

# The International Webinar on PHD THESIS WRITING

(10<sup>th</sup> September, 2020; 10 am to 2 pm)

## Speakers



**Dr. Venugopalan Cheriya**

Associate Professor

Dept. of Biological Sciences

Texas A&M University-Commerce, Texas, USA



**Dr. Izhar A Khan**

Associate Professor

Dept. of Biological Sciences

Texas A&M University-Commerce, Texas, USA

## Convenor



**Dr. Sivakumar Vijayaraghavalu, Ph.D.**  
Professor and Head,  
Narayana Translational Research Centre

## Patron



**Dr. Surya Prakash Rao, M.D**  
Professor and Dean, Narayana Medical  
College, Nellore, Andhra Pradesh, India

## WEBINAR REGISTRANTS

Total Registrants –494; From **India** - 96%, Rest of the world 4% - from the following countries –

**United States of America (USA), Saudi Arabia, Oman, Qatar, Bahrain, Ethiopia, Malaysia and Japan.**

Distribution of registrants from different states of India is as follows - Andhra Pradesh (30%), Tamil Nadu (17%), Karnataka (14%), Puducherry (7%), Telengana (5%), Kerala (5%), rest 22% are from - Maharashtra, Uttar Pradesh, Punjab, Jharkhand, Rajasthan, Madhya Pradesh, West Bengal, Uttrakhand, Himachal Pradesh, Gujarat, Haryana and Odisha.

21% of the registrants are from Narayana group of medical institutions, Nellore, Andhra Pradesh, India

The webinar started with greetings to **the 494 registrants** joined from all over the world by the Convenor – Dr. Sivakumar Vijayaraghavalu. Then he introduced the two eminent speakers from Texas A&M University-Commerce, Texas, USA; 1. Dr. Venugopalan Cheriyaath (Venu) and 2. Dr. Izhar Khan (Izhar), which was followed by the program schedule announcement as quoted –

“I will briefly introduce the first speaker; then inaugural speech will be given by our respected Dean Dr. Surya Prakash Rao (SP Rao). After that, Dr. Venu will deliver his presentation covering the following sub-topics – 1. Scientific process; 2. Background and significance; 3. Development of hypothesis. The second speaker Dr. Izhar will be introduced; then he will continue to talk on the second part of the PhD thesis writing with the following sub-topics – Results, Discussion, Conclusion and Citation. At the end of each speaker’s session, a time will be allotted for Q & A and discussion. Finally, the webinar will end with a vote of thanks.

Our Dean Dr. SP Rao is the backbone of support for us; his constant encouragement motivates us in organizing national and international webinars in a row. I deep heartedly thank him for giving us this opportunity and I kindly request him to deliver inaugural speech to the participants”. Post this announcement, Dr. SP Rao delivered his inaugural speech. His presentation is as follows ...



# Structure of Ph.D. Dissertation

A transition from student to scholar



**Dr. Surya Prakash Rao, MD**  
**Professor and Dean,**  
**Narayana Medical College,**  
**Nellore, Andhra Pradesh, India**





Make an appointment  
with yourself to write

Don't wait for inspiration



How did your supervisors and others contribute?

Thank those who provided help in participants & data

Any friend and family

Funding Agency

Others: typists, professionals, or proofreaders?

Acknowledgement





# Definition: Thesis

- ❖ Merriam Webster - Dissertation embodying results of original research and especially substantiating a specific view
- ❖ Cambridge - A long piece of writing on a subject, especially one based on original research and done for a higher college or university degree



# Definition: Dissertation

- ❖ Merriam Webster: An extended usually written treatment of a subject; specifically: one submitted for a doctorate
- ❖ Cambridge: A long piece of writing on a particular subject, especially one that is done to receive a degree at college or university

Thesis	Dissertation	Institutional Study	Multicentric Study
<p>Small Scale investigation</p> <p>Training in Methodology</p> <p>One year duration</p> <p>No Public Defense</p> <p>Nearly 100 pages</p>	<p>Detailed discourse</p> <p>Critical thinking</p> <p>Three to Four years</p> <p>Intellectual contribution</p> <p>Publishable</p> <p>Defendable</p> <p>≥ 200 pages</p>	<p>One location</p> <p>Large scale investigation</p> <p>Path-breaking result</p> <p>External funding</p>	<p>Common Protocol</p> <p>Several locations</p> <p>Publishable</p> <p>Large scale</p> <p>External funding</p> <p>Path breaking</p>

Levels of Medical Research



**Research is to see what everybody else has seen**

**&**

**To think what nobody else has thought**

**Albert Szent-Gyorgyi,**

**Nobel Prize winner in Physiology or Medicine in 1937**



How to plan, structure

&

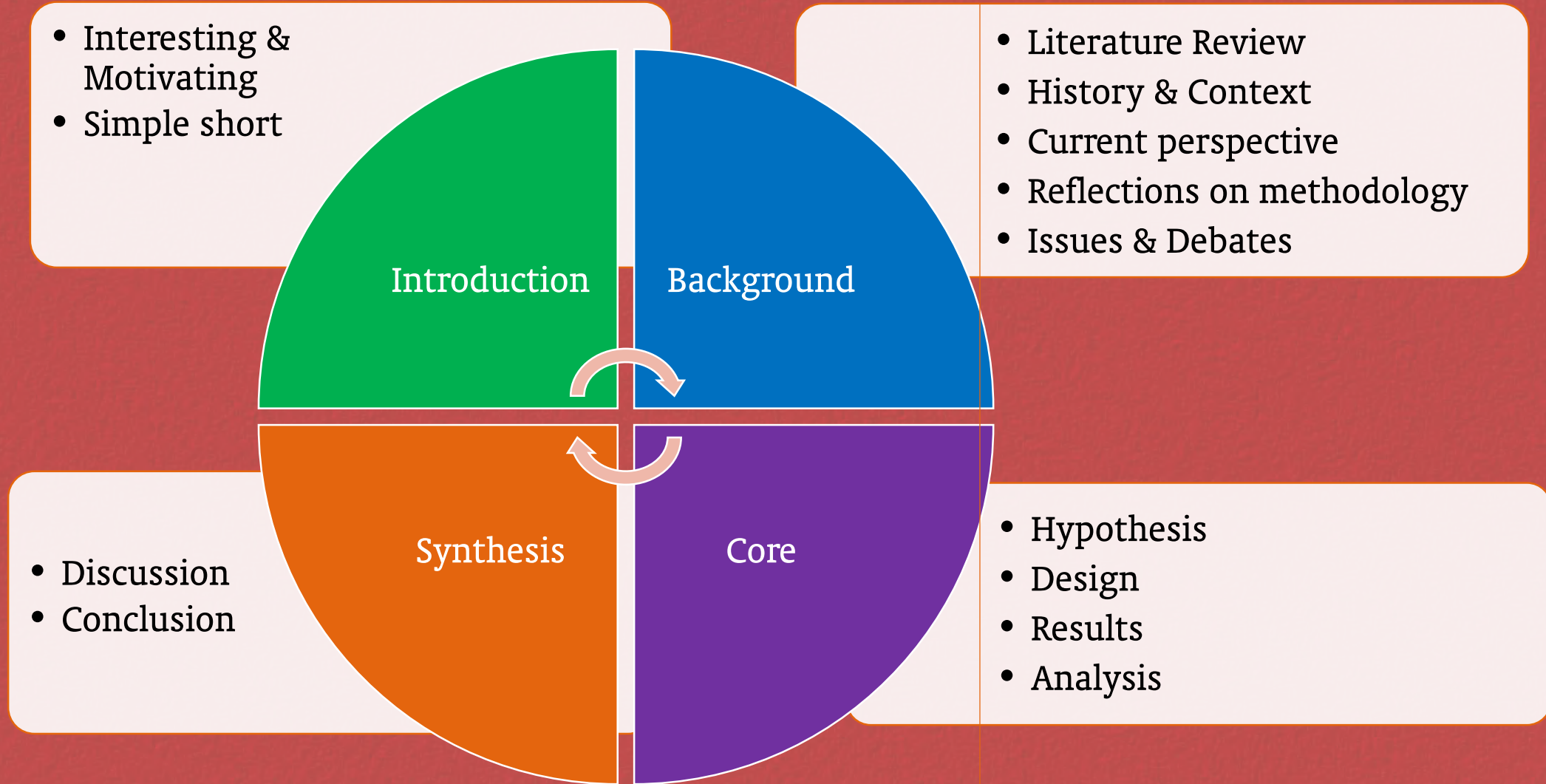
write a PhD thesis



# Easy Writing Tasks

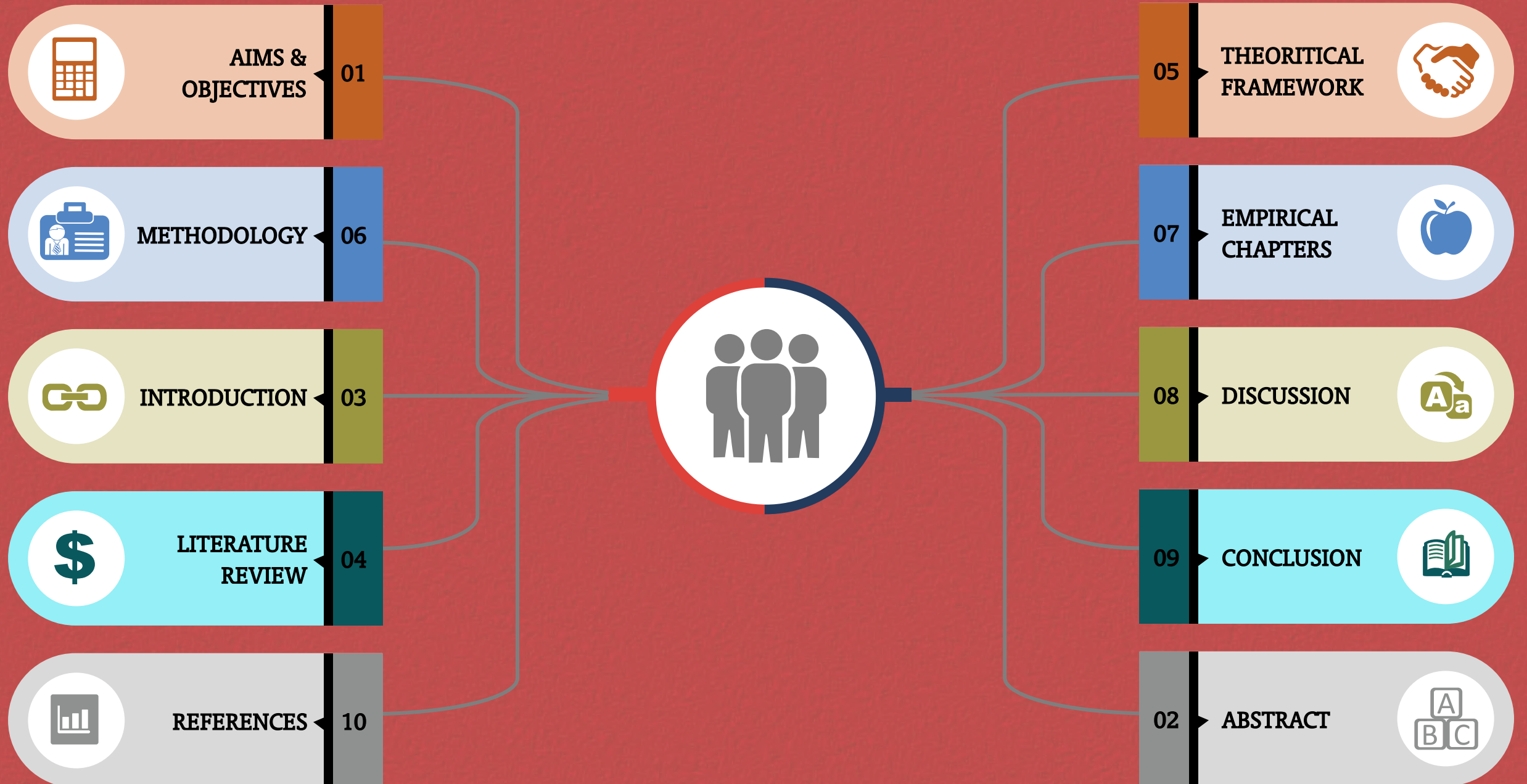
- Early writing tasks
- Noting ideas while reading
- Documenting reading
- Writing summaries
- Critiques of other research
- Draft proposals
- Revising thesis/research proposal
- Logging experiments/ observations
- Describe experiments/procedures
- Sketching plan of work
- Explain sequence of work
- Sketching structure of thesis
- Outlining literature review
- Speculative writing
- Design for first-year report

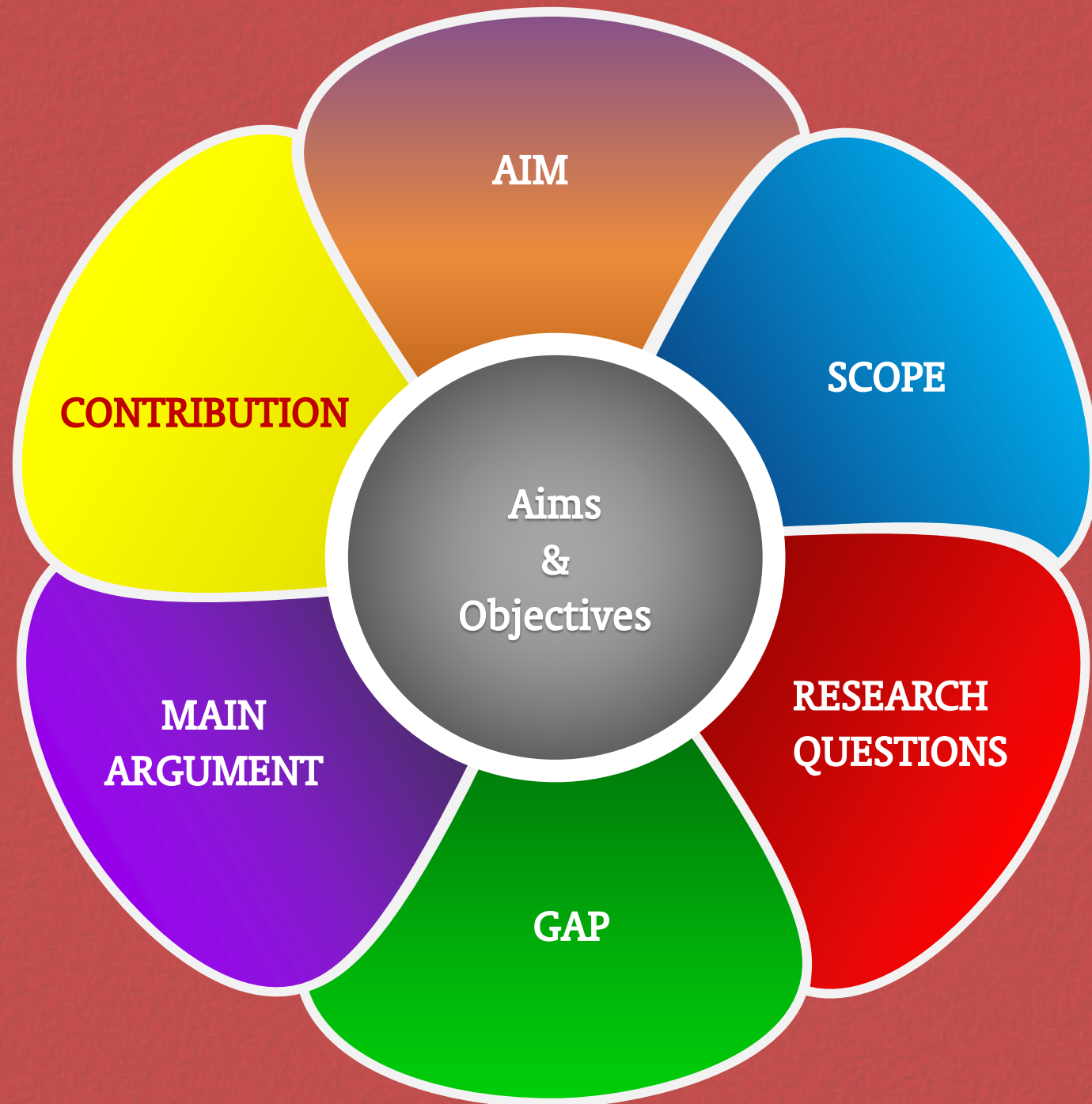
# The 'Standard' Thesis Structure





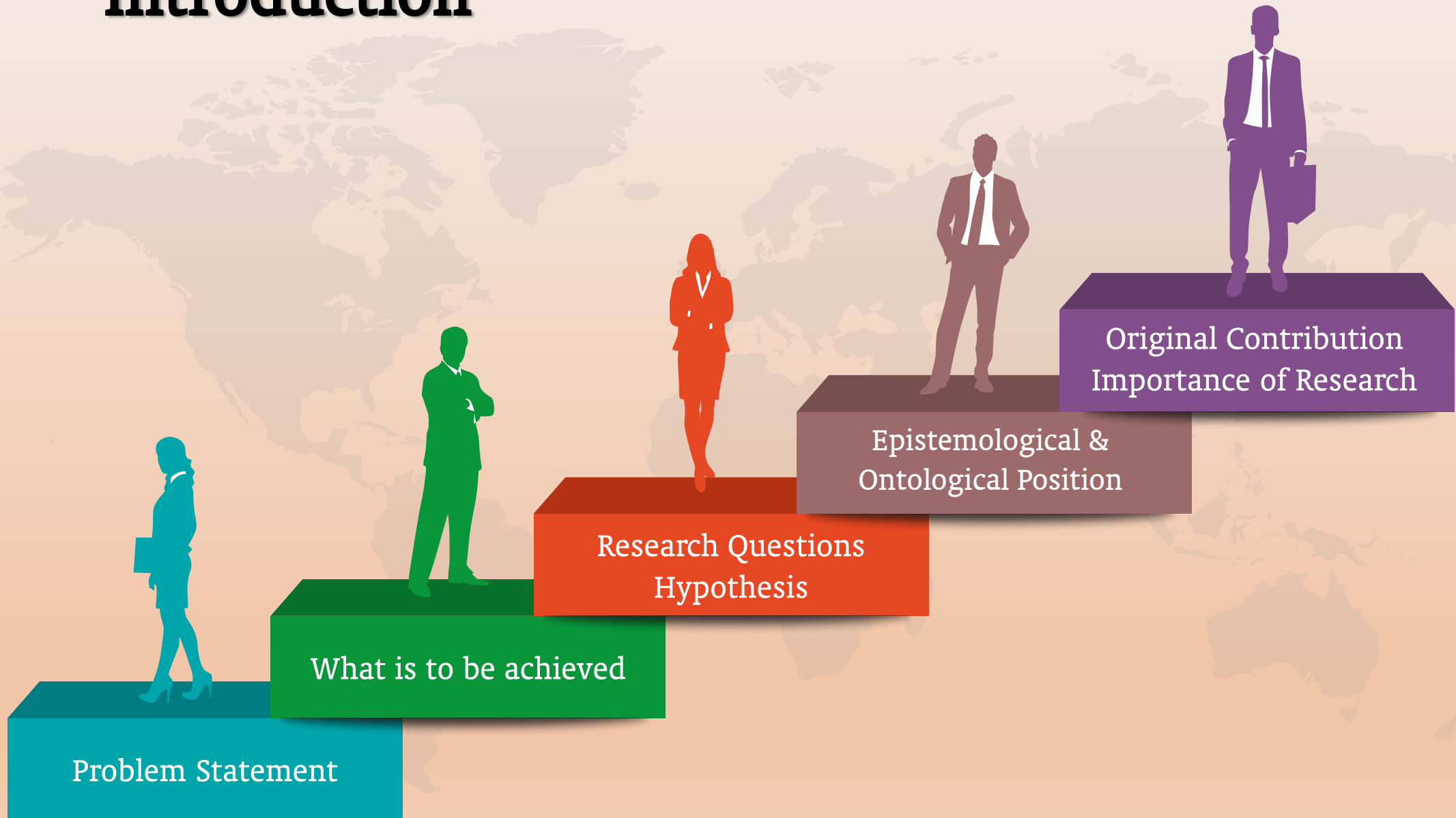
# Ph.D. Dissertation Writing Components



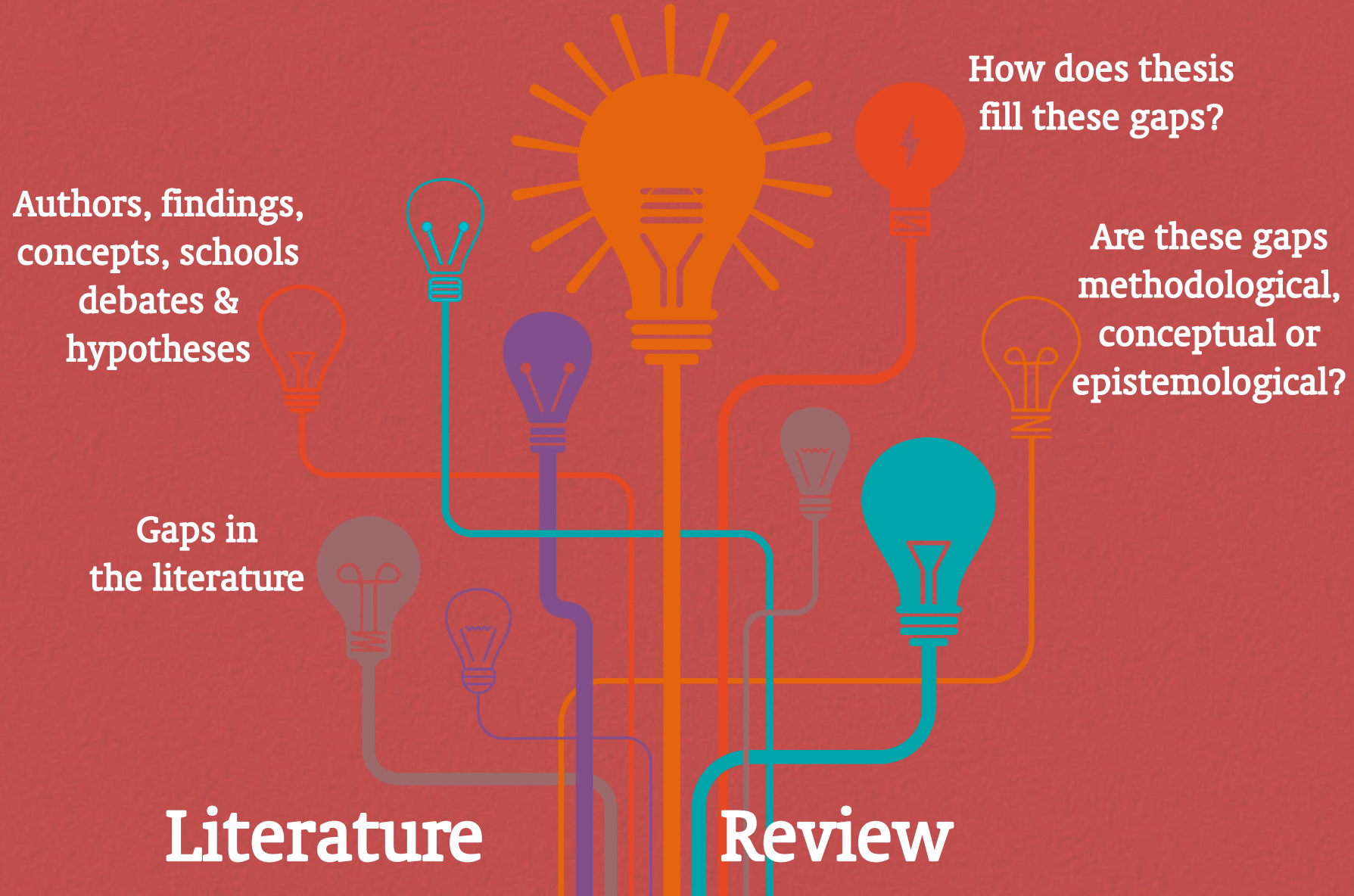




# Introduction

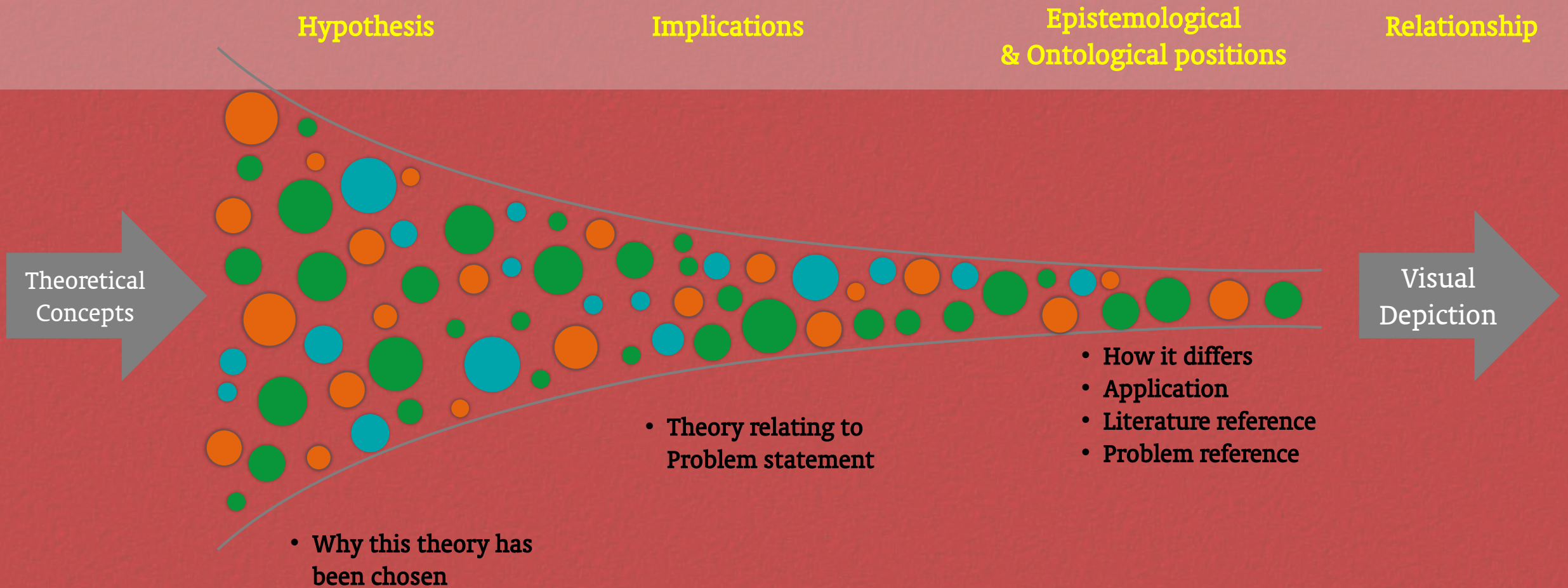


# What is the case for the research





# Theoretical Framework: Thesis Scaffolding





# Methodology: Who, What, When, Why & How?



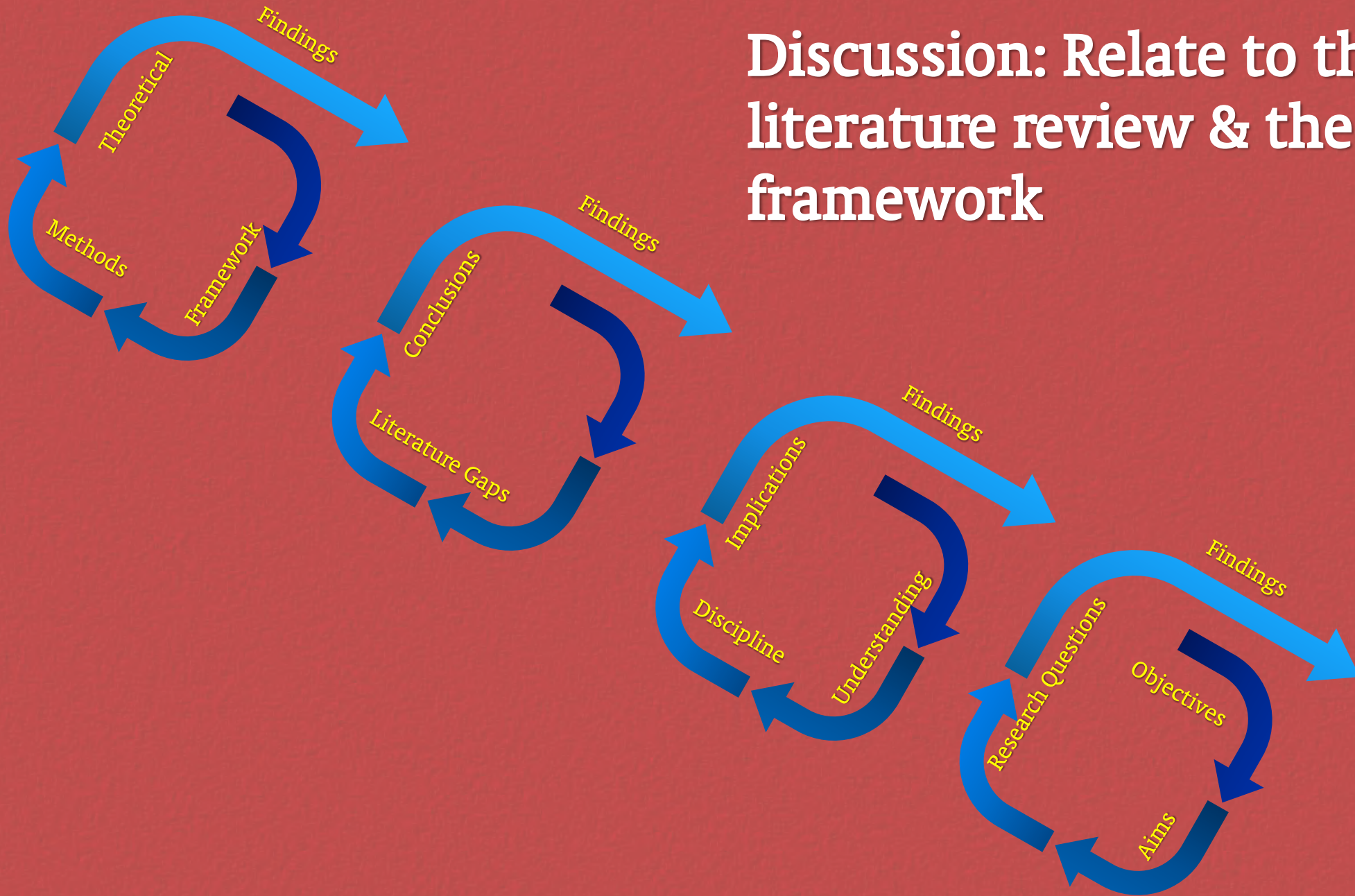


# Empirical: Present Factual Findings



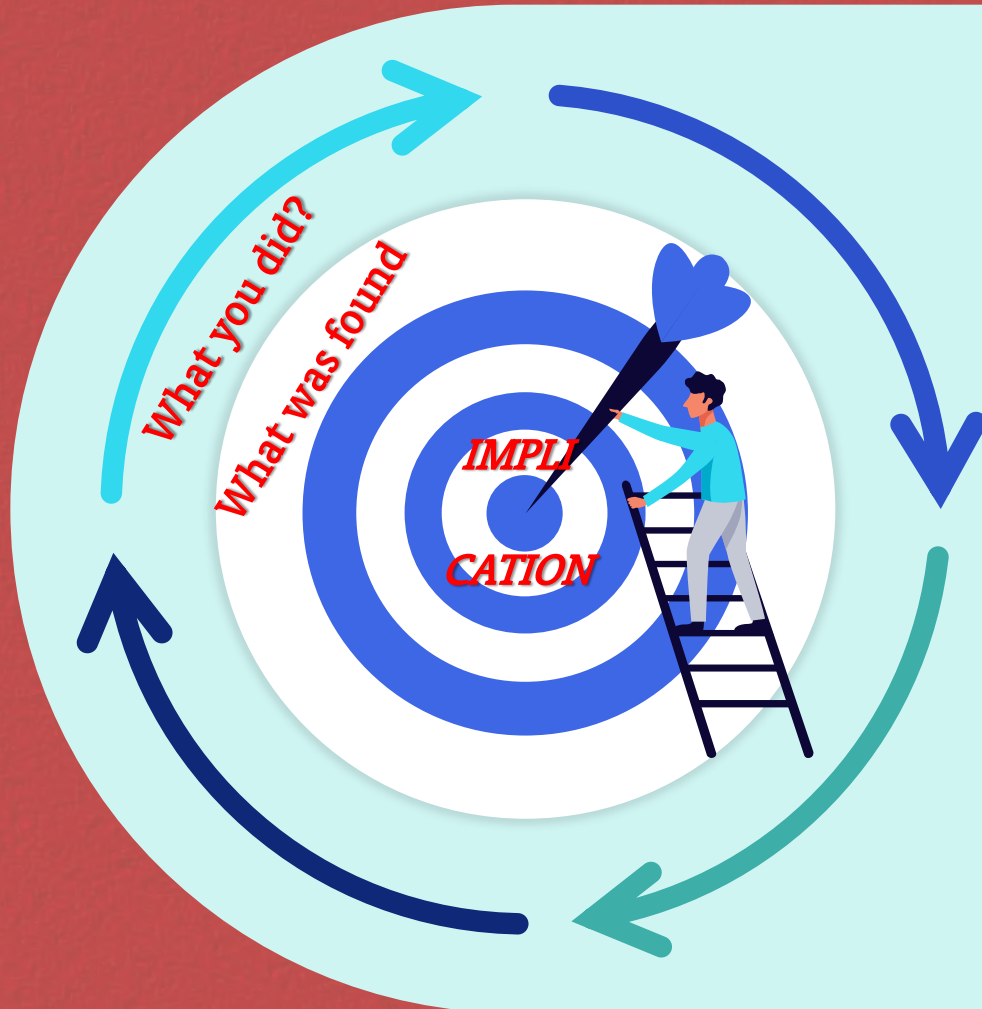


# Discussion: Relate to the literature review & theory framework





# Conclusions



**Answers to Research Question**

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**How Aims & Objectives addressed**

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**Significance & Implications**

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**Study Contribution**

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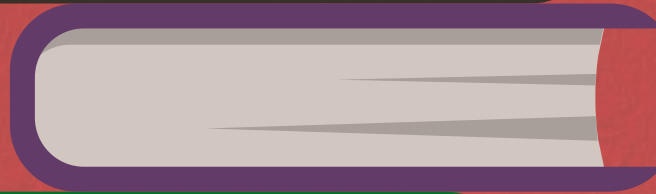


**Limitations & Further Research**

# References

## University house style

Read University guidelines &  
follow them strictly

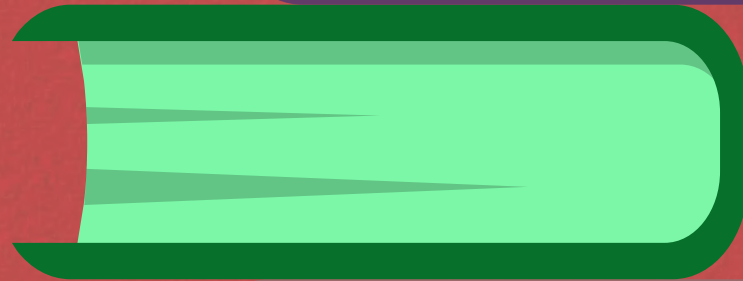


## Relevant

Avoid unnecessary and redundant literature

## Complete

All references contained in the text  
listed in the bibliography and vice versa



## Upto date

Include present and recent references





What happened during Research?



**Abstract**

- Reason for writing the thesis
- Current approaches and gaps in the literature
- Research question(s) and aims
- Research methodology adopted
- Main findings
- Conclusions and implications



# Ten Tips

- Do not be daunted by the task of “writing up”
- Plan the structure of your thesis
- Academic writing does not have to be dry
- Do not write up in chronological order
- Think carefully about your writing
- University preferred style of references
- Use a house style
- Take care quotes from other sources
- Think about plagiarism
- Present work in best possible light



The Convenor thanked the Dean Dr. SP Rao for his fantabulous presentation and seeked his permission to introduce the speaker Dr. Venu to the participants.

### **About the Speaker:**

Dr. Venu is currently the Associate Professor in Department of Biological and Environmental Sciences, Texas A&M University-Commerce, Texas, USA. He obtained his masters and PhD in biochemistry from Indian Agricultural Research Institute, New Delhi. After his doctorate, he joined as a postdoctoral fellow in Tufts University School of Medicine, Massachusetts, USA and got trained in Molecular biology; and then served as research associate in the Tufts Univ. for 2 years (99-2001). From academic research position he moved to industrial research scientist position and worked for 3 years (2001-2004) in a biotechnology company, Athersys Inc., Ohio, USA. Later he moved back to the academia and served as project scientist in the world's #2 ranking hospital Cleveland Clinic Foundation (CCF), Ohio, USA. He is a dedicated teacher and researcher. Over the years he trained and mentored 81 researchers at various levels of qualifications which includes, doctorates, masters, undergraduates and technicians. He penned many high impact journals as first and corresponding author. His professional service includes – Academic editor for the reputed open access journal – PlosONE, he is reviewer for many pubmed indexed scientific journals, books, grants and Phd thesis.

**Some of his accolades in Texas A&M includes –**

He brought 3,92,423 USD in Grants & Awards.

He received awards for three consecutive years from 2014 – 2016. In 2014 Excellence in Research, 2015- Paul W. Barrus distinguished faculty award for teaching and in 2016 Mentor of the year award. He has long list of awards and honors; each and every award is not mentioned due to time constraint.

Other than these recent awards, he secured third rank in All India National Eligibility Test (NET) for lectureship in 1995.

Considering his research background and accomplishments, we thought him to be an appropriate speaker for the chosen topic – PhD thesis writing; with this intention we approached him; despite his personal and professional tight schedule; in a short notice, Dr. Venu accepted to be a speaker and referred his colleague Dr. Izhar as another speaker. He helped us in organizing the webinar from his end. After the introduction the Convenor requested the speaker to deliver his presentation. Dr. Venu, started his talk by thanking our dean and the organization. The screen shots of his presentation is as follows.....



# Ph.D. Thesis Writing



**Venu Cheriyaath, Ph.D.**

**Associate Professor**

**Department of Biological and Environmental Sciences**

**Texas A&M-University-Commerce, Texas, USA**

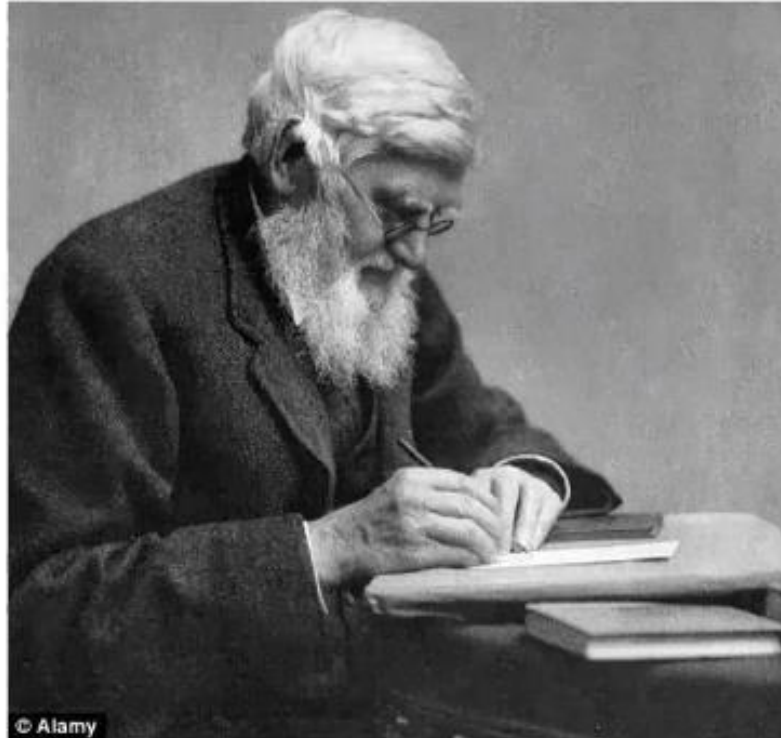
Selected Screen shots from Dr. Venu's Presentation

**“I enrolled in a doctoral program  
to do research. Why do I have to  
write a thesis?”**





# Writing is an important aspect of scientific process



**Without synthesis and publication,  
science is meaningless**

# What is Science



Science is the **process** of using observations and experiments to draw **evidence-based** explanations of a natural phenomena.

*Science is not just a body of established facts; it's a way of knowing.*



# What Drives Science

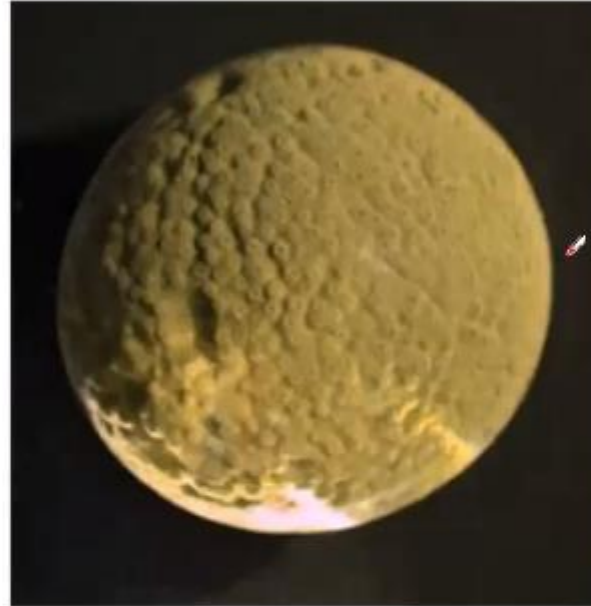


## Scientists

- Are curious
- Ask questions about how the world works
- Seek answers



# Why Science



9/10/2020



Venu Cheriyaath,  
Texas A&M-University-Commerce



# Steps in Scientific Process

## Scientific Method (a systematic process)



1. **Observation** (prior studies – Review of Literature)



2. **Hypothesis** (need to be testable and falsifiable)



3. **Experiments** (need to be controlled)



4. **Collect Data**

5. **Interpret Data**

6. **Accept or Reject Hypothesis** (& conduct future experiments)

# Anatomy of a Doctoral Thesis

## Scientific Method



1. Observation



2. Hypothesis



3. Experiments



4. Collect Data

5. Interpret Data

6. Accept or Reject Hypothesis

## Abstract

Introduction/  
Background and significance

Hypothesis & Specific Aims

Materials & Methods

Results

Discussion

Conclusions

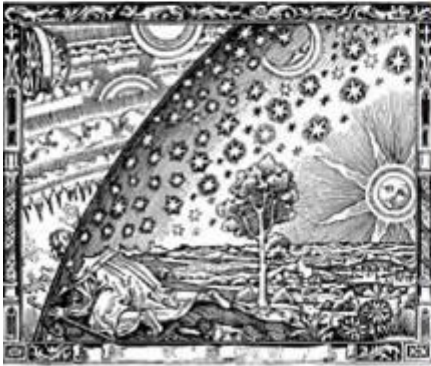


# Science is EMPIRICAL

**Empirical:** Describing knowledge that is based on experience and observations that are rational, testable, and repeatable. [*Gk., empeiria, experience*]

**BEWARE OF  
PSEUDOSCIENCE  
SUPERSITIONS  
& ANECDOTAL EVIDENCES**

These are not based on scientific processes



# Hypothesis

Hypothesis must be TESTABLE & Falsifiable

“Hell is exothermic”

Problem: Not testable, supernatural belief

**Scientists who express different views  
on Covid-19 should be heard, not  
demonized**

**Null hypothesis**

Symbol =  $H_0$  or  $H_0$

**Experimental hypothesis**

Symbol =  $H_1$ ,  $H_a$ , etc.

nondirectional (two-way)

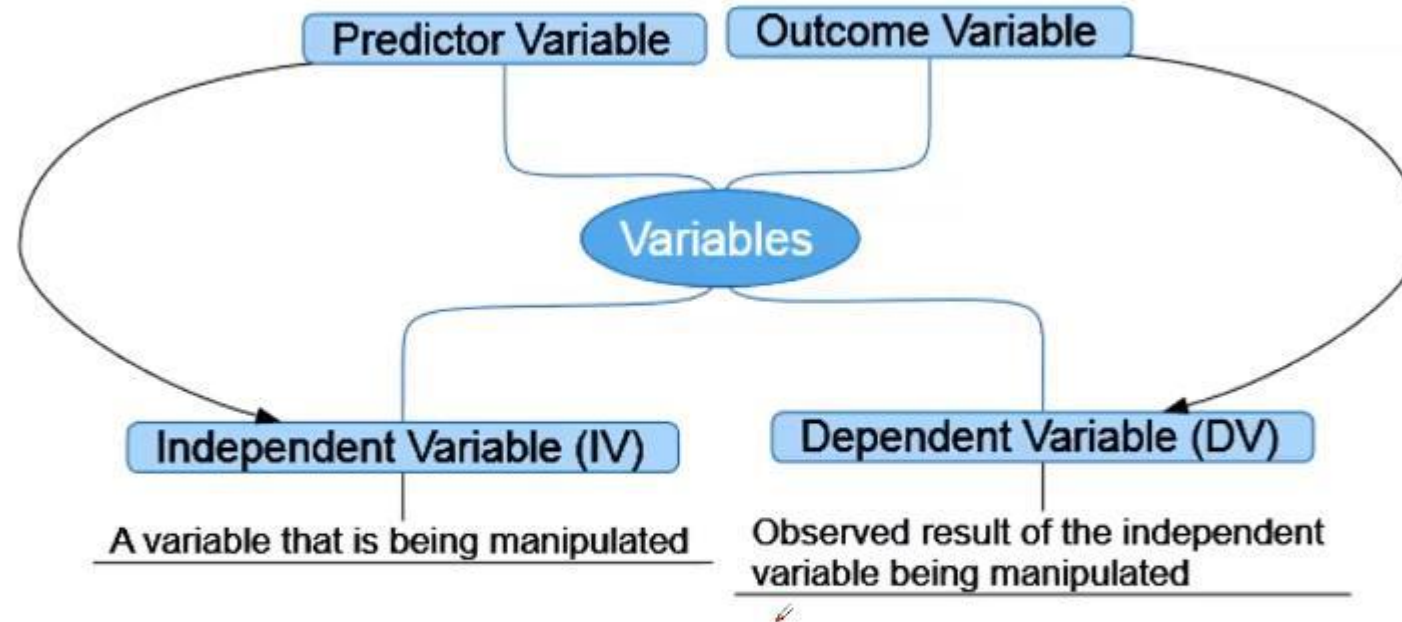
directional (one-way)

**Research Question**

Symbol = RQ or R



**Hypothesis:** "A specific and falsifiable tentative prediction regarding the relationship between or among two or more variables"



In an experimental set up predictor variable will be independent variable and outcome variable will become dependent variable

Hypothesis 1: People in positive mood walk faster than people in negative mood

Here **mood (independent variable)** influences how fast people are **walking (dependent variable)**

Implications: *Happy people tend to expend more energy overall than do sad people, and this is causing them to walk faster*

Hypothesis 2: People who walk faster will experience more positive moods than will people who walk more slowly.

Here walking speed (**independent variable**) influences the **mood (dependent variable)**

Implications: The act of physical exertion is implied to change people's mood in a positive direction

Hypothesis 3: There is a positive correlation between walking speed and mood.  
Less specific  
No directions



# Phrasing Hypothesis

Avoid vague or nebulous wording  
the hypothesis or research question must be clear and concise

The hypothesis or research question must be testable.

The hypothesis or research question must be falsifiable.

Wrong: Undergraduate students with high GPAs feel better about themselves than students with low GPAs?

Right: Undergraduates with GPAs greater than 3.0 have higher self esteem than undergraduates with GPAs of lower than 2.0.

# BACKGROUND AND SIGNIFICANCE

9/10/2020



Venu Cheriyaath,  
Texas A&M-University-Commerce



# Background and Significance

- Scientists write to communicate laws governing the physical processes.
- Therefore, scientific writing is not the same as writing in English Literature

## It must be:

- Non-fiction
- Amoral
- No emotional pictures
- No exaggeration
- Reader must be able to replicate the information or find its original source
- Methods
- Citations



# Background and Significance

Because scientific information is often very technical, scientific writing must clear and succinct.



Research article

## G1P3, an IFN-induced survival factor, antagonizes TRAIL-induced apoptosis in human myeloma cells

Venugopalan Cheriyaath,<sup>1,2\*</sup> Keith B. Glazer,<sup>1</sup> Jeffrey F. Winkler,<sup>1</sup> Rashid Boz,<sup>1</sup> Mohammad A. Hussein,<sup>2</sup> and Ernest C. Borden<sup>1</sup>

<sup>1</sup>Center for Hematology and Oncology, Molecular Therapeutics, and Multiple Myeloma Research Program, The Cleveland Clinic, Taussig Cancer Center, Cleveland, Ohio, USA, <sup>2</sup>Cancer Research, Abbott Laboratories, Abbott Park, Illinois, USA

The effectiveness of IFN- $\alpha$ 2b for human multiple myeloma has been variable. TRAIL has been proposed to mediate IFN- $\alpha$ 2b apoptosis in myeloma. In this study we assessed the effects of IFN- $\alpha$ 2b signaling on the apoptotic activity of TRAIL and human myeloma cell survival. While TRAIL was one of the most potently induced proapoptotic genes in myeloma cells following IFN- $\alpha$ 2b treatment, less than 20% of myeloma cells underwent apoptosis. Thus, we hypothesized that an IFN-stimulated gene (ISG) with pro-survival activity might suppress TRAIL-mediated apoptosis. Consistent with this, IFN- $\alpha$ 2b stabilized mitochondria and inhibited caspase-3 activation, which antagonized TRAIL-mediated apoptosis and cytotoxicity after 24 hours of cotreatment in cell lines and in fresh myeloma cells, an effect not evident after 72 hours. Induced expression of G1P3, an ISG with largely unknown function, was correlated with the antiapoptotic activity of IFN- $\alpha$ 2b. Ecopically expressed G1P3 localized to mitochondria and antagonized TRAIL-mediated mitochondrial potential loss, cytochrome c release, and apoptosis, suggesting specificity of G1P3 for the intrinsic apoptosis pathway. Furthermore, RNAi-mediated downregulation of G1P3 restored IFN- $\alpha$ 2b-induced apoptosis. Our data identify the direct role of a mitochondria-localized pro-survival ISG in antagonizing the effect of TRAIL. Curtailing G1P3-mediated anti-apoptotic signals could improve therapies for myeloma or other malignancies.

### Introduction

Interferon (IFN) can mediate apoptosis, antiproliferative effects, and immunomodulation (1–3). Although IFNs have been used for myeloma treatment since 1973 (1–5), their benefit for myeloma patients is still debated. A review by the European Myeloma Research Network identified beneficial effects of IFNs in 3 randomized studies and no effect in 3 others (6). Depending on experimental conditions, IFNs can either stimulate or inhibit cell survival or induce apoptosis in myeloma cells (7–10). Induction of TRAIL (also known as Apo2L) has been proposed to mediate apoptosis induced by IFN- $\alpha$  in myeloma cells and in some tumors (9, 11, 12). However, an antagonizing effect for IFNs on TRAIL-induced caspase 3 activation has been identified (13). In serum studies, IFN- $\alpha$  protected myeloma cells from dexamethasone-induced apoptosis (7, 14), suggesting antiapoptotic activity for IFNs in myeloma. However, molecular mechanisms for antiapoptotic effects of IFNs in malignancies have remained unclear.

To probe molecular and cellular actions of IFNs on myeloma cells, we assessed its effects on induction of IFN-stimulated genes (ISGs) and on TRAIL-induced apoptosis pathway. Depending on duration of treatment, IFN- $\alpha$ 2b had a dual role in modulating the balance between myeloma cell survival and death. IFN- $\alpha$ 2b for 24 hours antagonized TRAIL-induced apoptosis, but after 72 hours, it augmented the apoptotic activity

of TRAIL. Because pro-survival is an antiapoptotic pathway, a central role in the survival of myeloma cells (15), we hypothesized that induction of an ISG with pro-survival activity might be antagonizing the apoptotic activity of TRAIL. Further analysis identified G1P3 (ISG # 16) as a gene that antagonized the effects of TRAIL by stabilizing the intrinsic apoptosis pathway through mitochondrial stabilization.

### Results

**Altered effect of IFN- $\alpha$ 2b on apoptosis of myeloma cells.** Effects of IFN- $\alpha$ 2b on myeloma cell viability were determined by treating IL-6-independent NCI H928, RPMI 8226, and U266 cells with increasing concentrations of IFN- $\alpha$ 2b for 24 or 72 hours. Viability assays identified no inhibitory effects of IFN- $\alpha$ 2b after 24 hours, with marginally reduced viability after 72 hours (Figure 1A). Compared with NCI H928 and U266 cells, RPMI 8226 cells were more resistant to IFN- $\alpha$ 2b. Other IFNs, IFN- $\beta$  and IFN- $\gamma$  (Supplemental Figure 1, A and B; supplemental material available online with this article doi:10.1172/JCI312203B), had a similar lack of effects; the  $IC_{50}$  for IFNs could not be defined under these conditions.

To test whether the synergistic effects of IFN- $\alpha$ 2b on apoptosis cell viability resulted from lack of efficient signaling, the kinetics of Src-1 phosphorylation, a critical downstream target of IFNs, was assessed in RPMI 8226 and U266 cell lines (Figure 1B). Immunoblotting with an anti-p-Src antibody (p-Src) both identified increased Src-1 phosphorylation within 0.5 hours of IFN- $\alpha$ 2b, which was lost at treatment duration progressed to 24 and 72 hours. Reprobing with an anti-Src-1 antibody detected an equal amount of Src-1 in each lane, confirming that the difference in phosphorylation of Src-1 was not due to an increase in Src-1 (Figure 1B).

**Noninduced alterations in mitochondrial membrane potential.** The effect of IFN- $\alpha$ 2b on mitochondrial membrane potential (MMP) was assessed in NCI H928 and U266 cells. The effect of IFN- $\alpha$ 2b on MMP was assessed using the fluorescent dye JC-1, which is a mitochondrial membrane potential indicator.

**Condition of treatment.** The authors have determined that the conditions of treatment used in this study are appropriate for the study of the effects of IFN- $\alpha$ 2b on myeloma cells.

The Journal of Clinical Investigation | <http://www.jci.org> | Volume 117 | Number 10 | October 2007

3417

- Avoid obfuscatory Scrivenery
- Employ an economy of words

9/10/2020



Venu Cheriyaath,  
Texas A&M-University-Commerce



# Obfuscatory Scrivenery

Someone:

- writing about something they don't understand
- trying impress the reader of their intelligence
- Using excessive use of jargon and details
- who thinks scientific writing is supposed to be obscure and difficult to understand
- is trying to conceal a lack of significant findings
- is trying to pad their paper to make it longer

# Believe it or not, scientist do not want to sound too technical



Translation: "You have a bruised rib."

## Say No to Jargon



# Believe it or not, scientist do not want to sound too technical

Example:

“A metallic retainer, operated by a wing nut, was used to suspend a borosilicate glass cylindrical container over a flame produced by a natural gas fueled heat source. Exactly two millilitres of aqueous sample was carefully decanted into the borosilicate cylindrical container using a disposable polystyrene graduated dispensing device. Continuous exposure to the heat source was maintained for exactly 2.0 minutes.”

Is the same as:

“A 2.0 ml sample was heated over a flame for two minutes.”

# ABSTRACT

9/10/2020



Venu Cheriyaath,  
Texas A&M-University-Commerce

Speed 2



# Elements of an Abstract

Urban environments are characterized by conversion of natural ecosystems to artificial structures leading to changes in the physical properties of surfaces. As a result, air temperatures of the urban environments are higher than those of nearby rural areas causing the global phenomenon called 'Urban Heat Island' that has a negative impact on economics and health of inhabitants. Urban greening is believed to mitigate urban heat problems but information on the effect of using different plant species is scarce. This study will investigate the role of vegetation in urban heat mitigation in Dodoma, Tanzania. Specifically, the effect of species composition, vegetation density and spatial patterns will be evaluated in a quasi-experimental set-up. Data to be collected are: meteorological measurements (empirical data collection), characterization of plant species (observation and literature), density and arrangement patterns of vegetation (satellite images and aerial photographs). Descriptive statistics, regression and correlation analyses will be used to examine the relationships between urban heat and vegetation parameters; t-test and chi-square tests will be used. The results will allow conclusions on how urban planning can enhance thermal comfort of cities through use of vegetation.

## Elements

Background

Research problem

✓ Overall objective

Methodology  
Independent variables

Data, data collection

Data analysis

Impact  
Expected contribution

*Based on Feyisa (2008)*

# Hypothesis, Model, Theory, & Law

- Hypothesis:** “A specific and falsifiable tentative prediction regarding the relationship between or among two or more variables”  
**(Most Tentative, need to be testable and falsifiable)**  
In generating a hypothesis you would use your knowledge of the subject to make an “educated guess” as to what the correct hypothesis is.
- Model:** Provide a reasonable explanation of the phenomenon in question
- Theory:** A hypothesis or model that has been tested critically and validated under many different conditions.
- Law:** A thoroughly tested theory that has been validated over a long period of time.  
**Laws of gravity, Ideal gas laws, Mendel’s Laws of Heredity**



## Question and Answer Session

**Question:** Professor do abstract and summary are same? Kindly explain.

**Answer:** Abstract and summary are not same and these two terms are often used interchangeably resulting in some confusion. An abstract is a condensed overview of the thesis or a paper and it is typically found at the beginning of the document. It should be a stand-alone entity; by reading it a reader should get the complete picture of the article/thesis. It can contain information about the background, objectives, methods, results and conclusions of the work; and are generally written with 300 words or less.

Like an abstract, the summary is also a condensed write-up of the thesis/book. Unlike abstract summaries do not have word limit. It is usually about 5% to 15% in length of the original text. It should convey the main ideas and concepts in a clear and concise manner. It can have a brief introduction, major findings (results), discussion and conclusion.

Contd...



**Question:** Is hypothesis necessary for a qualitative research?

**Answer:** Hypotheses are testable statements linked to your research question. Generally, the qualitative research is not designed for hypothesis testing, it is often designed to collect the data, it can lead to hypothesis-testing and generating outcomes. But still in qualitative research, one can ask a research question. Whether it is quantitative or qualitative research; the question is whether the research is hypothesis based or not. The percentage of researchers doing hypothesis driven basic research –quantitative research is lowering in recent times; even the studies funded by NIH and other granting bodies are mostly technique based and are mostly general research questions and are not hypothesis based research. If someone is seeking pure science, it is going to be hypothesis based research. Hence my advice is to do a hypothesis driven research.

**Question:** what is the difference between part time and full time PhD in respect to quality of PhD outcome?

**Answer:** Quality of PhD outcome - It has nothing to do with whether you do the PhD as part time- or full time. All it depends on the significance of the research problem and the quality of the methodology designed to address the hypothesis.

Contd...

**Question:** How to translate knowledge into science or vice verse?

**Answer:** A knowledge can become a science by building a hypothesis and testing it in a systematic manner. **Science is a tool or a process that is useful to test the knowledge** and based on the outcome; knowledge keeps changing until you don't know what you know. The knowledge that you acquire may be correct at that time period and can remain as such or it can be in – correct in another time (future). For example, Pluto was a planet for longer period in the past, then all of a sudden it was not categorized as a planet by astronomers. Hence I strongly believe knowledge is a dynamic process and not static. Similarly, many theories of the past were disproved and some or many of the current existing theories may be falsified in the future. The scientific findings that withstood the time like Newton's law or Mendelian laws become the knowledge in this world. Hope answered the question.

**Question:** Do a PhD scholar require PhD guide?

**Answer:** Yes, PhD scholar requires a PhD guide and doctoral committee.

Contd...

**Question:** How to convince the doctoral committee members about my research when they are from different domain?

**Answer:** If doctoral committee (DC) members are from different domain then it is a problem. Because it will be difficult for them to clearly understand your research and cannot advise you further; with great difficulty you may have to convince them. It may be a better idea to replace the committee members with scientists from your field of research; regarding this better to discuss with the PhD mentor. In US universities; without much hassle the DC members can be changed, I am not aware about the process in India; again better to discuss with PhD advisor and resolve at the earliest.

**Question:** Role of philosophy in science

**Answer:** Philosophy can address the issues that cannot be settled by mere gathering the data to solve the problem. Philosophy of science is application of this approach to the domain of science. For example, think about consciousness because it cannot be quantified using instruments and cannot be converted in to numbers (data); it is not favorite subject for basic researchers; on the other hand, it is the favorite subject for philosophers. So I strongly believe to be a good scientist, one should have philosophical thinking.



## Second Speaker Introduction:

**Dr. Izhar** is currently working as an Associate Professor in Department of Biological and Environmental Sciences Texas A & M University, Texas. Prior to this position, he served as an assistant professor for six years in the same institute, where he is actively involved in teaching and supervising the research projects of undergraduates, post graduates and PhD students. He got two awards in teaching; 1 for Excellence in Teaching in 2016 and 2. Paul W. Barrus distinguished faculty award for teaching in 2017; in his department, for the past two years he is chairing the committee for space analysis, allocation and planning committee and he is member in 21 other different committees; this indicates his commitment in the job. Before joining Texas, A&M; he worked as research scientist for 10 years' in Univ. of Texas at Austin, Marine Science Institute, Texas, the institution where he completed his postdoctoral fellowship also. Furthermore, he served as a coordinator for PhD candidacy examinations and a member in graduate studies committee. In addition to his academic experience; he worked as Natural Resources Specialist for a year in Texas Parks & Wildlife Department and in as Research Leader for 3 years in US Fish & Wildlife Service, Dexter, New Mexico. He is well accomplished teacher and researcher with awards, honors, highly reputed research publications, offers professional service as reviewer for scientific journals, grants and thesis. Post this briefing about him, convenor requested him to take over the session.



# Ph.D. Dissertation

## Results, Discussion, Conclusions, and Citations

Izhar Khan



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# Writing Results

- Concise presentation of research findings describing only your data and statistical analyses of those data
  - ✓ No interpretation of results or their discussion in the Results section
- Avoid including details of experimental design or methods in the Results section, unless it is absolutely essential to understanding the results
  - ✓ include only the essential parts, if at all necessary



# Writing Results

- Follow the sequence of experiments in the Materials & Methods section designed to address specific hypotheses or sub-hypotheses
  - ✓ This can help avoid repetition of the experimental design/methods in the Results section
- Alternatively, you can present results beginning with the most important and ending with the least important, or present in another logical sequence
- Present only key findings that are relevant to the problem/questions/hypotheses

# Writing Results

- Avoid redundancy between Tables/Figures and written text of the results
  - ✓ Tables and/or Figures support the written results, which should not be a repetition of what is described in the Figures/Tables
- Be succinct and accurate in terms of indicating statistical significance of the results consistent with the statistical analyses employed
- Avoid reporting data “trends” in the change observed unless conflicting data is based on meta-analysis
- Write Material & Methods and Results in past tense

## Figure examples

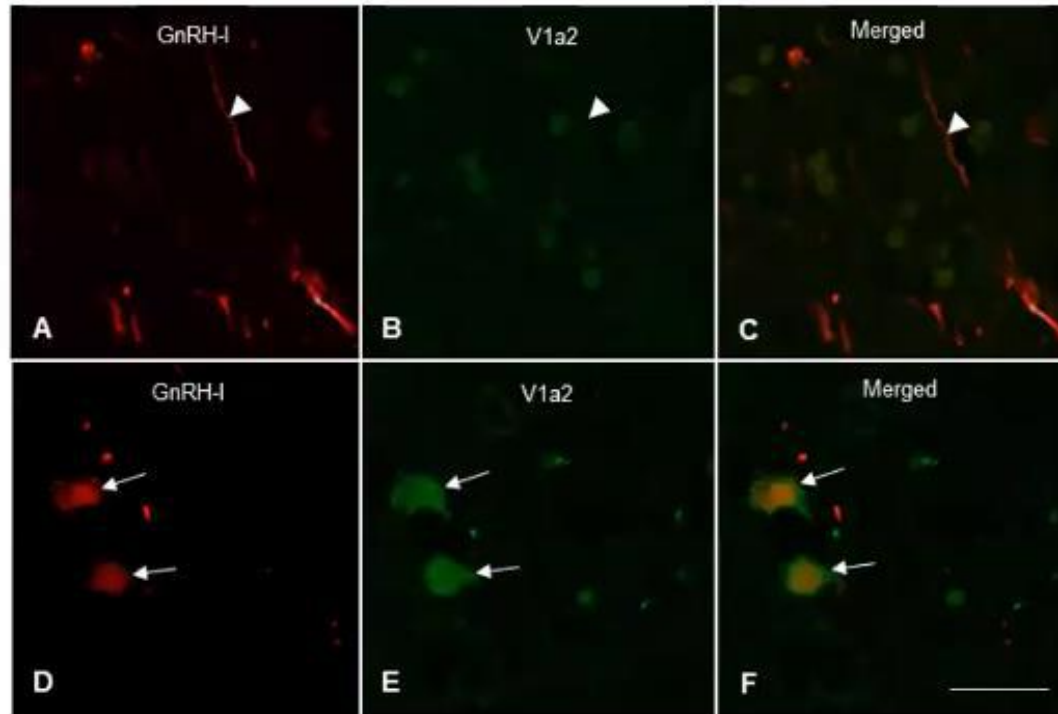


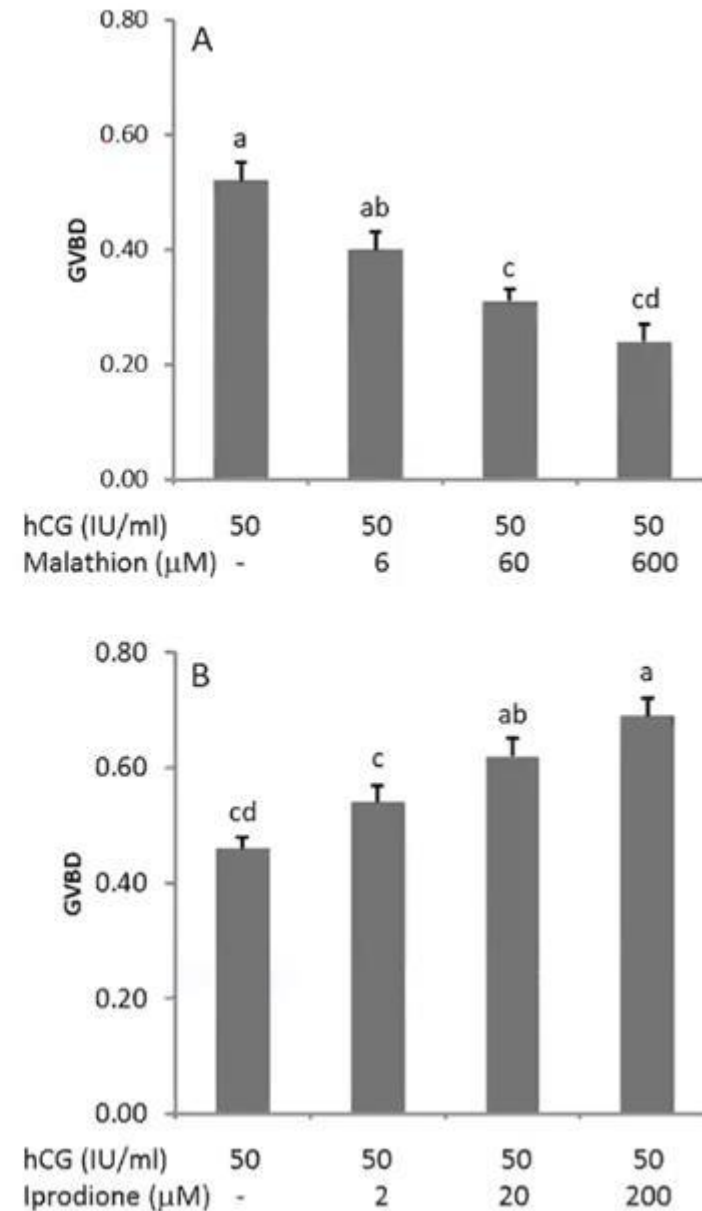
Fig. 4. Immunohistochemical co-localization of GnRH-I and AVT V1a2 receptors in the preoptic area of the rock hind brain. GnRH-I expression was seen in fiber bundles (A) and cell bodies (D). AVT V1a2 expression was seen in cell bodies (E and F). Small arrows (A–C) show GnRH-I containing fibers (A and C) with no apparent expression of AVT V1a2 (B). Tailed arrows (D–F) demonstrate colocalization of GnRH and AVT V1a2 in representative cells. Kline et al. 2016. *General and Comparative Endocrinology*. 54: 123-129.



## Figure examples

**Fig. 3.** Germinal vesicle breakdown (GVBD) in zebrafish oocytes in the control group exposed to 50 IU/ml human chorionic gonadotropin (hCG) alone and in combination with different concentrations of malathion (A) and iprodione (B). Each bar represents mean  $\pm$  SEM of data collected from four separate experiments. Statistically significant differences are denoted by different letters ( $p < 0.05$ ).

Maskey et al. 2019. *Toxicology in Vitro*. 54: 123-129.



## Figure examples

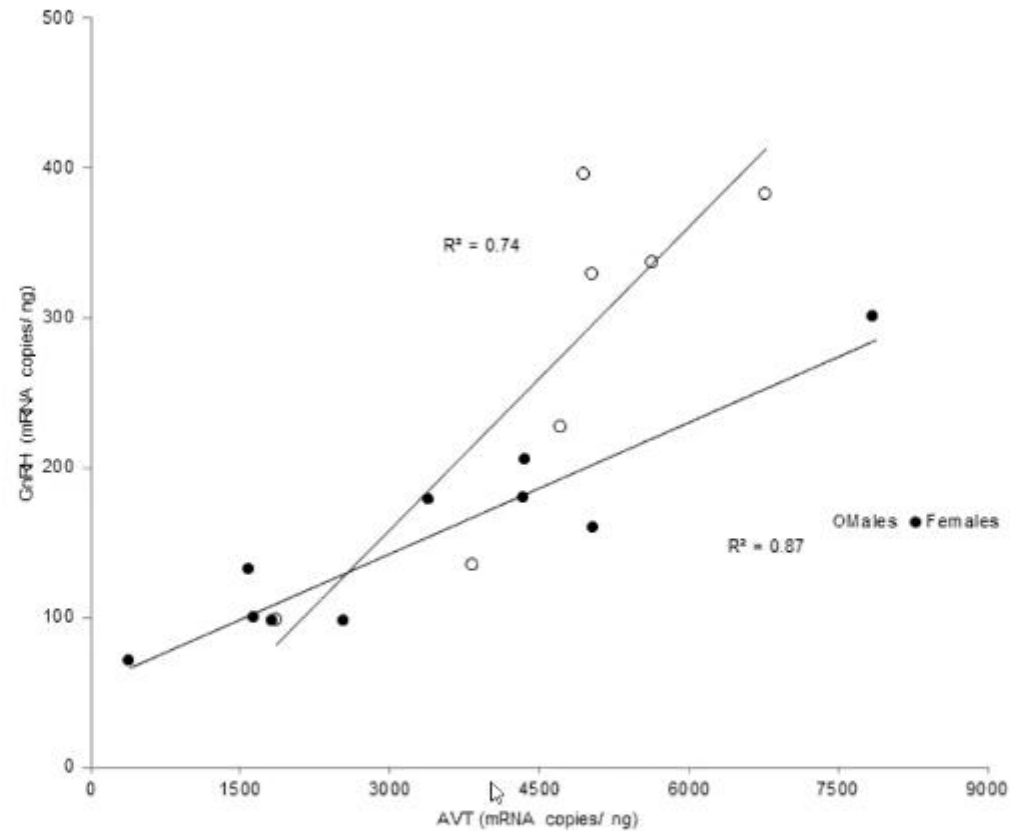


Fig. 7. Regressions of avt to gnrh-I mRNA transcript levels from the preoptic area + hypothalamus of male and female rock hind. Regressions for each sex were significantly different from the pooled model (ANCOVA;  $p = 0.038$ ).

Kline et al. 2016. *General and Comparative Endocrinology*. 54: 123-129.

## Figure examples

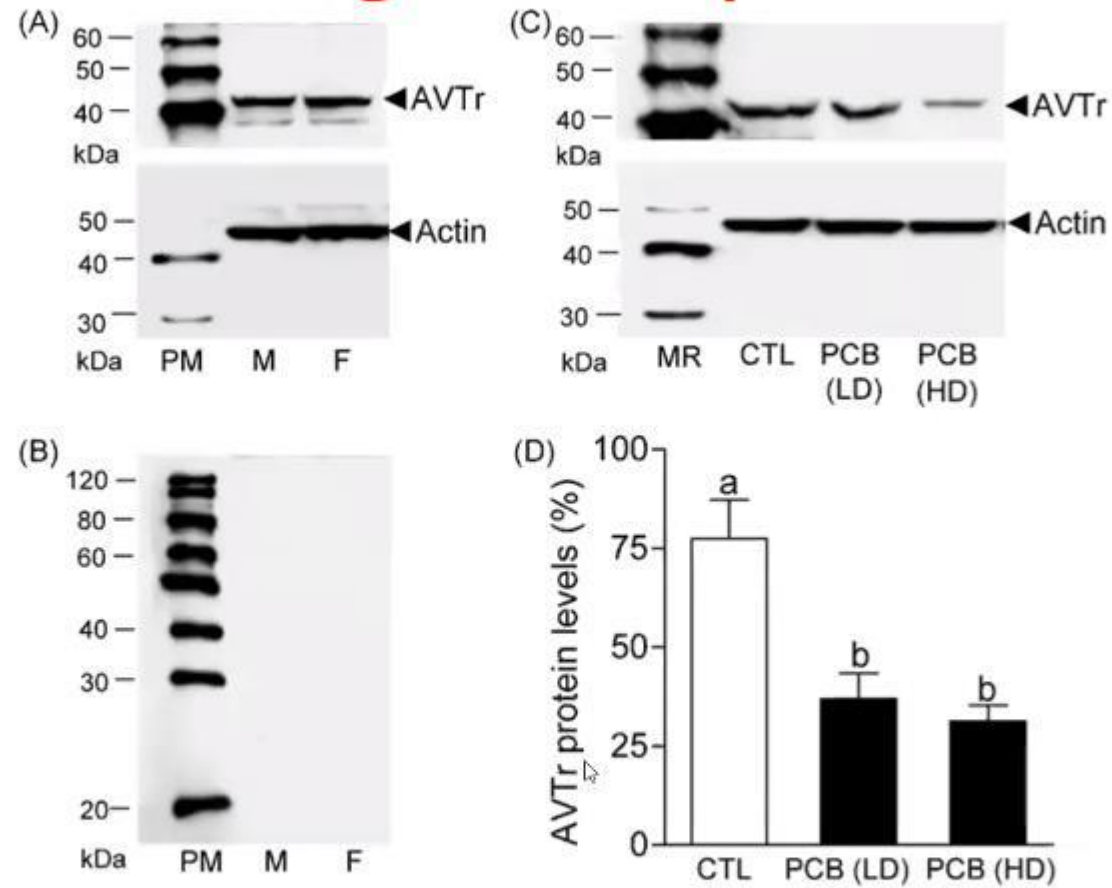


Figure legend on the next slide.

Rahman et al. 2020. *Journal of Molecular and Biochemical Toxicology*. DOI: [10.1002/jbt.22500](https://doi.org/10.1002/jbt.22500)



FIGURE 5 Effect of 4 weeks of exposure of PCB77 on AVT-V1a2 receptor protein expression and levels in croaker hypothalamus determined by Western blot analysis. (A) Immunoblot analysis of isolated AVT-V1a2 receptor protein expression in male and female croaker hypothalamus using a polyclonal AVT-V1a2 receptor antibody, and (B) immunoreaction blocked by coincubation of the antibody with peptide antigen showing the absence of protein signal. (C and D) Effects of 4 weeks PCB77 (LD: low dose, 2 µg/g body weight; HD: high dose, 8 µg/g body weight for 4 weeks) exposure on AVT-V1a2 receptor protein expression and relative protein levels in croaker hypothalamus. Each bar represents mean ± SE (N = 7-8, results of protein levels from both sexes were combined because they were not significantly different). Different letters indicate significant differences (Fisher's PLSD test  $P < .05$ ). AVT, arginine vasotocin; CTL, control; F, female; M, male; PLSD, protected least significant difference; PM, protein marker

Rahman et al. 2020. *Journal of Molecular and Biochemical Toxicology*. DOI: [10.1002/jbt.22500](https://doi.org/10.1002/jbt.22500)

## Table example

Table 1. Effects of Aroclor 1254 on tryptophan hydroxylase (TPH) protein content and malondialdehyde (MDA)-protein adducts expressed as the change in staining intensity of the protein bands.

Proteins	% Change in staining intensity <sup>b</sup>
49 kDa TPH	48.8 ↓ <sup>a</sup>
73 kDa TPH	34.7 ↓
116 kDa TPH	66.4 ↓ <sup>a</sup>
Total TPH protein	49.6 ↓ <sup>a</sup>
Total MDA-protein adducts (5 major bands)	191.0 ↑ <sup>a</sup>

<sup>a</sup>Significantly different from the control group: #, decrease; ", increase.

<sup>b</sup>Data represent percent changes in the mean values in the Aroclor 1254-exposed group compared to the control (5–8 observations/group).

*P* values <0.05 were considered significant.

Khan and Thomas 2004. *Marine Environmental Research*. 58: 333–336.

# Writing Discussion

**Discussion should include the following:**

- Describing major findings of the research specifically identifying what is new or unique
- Explaining what the findings mean and their importance
- Explaining whether the findings are consistent with or contradictory to what is known in the literature from similar/comparable studies
- Considering alternative explanations of the findings and whether these explanations raise new questions



# Writing Discussion

**Discussion should include the following:**

- Identifying relevance of the findings to the scientific community and the society as a whole
- Making sure to state the limitations of the study knowing all studies have limitations
- Suggesting future research directions based on questions/problems identified in the study and by comparing with known literature

# Writing Discussion

## **Avoid the following in the Discussion:**

- Statements not fully supported by data presented in the study
- Too much speculation
- Amplifying the significance of the study
- Criticizing other studies – contrasting your findings with other studies is fine
- Discussing issues not directly related to the study's findings
- Concluding statements

# Writing Discussion

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# Writing Conclusions

**Conclusions section should include the following:**

- What overall and specific objectives were achieved
- Significance/Relevance of the research findings
- How the study contributes to the existing knowledge in the field
- Study limitations and new questions arising from the study
- Future directions

# When Do We Cite Sources?

- Whenever we use someone else's idea or work
  - Common knowledge does not require citation
    - For example, Abraham Lincoln died in 1865.
    - Another example, genes are DNA segments that carry genetic information.
  - How do we know if a given piece of information is a common knowledge?
    - If you find the information occurring three or more scholarly sources without citation
    - Generally old and well accepted knowledge

# Why Do We Cite?

- To avoid plagiarism
- To give proper credit to the source
- To help readers
  - Finding further, in-depth information
  - To ensure the reproduction of your results/conclusion
  - To enable cross-examination of your work



## Why Do We Cite?

- To support your work (a way to convince readers)
  - Recently introduced scientific subject of study tends to be argumentative
  - Several competing ideas/theories/models
- You are not the only one who says it!

## End References

- Two Styles
  - Citation-Sequence (C-S) system
  - Name-Year (N-Y) system

### **C-S system**

#### In text citation

Gametophytes of the tropical fern *Ceratopteris richardii* (C-fern) develop either as males or hermaphrodites (1).

#### End Reference

1. Banks J, Webb M, Hickok L. 1993. Programming of sexual phenotype in the homosporous fern *Ceratopteris richardii*. Inter. J. Plant Sci. 154: 522-534

# N-Y System

- **In text citation**

- Consists of authors and year
  - May be cited in parentheses at the end of the sentence or may be the subject of sentence
- 
- Biliary copper excretion is mediated by the copper transporter ATP7B (Gates *et al.* 2008).
  - Gates et al. (2008) found that Biliary copper excretion is mediated by the copper transporter ATP7B.



# N-Y System

- **In text citation**

- Number of authors

- Three or more

- As subject: First author's last name followed by and others or *et al.* (year) found that....

- Zhan *et al.* (2008) found that.....

- Zhan and others (2008) found that.....

- Parenthetical: (First author's last name followed by and others or *et al.*, year)

- Sentence (Zhan and others, 2008).

- Sentence (Zhan *et al.*, 2008).

# N-Y System

- **In text citation**
  - Multiple papers from the same author
  - In different years
    - List them in chronological order  
(Banks 2006, 2008)
  - Same year
    - Add a letter after the year  
(DiSpirito 2008a, 2008b)

# N-Y System

- **End references (alphabetical order)**
  - Article in a book
    - First author's last name First initial, Subsequent author's names separated by commas. Year of publication. Article Title. In: Editor's names followed by a comma and the word *editors*. Book title, edition. Place of publication: Publisher. pp. inclusive pages.

Khan, I.A. and Thomas, P. 1999. Ovarian cycle, teleost fish. In: *Encyclopedia of Reproduction*. E. Knobil and J. D. Neill (eds.), Volume 3, Academic Press, San Diego, CA, pp. 552-564.



## N-Y System

- **End references (alphabetical order)**
  - Journal article
    - First author's last name First initial, Subsequent author's names separated by commas. Year of publication. Article Title. Journal title. Volume # (Issue #): Inclusive pages

Wu J, Forbes JR, Chen HS, Cox DW. 1994. The LEC rat has a deletion in the copper transporting ATPase gene homologous to the Wilson disease gene. Nat. Genet. 7(3): 541-545

# N-Y System

- **End references (alphabetical order)**
  - Book
    - First author's last name First initial,  
Subsequent author's names separated by  
commas. Year of publication. Book title.  
Place of publication: Publisher. Total number  
of pages followed by *p*.

Kim BH, Gadd GM. 2004. Bacterial Physiology and Metabolism. Cambridge, UK: Cambridge University Press. 529 p.

# N-Y System

- **End references (alphabetical order)**

- On-Line Sources: Database

- Title of Database [medium designator].  
Edition. Place of publication: Publisher.  
Beginning date-ending date [date cited].  
Available from: URL

Nucleotide blast [database on the Internet]. Bethesda (MD): National Library of Medicine, National Center for Biotechnology Information. [cited 2010 Nov 16].

Available from

[http://blast.ncbi.nlm.nih.gov/Blast.cgi?PROGRAM=blastp&BLAST\\_PROGRAMS=blastp&PAGE\\_TYPE=BlastSearch&SHOW\\_DEFAULTS=on&LINK\\_LOC=blasthome](http://blast.ncbi.nlm.nih.gov/Blast.cgi?PROGRAM=blastp&BLAST_PROGRAMS=blastp&PAGE_TYPE=BlastSearch&SHOW_DEFAULTS=on&LINK_LOC=blasthome)



# Avoid Using “Direct Quotes”

- Quotes should be used seamlessly, if at all
  - Placed within the context of the text
  - Presented to further the writer’s own argument (Paraphrase)
- If you must use a exact paragraph/statement from a reference source
  - Ask yourself one more time
    - Is it necessary? (Am I doing it only because I don’t want to paraphrase?)
    - Is it giving more argumentative impact in your paper/thesis?
  - Quote only necessary part

# Avoid Secondary Sources

- Citing sources based solely on citation by others
  - Happens a lot especially when
    - Your major source material is a review article
    - Comparable to “hearsay” in the court of law (not legally admissible evidence)
    - Should be avoided
      - » Go check the original source!!

Webinar\_Writing PhD Dissertation\_2020-09-10 - Microsoft PowerPoint

File Home Insert Design Transitions Animations Slide Show Review View

Paste Cut Copy Format Painter New Slide Layout Reset Section Font Paragraph Text Direction Align Text Convert to SmartArt Drawing Quick Styles Shape Fill Shape Outline Shape Effects Find Replace Select Editing

Slides Outline

1 **Ph.D. Dissertation**  
Results, Discussion, Conclusions, and Citations  
Izhar Khan

2 **Writing Results**

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- Avoid excessive data "noise" in the tables observed

# Ph.D. Dissertation

## Results, Discussion, Conclusions, and Citations

Izhar Khan





# Question and Answer Session

**Question:** How to select the methodology design, framework according to the topics?

**Answer:** First of all, design a strong hypothesis, then think in what are the ways to prove the hypothesis and discuss with your PhD advisor and experts in your field of research; this eventually will lead to designing a good methodology and thereby the results and a good discussion will follow it.

**Question:** How can I put discussion in qualitative research

**Answer:** Qualitative research still involves observations. So, discuss the observations and trends or patterns of those observations, that's how I would approach that qualitative research in terms of discussion. In the discussion section you are comparing and contrasting with what is already known in terms of for your research how it fits into the knowledge base that you have on the topic.

Contd...

**Question:** How to prepare online thesis defense? Your suggestions please

**Answer:** Several days before the online thesis defense, discuss with the PhD mentor and dissertation committee chair, about organizing it via online web portal, decide your conferencing platform; may be zoom or google or any other platform; try several practice sessions, record the video and watch it. Think whether the intended message is effectively communicated or not. Prepare the slides in such a manner that they are mostly self –descriptive, easy to follow and appealing to eyes; use the laser pointer in the Microsoft power point to highlight the key points in each slide while defending your thesis. Strong internet connection is important; if net signal is weak then voice will break and it may annoy the audience; hence check the net connectivity during practice session. To avoid net issues, try to practice in the university and do the defense presentation from the university itself.

Fully charge your laptop (if using) a night before your defense; that could save you from any unexpected power drop. Make a copy of presentation in USB drive and as well in an external hard-drive; If any issue arises with your laptop; then can use any university - desktop with camera. At times in stress throat may become dry to avoid that have a bottle of water handy while presenting. More than all the above, keep yourself healthy so that you can deliver the presentation effectively. On the given day – be highly professional; including dressing – let it be formal; use a good webcam that is centered on your face (no weird angles). Use adequate lighting and have clean/plain background, jazzy backgrounds will distract the audience. Read through your thesis and enlist possible questions. In addition, do little research on academic expertise of the committee members and anticipate questions and prepare for it. As well think in terms of lay-man and prepare for the questions from audience who may or may-not from the science background. Answer all the questions precisely and do not spend more time on explaining the concepts in depth and in an elaborate manner; audience may lose interest by that. At the end acknowledge all who helped you to attain this stage and at last thank the audience who patiently listened your talk

Contd...

**Question:** Difference between limitation and delimitation with example

**Answer:** Dr. Venu was requested to answer this question and he answered - Limitations are influences that the researcher cannot control. They are the shortcomings, conditions or influences that cannot be controlled by the researcher that place restrictions on your methodology and conclusions. Any limitations that might influence the results should be mentioned.

**Delimitations** are choices made by the researcher which should be mentioned. They describe the boundaries that you have set for the study. Assumptions are accepted as true, or at least plausible, by researchers and peers who will read your dissertation or thesis.

**Question:** When the review articles are referred, to whom should be given the citation for original articles or the review articles?

**Answer:** Dr. Izhar: Review articles are for general statements, but otherwise, you should see the data. You can use the original research that was cited by the reviewer. Dr. Venu: Scientists are also like any other human beings. So when you are writing a review article always go to the original source and try to understand what message is communicated in the original article. While reading the discussion do not just focus on it; also see the results, analyze and make your own conclusion. Because at times the researchers could write the discussion in a way to positively project their findings, negative results are usually not published. Hence care should be taken while analyzing and citing the article.

**Question:** Shall I collect the data through pilot study for unavailable previous statistics to accept my topic in ethical committee. Is it possible?

**Answer:** Dr. Izhar: Yes, it should be possible; otherwise novel research ideas cannot be experimented. However, follow the University rules; if such a provision is not there, then request to amend it. If the request is genuine; administrators will accept it; if preliminary experiments are not done then some good ideas may be lost.

**Dr. Venu:** Approval from human- /animal –ethics committee is needed even to collect the preliminary data; because the study protocol should be in line with bio-ethics and should be approved by the mentioned committees.

Contd...



**The Convenor** whole heartedly thanked both the speakers Dr Venu & Dr Izhar for sharing their experience and knowledge by sacrificing their sleep time. He also told that despite their busy work schedule both of them agreed to deliver the webinar as service for us. Further, he stated that “Dr. Venu in his talk mentioned that a researcher should have a curiosity mindset like a small kid while searching the solution for research problems and keep asking more and more questions to find the solutions that could benefit mankind”. He further told that to do research, PhD is not the only gateway. If a person have quest, that is enough to unravel the major scientific problems. For instance, Dr. Venu’s mentor – Dr. Ernest Borden (my mentor), MD, has not done PhD, but he guided several talented PhD’s and post doctoral fellows in Cleveland Clinic Foundation (world’s # 2 ranking hospital) and was highly respected in his field of research – the interferons and cytokines. Dr. Venu clearly defined and briefed the difference between - the hypothesis, model, theory and law. He explained about the types of hypothesis in detail. In a nutshell Dr. Venu’s talk was comprehensive and well communicated the following topics 1. Scientific process; 2. Background and significance; 3. Development of hypothesis. His talk was very engaging and we all lost the track of time in that. Participants highly commended his talk. His talk ended with a lively Q&A session mentioned above.

Convenor also thanked the second speaker Dr. Izhar for his wonderful presentation on the second part of the thesis-writing which covered the following sub-topics - Results, Discussion, Conclusion and Citation. Speaker elaborated each of the mentioned sub-topics. He explained the difference between the results and the figure legend; and gave tips to the participants in writing a good results section in their thesis. As well he explained the difference between the results and discussion section. He told that in discussion section the first paragraph should explain the major findings of that particular research and it should not repeat the results. Further he told that it is not mandatory to write the discussions in the same order as the results. The discussion can be in contradictory to the earlier findings or in light with what is known, however it eventually should lead to draw a conclusion and communicate a meaningful message to the scientific community and others. The discussion part should not be biased; it should enlist the limitations and suggest future research directions. In discussion section most of the researchers speculate the mechanism of action or other phenomenon based on the obtained results, speculations without concrete data is not correct and should not to emphasize much on speculation in the discussion section. He explained about the conclusions, it should not be a repeat of the summary/abstract section. The conclusions part should clearly state the overall and specific objectives achieved and it should state the significance of the research findings. It should also indicate the study limitations and new questions arising from the study.

Then he finally explained about citations, he asked why do we cite? and answered – to avoid plagiarism; to give proper credit to the source and to help readers to find further in-depth information. As well to ensure the reproduction of the results/conclusions and to enable cross examination of your work. His talk ended with an active Q& A session (mentioned above). The participants felt it was very informative and highly useful.

At-last the convenor thanked the organization Narayana Medical College and Hospital and the Dean Dr. SP Rao for giving the opportunity to organize this webinar and thanked the participants for their valuable time with us.

**Thank You**