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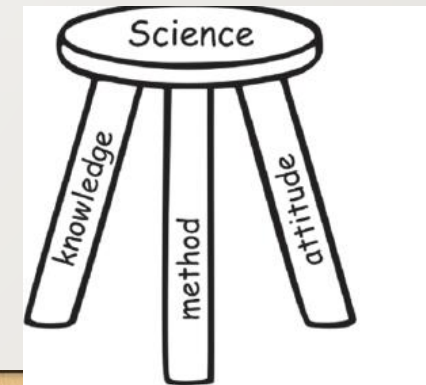
Writing a Scientific Research Paper

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Three Pillars of Science

- Science can be thought of as the combination of three essential things:
 - (1) a communal **collection of knowledge** (both facts/data and theories);
 - (2) a **method of evaluating the efficacy of scientific theories** by comparing the predictions of those theories to observation/experiment; and
 - (3) an **attitude of skeptical inquiry** and the belief that all scientific knowledge is provisional and subject to revision when confronted with new evidence.



What is Research

- Research is an unbiased, structured, and *sequential method of enquiry*, directed towards a clear implicit or explicit objective. This enquiry might lead to *validating existing postulates* or *arriving at new theories and models*.

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Scientific Approach to Research

- Develop the Problem
- Reviewing the literature
- Formulate the Hypothesis or Research questions
- Formulate the Research Plan (research Design)
- Develop theoretical solution to the problem
- Experimental design and collecting data
- Analyzing Data
- Refine the Theory if necessary
- Interpret the results and form the conclusions
- Reporting the Results

5 | Basis of Scientific Approach to Research

The scientific method is based on certain “articles of faith” which are:

- ▶ Logical reasoning process (Deduction, Induction and Abduction)
- ▶ Reliance on empirical evidence
- ▶ Use of relevant concepts
- ▶ Commitment to objectivity
- ▶ Ethical neutrality
- ▶ Generalization
- ▶ Verifiability

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Deductive Reasoning

- *Deduction* is generally defined as "the deriving of a conclusion by reasoning." Its specific meaning in logic is "inference in which the conclusion about particulars follows necessarily from general or universal premises." Simply put, deduction—or the process of deducing—is the formation of a conclusion based on generally accepted statements or facts.
- It occurs when you are planning out trips, for instance. Say you have a 10 o'clock appointment with the dentist and you know that it takes 30 minutes to drive from your house to the dentist's. From those two facts, you deduce that you will have to leave your house at 9:30, at the latest, to be at the dentist's on time.
- Deductive reasoning always follows necessarily from general or universal premises.

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Inductive Reasoning

- Whereas in deduction the truth of the conclusion is guaranteed by the truth of the statements or facts considered, induction is a method of reasoning involving an element of probability.
- In logic, *induction* refers specifically to "inference of a generalized conclusion from particular instances." In other words, it means forming a generalization based on what is known or observed.
- For example, at lunch you observe 4 of your 6 coworkers ordering the same sandwich. From your observation, you then induce that the sandwich is probably good—and you decide to try it yourself. Induction is at play here since your reasoning is based on an observation of a small group, as opposed to universal premises.

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Abductive Reasoning

- The third method of reasoning, *abduction*, is defined as "a sylllogism in which the major premise is evident but the minor premise and therefore the conclusion only probable."
- Basically, it involves forming a conclusion from the information that is known. A familiar example of abduction is a detective's identification of a criminal by piecing together evidence at a crime scene.
- If you have trouble differentiating *deduction*, *induction*, and *abduction*, thinking about their roots might help. All three words are based on Latin *ducere*, meaning "to lead."
- The prefix de- means "from," and deduction derives *from* generally accepted statements or facts. The prefix in- means "to" or "toward," and induction leads you *to* a generalization. The prefix ab- means "away," and you take *away* the best explanation in abduction.

9 | What is a Research Paper?

- A research paper is a written work which involves the processes of researching, critical thinking, source evaluation, composition and organization.
- The readers must be not only able to read it but also analyse it.
- Scientific papers must be **written clearly, concisely and precisely** so that readers with backgrounds similar to yours can understand easily what you have done and how you have done it should they want to repeat or extend your work.
- **A Scientific Paper should be a well-structured and comprehensive manuscript for a publication submission.**

What is not a Research Paper?

- It is **not merely a depository of quotations**. Quotations take place only to document or clarify findings.
- It is **not a rewriting of someone's thoughts or ideas**. A research paper is not a description or summary of the facts from textbooks or the Internet.
- It is **not a defence of your opinion**. The aim of every research paper is to reveal the truth. Avoid fighting the opposite opinion (unless you need to write a persuasive paper.)
- It is **not a simple presentation of one's point of view**. Research papers demand facts, information, and data which support a certain opinion or idea.
- It is **not emotional persuasion**. Vocabulary that is used in research papers should be neutral and free of emotional language and superlatives.

A Scientific Research Paper

- A scientific paper is a written and published report describing *original research results*. (Prof. Garry Dillard)
- A scientific experiment is not complete until the results have been published and understood.
- As Robert Day says in *How to Write and Publish a Scientific Paper* (1998), “The goal of scientific research is publication.... A scientific experiment, no matter how spectacular the results, is not complete until the results are published.”
- In fact, “the cornerstone of the philosophy of science is based on the fundamental assumption that original research must be published; only then can new scientific knowledge be authenticated and added to the existing database called scientific knowledge” (Bartow).

A Scientific Research Paper

- Writing a research paper for many is more stringent than the process of research. It is because it describes all the details of the original research. Only then it will be helpful for it to be published and will be of use for the future researchers to complete their studies.
- There is no such thing as a rule for writing a successful research paper. There is only the knowledge from the pros and cons of the research and writing the right way for approval by eminent professionals.
- The dilemma of where to start for the research paper is the biggest obstacle for writing it. Also, there will be many stumbling blocks on the way to finish the research paper. And more importantly, when concerned with scientific writing, it is a more difficult a task for researchers.

Purpose of Writing a Scientific Research Paper

- The purpose of scientific writing is to communicate new scientific findings
- Thus it has to be clear, simple and well ordered communication to transmit new scientific findings
- Knowledge is lost without written records
- Knowledge could be widely circulated through publication, with no effective duplication

Differences between Research Papers in Science and Research Papers in Humanities

- At the Dartmouth Writing Program, Karen Gocsik describes the purpose of writing a science paper as the search for truth, to find *one* correct answer to a problem. Additionally, scientists and researchers write for two reasons:
 - 1) to inform the community of new discoveries; and
 - 2) to help the scientific community arrive at a consensus about the truth.
- Published science papers measure and describe various observations and phenomenon and follow a more rigid format.
- Gocsik notes that “It is not important when writing a scientific paper to be eloquent. It is absolutely important, however, that you be clear.”

Differences between Research Papers in Science and Research Papers in Humanities

- In Humanities, often the focus of the paper is on the interpretation of texts, not on the interpretation of hard evidence. Paragraphs and sentences are usually longer and more eloquent.
- Papers may include imagery, sensory detail, and the use of metaphors.
- Voice is active, not passive.
- English and humanities papers are based on arguments (a thesis statement), in which writers attempt to convince their readers that the claims being made about the topic or a text in question are valid.
- The purpose of such papers is to persuade the reader and to provide compelling examples or instances to back up the thesis statement. Oftentimes, these papers are short (4-6 pages) in length.

Types of a Research Paper

Types of Research Papers

There can be Seven different research paper, which are:

- Analytical papers,
- Argumentative papers,
- Definition papers,
- Compare and Contrast papers,
- Cause and Effect papers,
- Research Reports, and
- Interpretive papers.

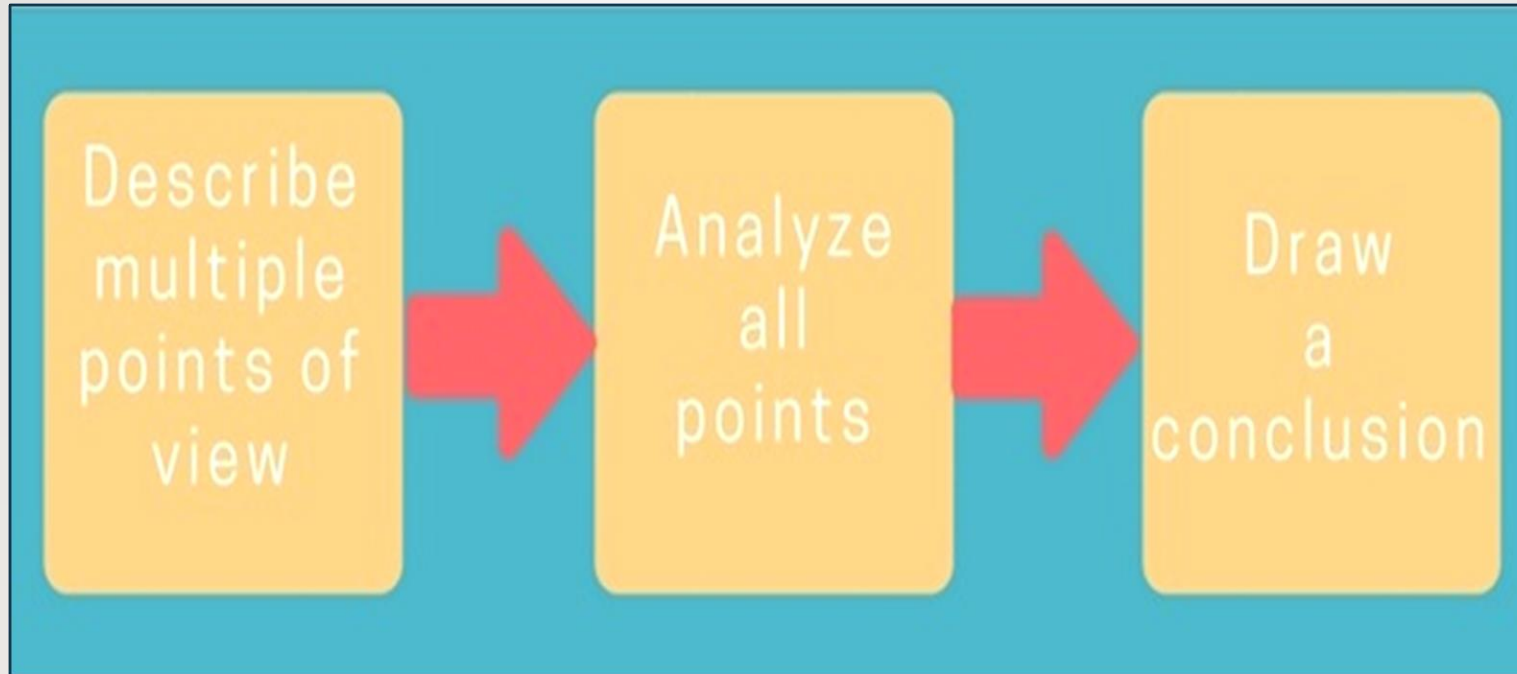
Analytical Research Paper

- Describe multiple points of view → Analyze all points → Draw a conclusion
- This paper is about posing a question, and the thinking involved in answering this question. Usually this paper starts with the description of the question and finds an element to analyze throughout the work. For this paper you need to collect relevant data from other researchers and make a personal conclusion about the topic.
- For an analytical paper, it is important to keep neutrality. An analytical research paper should not show your negative or positive position on the matter. If you want to define something as better or disagree with some aspects of your topic, switch to a persuasive research paper (but consult your tutor on whether it is acceptable).

Analytical papers

- *ANALYTICAL PAPERS* also include information from a range of sources but the focus on this type of research paper is in **analysing the different viewpoints** represented from a factual rather than opinionated standpoint.
- The author of an analytical paper may focus on the findings, methodology or conclusions of other researchers and will conclude such a paper with a summation of the findings and a suggested framework for further study on the issue.

Analytical Research Paper



Persuasive/Argumentative Research Paper

- Describe the problem from **two view points** → **Propose pros and cons** → **Give preference to one** This research paper is aimed to get the reader to the side of your point of view.
- Unlike an analytical research paper, this kind is more emotional, but still should be supported with logical facts and statistical data.
- Usually a researcher describes the object or event from two opposite viewpoints, analysing pros and cons. It is expected that the researcher will give preference to a certain opinion: for or against, better or worse, etc.

Persuasive/Argumentative Research Paper

ARGUMENTATIVE PAPERS present **two sides of a controversial issue** in the one paper.

A good argumentative paper will include in-text citations from researchers that present logical facts from both sides of an issue, and will conclude with the author analysing the pros and cons of each argument.

The confusing element of an argumentative paper is that **the author is expected to favour one side more than the other** on an issue, but the research and analysis must be un-emotive and factual and include both sides of the argument.

Persuasive/Argumentative Research Paper



Cause and Effect Research Paper

Along with these two types, there are other kinds of research paper types, such as: cause and effect, experimental, survey, problem-solution, and report types.

Cause and Effect Research Paper

Describe situation → Present causes/effects → Draw a conclusion.

This paper usually includes a thorough study of a researched topic, organization of the writing process, learning how to apply certain styles to text, and citations and references.

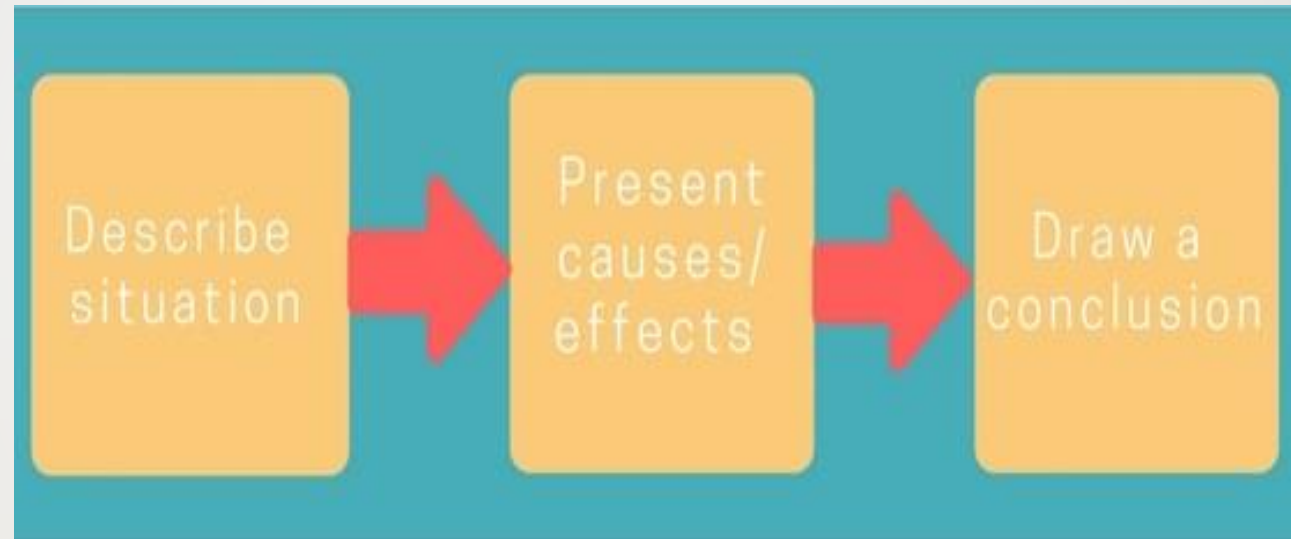
Simply, a cause and effect paper answers two main questions: “Why?” and “What?” which reflect effects and causes. It is not applicable to mix several causes and effects, as it may lose the main focus.

Cause and Effect Research Paper

- *CAUSE AND EFFECT PAPERS* trace the probable or expected results from a particular action or policy **in a logical progression** that is easily followed by the reader. Used in business and education fields, in particular, a good cause and effect paper will not only outline the predicted results from the action/situation specified, but also where applicable show the range of results that could arise from this one situation through to its logical conclusion.

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Cause and Effect Research Paper



Experimental Research Paper

- Conduct the experiment → Share useful experience → Provide data and sum up
- Describe a particular experimental case in detail.
- It is commonly written for biology, chemistry, physics, psychology, and sociology.
- Experiments are aimed to explain some causation or predict a phenomenon with certain actions.
- In this paper you need to describe your experiment with supporting data and an analysis of the experiment.

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Experimental Research Paper



Survey Research Paper

- Conduct a survey → Analyze findings → Draw conclusions
- This research is frequently used in sociology, psychology, marketing, public health, business, and advertising.
- It demands the conduction of a survey that includes asking questions to respondents.
- Survey research collects certain information about opinions, knowledge, and social facts through interaction with respondents to analyze their behaviour in certain conditions.

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Problem-Solution Research Paper

- Describe the problem → Propose a solution → Defend it
- Problem-solution research papers are written both by students and scholars.
- It is aimed to solve certain problems that have some challenges with proposed methods.
- The researcher should analyze the existing information about the problem, identify possible solutions, and prove its effectiveness with evidence (examples, details, statistical data, and everything on why this solution is the best.)

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Problem-Solution Research Paper



Report Paper

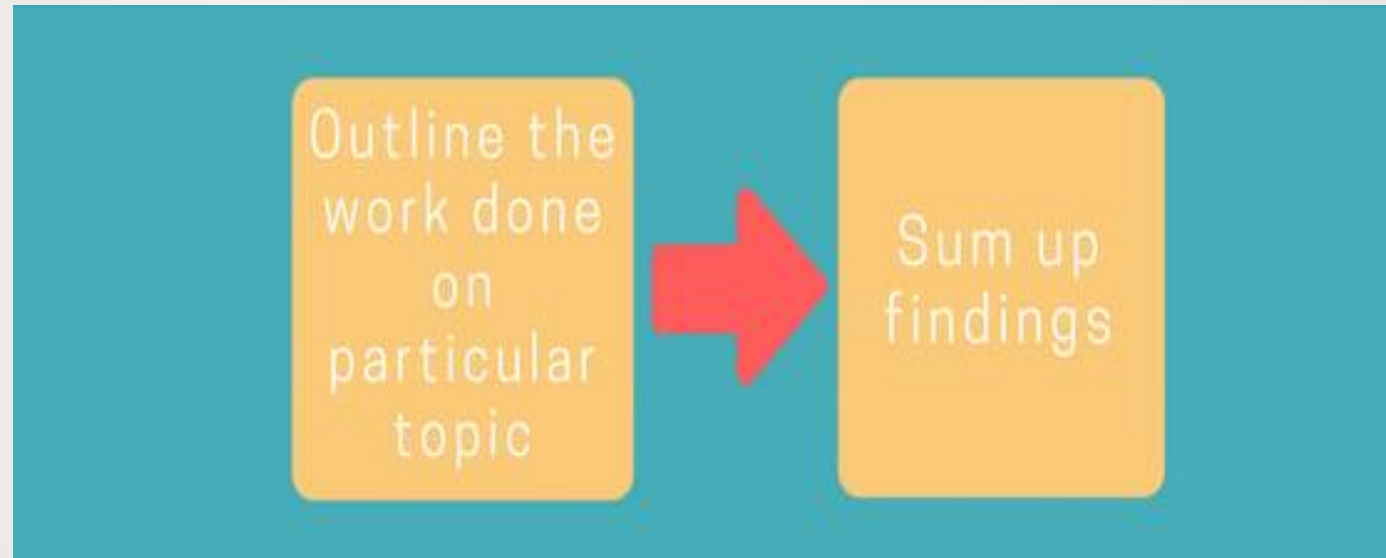
- Outline the work done on particular topic → Sum up findings
- This type of research paper may seem the easiest.
- The researcher needs to look through information about a particular object or event and describe data and the most valuable characteristics.
- The main aim of this research paper is to inform readers on the main facts about a particular topic based on research of existing information.

Report Paper

- *REPORTS* often follow a memorandum or similar business format and they are often written **to outline a case study situation**.
- While a comparison essay, for example, will use "If...but" or similar statements, the report will contain short factual sentences devoid of emotion.
- Reports usually include **an executive summary** that takes the place of an abstract in this type of research paper, as well as supporting evidence in the form of **appendix, graphs, and tables**.

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Report Paper



Definition papers

- *DEFINITION PAPERS* are relatively self-explanatory.
- They **describe a topic from a factual standpoint** that is usually devoid of emotion or the opinion of the author.
- Although the definition research paper will include facts from a variety of sources, this information is **left unanalysed** and contains only actual facts found in another's research paper findings.
- While a definition paper might be considered difficult to write especially by those students who enjoy discussing issues from their own perspective a good definition paper can provide a valuable information framework for other argumentative or analytical reports on the same topic.

Compare and Contrast papers

- *COMPARE AND CONTRAST PAPERS* are often used in literature courses to **compare two different authors or stories from a particular genre.**
- However, they can also be required in social sciences to compare two different theoretical viewpoints; in philosophy to compare the thoughts of two philosophical frameworks and even in business studies where different leadership styles could be compared for example.
- The important part of a compare and contrast paper is that while both elements in the paper need to be described succinctly, **the main part of the paper will be the comparison and contrasting examples provided by the author to support a thesis.**

Interpretive papers

- *INTERPRETIVE PAPERS* are often required by tutors in literature, humanities, and social sciences and they require the student to use the theoretical knowledge gained in a course of study to a particular case study example such as a piece of art or a poem in literary fields; a business situation in a management course; or a psychological case profile in either sociology or psychology fields.
- The **key element** of an interpretive paper is **evidence that the student has written the paper based on an established theoretical framework** and has used supporting data to back up the thesis statement and findings of the paper.

Choosing a Topic

Choosing a Topic

- A topic is the main organizing principle guiding the analysis of your research paper. Topics represent the core subject matter of scholarly communication, and the means by which we arrive at other topics of conversations and discover new knowledge.
- **Choosing a Topic / How to Begin**
- Do not expect choosing the topic to be a quick or easy task! You should be thinking about it right from the start of the course. **There are generally three ways you are asked to write about a research problem:**
 - your professor provides you with a general topic from which you study a particular aspect of;
 - your professor provides you with a list of possible topics; or
 - your professor leaves it up to you to choose a topic and you only have to obtain his/her permission to write about it before beginning your investigation.

How To Begin: You are given the topic to write about

Step 1: Identify concepts and terms that make up the topic statement.

Step 2: Review related literature to help refine how you will approach focusing on the topic and finding a way to analyze it.

Step 3: Since social science research papers are generally designed to get you to develop your own ideas and arguments, look for sources that can help broaden, modify, or strengthen your initial thoughts and arguments. There are least four appropriate roles your related literature plays in helping you formulate how to begin your analysis:

Sources of criticism -

Sources of new ideas

Sources for historical context -

Sources of interdisciplinary insight -

II. How To Begin: You are provided a list of possible topics to choose from

- **Step 1:** Which topic from this list is the easiest to find the most information on?
- An effective instructor should never include a topic that is so obscure or complex that no research is available to review and from which to begin to design a study. Instead of searching for the path of least resistance, begin by choosing a topic that you find interesting in some way, or that is controversial and you have a strong opinion about, or that has some personal meaning for you.
- You're going to be working on your topic for quite some time, so choose one that's interesting or that makes you want to take a position on.

Once you've settled on a topic of interest from the list, follow Steps 1 - 4 listed above to further develop it into a research paper.

III. How To Begin: Your professor leaves it up to you to choose a topic

- **Step 1:** Under this scenario, the key process is turning an idea or general thought into a topic that can be cast as a research problem.
- When given an assignment where you choose the research topic, don't begin by thinking about what to write about, but rather, ask yourself the question, "What do I want to know?"
- Treat an open-ended assignment as an opportunity to learn about something that's new or exciting to you.

III. How To Begin: Your professor leaves it up to you to choose a topic

- **Step 2:** If you lack ideas, or wish to gain focus, try some or all of the following strategies:
- Review your course readings, particularly the suggested readings, for topic ideas. Don't just review what you've already read but jump ahead in the syllabus to readings that have not been covered yet.
- Browse through some current journals in your subject discipline. Even if most of the articles are not relevant, you can skim through the contents quickly. You only need one to be the spark that begins the process of wanting to learn more about a topic.

III. How To Begin: Your professor leaves it up to you to choose a topic

- Consult a librarian or your professor about the core journals within your subject discipline.
- Think about essays you have written for past classes and other coursework you have taken or academic lectures and programs you have attended. Thinking back, what most interested you? What would you like to know more about?
- Search online media sources, such as News papers, TV Channels and other online sources to see if your idea has been covered in the news. Use this coverage to refine your idea into something that you'd like to investigate further but in a more deliberate, scholarly way based on a problem to research.

III. How To Begin: Your professor leaves it up to you to choose a topic

- **Step 3:** To build upon your initial idea, use the suggestions under this tab to help narrow, broaden, or increase the timeliness of your idea so you can write it out as a research problem.
- **Once you are comfortable with having turned your idea into a topic, follow Steps 1 - 4 listed in Part I above to further develop it into a research paper.**

Narrowing a Topic Idea

- Whether assigned a general issue to investigate, you are given a list of problems to study, or you have to make up your own research topic, it is important that the research problem that guides your study is not too broad, otherwise, it will be very difficult to adequately address the problem in the space and time allowed.
- You could experience a number of problems if your topic is too broad, including:
- You find too many information sources and, as a consequence, it is difficult to decide what to include or exclude or what are the most important.
- You find information that is too general and, as a consequence, it is difficult to develop a clear framework for understanding the research problem and the methods needed to analyze it.
- You find information that covers a wide variety of concepts or ideas that can't be integrated into one paper and, as a consequence, you easily trail off into unnecessary tangents.

Narrowing a Topic Idea

- **The most common challenge when beginning to write a research paper is narrowing down your topic.**
- Even if your professor gives you a specific topic to study, it will almost never be so specific that you won't have to narrow it down at least to some degree [besides, grading fifty papers that are all on exactly the same thing is very boring!].
- A topic is too broad to be manageable when you find that you have too many different, and oftentimes conflicting and only remotely related, ideas about how to investigate the research problem.
- While you will want to start the writing process by considering a variety of different approaches to studying the problem, you will need to narrow the focus of your research at some point so don't attempt to do too much in one paper.

Narrowing a Topic Idea

Here are some strategies to help focus your topic into something more manageable:

- **Aspect** -- choose one lens through which to view the research problem, or look at just one facet of it [e.g., rather than studying the role of food in Eastern religious rituals; study the role of food in Hindu ceremonies].
- **Components** -- determine if your initial variables or unit of analyses can be broken into smaller parts, which can then be analyzed more precisely [e.g., a study of tobacco use among adolescents can focus on just chewing tobacco rather than all forms of usage or, rather than adolescents in general, focus on female adolescents of a certain age who smoke].

Narrowing a Topic Idea

- **Place** -- the smaller the area of analysis, the more narrow the focus [e.g., rather than study trade relations in West Africa, study trade relations between Niger and Cameroon].
- **Relationship** -- how do two or more different perspectives or variables relate to one another? [e.g., cause/effect, compare/contrast, group/individual, male/female, contemporary/historical, etc.].
- **Time** -- the shorter the time period, the more narrow the focus.
- **Type** -- focus your topic in terms of a specific type or class of people, places, or things [e.g., a study of traffic patterns near schools can focus only on SUVs, or just student drivers, or just the timing of stoplights in the area].
- **Combination** -- use two or more of the above strategies to focus your topic very narrowly.
- **NOTE:** Apply one of the above first to determine if that gives you a manageable study; combining multiple strategies risks creating the opposite problem--your topic becomes too narrowly defined.

Broadening a Topic Idea

A research problem that is too narrowly defined leads to any of the following:

- You don't find enough information and what you do find is tangential or irrelevant.
- You find information that is so specific that it can't lead to any significant conclusions.
- Your sources cover so few ideas that you can't expand them into a significant paper.

Extending the Timeliness of a Topic Idea

- It is often the case that a research problem, even one assigned by your professor, interests you because it relates to a **current issue** in the news or it is something you have very recently experienced.
- Choosing a research problem that connects to current affairs is an excellent way to remain engaged in the topic; you feel a connection to the issue or event because it's happening now and a definitive outcome has yet to play itself out.

However, you could experience a number of problems if your topic focuses on a very recent issue or event, including:

- It can be particularly difficult to find scholarly sources and, as a consequence, your study may be considered less rigorous and valid because it does not cite studies that include a detailed analysis of the topic.
- Ironically, examination of a very recent event or issue may force you to draw upon historical precedents in order to effectively frame the research problem and, as a consequence, the scholarly sources supporting your paper ends up being more about the historical context than the current event or issue.
- The consequences or results of a current event or issue have yet to be determined and, therefore, the conclusions or any recommendations presented in your paper may be rendered less relevant as things unfold.

Extending the Timeliness of a Topic Idea

- The obvious solution is to choose a different research problem to investigate. However, if the topic is of particular interest to you, here are several strategies you can use to find scholarly or related research-level analysis of a very current issue or event:
- Look for related literature that provide opportunities for comparative analysis.
- Locate opinions/statements of prominent authors and researchers.
- Identify research centres and special interest organizations that focus on studying current issues and events.
- Look for Congressional Hearings and government agency reports.

Choosing a Research Design

Research Design

- **Beginning your paper, you need to decide how you plan to design the study.**
- The research design refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data.
- Note that your research problem determines the type of design you can use, not the other way around!

Research Design

- The function of a research design is to ensure that the evidence obtained enables you to effectively address the research problem as unambiguously as possible. A sound research design will do the following things:
- Identify the research problem clearly and justify its selection,
- Review previously published literature associated with the problem area,
- Clearly and explicitly specify hypotheses [i.e., research questions] central to the problem selected,
- Effectively describe the data which will be necessary for an adequate test of the hypotheses and explain how such data will be obtained, and
- Describe the methods of analysis which will be applied to the data in determining whether or not the hypotheses are true or false.

Types of Research Designs

There are various types of Research Designs available in Literature:

- General Structure and Writing Style
- Action Research Design
- Case Study Design
- Causal Design
- Cohort Design
- Cross-Sectional Design
- Descriptive Design
- Experimental Design
- Exploratory Design

Types of Research Designs

- Historical Design
- Longitudinal Design
- Observational Design
- Philosophical Design
- Sequential Design
- Meta-Analysis Design
- Field Design
- Mixed Methods Design

Action Research Design

- The essentials of action research design follow a characteristic cycle whereby initially an exploratory stance is adopted, where an understanding of a problem is developed and plans are made for some form of interventionary strategy.
- Then the intervention is carried out (the action in Action Research) during which time, pertinent observations are collected in various forms.
- The new **interventional strategies** are carried out, and the cyclic process repeats, continuing until a sufficient understanding of (or implement able solution for) the problem is achieved.
- The protocol is **iterative or cyclical in nature** and is intended to foster deeper understanding of a given situation, starting with conceptualizing and particularizing the problem and moving through several interventions and evaluations.

Case Study Design

- A case study is an **in-depth study of a particular research problem** rather than a sweeping statistical survey. It is often used to narrow down a very broad field of research into one or a few easily researchable examples.
- The case study research design is also useful for testing whether a specific theory and model actually applies to phenomena in the real world. It is **a useful design when not much is known about a phenomenon.**

Causal Design

- Causality studies may be thought of as understanding a phenomenon in terms of conditional statements in the form, “If X, then Y.” This type of research is used to measure what impact a specific change will have on existing norms and assumptions. Most social scientists seek causal explanations that reflect tests of hypotheses.
- **Causal effect (nomothetic perspective)** occurs when variation in one phenomenon, an independent variable, leads to or results, on average, in variation in another phenomenon, the dependent variable.
- Conditions necessary for determining causality:
- **Empirical association**--a valid conclusion is based on finding an association between the independent variable and the dependent variable.
- **Appropriate time order**--to conclude that causation was involved, one must see that cases were exposed to variation in the independent variable before variation in the dependent variable.
- **Non-spuriousness**--a relationship between two variables that is not due to variation in a third variable.

Cohort Design

- Often used in the medical sciences, but also found in the applied social sciences, a cohort study generally refers to a study conducted over a period of time involving members of **a population which the subject or representative member comes from, and who are united by some commonality or similarity.**
- Using a quantitative framework, a cohort study makes note of statistical occurrence within a specialized subgroup, united by same or similar characteristics that are relevant to the research problem being investigated, rather than studying statistical occurrence within the general population.
- Using a qualitative framework, cohort studies generally gather data using methods of observation. Cohorts can be either "open" or "closed."
- Given this, the number of study participants remains constant (or can only decrease).

Cohort Design

- Open Cohort Studies involve a dynamic population that is defined just by the state of being a part of the study in question (and being monitored for the outcome). Date of entry and exit from the study is individually defined, therefore, the size of the study population is not constant.
- In open cohort studies, researchers can only calculate rate based data, such as, incidence rates and variants thereof.
- Closed Cohort Studies involves a static populations, involve participants who enter into the study at one defining point in time and where it is presumed that no new participants can enter or exit the cohort.

Cross-Sectional Design

- Cross-sectional research designs have three distinctive features: **no time dimension, a reliance on existing differences** rather than change following intervention; **and, groups are selected based on existing differences rather than random allocation.**
- The cross-sectional design can only measure differences between or from among a variety of people, subjects, or phenomena rather than change.
- As such, researchers using this design can only employ a relative passive approach to making causal inferences based on findings.

Descriptive Design

- Descriptive research designs help provide answers to the questions of who, what, when, where, and how associated with a particular research problem; a descriptive study cannot conclusively ascertain answers to why.
- Descriptive research is used to obtain information concerning the current status of the phenomena and to describe "what exists" with respect to variables or conditions in a situation.

Experimental Design

- A blueprint of the procedure that enables the researcher to maintain control over all factors that may affect the result of an experiment. In doing this, the researcher attempts to determine or predict what may occur.
- Experimental Research is often used where there is time priority in a causal relationship (cause precedes effect), there is consistency in a causal relationship (a cause will always lead to the same effect), and the magnitude of the correlation is great.
- The classic experimental design specifies an experimental group and a control group.
- The independent variable is administered to the experimental group and not to the control group, and both groups are measured on the same dependent variable.
- Subsequent experimental designs have used more groups and more measurements over longer periods. True experiments must have control, randomization, and replication.

Exploratory Design

- An exploratory design is conducted about a research problem when there are few or no earlier studies to refer to. The focus is on gaining insights and familiarity for later investigation or undertaken when problems are in a preliminary stage of investigation.
- The goals of exploratory research are intended to produce the following possible insights:
- Familiarity with basic details, settings and concerns.
- Well grounded picture of the situation being developed.
- Generation of new ideas and assumption, development of tentative theories or hypotheses.
- Determination about whether a study is feasible in the future.
- Issues get refined for more systematic investigation and formulation of new research questions.
- Direction for future research and techniques get developed.

Historical Design

- The purpose of a historical research design is **to collect, verify, and synthesize evidence from the past** to establish facts that defend or refute your hypothesis.
- It uses secondary sources and a variety of primary documentary evidence, such as, logs, diaries, official records, reports, archives, and non-textual information [maps, pictures, audio and visual recordings].
- The limitation is that the sources must be both authentic and valid.

Longitudinal Design

- A longitudinal study follows the same sample over time and makes repeated observations.
- With longitudinal surveys, for example, the same group of people is interviewed at regular intervals, enabling researchers to track changes over time and to relate them to variables that might explain why the changes occur.
- Longitudinal research designs describe patterns of change and help establish the direction and magnitude of causal relationships.
- Measurements are taken on each variable over two or more distinct time periods. This allows the researcher to measure change in variables over time.
- It is a type of observational study and is sometimes referred to as a panel study.

Observational Design

- This type of research design **draws a conclusion by comparing subjects against a control group, in cases where the researcher has no control over the experiment.** There are two general types of observational designs.
- In direct observations, people know that you are watching them.
- Unobtrusive measures involve any method for studying behaviour where individuals do not know they are being observed.
- An observational study allows a useful insight into a phenomenon and avoids the ethical and practical difficulties of setting up a large and cumbersome research project.

Philosophical Design

- Understood more as a broad approach to examining a research problem than a methodological design, philosophical analysis and argumentation is intended to challenge deeply embedded, often intractable, assumptions underpinning an area of study.
- This approach uses the tools of argumentation derived from philosophical traditions, concepts, models, and theories to critically explore and challenge, These overarching tools of analysis can be framed in three ways:
 - **Ontology** -- the study that describes the nature of reality; for example, what is real and what is not, what is fundamental and what is derivative?
 - **Epistemology** -- the study that explores the nature of knowledge; for example, on what does knowledge and understanding depend upon and how can we be certain of what we know?
 - **Axiology** -- the study of values; for example, what values does an individual or group hold and why? How are values related to interest, desire, will, experience, and means-to-end? And, what is the difference between a matter of fact and a matter of value?

Sequential Design

- Sequential research is that which is carried out in a deliberate, staged approach [i.e. serially] where one stage will be completed, followed by another, then another, and so on, with the aim that each stage will build upon the previous one until enough data is gathered over an interval of time to test your hypothesis.
- The sample size is not predetermined. After analysing each sample, the researcher can accept the null hypothesis, accept the alternative hypothesis, or select another pool of subjects and conduct the study once again.
- This means the researcher can obtain a limitless number of subjects before finally making a decision whether to accept the null or alternative hypothesis. Using a quantitative framework, a sequential study generally utilizes sampling techniques to gather data and applying statistical methods to analyze the data.
- Using a qualitative framework, sequential studies generally utilize samples of individuals or groups of individuals [cohorts] and use qualitative methods, such as interviews or observations, to gather information from each sample.

Meta- Analysis Design

- Meta -analysis is an analytical methodology designed to systematically evaluate and summarize the results from a number of individual studies, thereby, increasing the overall sample size and the ability of the researcher to study effects of interest.
- The purpose is to not simply summarize existing knowledge, but to develop a new understanding of a research problem using synoptic reasoning.
- The main objectives of meta-analysis include analyzing differences in the results among studies and increasing the precision by which effects are estimated.

Field Design

- Sometimes referred to as **ethnography or participant observation**, designs around field research encompass a variety of interpretative procedures [e.g., observation and interviews] rooted in **qualitative approaches** to studying people individually or in groups while inhabiting their natural environment as opposed to using survey instruments or other forms of impersonal methods of data gathering.
- Information acquired from observational research takes the form of “**field notes**” that involves documenting what the researcher actually sees and hears while in the field.
- Findings do not consist of conclusive statements derived from numbers and statistics because **field research involves analysis of words and observations of behaviour**. Conclusions, therefore, are developed from an interpretation of findings that reveal overriding themes, concepts, and ideas.

Mixed Methods Design

- Mixed methods research represents more of an approach to examining a research problem than a methodology.
- Mixed method is characterized by a focus on research problems that require, 1) an examination of real-life contextual understandings, multi-level perspectives, and cultural influences; 2) an intentional application of rigorous quantitative research assessing magnitude and frequency of constructs and rigorous qualitative research exploring the meaning and understanding of the constructs; and, 3) an objective of drawing on the strengths of quantitative and qualitative data gathering techniques to formulate a holistic interpretive framework for generating possible solutions or new understandings of the problem.
- Tashakkori and Creswell (2007) and other proponents of mixed methods argue that the design encompasses more than simply combining qualitative and quantitative methods but, rather, reflects a new "third way" epistemological paradigm that occupies the conceptual space between positivism and interpretivism.

Design Flaws to Avoid

- The research design establishes the decision-making processes, conceptual structure of investigation, and methods of analysis used to address the central research problem of your study.
- Taking the time to develop a thorough research design helps to organize your thoughts, set the boundaries of your study, maximize the reliability of your findings, and avoid misleading or incomplete conclusions.
- Therefore, if any aspect of your research design is flawed or under-developed, the quality and reliability of your final results and, by extension, the overall value of your study will be weakened.

Common problems to avoid when designing a research study.

- **Lack of Specificity** -- do not describe aspects of your study in overly-broad generalities. It is important that you design a study that describes the process of investigation in clear and concise terms. Otherwise, the reader cannot be certain what you intend to do.
- **Poorly Defined Research Problem** -- the starting point of most new research is to formulate a problem statement and begin the process of formulating questions about that problem.
- **Lack of Theoretical Framework** -- the theoretical framework represents the conceptual foundation of your study. Therefore, your research design should include an explicit set of basic postulates or assumptions related to the research problem and an equally explicit set of logically derived hypotheses.

Common problems to avoid when designing a research study.

- **Significance** -- the research design must include a clear answer to the "So What" question. Be sure you clearly articulate why your study is important and how it contributes to the larger body of literature about the topic of investigation.
- **Relationship between Past Research and Your Study** -- do not simply offer a summary description of prior research. Your literature review should include an explicit statement linking the results of prior research to the research you are about to undertake. This can be done, for example, by identifying basic weaknesses in previous research studies and how your study helps to fill this **research gap** in knowledge.



Writing Approaches

Preparing to Write

- Carefully analyze the assignment to determine what you are specifically being asked to do. The way in which your professor may ask you to frame your analysis can include any of the following approaches:
- **Comparison approach** in which the task is to compare and contrast two ideas, constructs, or tangible things with one another.
- **Definition approach** that asks you to discuss in depth the cultural and associative meanings of, for example, a political theory, a policy proposal, or a controversial practice.

Preparing to Write

- **Descriptive approach** where you choose a subject that you know well and help others to understand it.
- **Evaluative approach** that asks you to assess a theoretical concept, issue, person, place, or thing in a critical, but not necessarily critical, way.
- **Exploratory approach** in which you are asked to pursue a specific line of inquiry, often with the purpose of making recommendations for further research or to advocate for specific actions to be taken.
- **Interpretive approach** that requires you to apply the theoretical knowledge gained in a course to a particular case study, such as, a business situation in a management course or a psychological case profile.

Preparing to Write

- **Narrative approach** written from a certain point of view, usually your own and written in the first person.
- **Persuasive approach** in which you are asked to take a position in a scholarly argument and give the reader reasons why they should agree with your position.
- **Policy memorandum approach** in which you are asked to write short factual sentences devoid of emotion that summarize a situation to date, identify the main issue of concern, provide a breakdown of the elements of this main issue, and then recommend how to address the issue based on research about the topic.

Structure of A Research Paper

Scientific Approach: Structure of a Research Paper

- Key to writing and effectively organizing or formatting the scientific research paper is to understand the structure (different sections or parts) that are typically included in a scientific research paper

IMRAD Approach

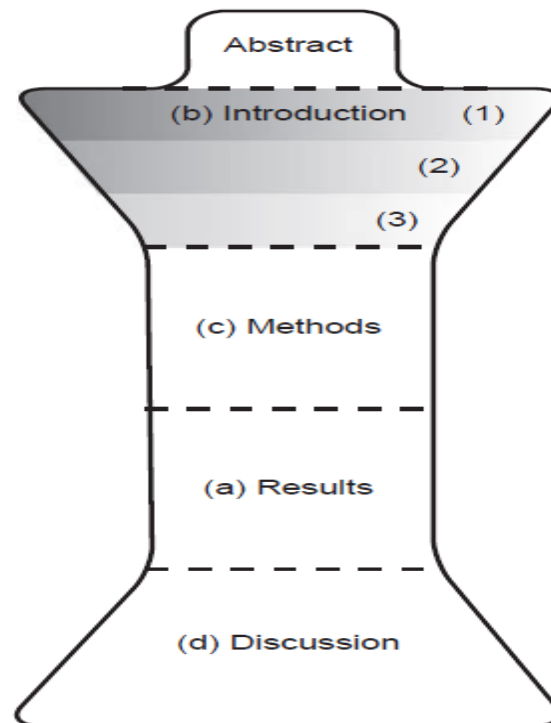
- Rebecca Bartow, Ph.D., an instructor at Western Kentucky University helps to simplify the organization of a scientific paper by using the IMRAD Approach:
- **I** - Introduction: What problem (question) was studied?
- **M** – Methods: How was the problem studied?
- **R** – Results: What were the findings?
- **A** – and
- **D** – Discussion: What do these findings mean?

AIMRaD Approach

M. Cargill and P. O'Connor have extended this approach to:

- A-Abstract,
- I-Introduction,
- M-Materials and methods,
- R-Results
- a-and
- D-Discussion
- and its variations

AIMRaD Approach



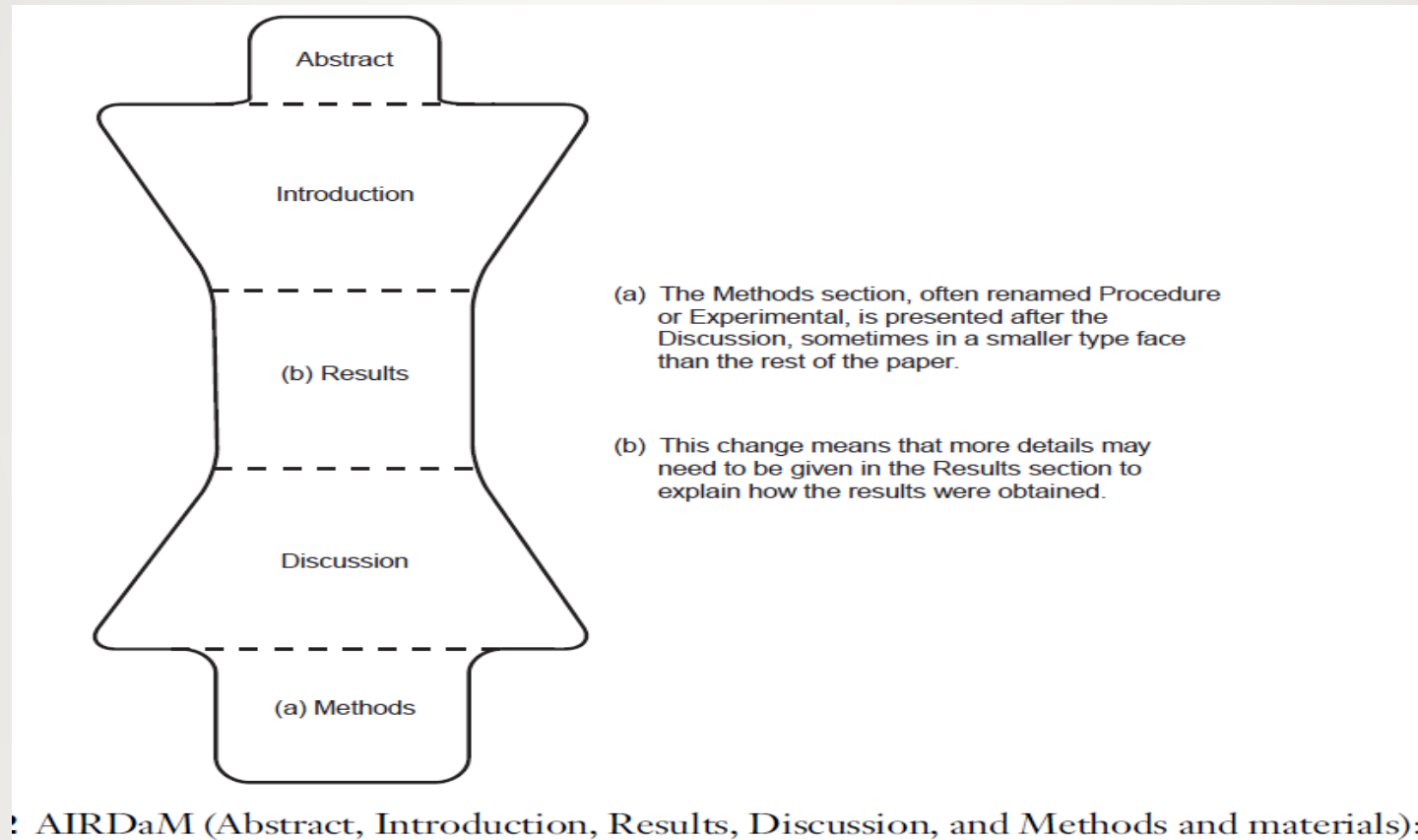
- (a) The whole structure is governed by the Results box; everything in the article must relate to and be connected with the data and analysis presented in the Results section.
- (b) (1) The Introduction begins with a broad focus. The starting point you select for your Introduction should be one that attracts the lively interest of the audience you are aiming to address: the international readers of your target journal.
- (3) The Introduction ends with a focus exactly parallel to that of the Results; often this is a statement of the aim or purpose of the work presented in the paper, or its principal findings or activity.
- (2) Between these two points, background information and previous work are woven together to logically connect the relevant problem with the approach taken in the work to be presented to address the problem.
- (c) The Methods section, or its equivalent, establishes credibility for the Results by showing how they were obtained.
- (d) The Discussion begins with the same breadth of focus as the Results – but it ends at the same breadth as the starting point of the Introduction. By the end, the paper is addressing the broader issues that you raised at the start, to show how your work is important in the ‘bigger picture.’

2.1 AIMRaD: the hourglass “shape” of a generic scientific research article

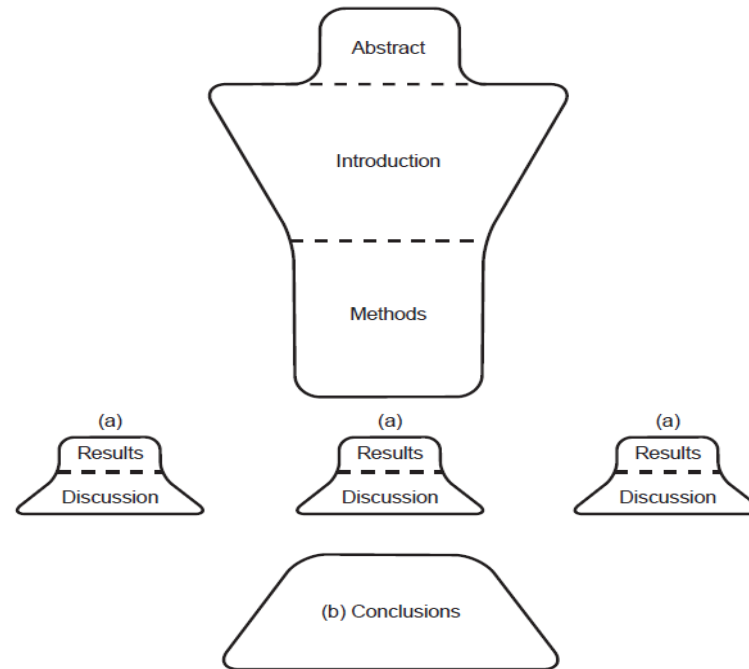
AIMRaD Approach

- In this diagram, it is the width and shape of the segments, rather than their depth, that tell us something important about scientific articles.
- There are different variants of this basic model adopted by journals of different disciplines as under, depending upon which section of this model they want to emphasize:

AIRDM Approach



AIMRDC Approach



(a) The Results and Discussion are presented together in a single combined section; each result is presented, followed immediately by the relevant discussion.

(b) This change means that a separate section is needed at the end to bring the different pieces of discussion together; it is often headed Conclusions.

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General Scientific Structure for Social Sciences and Humanities: TAKILMRDC Approach

- T-Title
- A-Abstract
- K-Keywords
- I-Introduction
- L-Literature Review
- M-Methodology
- R-Results
- D-Discussions
- C-Conclusion

General Scientific Structure

- **The Big Picture: Sections of a Scientific Research Paper includes:**
- **Abstract** – States the principal objectives and scope of the investigation, describes the methods used, summarizes the results, and states the principal conclusions in less than 250 words (maximum).
- **Introduction** – Clearly states the purpose of the paper with a hypothesis, thesis or topic sentence.
- **Review of Literature** – Provides an extensive search of the literature to discover what is known about the subject to date. This also includes how the search of the literature was conducted.
- **Methodology or Materials and Methods** – The section where key terms are described. Also included are the research instruments and procedures used in conducting the study, or researching the topic.
- **Results** – This is where the findings are reported. This section may include tables and figures that summarize the data or information.
- **Discussion** – This is the main body of the paper, the section for reporting findings, sharing thoughts and analysis of the results.

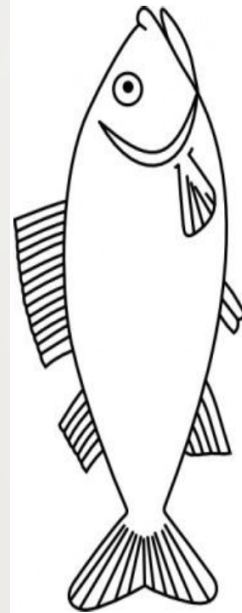
General Scientific Structure

- **Conclusions** – The conclusions presented in the paper are those supported by the data. They also reflect the original purpose for the paper from the introduction. Researchers often answer a few questions, but raise several more to pursue in future research projects.
- **References** – References should include an extensive list of relevant studies discovered reviewing the literature. Ideally important older studies are included along with current, newer ones.
- **Abbreviations** – A list of all abbreviations (shortened form of a word or phrase used for brevity in place of the whole) used in the manuscript or paper.
- **Tables** – A set of data organized and arranged in rows and columns.
- **Figures** – A diagram, picture or photograph illustrating material from the text or research data.
- **Appendix** – Supplementary material appended or added at the end of the paper such as research data, handouts. These may include tables, figures and multimedia sources.

Framing the Title of a Research Paper

Writing a Research Paper

General Structure of a Research Article



- Title
- Abstract
- Keywords

Make it easy for indexing and searching
(informative, attractive, effective)

- Main text
 - Introduction
 - Methods
 - Results
 - Discussion
- Conclusion
- Acknowledgements
- References
- Supplementary Data



Choosing a Title

- The title summarizes the main idea or ideas of your study. A good title contains the fewest possible words that adequately describe the contents and/or purpose of your research paper.
- **The title is without doubt the part of a paper that is read the most, and it is usually read first.** If the title is too long it usually contains too many unnecessary words

Choosing a Title

Title

A good title should contain the **fewest** possible words that **adequately** describe the contents of a paper.

Articles with short, catchy titles are better cited

Choosing a Title

- The title should be clear and informative, and should reflect the aim and approach of the work.
- The title should be as specific as possible while still describing the full range of the work.
- Does the title, seen in isolation, give a full yet concise and specific indication of the work reported?
- Do not mention results or conclusions in the title.
- *Avoid:* overly clever or punny titles that will not fare well with search engines or international audiences; titles that are too short to be descriptive or too long to be read; jargon, acronyms, or trademarked terms.

Choosing a Title

- **The following parameters can be used to help you formulate a suitable research paper title:**
- The purpose of the research
- Scope of Research: Academic Scope, Geographic Scope, Temporal Scope (Duration of Study)
- The narrative tone of the paper [typically defined by the type of the research]
- The methods used

Choosing a Title

- **Effective titles in academic research papers have several characteristics.**
- Indicate accurately the subject and scope of the study.
- Avoid using abbreviations.
- Use words that create a positive impression and stimulate reader interest.
- Use current nomenclature from the field of study.
- Identify key variables, both dependent and independent.

Choosing a Title

- May reveal how the paper will be organized.
- Suggest a relationship between variables which supports the major hypothesis.
- Is limited to 10 to 15 substantive words.
- Do not include "study of," "analysis of" or similar constructions.
- Titles are usually in the form of a phrase, but can also be in the form of a question.
- Use correct grammar and capitalization with all first letters of the words capitalized, including the first word of a subtitle. All nouns, pronouns, verbs, adjectives, and adverbs that appear between the first and last words of the title are also capitalized.
- In academic papers, rarely is a title followed by an exclamation mark. However, a title or subtitle can be in the form of a question.

Choosing a Title

- **The Subtitle**

Subtitles are quite common in social science research papers. **Examples of why you may include a subtitle:**

- **Explains or provides additional context**, e.g., "Linguistic Ethnography and the Study of Welfare Institutions as a Flow of Social Practices: The Case of Residential Child Care Institutions as Paradoxical Institutions."
- **Adds substance to a literary, provocative, or imaginative title**, e.g., "Listen to What I Say, Not How I Vote: Congressional Support for the President in Washington and at Home."
- **Qualifies the geographic scope of the research**, e.g., "The Geopolitics of the Eastern Border of the European Union: The Case of Romania-Moldova-Ukraine."
- **Qualifies the temporal scope of the research**, e.g., "A Comparison of the Progressive Era and the Depression Years: Societal Influences on Predictions of the Future of the Library, 1895-1940."
- **Focuses on investigating the ideas, theories, or work of a particular individual**, e.g., "A Deliberative Conception of Politics: How Francesco Saverio Merlino Related Anarchy and Democracy."



ABSTRACT

The Abstract

- An abstract summarizes, usually in one paragraph of 300 words or less, the major aspects of the entire paper in a prescribed sequence that includes: 1) the overall **purpose of the study and the research problem(s)** you investigated; 2) the **basic design of the study**; 3) **major findings or trends found as a result of your analysis**; and, 4) **a brief summary of your interpretations and conclusions**.
- **Importance of a Good Abstract**
- Sometimes your professor will ask you to include an abstract, or general summary of your work, with your research paper. **The abstract allows you to elaborate upon each major aspect of the paper and helps readers decide whether they want to read the rest of the paper.** Therefore, enough key information [e.g., summary results, observations, trends, etc.] must be included to make the abstract useful to someone who may want to reference your work.

ABSTRACT

- The abstract section of your research paper should include the following:
- Topic
- Purpose
- Scope
- Results
- Conclusion

Types of Abstracts

- To begin, you need to determine which type of abstract you should include with your paper. There are four general types.
- **Critical Abstract**
- A critical abstract provides, in addition to describing main findings and information, a judgement or comment about the study's validity, reliability, or completeness. The researcher evaluates the paper and often compares it with other works on the same subject. Critical abstracts are generally 400-500 words in length due to the additional interpretive commentary. These types of abstracts are used infrequently.
- **Descriptive Abstract**
- A descriptive abstract indicates the type of information found in the work. It makes no judgments about the work, nor does it provide results or conclusions of the research. It does incorporate key words found in the text and may include the purpose, methods, and scope of the research. Essentially, the descriptive abstract only describes the work being abstracted. Some researchers consider it an outline of the work, rather than a summary. Descriptive abstracts are usually very short, 100 words or less.

Types of Abstracts

- **Informative Abstract**

The majority of abstracts are informative. While they still do not critique or evaluate a work, they do more than describe it. A good informative abstract acts as a surrogate for the work itself. That is, the researcher presents and explains all the main arguments and the important results and evidence in the paper. An informative abstract **includes the information that can be found in a descriptive abstract [purpose, methods, scope] it but also includes the results and conclusions of the research and the recommendations of the author.** The length varies according to discipline, but an informative abstract is rarely more than 300 words in length.

- **Highlight Abstract**

A highlight abstract **is specifically written to attract the reader's attention to the study.** No pretence is made of there being either a balanced or complete picture of the paper and, in fact, incomplete and leading remarks may be used to spark the reader's interest. In that a highlight abstract cannot stand independent of its associated article, it is not a true abstract and, therefore, rarely used in academic writing.

A Structured Abstract

- Although the exact structure can be modified to suit the topics of the journal (or even the specific paper), in engineering and physical sciences a five-structure format as under is probably best:
- Each subsection should contain one to two sentences, answering the following questions:
- **Background:** What issues led to this work? What is the environment that makes this work interesting or important?
- **Aim:** What did you plan to achieve in this work? What gap is being filled?
- **Approach:** How did you set about achieving your aims (e.g., experimental method, simulation approach, theoretical approach, combinations of these, etc.)? What did you actually do?
- **Results:** What were the main results of the study (including numbers, if appropriate)?
- **Conclusions:** What were your main conclusions? Why are the results important? Where will they lead?

A Structured Abstract

- The abstract should be written for the audience of *this* journal: do not assume too much or too little background with the topic.
- Ensure that all of the information found in the abstract also can be found in the body of the paper.
- Ensure that the important information of the paper is found in the abstract.
- *Avoid*: using the first paragraph of the introduction as an abstract; citations in the abstract; acronyms (but if used, spell them out); referring to figures or tables from the body of the paper; use of the first person; use of words like “new” or “novel,” or phrases like “in this paper,” “we report,” or “will be discussed.”

ABSTRACT

- **The abstract SHOULD NOT contain:**
- Lengthy background information,
- References to other literature [say something like, "current research shows that..." or "studies have indicated..."],
- Using ellipticals [i.e., ending with "..."] or incomplete sentences,
- Abbreviations, jargon, or terms that may be confusing to the reader, and
- Any sort of image, illustration, figure, or table, or references to them.

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Keywords

Keywords

- The important idea behind identifying the keywords to be listed under the abstract as “subject terms” is simple: if you were looking for an article on exactly the topic of your manuscript, what words would you type into a search engine in order to find it?
- Chances are you would start with only two to four words or phrases.
- If that resulted in too many hits, or too many off-scope articles, then you would refine your search by adding one or two more phrases.
- These are the words or phrases (plus all of their common variants and synonyms) that should be included in the list of subject terms.

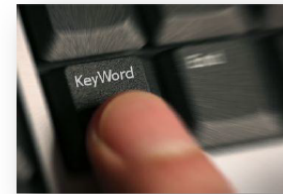
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Keywords

Keywords

In an electronic world, keywords determine whether your article is found or not!



Avoid making them

- too general (“drug delivery”, “mouse”, “disease”, etc.)
- too narrow (so that nobody will ever search for it)

TIPS:

- Look at the keywords of articles relevant to your mss
- Play with these keywords, and see whether they return relevant papers, neither too many nor too few
- Search for your keywords online: would readers find YOUR article using them?



INTRODUCTION

Introduction

- The introduction serves the purpose of leading the reader from a general subject area to a particular field of research.
- It establishes the context of the research being conducted by summarizing current understanding and background information about the topic, stating the purpose of the work in the form of the hypothesis, question, or research problem, briefly explaining your rationale, methodological approach, highlighting the potential outcomes your study can reveal, and describing the remaining structure of the paper.

Introduction

- Introduction as a mental road map that must answer for the reader these four questions:
- What was I studying?
- Why was this topic important to investigate?
- What did we know about this topic before I did this study?
- How will this study advance our knowledge?
- **Be sure to describe the problem you are investigating. Why was there a need to conduct the study?**
- **A well-written introduction is important because, quite simply, you never get a second chance to make a good first impression.** The opening paragraph of your paper will provide your readers with their initial impressions about the logic of your argument, your writing style, the overall quality of your research, and, ultimately, the validity of your findings and conclusions. A vague, disorganized, or error-filled introduction will create a negative impression, whereas, a concise, engaging, and well-written introduction will start your readers off thinking highly of your analytical skills, your writing style, and your research approach.

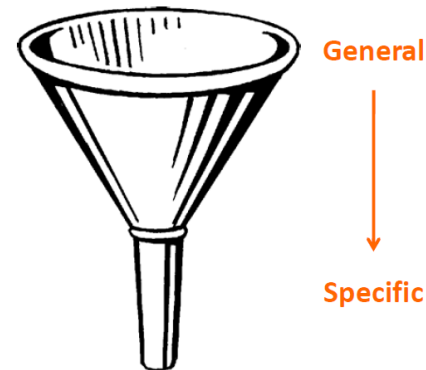
Introduction

Introduction – Puts your data into perspective

The place to convince readers that you know why your work is relevant, also for them

Answer a series of questions:

- What is the problem?
- Are there any existing solutions?
- Which one is the best?
- What is its main limitation?
- How do you hope to improve or contribute to this?



Introduction

Introduction

- Indicate the field of the work, why this field is important, and what has already been done (with proper citations).
- Indicate a gap, raise a research question, or challenge prior work in this territory.
- Outline the purpose and announce the present research, clearly indicating what is novel and why it is significant.
- *Avoid*: repeating the abstract; providing unnecessary background information; exaggerating the importance of the work; claiming novelty without a proper literature search.

Components of Introduction (Tischler)

Question to address	How to address
What is the problem?	• Describe the problem investigated. • Summarize relevant research to provide context, key terms, and concepts so your reader can understand the experiment.
Why is it important?	• Review relevant research to provide rationale. (What conflict or unanswered question, untested population, untried method in existing research does your experiment address? What findings of others are you challenging or extending?)
What solution (or step toward a solution) do you propose?	• Briefly describe your <i>experiment: hypothesis(es), research question(s); general experimental design or method; justification of method</i> if alternatives exist.



Literature Review

Literature Review

- A literature review surveys scholarly articles, books and other sources relevant to a particular issue, area of research, or theory, and by so doing, providing a description, summary, and critical evaluation of these works. Literature reviews are designed to provide an overview of sources you have explored while researching a particular topic and to demonstrate to your readers how your research fits into the larger field of study.

Literature Review

- A literature review may consist of simple a summary of key sources, but **it usually has an organizational pattern and combines both summary and synthesis, often within specific conceptual categories.**
- The analytical features of a literature review might:
- Give a new interpretation of old material or combine new with old interpretations,
- Trace the intellectual progression of the field, including major debates,
- Depending on the situation, evaluate the sources and advise the reader on the most pertinent or relevant, or
- Usually in the conclusion of a literature review, identify where gaps exist in how a problem has been researched to date.

Literature Review

- **The purpose of a literature review is to:**
- Place each work in the context of its contribution to the understanding of the research problem being studied,
- Describe the relationship of each work to the others under consideration,
- Identify new ways to interpret, and shed light on any gaps in previous research,
- Resolve conflicts amongst seemingly contradictory previous studies,
- Identify areas of prior scholarship to prevent duplication of effort,
- Point the way in fulfilling a need for additional research, and
- Locate your own research within the context of existing literature.
- Literature Review

Types of Literature Reviews

- **Argumentative Review**
- This form examines literature selectively in order to support or refute an argument, deeply imbedded assumption, or philosophical problem already established in the literature.
- The purpose is to develop a body of literature that **establishes a contrarian viewpoint**. Given the value-laden nature of some social science research [e.g., educational reform; immigration control], argumentative approaches to analysing the literature can be a legitimate and important form of discourse.
- However, note that they can also introduce problems of bias when they are used to to make summary claims of the sort found in systematic reviews.

Types of Literature Reviews

- **Integrative Review**
- Considered a form of research that reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new frameworks and perspectives on the topic are generated.
- The body of literature includes all studies that address related or identical hypotheses.
- A well-done integrative review meets the same standards as primary research in regard to clarity, rigor, and replication.

Types of Literature Review

- **Historical Review**
- Few things rest in isolation from historical precedent.
- Historical reviews are focused on examining research throughout a period of time, often starting with the first time an issue, concept, theory, phenomena emerged in the literature, then tracing its evolution within the scholarship of a discipline.
- The purpose is to place research in a historical context to show familiarity with state-of-the-art developments and to identify the likely directions for future research.

Types of Literature Reviews

- **Methodological Review**
- A review does not always focus on **what** someone said [content], but **how** they said it [method of analysis].
- This approach **provides a framework of understanding at different levels (i.e. those of theory, substantive fields, research approaches and data collection and analysis techniques)**, enables researchers to draw on a wide variety of knowledge ranging from the conceptual level to practical documents for use in fieldwork in the areas of ontological and epistemological consideration, quantitative and qualitative integration, sampling, interviewing, data collection and data analysis, and helps highlight many ethical issues which we should be aware of and consider as we go through our study.

Types of Literature Reviews

- **Systematic Review**
- This form consists of an overview of existing evidence pertinent to a clearly formulated research question, which uses pre-specified and standardized methods to identify and critically appraise relevant research, and to collect, report, and analyse data from the studies that are included in the review. Typically it focuses on a very specific empirical question, often posed in a cause-and-effect form, such as "To what extent does A contribute to B?"

Types of Literature Reviews

- **Theoretical Review**
- The purpose of this form is to concretely examine the corpus of theory that has accumulated in regard to an issue, concept, theory, phenomena.
- The theoretical literature review **helps establish what theories already exist, the relationships between them, to what degree the existing theories have been investigated, and to develop new hypotheses to be tested.**
- Often this form is used to help establish a lack of appropriate theories or reveal that current theories are inadequate for explaining new or emerging research problems.
- The unit of analysis can focus on a theoretical concept or a whole theory or framework.

Scientific Literature Review

Scientific Literature Review:

A scientific literature review is a *critical* account of what has been published on a topic by accredited researchers.

It may be:

- A stand-alone assignment
- An introduction to an essay, report, thesis, etc.
- Part of research/grant proposals

Scientific Literature Review

Scientific Literature Review:

How to structure a scientific literature review?

- **Introduction:** An *overview* of the topic under consideration, along with the *objectives* of the literature review.
- **Main body:** Critical analysis, evaluation of topically relevant research/data; Break into **sub-headings**
- **Conclusion:** Summarise the **key points** from your review

Word count:

Introduction = 10%
Main Body = 80-85%
Conclusion = 5-10%

Research Gap

- Literature Review Section must be concluded with the identification of the Research Gap: The Gap between What is Done in Past Studies and what is Proposed to be done in the Current Study.
- This helps to justify the significance /Rationale of the current study and its contribution to the existing arena of knowledge in the respective field of study.

Research Methodology

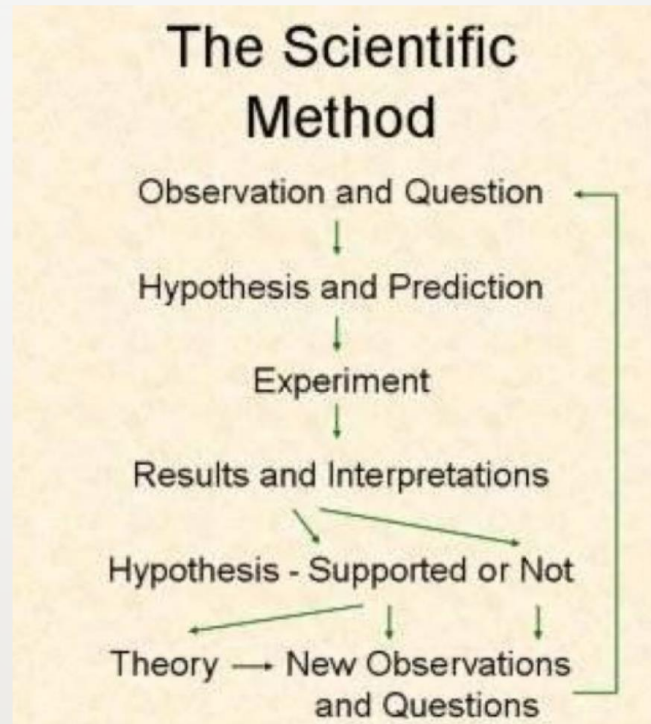
Research Methodology

- The methods section of a quantitative study should describe how each objective of your study will be achieved. Be sure to provide enough detail to enable that the reader can make an informed assessment of the method being used to obtain results associated with the research problem.
- Study population and sampling -- where did the data come from; how robust is it; note where gaps exist or what was excluded. Note the procedures used for their selection;
- Data collection – describe the tools and methods used to collect information and identify the variables being measured; Describe the methods used to obtain the data; Note if the data was pre-existing [i.e., government data] or you gathered it yourself. If you gathered it, describe what type of instrument you used and why. Note that no data set is perfect--describe any limitations in methodology.
- Data analysis -- describe the procedures for processing and analysing the data. If appropriate, describe the specific instruments of analysis used to study each research objective.

Research Methodology

- Research Questions (Problem Statement)
- Research Objectives
- Research Hypothesis
- Research Design
- Sampling Design: Sampling Technique, Sample Size
- Data Collection Strategies: Identifying and Defining Variables under Study, Data Sources (Secondary Sources), Data Collection Instrument (Primary Studies), Questionnaire Pretesting and Pilot Study, Duration of Study
- Tools and Techniques of Data Analysis

Scientific Method



Scientific Method

The different steps in the Scientific Method include:

- **Observation and Question** – A problem to be solved is identified or the researcher asks a specific question.
- **Hypothesis and Prediction** – A hypothesis, a tentative solution to the problem or answer to the question, is formulated and a prediction is made that can be tested.
- **Experiment** – A study is designed and the research is conducted to collect relevant data.
- **Results and Interpretations** – The collected data is summarized, analyzed and interpreted. Conclusions are drawn based on the observations.
- **Theory** – A theory may be developed that integrates the findings from their study with findings from other studies.

With the sciences, sometimes a hypothesis is supported by the data and a theory may be developed and other times the hypothesis is not supported. If the data does not support the hypothesis it is "back to the drawing board" to start the process over again.

Research Methodology

Guidelines for effective Methodology (Materials and Methods) sections in scientific reports (Tischler)

Questions to address:	How to address them:
How did you study the problem?	Briefly explain the general type of scientific procedure you used.
What did you use? (May be listed as Materials)	Describe what materials, subjects, and equipment (chemicals, experimental animals, apparatus, etc.) you used. May be listed as animals, reagents, etc.
How did you proceed? (May be listed as Methods or Procedures)	Explain the steps you took in your experiment. (May be listed as experiment, types of assay, etc.)

Data Analysis

- Data Analysis: Description of how the Data is Analysed and precise presentation of how the results are arrived at.

Results/Findings

Results/Findings

- The results section of the research paper is where you report the findings of your study based upon the information gathered as a result of the methodology [or methodologies] you applied.
- The results section should simply state the findings, without bias or interpretation, and arranged in a logical sequence.
- The results section should always be written in the past tense.
- A section describing results [a.k.a., "findings"] is particularly necessary if your paper includes data generated from your own research.

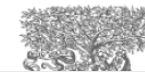
Results

Results – what have you found?

**Driving force of the publication:
Tell a clear and easy-to-understand story**

The following should be included:

- the **main findings**
 - Thus not *all* findings
 - Findings from experiments described in the Methods section
- Highlight findings that **differ** from findings in previous publications, and **unexpected** findings
- Results of the **statistical analysis**



Results

How to Present Your Results (Tischler)

In the Results section, you will be explaining what you observed:

Question to address:	How to address it:
What did you observe?	For each experiment or procedure: • Briefly describe the experiment (not in as much detail as the Methods section) • Report main result(s), supported by selected data: 1. Representative (most common) 2. Best case: best example of ideal or exception

Results

Additional tips:

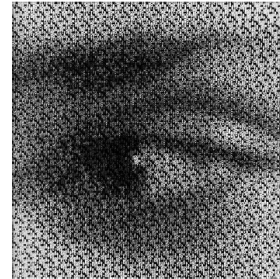
1. **Order** multiple results logically:
from most to least important
from simple to complex
organ by organ; chemical class by chemical class.
2. **Use past tense** to describe *what happened*.
3. **What to avoid:**
Don't simply repeat table data; **select**.
Don't interpret results.
Avoid extra words:
Not: "It is show in Table 1 that X induced Y"
Better: "X induced Y (Table 1)."
4. Create tables with the Table pull-down in Word. Do not use tabs.

Results – Figures and tables

Illustrations are critical, because

- Figures and tables are the most efficient way to present results
- Captions and legends must be detailed enough to make figures and tables self-explanatory
- No duplication of results described in text or other illustrations

*"One Picture is Worth a
Thousand Words"*
Sue Hanauer (1968)



Figures and Tables

Figures and Tables

- Ensure that the figures accurately and carefully document the data and their context.
- Ensure that the figures allow for comparisons and inferences of cause and effect, avoiding spurious readings.
- Figures should have captions and legends to allow them to be understood independent of the text, if possible.
- Ideally, a figure caption will do three things: describe everything in the graph, draw attention to its important features, and (when practical) describe the main conclusions to be drawn from it.
- All figures should be referred to in the text, with first references in numerical order.
- A piece of data has four parts: a description (what is it?), a number, a unit, and an uncertainty estimate. Try to put all four parts of the data in the figure.

Figures and Tables

- Error bars should be present; explain clearly what they represent. If any data points have been removed, explain why.
- Use color when it can enhance the graphic (most articles are now read online), but make sure that no information is lost when printed in black and white.
- Tables are best for looking up specific information or exact values, and graphs excel at displaying trends and making comparisons.
- When the number of data points is small, a table could work better than a graph.
- Use log-scales to reveal trends in the data, not hide them. Log-scales emphasize relative changes, whereas linear scales are best at showing absolute changes.
- Choose plot scales (x - and y -axis start and stop values, for example) to avoid white space: try to use at least 80% of each scale to display data.
- *Avoid*: titles on the graph (title information should be in the figure caption); pie charts; bar charts unless there isn't a better option; spurious 3D effects, such as the use of 3D bars in a bar chart; gridlines and other clutter; inconsistent formatting of figures; commercial displays in the guise of diagrams or figures.

Figures and Tables

- **Tables must have a table header (above the table) and figures must be accompanied by a caption (below the figure).**
- **Both tables and figures must be referred to in the text**

Footnotes or Endnotes?

- **Things to keep in mind when considering using either endnotes or footnotes in your research paper:**
- **Footnotes are numbered consecutively throughout a research paper, except for those notes accompanying special material** (e.g., figures, tables, charts, etc.). Numbering of footnotes are "superscript"--arabic numbers typed slightly above the line without periods, parentheses or slashes. They can follow all punctuation marks except dashes. In general, to avoid interrupting the continuity of the text, footnote numbers are placed at the end of the sentence, clause or phrase containing the quoted or paraphrased material.
- **Depending on the writing style used in your class, endnotes may take the place of a list of resources cited in your paper** or they may represent non-bibliographic items, such as comments or observations, followed by a separate list of references to the sources you cited and arranged alphabetically by the author's last name.
- **In general, the use of footnotes is now considered outdated** and has been replaced by endnotes, which are much easier to place in your paper, even with the advent of word processing programs. However, some disciplines, such as law and history, still predominantly utilize footnotes. Consult with your professor about which form to use and always remember that, whichever system you choose, apply it consistently throughout your paper.

Footnotes or Endnotes?

- **Endnote**

Note citing a particular source or making a brief explanatory comment placed at the end of a research paper.

- **Footnote**

Note citing a particular source or making a brief explanatory comment placed at the bottom of a page corresponding the item cited.

Footnotes or Endnotes?

- **Advantages of Using Endnotes**
- Endnotes are less distracting to the reader and allows the narrative to flow better.
- Endnotes don't clutter up the page.
- As a separate section of a research paper, endnotes allow the reader to read and contemplate all the notes at once.

Footnotes or Endnotes?

- **Disadvantages of Using Endnotes**
- If you want to look at the text of a particular endnote, you have to flip to the end of the research paper to find the information.
- Depending on how they are created [i.e., continuous numbering or numbers that start over for each chapter], you may have to remember the chapter number as well as the endnote number in order to find the correct one.
- Endnotes may carry a negative connotation much like the proverbial "fine print" or hidden disclaimers in advertising. A reader may believe you are trying to hide something by burying it in a hard-to-find endnote.

A Word About Numbers and Statistics

- Follow this guide as you use numbers and statistics in your writing:
- • Use symbol $\sim$ to mean *approximately equal to*.
- • Numbers beginning a sentence must be spelled.
- It is usually better to rewrite a sentence so you don't start it with numbers greater than ninety-nine.
- • Put a space between numbers and units: for example 75 kg. Exception: 75%.
- • Note: 0.32 is correct, NOT .32.
- • Note: write numbers as follows: 14,3 2,461 or 21,40,9,00

A Word About Numbers and Statistics

- When you quote numbers, make sure you use the minimum number of significant digits or decimal places. For example, 23 ± 7 years is appropriate but not 23.4 ± 6.6 years; the loss of accuracy is not important because the measurement is not significant to the first decimal place.
- Use the appropriate number of digits: two significant digits for standard deviations (one digit if the standard deviation is for a descriptive statistic like height or weight, or if precision is not important); two decimal places for correlations, two significant digits for percentages. Examples: 73 ± 5 ; $r=0.45$; $r = 0.08$; 16%; 1.3%, 0.013%.

A Word About Numbers and Statistics

- If it is more convenient to show p values than confidence limits, show the exact p value to one significant digit (for $p < 0.1$) or two decimal places (for $p > 0.10$).
- Rather than using $p < 0.05$ or $p > 0.05$ it may be better to use the following examples: $p = 0.03$; $p = 0.007$; $p = 0.09$; $p = 0.74$ when the exact p value is important for anyone using your data to calculate confidence limits or using your data in a meta-analysis.
- If you have a table or figure with a large number of comparisons, it may be simpler to use the $p <$ notation to refer to a group of observations.
- Show 95% confidence intervals for effect statistics like correlation coefficient or the difference between means.

Discussion/Interpretations

Discussion

Discussion – what do the results mean?

- **Here you get the chance to SELL your data!**
 - Many manuscripts are rejected because the Discussion is weak
- **Check for the following:**
 - How do your results relate to the original question or objectives outlined in the Introduction section?
 - Do you provide interpretation for each of your results presented?
 - Are your results consistent with what other investigators have reported? Or are there any differences? Why?
 - Are there any limitations?
 - Does the discussion logically lead to your conclusion?
- **Do not:**
 - Make statements that go beyond what the results can support
 - Suddenly introduce new terms or ideas



Discussion

Questions to address:	How to address them:
What do your observations mean?	• Summarize the most important findings at the beginning.
What conclusions can you draw?	• Describe the patterns, principles, relationships results show. • Explain how your results relate to expectations and to literature cited in your Introduction. Do they agree, contradict, or are they exceptions to the rule? • Explain plausibly any agreements, contradictions, or exceptions. • Describe what additional research might resolve contradictions or explain exceptions.
How do your results fit into a broader context?	• Suggest the theoretical implications of your results. • Suggest practical applications of your results? • Extend your findings to other situations or other species. • Give the big picture: do your findings help us understand a broader topic?

Discussion

Additional tips:

1. **Move from specific to general:** Your findings(s) → literature, theory, practice.
2. **Don't ignore or bury the major issue.** Did the study achieve the goal (resolve the problem, answer the question, support the hypothesis) presented in the Introduction?
3. **Make explanations complete.**
Give evidence for each conclusion.
Discuss possible reasons for expected and unexpected findings.
4. **What to avoid:**
Don't over generalize.
Don't ignore deviations in your data.
Avoid speculation that cannot be tested in the foreseeable future.



Conclusions

Conclusions

Conclusions

- Do not summarize the paper
 - The abstract is for that purpose
- Present what have you shown and what it means for the field
- Suggest future experiments and indicate whether they are underway
- Avoid bold judgments about impact

Conclusions

Conclusions

- Provide a *very brief* summary of the Results and Discussion.
- Emphasize the implications of the findings, explaining how the work is significant and providing the key message(s) the author wishes to convey.
- Provide the most general claims that can be supported by the evidence.
- Provide a future perspective on the work.
- *Avoid:* repeating the abstract; repeating background information from the Introduction; introducing new evidence or new arguments not found in the Results and Discussion; repeating the arguments made in the Results and Discussion; failing to address all of the research questions set out in the Introduction.

Conclusions

- The conclusion is intended to help the reader understand why your research should matter to them after they have finished reading the paper.
- A conclusion is not merely a summary of your points or a re-statement of your research problem but a synthesis of key points.
- For most essays, one well-developed paragraph is sufficient for a conclusion, although in some cases, a two-or-three paragraph conclusion may be required.
- **Importance of a Good Conclusion**
- A well-written conclusion provides you with several important opportunities to demonstrate your overall understanding of the research problem to the reader. These include:

Conclusions

- **Presenting the last word on the issues you raised in your paper.** Just as the introduction gives a first impression to your reader, the conclusion offers a chance to leave a lasting impression. Do this, for example, by highlighting key points in your analysis or findings.
- **Summarizing your thoughts and conveying the larger implications of your study.** The conclusion is an opportunity to succinctly answer the "so what?" question by placing the study within the context of past research about the topic you've investigated.
- **Demonstrating the importance of your ideas.** Don't be shy. The conclusion offers you a chance to elaborate on the significance of your findings.
- **Introducing possible new or expanded ways of thinking about the research problem.** This does not refer to introducing new information [which should be avoided], but to offer new insight and creative approaches for framing/contextualizing the research problem based on the results of your study.

Conclusion

- **General Rules**
- **When writing the conclusion to your paper, follow these general rules:**
- State your conclusions in clear, simple language.
- Do not simply reiterate your results or the discussion.
- Indicate opportunities for future research, as long as you haven't already done so in the discussion section of your paper.
- **The function of your paper's conclusion is to restate the main argument.** It reminds the reader of the strengths of your main argument(s) and reiterates the most important evidence supporting those argument(s). Make sure, however, that your conclusion is not simply a repetitive summary of the findings because this reduces the impact of the argument(s) you have developed in your essay.



REFERENCES/CITATIONS

REFERENCES/CITATIONS

- Because virtually all scientific advances build on past knowledge, it is critical that the new work be placed in the proper context with respect to the past work upon which it builds. The primary mechanism for this is the citation (or reference).
- Within a scientific paper, references are placed to other works, creating points of contact with the communal collection of scientific literature in order to fit the new work into the web of knowledge.
- But given the skeptical attitude that is also a part of science, citations are also used to help readers verify the quality of the new work and assess the strength of its conclusions.

REFERENCES/CITATIONS

References: get them right!

- **Cite the main scientific publications on which your work is based**
- **Check**
 - Referencing style of the journal (Guide for Authors)
 - The spelling of author names, the year of publication
 - Punctuation use

REFERENCES/CITATIONS

Preparing the Reference Section

Your reference list should appear at the end of your paper. It provides the information necessary for a reader to locate and retrieve any source you cite in the body of the paper. Each source you cite in the paper must appear in your reference list; likewise, each entry in the reference list must be cited in your text.

Your references should begin on a new page separate from the text of the essay; label this page "References" centered at the top of the page (do NOT bold, underline, or use quotation marks for the title). All text should be double-spaced just like the rest of your essay.

Referencing Formats/Citation Styles

- Researchers and writers should understand some of the following styles:
- **APA** The American Psychology Association – Use this style for education, psychology, sociology and other social sciences.
- **Example of APA style for a book with one author:** Doe, J. (1999). *Causes of the Civil War*. Ohio: Smith Books.
- **Resources:**
- [Publication Manual of the American Psychological Association](#)
- [APA Formatting and Style Guide](#): Available online from The Owl at Purdue, this contains examples of reference list entries and in-text citations.
- [Basics of APA Style Tutorial](#): Available online from the APA, this outlines citing and writing guidelines.
- Read more: <https://html.com/resources/citation-guide/#ixzz6Ntml5059>

Referencing Formats/Citation Styles

- **MLA**

Modern Language Association – Use this style for arts, literature and the humanities.

- **Example of MLA style for a book with one author:** Doe, John: "Causes of the Civil War." Smith.

Resources:

- [MLA 2009 Formatting and Style Guide](#): Available online from The Owl at Purdue, with many examples for producing works cited entries and in-text footnotes.

- [MLA Style Manual and Guide to Scholarly Publishing](#): Available online from The Owl at Purdue, contains examples.

•

Read more: <https://html.com/resources/citation-guide/#ixzz6NtmyFKyQ>

Referencing Formats/Citation Styles

- **AMA or NLM:** American Medical Association or the National Library of Medicine for health, medicine and biological sciences.
- **Example of AMA for a book with one author:** Doe JD. *Causes of the Civil War*. Columbus, OH: Smith Books; 1999.
- **Example of NLM for a book with one author:** Doe, JD. Causes of the Civil War. Columbus (OH): Smith Books; 1999.
- **Resources:**
- [AMA Manual of Style: A Guide for Authors and Editors](#)
- [Citing Medicine: The NLM Style Guide for authors, editors and publishers](#); available online from the National Library of Medicine.
- Read more: <https://html.com/resources/citation-guide/#ixzz6Ntn85imk>

Referencing Formats/Citation Styles

- **Chicago or Turabian:** Students and researchers commonly use the Chicago Manual of Style guide, or Turabian, for most real-world subjects in magazines, books, newspapers and many other non-scholarly publications.
- **Example of Chicago style for a book with one author:**
- Doe, John. 1999. *Causes of the Civil War*. Columbus, Ohio: Smith Books.
- **Resources:**
- [CMS: Provide by the Perdue Owl Online Writing Laboratory.](#)
- Read more: <https://html.com/resources/citation-guide/#ixzz6NtnI4m1e>

Referencing Formats/Citation Styles

- **Scientific Style (CSE)** : There are a variety of scientific style guides depending on the particular field, whether it be biology, chemistry, engineering.
- **Example of Scientific Style for a book with one author:** John D. Doe. Causes of the Civil War. Columbus (OH): Smith Press: 1999.
- **Resources:**
- **ACS:** American Chemical Society
 - [ACS Style Guidelines](#): Available online from UW-Madison Libraries, providing examples for citing references in the text and the bibliography of a research paper.
- **IEEE:** Institute of Electronics and Electrical Engineers
 - [IEEE Editorial Style Manual](#): An online PDF that provides editorial guidelines for IEEE letters, journals and transactions, with citation examples.
- [The Writer's Handbook – CSE Citation](#)
- Read more: <https://html.com/resources/citation-guide/#ixzz6NtnV663S>

Programs for Creating Citations

- The following resources provide programs to help researchers create citations:
- [Landmark Citation Machine](#)
- [KnightCite](#)
- [Citation Builder](#)
- [EasyBib](#)

Citations (References)

- Include citations that provide sufficient context to allow for critical analysis of this work by others.
- Include citations that give the reader sources of background and related material so that the current work can be understood by the target audience.
- Include citations that provide examples of alternate ideas, data, or conclusions to compare and contrast with this work, if they exist. Do not exclude contrary evidence.
- Include citations that acknowledge and give credit to sources relied upon for this work.
- Are the citations up to date, referencing that latest work on this topic?
- It is the job of the *authors* to verify the accuracy of the references.
- *Avoid*: spurious citations (citations that are not needed but are included anyway); biased citations (references added or omitted for reasons other than meeting the above goals of citations); excessive self-cites (citations to one's own work).

Citation Styles

- **JOURNAL ARTICLE WITH VOLUME – ONE AUTHOR**

- The example used is an article by author Truly Learned, entitled “The Web-Toed Bibliosaurus: Cranial Measurements Indicate a Smarter Than Average Lizard,” published in volume 85 of the *Journal of the Paleocranial Society* in 1995 on pages 566-592. The journal does not paginate each issue separately, but numbers continuously over the entire volume.
- APA
 - Learned, T. (1995). The Web-Toed Bibliosaurus: Cranial measurements indicate a smarter than average lizard. *Journal of the Paleocranial Society*, 85, 566-592.
- MLA
 - Learned, Truly. “The Web-Toed Bibliosaurus: Cranial Measurements Indicate a Smarter than Average Lizard.” *Journal of the Paleocranial Society*, vol. 85, 1995, pp. 566-592.
- TUR.
 - Learned, Truly. “The Web-Toed Bibliosaurus: Cranial Measurements Indicate a Smarter than Average Lizard.” *Journal of the Paleocranial Society* 85 (1995): 566-592.

Citation Styles

- **JOURNAL ARTICLE WITH VOLUME & NUMBER – MULTIPLE AUTHORS**

The example used is an article by authors Adam Bisantz and Bea Biserk entitled “Adaptivity and Genetic Predisposition to Temper Tantrums.” The article was published in 2000 in volume 35, issue number 3, of the journal *Misbehavior and Medication* on pages 34-48. Each issue of the journal has its own pagination beginning with page 1.

- APA
- Bisantz, A. & Biserk, B. (2000). Adaptivity and genetic predisposition to temper tantrums. *Misbehavior and Medication*, 35(3), 34-48.
- MLA
- Bisantz, Adam and Bea Biserk. “Adaptivity and Genetic Predisposition to Temper Tantrums.” *Misbehavior and Medication*, vol. 35, no. 3, 2000, pp. 34-48.
- TUR.
- Bisantz, Adam and Bea Biserk. “Adaptivity and Genetic Predisposition to Temper Tantrums.” *Misbehavior and Medication* 35, no. 3 (2000): 34-48.

Citation Styles

- The example used is an article authored by Otto Nomick, Rhea Flecks, Kaye Tschin, Nye Dzherk, and Nobbie Knease, entitled “Reaction Times in White Mice Which have Been Administered Large Doses of MSG.” The article was published in 1998 in volume 33, issue number 1, of the *Journal of Reflexology & Reactivity*, on pages 22-43. Each issue of the journal has its own pagination.
- APA requires listing all authors up to seven. For references with more than seven authors, give the first six authors, followed by an ellipsis, and followed by the last author. (Example: Adams, B., Brown, C., Cook, D., Davis, E., Edge, F., Francis, G., Green, H., ... Zabriskie, A.) Turabian bibliography style calls for listing all the authors, regardless of how many.
- APA: Nomick, O., Flecks, R., Tschin, K., Dzherk, N., & Knease, N. (1998). Reaction times in white mice which have been administered large doses of MSG. *Journal of Reflexology & Reactivity*, 33(1), 22-43.
- MLA: Nomick, Otto, et al. “Reaction Times in White Mice Which Have Been Administered Large Doses of MSG.” *Journal of Reflexology & Reactivity*, vol. 33, no. 1, 1998, pp. 22-43.
- TUR.: Nomick, Otto, Rhea Flecks, Kaye Tschin, Nye Dzherk, and Nobbie Knease. “Reaction Times in White Mice Which Have Been Administered Large Doses of MSG.” *Journal of Reflexology & Reactivity* 33, no. 1 (1998): 22-43.

Citation Styles

- **JOURNAL ARTICLE – ELECTRONICALLY PUBLISHED JOURNAL (No DOI listed)**
This example is based on an article published in an online journal. The article, written by author C.B. Cybernaught, is entitled “Hyper Over Hypertext” and was published online in volume 39, issue number 4, April 1995, in the electronic journal *World Wide Wanderer*. The article is not paginated and was retrieved on 25 May 2008.
- APA: Cybernaught, C.B. (1995, April). Hyper over hypertext. *World Wide Wanderer*, 39(4).
<http://www.ccu.edu/wwwander/>
- MLA: Cybernaught, C.B. “Hyper Over Hypertext.” *World Wide Wanderer*, vol. 39, no. 4, April 1995, www.ccu.edu/wwwander/april95.html. Accessed 25 May 2008.
- TUR.: Cybernaught, C.B. “Hyper Over Hypertext.” *World Wide Wanderer* 39, no. 4 (April 1995).
<http://www.ccu.edu/wwwander/april95.html> (accessed May 25, 2008).

Citation Styles

- JOURNAL ARTICLE – ELECTRONICALLY PUBLISHED JOURNAL (DOI listed)**
 This example is based on an article published in an online journal that assigns DOIs (Digital Object Identifiers) to each of its articles. Most publishers are now assigning DOIs to make it easier to link back to electronically published articles. The article, written by author Cosette Cremedelacreme, is entitled “An Examination of Gastronomic Imagery in the Later Poetry of Fifi LaRue. The article was published in 2008 in volume 13, issue number 2, on pages 23-43 of the journal *Poetry Parisienne*. The URL for the article is http://www.parisienne.com/13_2/cremedelacreme.html. The DOI for the article is 29.1027/00013- 2893.13.2.23. The article was retrieved June 13, 2008.
- Note: APA recommends using both volume and issue numbers for all electronic journal articles when both are available, regardless of pagination.
- APA: Cremedelacreme, C. (2008). An examination of gastronomic imagery in the later poetry of Fifi LaRue. *Poetry Parisienne*, 13(2), 23-43. <https://doi.org/29.1027/00013-2893.13.2.23>
- MLA: Cremedelacreme, Cosette. “An Examination of Gastronomic Imagery in the Later Poetry of Fifi LaRue.” *Poetry Parisienne*, vol. 13, no. 2, 2008, pp. 23-43. doi: 29.1027/00013- 2893.13.2.23. Accessed 13 June 2008.
- TUR.: Cremedelacreme, Cosette. “An Examination of Gastronomic Imagery in the Later Poetry of Fifi LaRue.” *Poetry Parisienne* 13, no. 2 (2008): 23-43. doi:29.1027/00013- 2893.13.2.23 (accessed June 13, 2008).

Citation Styles

- **JOURNAL ARTICLE FROM AN ONLINE FULL-TEXT DATABASE (No DOI or Journal URL listed)**
The example is based on the 2007 article “Entanglements in Wonderland: Children’s Stories and Their Underlying Adult Themes,” by author Silvester Stiltskin. The article was published in the journal *Studies in Children’s Fiction* in the March 2007 issue, volume 37, number 3, on pages 123-145. The journal has no online equivalent but it has been reproduced electronically in Literature Online. The database is available at the Thomas G. Carpenter Library at UNF and was retrieved on August 28, 2008. Note: APA advises that it is generally not necessary to provide retrieval information for journal articles pulled from databases, since coverage in the database might change. When no DOI or website is available, the citation will take the format of the print journal article.
- APA: Stiltskin, S. (2007). Entanglements in Wonderland: Children’s stories and their underlying adult themes. *Studies in Children’s Fiction*, 37(3), 123-145.
- MLA: Stiltskin, Sylvester. “Entanglements in Wonderland: Children’s Stories and Their Underlying Adult Themes.” *Studies in Children’s Fiction*, vol. 37, no. 3, 2007, pp. 123-145. *Literature Online*, gateway.lion.com/scf/2007_37_03_stiltskin.html. Accessed 28 Aug. 2008.
- TUR. : Stiltskin, Sylvester. “Entanglements in Wonderland: Children’s Stories and Their Underlying Adult Themes.” *Studies in Children’s Fiction* 37, no. 3 (2007): 123-145. http://gateway.lion.com/scf/2007_37_03_stiltskin.html (Accessed August 28, 2008).

Citation Styles

- **JOURNAL ARTICLE FROM AN ONLINE FULL-TEXT DATABASE (Journal URL listed)**
The example is based on the 2006 article authored by Rubio Buttons entitled “Send in the Clowns: Political Misadventures of 21st Century America.” The article was published in volume 3, issue number 2, of the journal *Political Profundity* on pages 47-62. The journal also maintains electronic copies of the articles and provides the URL on the article title page (<http://www.polprof.com/2006/buttons.html>). The article is available in the database *PoliSci Online* and was retrieved from the database on September 3, 2008.
- APA: Buttons, R. (2006). Send in the clowns: Political misadventures of 21st century America. *Political Profundity*, 3(2), 47-62. <http://www.polprof.com/>
- MLA: Buttons, Rubio. “Send in the Clowns: Political Misadventures of 21st Century America.” *Political Profundity*, vol. 3, no. 2, 2006, pp. 47-62. *PoliSci Online*, http://text.poliscionline.com/2006_3_2_47.html. Accessed 3 Sep. 2008.
- TUR.: Buttons, Rubio. “Send in the Clowns: Political Misadventures of 21st Century America.” *Political Profundity* 3, no. 2 (2006): 47-62. http://text.poliscionline.com/2006_3_2_47.html (accessed September 3, 2008).

Harvard Referencing Style

- The basics of a Reference List entry for a journal article:
- Author or authors. The surname is followed by first initials.
- Year of publication of the article.
- Article title (in single inverted commas).
- Journal title (in italics).
- Volume of journal.
- Issue number of journal.
- Page range of article.
- **Example:**
Gray, L 2018, 'Exploring how and why young people use social networking sites', *Educational Psychology in Practice*, vol. 34, no. 2, pp. 175-194.

Harvard Referencing Style

Author	Year	Article Title	Journal Title (<i>in italics</i>)	Volume
↓	↓	↓	↓	↓
Gray, L 2018, 'Exploring how and why young people use social networking sites', <i>Educational Psychology in Practice</i> , vol. 34, no. 2, pp. 175-194.				
↑	↑			
Issue	page(s)			

Academic Writing Style

- Academic writing refers to a particular style of expression that scholars use to define the boundaries of their disciplines and their areas of expertise. Characteristics of academic writing include a formal tone, use of the third-person rather than first-person perspective (usually), a clear focus on the research problem under investigation, and precise word choice.
- Like the specialist languages adopted in other professions such as law, academic writing is designed to convey agreed meaning about complex ideas for a group of scholarly experts.

Scientific Writing Style

- There are many writing styles: plain, practical, classic, romantic, contemplative, oratorical, and others. According to Thomas and Turner, a scientific writing style is defined by the stand taken on five issues:
- ◎ **Truth:** What is the writer's philosophical stand on truth and how it can be known and communicated?
- ◎ **Presentation:** What does the writer (and reader) value in the mode of presentation?
- ◎ **Scene:** What is the model for transmitting the writer's thoughts to the reader?
- ◎ **Cast:** Who is the intended reader? What does the writer assume about the reader?
- ◎ **Thought and Language:** What is the relationship between the writer's thoughts and the language chosen to express them?

Academic Writing Style

- **It is important that specialist terms [i.e., jargon] must be used accurately and applied under the appropriate conditions.** Subject-specific dictionaries are the best places to confirm the meaning of terms within the context of a specific discipline. It is appropriate for you to use specialist language within your field of study, but avoid using such language when writing for non-academic or general audiences.
- **Key Problems to Avoid**
 - **Excessive use of specialized terminology.** Although academic writing represents a formal style of expression, it does not mean using "big words" just for the sake of doing so. Overuse of big words and complicated sentence constructions gives readers the impression that your writing is more style over substance; it leads the reader to question if you really know what you are talking about.
 - **Inappropriate use of specialized terminology.** Because you are dealing with the concepts, research, and data of your subject, you need to use the technical language appropriate to the discipline. However, nothing will undermine the validity of your study quicker than the inappropriate application of a term or concept. Avoid using terms whose meaning you are unsure of--don't guess or assume! Consult the meaning of terms in specialized, discipline-specific dictionaries. These can be found by searching the [library catalog](#), by entering, for example, the phrase "sociology and dictionaries."

Scientific Language

Scientific Language

A writer should try to teach the readers, not impress them. The easiest way to do that is to draft the passage using the words that come most naturally, then revise, rewrite, and revise again with accuracy, precision, and clarity in mind. Sleep on it, let someone else read it, then revise it again. Writing is mostly the act of rewriting, and it is work.

Scientific Language

Scientific Language – Overview

Write with clarity, objectivity, accuracy, and brevity.

Key to successful scientific writing is to be alert for common errors:

- Sentence construction
- Incorrect tenses
- Inaccurate grammar
- Spelling mistakes

Scientific Language

Scientific Language – Sentences

- Write direct and short sentences – more professional looking
- One idea or piece of information per sentence is sufficient
- Avoid multiple statements in one sentence – they are confusing to the reader.

Scientific Language

Language

- *Why is language important?*

Save your editor and reviewers the trouble of guessing what you mean



Complaint from an editor:

“[This] paper fell well below my threshold. I refuse to spend time trying to understand what the author is trying to say. Besides, I really want to send a message that they can't submit garbage to us and expect us to fix it. My rule of thumb is that if there are more than 6 grammatical errors in the abstract, then I don't waste my time carefully reading the rest.”

Scientific Language

- *Do publishers correct language?*

- No. It is the author's responsibility to make sure his paper is in its best possible form when submitted for publication
- However:
 - Publishers often provide resources for authors who are less familiar with the conventions of international journals. Please check your publishers' author website for more information.
 - Some publishers may perform technical screening prior to peer review.

Scientific Language: Acronyms

- The term *acronym* is the name for a word made from the first letters of each word in a series of words. Some distinguish an acronym (such as NATO), which is pronounced as a word, from an *initialism* (such as FBI), which is pronounced by saying each letter separately.
- Most people, however, ignore such distinctions. The more general term *abbreviation* includes acronyms but also abbreviations that use letters other than the first letters of a word (such as nm for “nanometers” or Mr. for “mister”). Here, “acronym” will be used loosely to mean any abbreviation.

Scientific Language: Acronyms

- Acronyms serve an important purpose in scientific writing: to speed up the reading and ease the understanding of the content of a paper.
- Thus, the goal of acronym use generally requires that the abbreviation be familiar and that it save considerable space and/or prevent cumbersome repetition. We should use an acronym only when it will be referred to frequently throughout the text (say, five or more times) or because it is commonly known and understood.
- There is no requirement for authors to use acronyms—it is their choice if and when to use them.
- Additionally, authors should avoid uncommon abbreviations (if the reader is not familiar with the acronym, its use will likely detract from the readability of the paper rather than enhance it).

Scientific Language: Acronyms

1. Do not use acronyms in the title unless (a) the subject is almost exclusively known by its acronym or is widely known and used in that form, and (b) the acronym does not commonly have more than one expansion. For example, the acronym CD is widely used in the semiconductor industry for critical dimension, in the music and data-storage fields for compact disk, in some areas of optics for circular dichroism, in economics for certificate of deposit, with other meanings in other fields. Acronyms should not be spelled out in the title—if you are going to spell it out, do not use the acronym!
2. Standard abbreviations for measurement units and chemical names that are widely known can be used in the title, abstract, and body of the paper and do not need to be spelled out.
3. Always spell out the acronym the first time it is used in the body of the paper.

Scientific Language: Acronyms

4. **Avoid acronyms in the abstract unless the acronym is commonly understood and used multiple times in the abstract.** If an acronym is used in the abstract, it must be spelled out (defined) in the abstract, and then spelled out again the first time it is used in the body of the paper.
5. **Once an acronym has been defined in the body of the paper, do not repeat the definition again.** *Exception:* if an acronym is used and spelled out in a figure caption, it should also be defined the first time it is used in the body of the paper. Spelling out an acronym the first time it is used in a figure is useful for those readers who wish to scan the figures before deciding whether to read the full paper. In general, though, figures and their captions are better off without acronyms unless they are commonly understood.

Scientific Language: Acronyms

6. Acronyms can be multilayered, but the need for common familiarity is even greater. For example, VHDL = VHSIC hardware description language, where VHSIC stands for very-high-speed integrated circuit.
7. Some acronyms are so commonly used that they have become their own words (e.g., laser and sonar) and are listed in common dictionaries as words rather than abbreviations. These terms do not need to be spelled out.

If these rules and guidelines are followed, the use of an acronym will help rather than impede your reader's understanding. This, of course, should always be the goal. When in doubt, use fewer acronyms, not more.

- LASER: Light Amplification by Stimulated Emission of Radiation.
- SONAR: (Sound Navigation Ranging) is a technique that uses sound propagation to navigate

Scientific Writing: Active vs. Passive Voice

- In scientific writing, overuse of passive voice or use of passive voice in long and complicated sentences can cause readers to lose interest or to become confused. Sentences in active voice are generally—though not always—clearer and more direct than those in passive voice.
- That being said, the passive voice is especially helpful (and even regarded as mandatory) in scientific or technical writing or lab reports: The actor is not really important but the process or principle being described is of ultimate importance.
- Instead of:
 - “I poured 20 cc of acid into the beaker”
 - Better to say:
 - “Twenty cc of acid was poured into the beaker”
- The passive voice is also useful when describing, say, a mechanical process in which the details of process are much more important than anyone’s taking the responsibility of the process.

Scientific Writing: Formatting of Research Paper

- Paper Size
- Margins
- Line spacing
- Font style
- Font Size: Text, Titles, Subtitles, Tables
- Table Numbers, Graph/Figure/Chart/Diagram Numbers
- Section Number
- Paragraph Spacing
- Orientation: Portrait and Landscape

Writing Styles

When to use Active Voice

In general, writing should be composed in the active voice because of the sense of immediacy and conciseness conveyed when the subject of the sentence carries out the action. In addition, fewer words are usually required for the active voice, it is more efficient, and it takes the reader from point A to point B in a “straight line.”

When to use Passive Voice

The passive voice does exist for a reason, however, and its presence is not always to be despised. The passive is particularly useful (even recommended) in two situations:

When it is more important to draw our attention to the person or thing acted upon:

The victim was apparently struck during the early morning hours.

When the actor in the situation is not important:

The aurora borealis can be observed in the early morning hours.

Scientific Writing: Formatting of Research Paper

Basic Formatting Requirements for a Research Paper

Before submitting a paper, prepare the final copy on a good quality standard 8½-by-11-inch paper of a common weight and thickness, for example, 16-20 pound bond paper. Moreover, use a font style and size that are readable, and in both APA and MLA, the only acceptable font styles are Times New Roman, Arial, and Courier, while the only acceptable font size is 12-point, except in certain rare circumstances explained in the APA and MLA manuals. Finally, use only black ink and make certain the printed copy is legible, not smeared or the text so light as to be unreadable.

How to Format Margins on Research Papers

Margins should be 1-inch on both sides and at the top and bottom of all pages. Additionally, text in the body of the paper, other than the paper's title on the first page, which is centered, should be aligned left, not justified or aligned right.

Scientific Writing: Formatting of Research Paper

Basic Rules for APA Formatting

- All lines after the first line of each entry in your reference list should be indented one-half inch from the left margin. This is called hanging indentation.
- Authors' names are inverted (last name first); give the last name and initials for all authors of a particular work for up to and including seven authors. If the work has more than seven authors, list the first six authors and then use ellipses after the sixth author's name. After the ellipses, list the last author's name of the work.
- Reference list entries should be alphabetized by the last name of the first author of each work.
- If you have more than one article by the same author, single-author references or multiple-author references with the exact same authors in the exact same order are listed in order by the year of publication, starting with the earliest.
- Capitalize all major words in journal titles.

Scientific Writing: Formatting of Research Paper

- When referring to books, chapters, articles, or Web pages, capitalize only the first letter of the first word of a title and subtitle, the first word after a colon or a dash in the title, and proper nouns. Do not capitalize the first letter of the second word in a hyphenated compound word.
- Italicize titles of longer works such as books and journals.
- Do not italicize, underline, or put quotes around the titles of shorter works such as journal articles or essays in edited collections.
- **Please note:** While the APA manual provides many examples of how to cite common types of sources, it does not provide rules on how to cite all types of sources. Therefore, if you have a source that APA does not include, APA suggests that you find the example that is most similar to your source and use that format.

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Ethical Writing

Ethical Responsibilities of Authors Before Publication

Before submitting a manuscript to a peer-reviewed journal for publication, here are the major responsibilities of the authors:

- Carry out the research leading to publication in an ethical manner.
- Write your paper with openness and honesty, keeping the primary ethic of scientific publication in mind.
- Cite as you write to avoid plagiarism through sloppy citation practice.

Ethical Responsibilities of Authors Before Publication

- Ensure that the work is original and has not been previously published or submitted for publication elsewhere
- Cite your own prior and overlapping work properly
- Select the list of authors appropriately with full approval of the submission by all authors.
- Choose the most appropriate journal and submit the best manuscript possible. Never knowingly submit a poor manuscript with the hope that the editors and reviewers will help you fix it.
- Spend the time to understand the submission requirements of the chosen journal and comply with those requirements.
- Identify all funding sources and notify the editors of any potential conflicts of interest.

Unethical Behaviour

What is unethical behaviour? Connex Partnering with the Global

Unethical behaviour can earn rejection and even a ban from publishing in some journals. Unethical behaviour includes:

- Scientific misconduct
 - Falsification of results
- Publishing misconduct
 - Plagiarism
 - Different forms / severities
 - The paper must be original to the authors
 - Duplicate/multiple submission
 - Redundant publication
 - Failure to acknowledge prior research and researchers
 - Inappropriate identification of all co-authors
 - Conflict of interest

Scientific Misconduct

Scientific misconduct **- *Fabrication and falsification***

- Fabrication is making up data or results, and recording or reporting them
- Falsification is manipulating research materials, equipment, processes, or changing/omitting data or results such that the research is not accurately represented in the research record



Plagiarism

Publishing Misconduct: Plagiarism

Publishing misconduct **- Plagiarism**

“Plagiarism is the appropriation of another person’s ideas, processes, results, or words without giving appropriate credit, including those obtained through confidential review of others’ research proposals and manuscripts”

Federal Office of Science and Technology Policy, 1999

“Presenting the data or interpretations of others without crediting them, and thereby gaining for yourself the rewards earned by others, is theft, and it eliminates the motivation of working scientists to generate new data and interpretations”

Bruce Railsback, Professor, Department of Geology, University of Georgia

Types of Plagiarism

Plagiarism can commonly be divided into 5 types. They are as follows:

- **Direct plagiarism:** Copying someone's work verbatim (word by word) without giving credits.
- **Self-plagiarism:** Copying or producing an assignment influenced by your own previous work (also called unintentional plagiarism).
- **Mosaic or patchwork plagiarism:** Quoting someone else's work without quotation mark or changing the language (of original work) while keeping the structure same.
- **Accidental plagiarism:** Unintentionally forgetting to cite the original work, misquotation etc.
- **Outsourcing:** Paying essay mills, friends, hiring article writers, bloggers to write on your behalf.

Avoiding Plagiarism

- What is Plagiarism?
- Plagiarism is essentially the “imitation of someone else’s work” without giving them their due credit.
- According to Seton Hall University (SHU’s) Academic Integrity Policy, plagiarism is: any act of misrepresenting the sources of one's information and ideas. When writing essays, it is the act of presenting another person's written words or ideas as one's own. When reporting experimental work, it includes the acts of falsifying data and presenting another's data as one's own. In speeches, it involves quoting passages of others' speeches or written words without mention of the author.

Avoiding Plagiarism

Forms of plagiarism therefore include, but are not limited to:

- Copying whole papers or passages from another student or from any source.
- Allowing another student to copy or submit one's work.
- Buying or obtaining a paper from any source, including term-paper sellers and internet sources, and submitting that paper or passages of it as one's own work.
- Pasting a passage from the internet or any computer source into one's paper without quoting and attributing the passage.
- Fabricating or falsifying a bibliography.

Examples of Plagiarism

- There are dime a dozen examples of plagiarism and some of them are as follows:
- Copying someone else's work without citing them properly,
- Paying an external writer/essay mill to write the essay on your behalf,
- Stealing ideas and verbal conversations (overheard during discussions etc.) and presenting them as your own,
- Copying data from websites, library books and other sources verbatim,
- Using someone else's images, music, videos and even style of writing in your own work without their explicit permission is a punishable plagiarism example.

Strategies for Avoiding Plagiarism

- Credit must be given when using one of the following in the own research paper:
- Another person's idea, opinion, or theory
- Any facts, statistics, graphs, drawings or other non-textual elements used or that you adapted from another source
- Any pieces of information that are not common knowledge
- Quotations of another person's actual spoken or written words
- Paraphrase of another person's spoken or written words

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Anti- Plagiarism Software Tools: Top 20 best free plagiarism checker tools in 2020

Grammarly	WordPress Plugin
Whitesmoke	Plagium
ProWritingAid	Plagiarism Checker
Duplichecker	Copyscape
PlagiarismCheck.org	DMCA Scan
Quetext	Dustball
Small SEO Tools Plagiarism Checker	Webconf Tool
Copyleaks	Plagtracker
Viper	Plagiarisma
CheckForPlagiarism.net	Unicheck
	Urkund

A Cover Letter for Manuscript Submission

A Cover Letter

- A cover letter is formatted like a standard business letter and addressed to the Editor-in-Chief. It should be succinct and focused—not longer than one page, containing everything needed for the editors to make the “decline/send out for peer review” decision.
- Start with a standard business letter opening/greeting. Then, in the body, supply the following structure, with one or at most two sentences for each of the following topics:

A Structured Cover Letter

- **Manuscript information:** Title of the submitted manuscript and type of article (letter, regular paper, special section paper, review, tutorial, communication, etc.). If submitting to a special section, mention the special section name.
- **Problem being addressed:** What issues led to this work? What gap is being filled? What is the broader context for this work?
- **Novelty of the work:** What is new here, not previously published? “To our knowledge, this is the first report showing....”
- **Significance of the work:** Why is the novel content mentioned above important? What is the potential impact to the field?

A Structured Cover Letter

- **Fit to this journal:** Why does this work belong in and appeal to the readership of this journal? How will publication of this manuscript benefit the journal? (Be familiar with the journal scope.)
- Mention if this paper builds on a previous paper published in this journal or is otherwise directly linked to a paper published in this journal.
- **Double publication:** “This manuscript has not been previously published and is not currently in press, under review, or being considered for publication by another journal.”
- **Author approval:** “All authors have read and approved the manuscript being submitted, and agree to its submittal to this journal.”
- Finally, end with a standard letter ending, including the name and contact information for the corresponding author.

A Strong Manuscript

A Strong Manuscript

Always keep in mind that ...

.... your published papers, as a permanent record of your research, and your passport to your community !



A Strong Manuscript

What to publish

What to publish:

- New and original results or methods that **advance** the **knowledge** and understanding in a certain scientific field
- Reviews or summaries of particular subject or field

Do NOT consider to publish:

- Results with lack of scientific interest
- Outdated work
- Duplication of work already published
- Incorrect data or conclusions not supported by data

You need a **STRONG manuscript to present your contributions to the scientific community**

A Strong Manuscript

A strong manuscript

- Good **CONTENT**
 - novel, useful, and exciting
- Good **PRESENTATION**
 - Clear presented and logically constructed
- Reviewers and editors are able to grasp the scientific significance **easily**

A Strong Manuscript

What is a strong manuscript?

- Has a clear, useful, and exciting message
- Presented and constructed in a logical manner
- Reviewers and editors can grasp the significance easily

**Editors and reviewers are all busy people –
make things easy to save their time**

A Strong Manuscript

Save your editor and reviewers the trouble of guessing what you mean

Complaint from an editor:

“[This] paper fell well below my threshold. I refuse to spend time trying to understand what the author is trying to say. Besides, I really want to send a message that authors can't submit a substandard paper to us and expect us to fix it. My rule of thumb is that if there are more than 6 grammatical errors in the abstract, then I don't waste my time carefully reading the rest.”

A Strong Manuscript

- *Acknowledgements*

Ensure those who helped in the research are recognised

Include individuals who have assisted with your study, including:

- Advisors
- Financial supporters
- Proofreaders
- Suppliers who may have given materials

A Strong Manuscript

Submission - *Final checks*



- Revise before submission
- Check the manuscript as thoroughly as possible before submission
- Ask colleagues and supervisors to review your manuscript

A Strong Manuscript

What leads to acceptance???

- A**ttention to details
- C**heck and double check your work
- C**onsider the reviewers' comments
- E**nglish must be as good as possible
- P**resentation is important
- T**ake your time with revision
- A**cknowledge those who have helped you
- N**ew, original and previously unpublished
- C**ritically evaluate your own manuscript
- E**thical rules must be obeyed



Summary of Steps to Writing a Scientific Research Paper

Twenty Steps to Writing a Research Article

- 1. Determine the authors.
- 2. Start writing before the experiments are complete.
- 3. Decide it is time to publish.
- 4. Draft a title & abstract.
- *5. (Re)examine the list of authors.
- 6. Determine the basic format (Structure).
- 7. Select the journal.

Twenty Steps to Writing a Research Article

- 8. Stock the sections of your paper.
- *9. Construct the tables, figures, and legends.
- *10. Outline the paper.
- *11. Write the first draft.
- 12. Revise the manuscript.
- *13. Check the references.
- *14. Write the final title and abstract.

Twenty Steps to Writing a Research Article

- 15. Reread the journal's Instructions to Authors.
- *16. Prepare the final illustrations.
- *17. Get feedback on your manuscript and then revise your manuscript again.
- *18. Submit the manuscript to the editor.
- *19. Deal with reviewers' comments.
- *20. Check the proofs.

Further Readings

- Day, R.A.(1998) How to Write and Publish a Scientific Paper, 5th Edition. Phoenix: Oryx Press.
- Fischer, B.A., Zigmond, M.J.(2004) Components of a Research Article www.survival.pitt.edu. Institute for Scientific Information. www.isinet.com
- Sides, C.(1991) How to Write and Present Technical Information. USA: Oryx Press.
- Woodford, F.P.(1999) How to Teach Scientific Communication. Reston, VA: Council of Biology Editors.
- Margaret Cargill & Patrick O' Connor (, 2009) Writing Scientific Research Articles: Strategies and Steps, Wiley Blackwell Publication
- Chris A Mack (2018) How to write a Good Scientific Paper, SPIE PRESS, Bellingham, Washington USA

Thank You