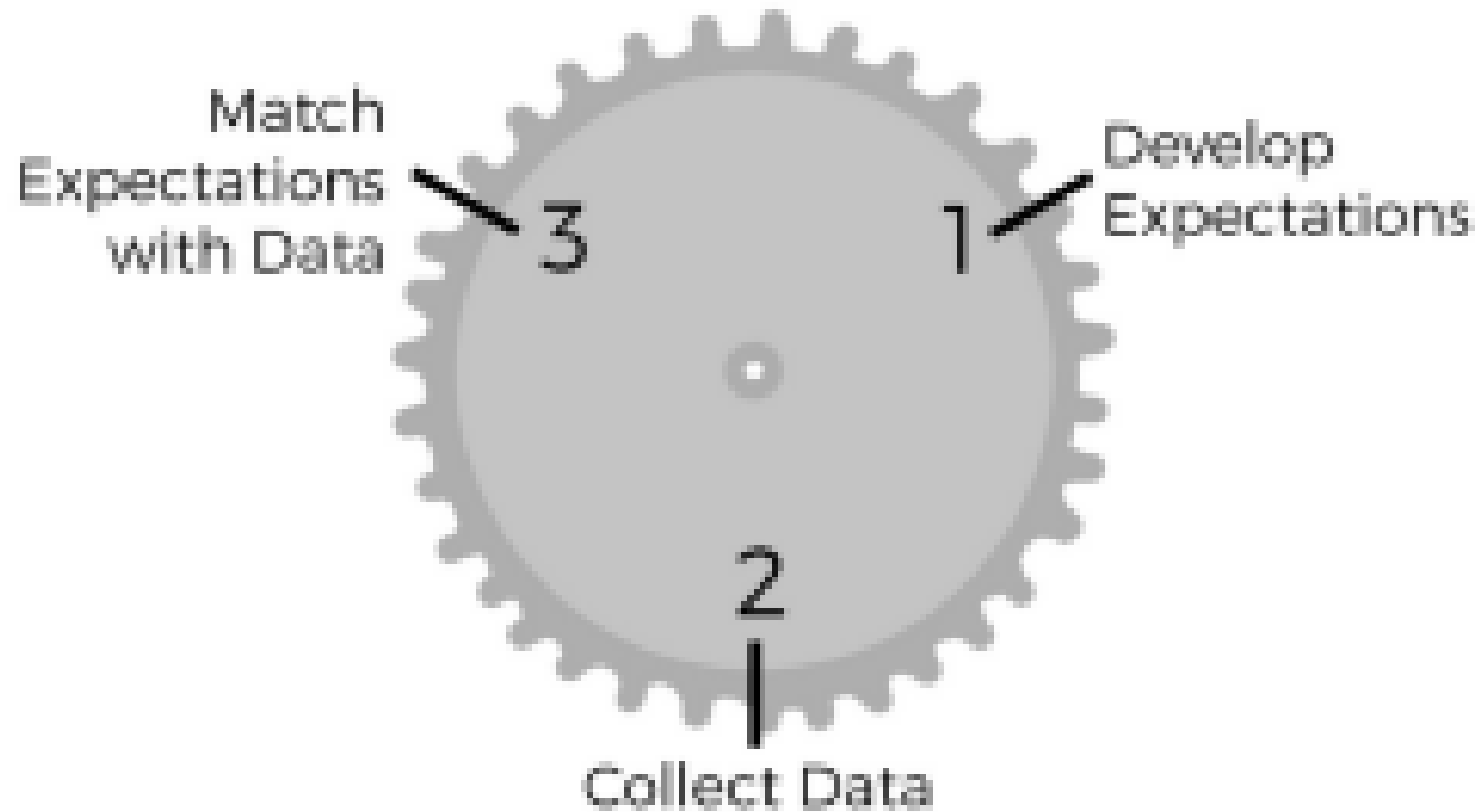
- Test with an experiment

4

- Analyze the data and draw conclusions

-We must have expectations during every step of the data analysis.

Epicycle for analyzing data from experiments



Notice that developing expectations are first.

If the expectations don't match with the data, we cannot move forward.

Roger D. Peng and Elizabeth Matsui. The Art of Data Science (Kindle Locations 64-65). leanpub.com.

These epicycle inside the big epicycle is common when analyzing data, interpreting results, and communication results to the scientific community.

Recall that each of the 5 cycles have same a common epicycle.

It can be applied to other fields outside of science as well.



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Scientific method

-Do I have all the necessary data?

3

- Test with an experiment

4

- Analyze the data and draw conclusions

Scientific method

3

- Test with an experiment

4

- Analyze the data and draw conclusions

-Do I have all the necessary data?

-Are there missing values in the data?

-Is the data properly organized?

-How does the data behave?

Scientific method

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- Analyze the data and draw conclusions

-Do I have all the necessary data?

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Scientific method

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- Test with an experiment

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- Analyze the data and draw conclusions

-Do I have all the necessary data?

-Are there missing values in the data?

-Is the data properly organized?

-How does the data behave?

-How should the data be presented

Group Homework

I'll be providing a dataset for groups to practice the epicycle(s).