RESEARCH PROJECT: The Outline
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Research is 25% inventiveness and critical thinking, 25% academic knowledge, and 50% organization, planning, design rigor, and editing, editing, editing. You bring your intellectual creativity to your research projects independent. Your research knowledge is bolstered by a thorough literature review on your research topic and the organization is supported by an outline. Sound research is founded on a single or testable question (or series of testable questions). Of course, this requires supreme clarity and preparation in order to anticipate your confounds, learn to self-manage, and proceed with a cogent design. But more importantly, what do you say when at the bar with your friends – if you're underage, at a kegger with your friends – when they ask, "So what's your research project about?" My role as your research methods professor is to help you learn to think critically about research, to guide you to good empirical habits, professional behavior, and to learn to think like a researcher – this is called evidence-based thinking – so you have an answer for your friend that doesn't sound like, "I have no idea."

Over the course of the semester you will receive a series of handouts that walk you through the process of outlining your research project, writing the important parts of an empirical paper, addressing common questions, like "how do I start the introduction?" "If this paper is just a proposal, how do I write the results to something that I haven't yet collected data for?" We will also discuss how to provide, valuable quality feedback to your peers without resulting in a fatwa or agave in your gas tank.
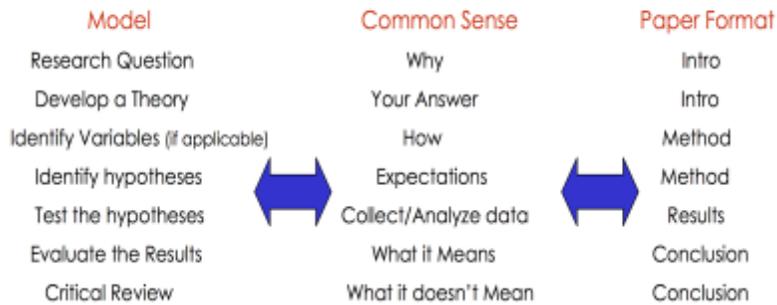
Project Organization

The first step in developing a research project is to ask a question, but not just *any* question. In research, there is such a thing as a bad (or even stupid) question. For example, "Is there a God?" although an interesting existential question, it is not a good research question. Why? Because it is not a quantifiable question, in other words, it cannot be tested, verified, or replicated, therefore the results of any data used to validate the question is not defensible. It becomes what is referred to as a tautology, that is it is self-reinforcing. Question: *Is there a God?* Answer: *Yes, because all life, the world, galaxy…ad nauseam…exist.* This does not work, not only because it is tautological, but it cannot be replicated, this makes it a poor research question. In addition this question does not answer a meaningful question, meaningful questions answer real world problems. Just for the sake of argument, lets say we answer the question of whether there is a God, then what? Aside from just satisfying basic epistemological curiosity, what can we do with that information? It doesn't solve a problem we can fix or attempt to fix. Although this is not a requirement for research, it is, for *good, fundable* research.

So as you consider your research questions, be sure that it is quantifiable. No matter what you might think of Sigmund Freud as a scholar, despite his detailed observations and reasoning on the inner nature of people, it was this failure to construct a quantifiable theory that defined Freud as a psychological philosopher rather than an empirical scientist. The way you construct a quantifiable question, is you consider whether it can be verified (e.g., can it be tested?), replicated (e.g., can it be duplicated by someone else?), and based on the verification and replication of the methodology, defended. Below is an example of how you might conceptualize this (Prasad, Rao, & Rehani, 2001):

Quantifiable   Verifiable   Replicable   Defensible

Corollaries among the model, common sense & paper format

Model	Common Sense	Paper Format
Research Question	Why	Intro
Develop a Theory	Your Answer	Intro
Identify Variables (if applicable)	How	Method
Identify hypotheses	Expectations	Method
Test the hypotheses	Collect/Analyze data	Results
Evaluate the Results	What it Means	Conclusion
Critical Review	What it doesn't Mean	Conclusion

In addition, consider what problem your question addresses. How might the answer to your question be used to solve a problem?

Brain Storming Research Ideas

Psychology is the study of the mind and behavior. So, what brought you to Psychology as a major, what is your end goal as a psychology scholar? This might be a good place to start in developing a research project idea. If you're planning to go into clinical psychology and have a special interest in addictions, what questions might you have about college students (most likely the population you'll be working with) and compulsive behavior (this is really what addiction is)? This does not have to be drug and alcohol related, remember that gambling, shopping, sex, and even social media have also been cited as potential sources for compulsive behavior. Warning: Avoid the shiny! In this instance, the "shiny" is the lure of fancy equipment and software (e.g., electroencephalography, hormone assays, etc.) or desirable demographic populations. Many newbie research students go for the research topic rather than the question.   A common mistake of newbie researchers is to develop a research project based not on an empirical question, but on the equipment or the sample they hope to use or work with. The equipment and the sample do not define the research project – it is the mechanism or the theory that influences the project type. With that in mind, you can certainly refer to your favorite psychology courses to mine ideas, but you need to focus on the theory.

For example, let's say Social Psychology was your favorite class, what study was most interesting to you? Was it the Zimbardo Prison experiment? If so, then consider ideas around obedience. Perhaps you loved Lifespan Development, that's also great, but what theory did you find compelling? Was it Learning theory (Skinner)? Cognitive (Piaget)? Social Cognitive (Erikson)? Did you love Introduction to Neuroscience? What area discussed was most compelling to you? Brain injury? Language dysfunction? Genetic disorders?

Use the following chart to help you brainstorm at least five potential areas you might be interested in further investigating…

Psychology course(s) you loved	Area of phenomena that held your attention
1.	
2.	
3.	
4.	
5.	

Given your five areas of interest outlined above, consider the 6 Ws of research, they are:

Address each of the six Ws

Who?   [Who is the population? Who are the participants?]

What?   [What is the purpose (i.e., what is the question this study hopes to answer?)]

When?   [When will this project take place?]

Where?   [Where will the study take place?]

Wherein?   [Wherein = how? How will you conduct this project? What is the design/method?]

Why?   [Why conduct this project? Justify with applied examples of how this research will benefit the participants, population, or society]

Provide the 6 Ws for each of the 5 areas you identified above.

Empirical Area 1:
Who?
What?
When?
Where?
Wherein?
Why?

Empirical Area 2:
Who?
What?
When?
Where?
Wherein?
Why?

Empirical Area 3:	
Who?	
What?	
When?	
Where?	
Wherein?	
Why?	

Empirical Area 4:	
Who?	
What?	
When?	
Where?	
Wherein?	
Why?	

Empirical Area 5:	
Who?	
What?	
When?	
Where?	
Wherein?	
Why?	

For the "What" of your project idea, this is essentially your empirical question, in other words the hypothesis. In science, questions are phrased as predictions. This further ensures the questions are testable. Thus, the empirical questions became hypotheses.

If you look at the "what?" again, what is the construct? Consider the examples of ideas I provided above, if we were to use brain injury as a possible research area, we might be interested in differences in processing speed between those who had a concussion in the last six months from those who have not. Thus, processing speed, a cognitive variable is our construct of interest. This is our dependent variable (i.e., what we are measuring). The independent variable (what we are controlling) is post-concussive syndrome: those with it and those who have not had a recent concussion. To vet who has had a recent concussion from those who have not we will likely need a screening survey. Just like in gold panning (using screens), the screens sous out the gold ore from

the waste rock. In this analogy, the "gold nuggets" are those people you find that have had a concussion, they're a special population. There will be a lot of people who have not had a concussion, they don't require screening. You usually screen before you collect data, but just because you use a survey here, that is not a dependent variable. Surveys are not universally dependent variables, ONLY those measures that get at your empirical question become DVs.

Lets say, that you're not just interested in differences in processing speed between those who have had a recent concussion but also what <u>contributes</u> to differences in processing speed between those with and without concussion. Perhaps there's a difference in cortical activation, that is the way that information is delegated across the cerebra. How do we measure that? Okay, so the electroencephalograph is the least expensive way to measure that, now you can use your shiny piece of equipment. So are the post-synaptic potentials (what EEG measures, NOT brain waves) a dependent or an independent variable?

So, if we wanted to write this out like a formal series of hypotheses how would this look?
<u>Note</u>: Each prediction should coincide with the number of dependent variables you have, also be mindful that you do not make multiple predictions for one hypothesis. For example,

Incorrect: *HR_1 – It is predicted that longer processing times (also called reaction time) on a Letter Cancellation task and less overall neural activation measured through the EEG will be predictive of on the will be predictive of concussion.*

Correct: *HR_1 – It is predicted that longer processing times (also called reaction time) on a Letter Cancellation task will be predictive of on the will be predictive of concussion.*

HR_2 – It is predicted that less overall neural activation measured through the EEG will be predictive of on the will be predictive of concussion.

Research constructs are always the dependent variables, while the independent variables are those qualities you can control. These are also often referred to as predictor variables. Independent variables will generally have levels associated with them, these are the number of groups for each quality manipulated.
For example,
IV_1: Head Injury

1. *Concussion*
2. *No concussion*

For our head injury example, there is only one IV: head injury, but there are two groups of that one variable. The dependent variables (the variables you measure) generally only have one measured outcome per variable, though there are exceptions to this. Dependent variables are also referred to as criterion variables. For our head injury example, here are our DVs:
DV_1: Time on the Letter Cancellation Test
DV_2: EEG values

Outlining Your Introduction

The purpose of an outline is to help you organize your ideas, background literature, and to help you visually see the progression of information down to the empirical question. Do this BEFORE you start writing. A good outline is the most important step in writing anything, whether it is fiction or nonfiction. Check your outline to make sure that the points covered flow logically from one to the other. Include in your outline headers, you may not use these in your introduction but the headers in the outline will allow you to make sense of the flow of information and where different literature should go. Essentially the last sentence of each paragraph should introduce the next paragraph's topic. See an example outline below that I used for a project on professionalism among college students.

I. **INTRODUCTION**
    A.   Describe the problem or the area of research
        a.   Identify the purpose of the research

    B.   The Body - Shakespeare's Early Life, Marriage, Works, Later Years
        a.   Early life in Stratford
            i.   Shakespeare's family

        b.   Shakespeare's marriage
            a.   Life of Anne Hathaway
            b.   Reference in Shakespeare's Poems

    C.   Concluding paragraph
        a.   Research questions
            1.   Tragedies
                i.   Hamlet
                ii.   Romeo and Juliet

            2.   Comedies
                i.   The Tempest
                ii.   Much Ado About Nothing

            3.   Histories
                i.   King John
                ii.   Richard III
                iii.   Henry VIII

II. **METHOD**
    A.   Participants
        a.   Undergraduate students and faculty
            1.   Mean ages (and standard deviations)
            2.   Number of males and females, and N.

        b.   Sampling method: Convenience sampling

        c.   Sampling Frame: List-serves and emails

B. Materials
   a. Instruments
   b. Apparatuses
   c. Supplies

C. Design and Procedure
   a. Descriptive research using an online survey
   b. SurveyMonkey Platform with an initial informed consent and concluding debriefing page

III. RESULTS
A. Reiterate the empirical questions
   1. Identify the statistical analyses used to address each question
   2. Provide the data for each analysis
   3. Create and refer to a Table or Figure where appropriate

IV. DISCUSSION
A. Reiterate the empirical questions
   1. Highlight the supported predictions first
   2. Tie in theory

B. Limitations and Future Directions

C. Conclusions

References

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