

# **Princeton University**

## **Department of Psychology**



### **Independent Work in Psychology**

*An Overview of the Junior Paper and Senior Thesis*  
**2024-2025**

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## Psychology: Portrait of a Department

The Department of Psychology focuses on the study of people's thoughts, feelings, and behaviors as well as on issues in animal cognition and behavior. Faculty members in the department conduct research and teach on a variety of psychological topics, including (but not limited to), how people's beliefs and behaviors are influenced by situations, how people make judgments and decisions in situations of conflict and uncertainty, how people see the world and pay attention, how computer models can help in uncovering brain function, and on the neurobiological mechanisms underlying sensory processing, cognitive control, and decision making.

As a major in the Department of Psychology, you will be given the opportunity to take courses that expose you to various topics and broader areas in psychology. Specifically, you may take courses in (1) Social, Personality, and Clinical Psychology; (2) Developmental and Cognitive Psychology; and (3) Cognitive and Behavioral Neuroscience. In addition, as a major in the department, your independent work will generally fall into one of those three broad areas. Given that the department has strong ties to other units within the university, Psychology majors often work on topics that connect to other programs, including Neuroscience, Cognitive Science, Computer Science, Sociology, Anthropology, and Biology.

Psychologists employ a wide range of methods and techniques to address psychological questions. The faculty members in our department are no exception. Faculty use experimental design, field studies, functional neuroimaging (fMRI), reaction time analyses, and computational modeling to answer psychological questions. As a psychology major, you will be exposed to these methods and techniques in courses and gain valuable hands-on experience with some of them via your junior and senior independent work. For instance...

You may follow in your peers' footsteps and conduct a field study to explore social contagion in social media (senior thesis by Jennifer Dannals titled, "#SheProbablyAHoodRat if she loves her alcohol": An Examination of the Role of Arousal and Perceived Endorsement in Propagating Social Contagions on Twitter) or perhaps use an experimental design to find out how awareness of one's mental health diagnosis impacts others' actions and perceptions (senior thesis by Rosmeilyn Jerez titled, "The Depression Confession: How Disclosing a Student's Depression Diagnosis Impacts the Actions and Perceptions of School Teachers").

If you are trained to use functional neuroimaging, then you can explore whether neural networks are associated with neurodivergence (senior thesis by Margaret Kasey Pecsok titled, "Implications of Inattention") or examine how we represent complex stimuli on a neural level (senior thesis by Peter Johnson titled, "A Shared Space in Thought: Similarity Approaches to Analyzing fMRI Data").

Regardless of your specific area of interest, you will learn a wide variety of methods and techniques that will allow you to explore your psychological research question in great depth.

The faculty members in the psychology department serve as mentors and advisers, available to discuss their research with you and to advise you on original thoughts and ideas for your independent research. Specific information about each faculty member's research interest is listed on the departmental webpage at: <https://psych.princeton.edu/people/faculty>

## Independent Work in Psychology

### Overview of Independent Work

During your junior and senior year in the Department of Psychology, you will learn:

1. How to identify and frame an open scientific question.
2. How to select, organize, and critically analyze relevant primary scientific literature.
3. How to select the appropriate methodological design and statistical analyses to test a question.
4. To develop clear and well organized written and verbal presentation of the material, including:
  - a. Definition of a topic.
  - b. Statement of the plan of the paper.
5. To develop and demonstrate independent thought, which can be shown by:
  - a. Creativity in selecting or organizing the material to be discussed.
  - b. Clear communication of original ideas or questions. Original ideas can include, but need not be limited to, suggestions for empirical work or further study.

Although these goals will be emphasized during your junior and senior years, developing the tools for research begins well before independent work via the prerequisite coursework required to declare a major in Psychology.

One of these prerequisite courses, Psychology 251 (or an approved equivalent course from another department), teaches basic research methods, with a focus on study design and statistical data analysis. *These skills will help you evaluate and analyze published studies as you read scientific literature related to your research question. They may also help you design your own studies and data analysis.*

In addition, you must take two foundational psychology courses<sup>1</sup> to ensure that you acquire a diversified background and understanding of the types of scientific questions posed in psychology. *These skills will help you identify psychological topics to pursue in your independent work that are especially interesting to you.*

In the fall semester of your junior year, you are required to take PSY 300, a course on research methods. Although this course is not itself a part of the independent work, it is an important step in preparing you for it: building upon the required prerequisite statistics class, PSY 300 helps you further develop your foundation in designing experiments and analyzing data, which are essential skills for independent work in Psychology. That is, even if your independent work or thesis does *not* directly involve experimental design or data collection, this knowledge will improve your ability to evaluate and write critically about prior research that is relevant to your topic. Additionally, because all majors take PSY 300 together in the fall of junior year, this course can also provide you with a sense of community within the department, providing you with a sense for where to go and who to ask when you have questions throughout the course of your independent work.

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<sup>1</sup> Please note that we sometimes allow alternative courses to serve as prerequisites, but they must be approved by the Director of Undergraduate Studies.

## ***Junior Independent Work***

The overall goal of the junior papers (JP) are for you to develop proficiency in reading and analyzing the professional literature in a focused area and to develop an independent project in preparation for a thesis.

As a Psychology major, you will write two JPs to satisfy the junior independent work requirement: the fall semester JP focuses on learning how to review a topic in the scientific literature, while the spring semester JP focuses on learning how to develop a proposal for a novel study that relates to existing literature. For each JP, you will also give a presentation midway through the semester that demonstrates your progress and helps you learn how to communicate your research ideas to others.

### **Matching with an Advisor**

Within the first month of the fall semester your junior year, you will be matched with an independent work faculty advisor.

Before this time, you will have the opportunity to meet with multiple [Faculty in the Department of Psychology](#) at the Sophomore Open House in late March. We encourage you to use this opportunity to learn about multiple research labs within the department. Then, when you declare Psychology as your major at the end of your Sophomore year, you will meet with the department Undergraduate Program Manager, who will discuss degree requirements and work with you to outline your interests and goals for independent work. Using this information, several potential faculty advisors will be identified for you by August, and during the first week or two of the fall semester, the department will schedule several individual or small group meetings between you and faculty members. This will provide you with another opportunity to learn more about various research labs within the department and ask questions. By mid-Sept, the department will reach out to all students to share their independent work advisor assignments.

#### **What determines a good advising fit?**

Students often match with an advisor based on mutual interest in the same research questions. When the questions being investigated by your advisor make you intellectually excited, the rest of the work is more enjoyable and engaging. Curiosity is a powerful motivator, and your independent work topic should be as interesting as possible to you.

Students may also match with an advisor based on skills they want to acquire via their independent work. If you think there are specific research methods (e.g., field studies, neuroimaging, experimental manipulations) and/or quantitative methods (e.g., advanced data analysis, machine learning, natural language processing) that would be useful for you to learn, consider faculty advisors who use these methods in their labs.

Students also sometimes match with advisors based on a unique style of advising. Your independent work in Psychology allows a great deal of freedom in pursuing different interests and topics, and the faculty also have flexibility in how they advise. Some faculty provide a great deal of structure, with a specific schedule of meetings, progress checkpoints, and

deadlines. Other faculty encourage you to be more self-motivated and set your own course of progress, providing support when requested. There is not a one-size-fits-all style of advising, and you should reflect on what works for you. This particular aspect of advising fit is difficult to determine from faculty summaries, so when you meet with faculty to discuss advising, ask about their advising style to see if it fits with how you work best.

### **What should you discuss in your meetings with faculty?**

Because faculty are meeting with multiple potential advisees, it helps them to know more about your interests and what you're hoping to accomplish with your independent work.

For example, do you have specific interests in certain topics? If so, are these interests related to research in their lab? Or, are you generally interested in many topics within Psychology and would prefer to learn more by being part of an ongoing project? Or are you somewhere in between?

There are no wrong answers- being flexible and open to many ideas is just as valuable as having a clear idea of the research area you want to study. However, we encourage you to take time to reflect on these questions in advance as they inform which advisors may be best for you. If you are certain about a particular topic that you want to work on, please make sure to share this information; though, please note that you do not need to propose original research ideas in this first meeting, as project ideas typically develop as part of JP advising.

If you still have trouble finding a faculty advisor by mid-September, do not worry: contact the Department of Psychology [Undergraduate Program Manager](#) and we will help you through the process.

Please note: if you wish to work in a lab from another department, an advisor from another department may oversee the student's independent work only if the student has matched with a primary advisor within the Department of Psychology *and* obtained permission from that primary advisor, the Psychology Director of Undergraduate Studies, and the potential outside advisor. Then the student must submit written notification to the [Undergraduate Program Manager](#) indicating the name and department of the outside advisor.

## Fall Semester Paper

The primary goal of the Fall JP in Psychology is for students to practice how to formulate a question and to query the literature. Therefore, the final fall paper should involve critical analysis and original synthesis of the relevant scholarly literature, with a topic chosen collaboratively by student and advisor.

The Fall JP may take many formats. Different advisors prefer different approaches, so make sure to discuss the options with your advisor and clarify what is exactly expected of you.

### ***What are common formats for the Fall JP?***

In one common approach, you will find a topic that overlaps with both your interests and your advisor's expertise. You will research the topic, find the relevant scientific literature, and write a review paper on that literature. However, the literature review must be more than a recounting of what others have done: specifically, the review should formulate an open question of interest and use the literature to support and explore that question.

In a second common approach, some faculty organize a "JP lab," with many students working together in a discussion group that meets regularly throughout the semester. At the end of the process, you must submit a paper formulating an open question of interest and synthesizing the literature that supports and explores that question.

In a third common approach, you will become a part of a research team, working with your faculty advisor as well as the graduate students and other researchers in the lab group. At the end of the Fall semester, you will be required to submit a paper describing your work to date. The paper should explain the questions being investigated empirically and place them in the context of the larger literature background. You may also include any results you have by that time. The exact format of the paper will depend on your discussions with your advisor.

Although the Fall JP may involve one of these formats, the Department requires that all Fall JPs meet the following guidelines:

- |                   |  |
|-------------------|--|
| <b>Length</b>     | The Fall JP should be 10 to 20 pages (about 2,500 – 5,000 words). Longer is not better. You should be able to cover your topic concisely.  |
| <b>Sections</b>   | The paper should contain a title page; an abstract (a brief, 100 – 300 word summary); the main text, divided up into sections with headings; and references.   |
| <b>Sources</b>    | The paper should include references that cite appropriate sources, primarily published papers in scientific journals. The number of references depends on your topic, but are often between about 10 and 30.   |
| <b>APA Format</b> | The paper should be double-spaced and must be submitted in a journal format that is pre-approved by your advisor. The default format for Psychology independent work is to follow the instructions of the American Psychological Association. The APA Style Manual (reference book format) is available in the <a href="#">Lewis Science Library</a> . Frequently asked questions and general style guidelines can also be found online at <a href="#">APA.org</a> . |

The Psychology librarian at the Lewis Library, [Meghan Testerman](#) (schedule appt [here](#)), is also available to help you with library research. Meghan has also created a [helpful guide](#) for Psychology concentrators that covers things like finding literature and APA Style.

## Spring Semester Paper

The primary goal of the Spring JP in Psychology is to prepare students for a thesis by having them formulate an original research idea and embody it in a paper. It should be written for a broad, academic audience.

Like the Fall JP, the format of the Spring JP is flexible and depends on discussions between you and your advisor. Different advisors prefer different approaches, so please make sure to discuss the options with your advisor and clarify what is exactly expected of you.

### *What are common formats for the Spring JP?*

In one common approach, the Spring JP can be a theoretical piece that proposes a thesis idea and uses creative exploration of the literature to evaluate the idea. This type of JP would look like a mini-thesis or a first pass at a theoretical thesis.

In a second common approach, the Spring JP can be a research proposal. The goal of writing a research proposal is to learn how to read the literature, identify an open scientific question, and design an experiment that might address that question. In some cases, the research proposal lays the groundwork for the Senior Thesis, but this is not required. A research proposal typically includes a comprehensive review of the relevant research literature, a statement of your specific scientific question, a detailed description of the methods you will use to collect data, a description of the statistical analyses you will use, and a discussion of the possible outcomes and their interpretations. It may be useful to include figures diagramming the possible quantitative outcomes.

In a third common approach, a Spring JP might be a write-up of experimental work completed during the Junior year, with separate sections for introduction, methods, results, and discussion (again, like a mini-thesis). Some students may be midway through an experiment by the end of the Spring semester and lack complete results. In that case, the student may write a research proposal, including an introduction that places the experiment in the context of the larger literature, a description of the method, and a discussion of possible outcomes.

Although the Spring JP may involve one of these formats, the Department requires that all Spring JPs meet the following guidelines:

- Length** The Spring JP should be 20 to 40 pages (about 5,000 to 10,000 words). Longer is not better. You should be able to cover your topic concisely.
- Sections** The paper should contain a title page; an abstract (a brief, 100 – 300 word summary); the main text, divided up into sections with headings; and references.
- Sources** The paper should include references that cite appropriate sources, primarily published papers in scientific journals. The number of references depends on your topic, but are often between about 10 and 50.
- APA Format** The paper should be double-spaced and must be submitted in a journal format that is pre-approved by your advisor. The default format for Psychology independent work is to follow the instructions of the American Psychological Association. The APA Style Manual (reference book format) is available in the [Lewis Science Library](#). Frequently asked questions and general style guidelines can also be found online at [APA.org](#).



## Midpoint Presentations

During the Fall and Spring of your junior year, you will give a brief presentation midway through each semester to demonstrate your progress on your JP.

### ***When are Midpoint Presentations scheduled?***

Presentations typically take place the week or two following Fall and Spring Recess (see [Important Dates](#)).

### ***What is the goal of the Midpoint Presentation?***

Midpoint presentations aim to support your progress on the Fall and Spring JP paper.

The Fall JP in Psychology will often take the form of a literature review. The presentation encourages you to reflect on what you've learned so far about your topic (via your research and reading) and articulate how this knowledge connects to the overall literature review you're working towards.

The Spring JP in Psychology will often take the form of a research proposal, though some of you may also be working on a more extensive literature review in preparation for a theoretical thesis. The presentation encourages you to introduce an open question, explain supporting evidence, and describe the methods intended to answer that open question.

### ***What should I include in my Fall Midpoint Presentation?***

Your midpoint presentation should strive to accomplish the following 4 goals.

1. **Describe and provide motivation for your topic.** To start your presentation, you should 1) describe the overarching question that you are currently interested in researching for your Fall JP and 2) justify why it is important and/or interesting. Some common ways to motivate a question include:
  - Highlighting the real-world relevance of the question.
  - Introducing longstanding questions or debates in the field.
  - Justifying the urgency of the question given current events.
2. **Share the knowledge you've accumulated on your topic so far.** Next, you should briefly summarize 3 key articles that you've read so far by explaining 1) how the article connects to the broader question that you're interested in and 2) the main takeaway of each paper.
3. **Summarize what this evidence collectively tells us about your topic.** Conclude by synthesizing the key lesson you've learned about your topic. For instance, across the papers you've read so far, what's one central observation you can take away and what's one outstanding question you still have?
4. **Tell us what you're planning to do next.** Given your key lesson, what 3-5 concrete steps do you plan to take in the rest of the semester? This may include additional reading areas, involvement in data collection, or other steps that will help you complete your fall JP paper.

### ***What should I include in my Spring Midpoint Presentation?***

Your Spring Midpoint Presentation should strive to accomplish the following 4 goals.

1. **Describe your question, connect it to your Fall JP, and provide motivation for your topic.** To start your presentation, 1) describe the overarching question that you are researching, 2) explain how this connects to your Fall JP, and 3) justify why it is important and/or interesting. That is, what will you be talking about today and how did you arrive at this question through your prior research? Is this a new topic and if so, what inspired the shift? If the topic is related, what was your key take-away from the Fall JP and how are you building off that? Finally, why is this an important topic for your audience to learn about?
2. **Set presentation expectations for your audience.** Before diving into your evidence, share whether there is specific feedback you are looking for. This will give your audience an idea about what to expect upfront as well as what types of questions or ideas they can consider providing. That is, will your Spring JP take the form of a more extensive literature review or a research proposal? Given this, what type of feedback would be most helpful to you at this stage? For example, do you want to know what people think about a

methodological design you are considering? Are you curious if there are other factors or bodies of literature you should examine?

3. **Share the synthesized knowledge you've accumulated on your topic so far.** Next, you should 1) briefly summarize 3 key take-aways from your research to date and 2) explain what this means for your topic. In the fall, you were tasked to summarize *individual sources*, but in the spring, you should aim to *synthesize evidence across multiple sources*, providing a key piece of understanding for each group of sources that is important to your question. For example, rather than saying paper X found Y, you might say "Across this literature, I've found several studies that all show Y." Then, you should state what this collectively means for your topic. For example, what can we say we know about your topic or the relationship between your variables? What open question exists in light of this understanding?
4. **Tell us how you plan to answer this open question.** At this point, presentations will look different for those who are working on a research proposal or literature review. For those who are working on a research proposal, you should include a high-level review of your potential method (participants, variables, and experimental design) as well as plans for data collection. For those who are working on a literature review, you should discuss at least 3 additional areas of the literature you may consider reviewing and explain how this relates to your topic.

### ***How long should my Midpoint Presentation be? Do I need to use slides?***

In the fall, you are expected to present for 10-15 minutes and answer questions from the "audience" for 5-10 minutes. In the spring, you are expected to present for no more than 10 minutes and answer questions from the "audience" for 5-10 minutes.

In both semesters, each student should be prepared to present and discuss their topic for 15-20 minutes (in total), and should prepare slides to accompany their presentation.

### ***Who will watch and grade my Midpoint Presentation?***

The "audience" will consist of a moderator (often someone other than your advisor), the Undergraduate Program Manager, and a few of your junior PSY peers. As you prepare, please keep in mind that, although other students in your group will share a background knowledge in psychology, they may lack expertise in your specific topic. Therefore, you should aim to explain your work a general and accessible manner such that everyone can follow it.

Each group is scheduled for a 90-minute slot. All students are encouraged to ask their peers questions and are expected to stay for the entire slot until all presentations are complete.

The moderator will be responsible for grading and providing feedback on your presentation. Grades will be posted in the IW portal sometime after your presentation group is completed.

### ***How does the presentation factor into my JP grade?***

Junior students receive a single grade on their transcripts in the Spring semester for Fall and Spring independent work, which reflects a combination of the Fall JP (40%) and Spring JP (60%) grades.

- Fall JP grade = 10% (midpoint presentation) + 90% (final fall paper).
- Spring JP grade = 10% (midpoint presentation) + 90% (final spring paper).

**Please remember:** like other aspects of the JP, it is important to discuss your presentation with your advisor well in advance. The Department of Psychology Undergraduate Program Manager will contact you early in each semester to schedule your Midpoint Presentation, but you should aim to discuss your advisor's goals and suggestions for the presentation in one of your initial meetings.

If you are studying abroad during your Junior year, please note that you will be exempt from the Midpoint Presentation for that semester but are not exempt from the JP.

## **Senior Independent Work**

Each Psychology Senior works in close consultation with a faculty advisor to develop, carry out and write a Senior Thesis that identifies and addresses an open question in psychological science.

### **Overview of the Senior Thesis**

A Senior Thesis in Psychology can take one of two main forms: experimental or theoretical.

An **experimental** thesis should include a comprehensive review of the literature relevant to the open question, methodological steps taken to address that question, findings from at least one original research study (an experiment or a field study) with appropriate statistical analyses, and a general discussion of the findings.

A **theoretical** thesis should include a comprehensive review of the research literature on a psychology topic of importance that demonstrates an extensive evaluation of the findings and original interpretations and includes theoretical proposals or a proposed program of research to advance scientific knowledge on this topic.

The skills you gain in PSY 300 (Research Methods) will be especially useful in completing your thesis. While they are of course necessary if you conduct an experimental thesis, a good grounding in experimental design, data analysis, and data interpretation are invaluable in critically evaluating prior research, a component of all theses in Psychology.

### **Format of the Senior Thesis**

In scientific research, different projects are best accomplished via different approaches. As such, students in Psychology write many different kinds of theses, and the format of your thesis will be jointly decided via discussions between you and your advisor.

For example, a theoretical thesis will aim to critically review previous research on a topic and present the writer's original thoughts and interpretations of that research. Thus, the exact organization of thesis chapters and subheadings will depend on the topics relevant to that field of research. By contrast, an experimental thesis will involve designing an experiment, collecting data, analyzing data, and interpreting results. This work will be presented in a fairly standard, experimental format that includes an introduction, method, results, and discussion section. Therefore, it is extremely important to work with your advisor and discuss exactly how your thesis is best organized.

Although the exact format of the thesis will be determined by the student and advisor, the Department requires that all Senior Theses meet the following guidelines:

- Length**     There is no specific page or word length for the Senior Thesis; this varies by topic and advisor.
- Sections**     The paper should contain a title page; an abstract (a brief, 100 – 300 word summary); the main text, divided up into sections with headings; and references.

- Sources** The paper should include references that cite appropriate sources, primarily published papers in scientific journals. The number of references depends on your topic; please discuss this with your advisor.
- APA Format** The paper should be double-spaced and must be submitted in a journal format that is pre-approved by your advisor. The default format for Psychology independent work is to follow the instructions of the American Psychological Association. The APA Style Manual (reference book format) is available in the [Lewis Science Library](#). Frequently asked questions and general style guidelines can also be found online at [APA.org](#).

## Departmental Examination

Near the end of your Spring semester Senior year, you will present your Senior Thesis to your primary reader (advisor) and secondary thesis reader (assigned in March) as part of the Senior Thesis Departmental Examination. This required presentation typically lasts 1 hour and is held on or around the University's Departmental Exam dates.

During this 1-hour exam, you will spend 10-15 minutes presenting your Thesis and approximately 45-minutes answering questions about your thesis, its background, and how it relates to other topics in psychology.

The limited presentation time means that you will not be able to present every finding in your Thesis, nor should you attempt to. Like a well-written paper, a clear presentation is one that presents a coherent, easy to follow narrative that is supported by the most relevant points.

To aid your presentation and Q&A, you may wish to use slides to present information. Although most students do use slides during the exam, this is not required and you should do what makes you feel most comfortable. If you do use slides, here are some tips:

- **Pace yourself.** Don't try to rush through 50 slides in 10 minutes; a good pace is 1 slide per minute.
- **A picture (i.e., graph) can be worth a thousand words.** In a presentation, relevant graphics can facilitate understanding more effectively than a block of text. However, select graphics carefully- irrelevant pictures can be distracting and the audience should be able to understand the meaning of an image without your explanation. One exception to this latter rule are figures- always take a moment to walk your audience through their interpretation.
- **Emphasize take-aways.** While you have been studying your research question for a year (or longer), this topic may be relatively new to your audience. With this in mind, aim to have one to two clear "take-home" points about your topic that your audience should understand after hearing/viewing your presentation.

## Planning for the Thesis

### *Your Thesis Advisor*

While most students continue to work with the faculty member who advised them during their Spring JP, this is not required. If you wish to change topics and advisors, you may do so. If you are considering a change, you should meet with the Undergraduate Program in the late spring of your junior year or during the summer before senior year.

### *Developing your Research Question*

It is very common for students to have a (relatively) easy time deciding on a general area or topic of research that they are interested in, but struggle to turn that interest into a specific and testable research question. With this in mind, when generating a research question to pursue in your thesis, the best places to start are the existing literature on your topic of interest and discussions with your advisor.

1. By reviewing the literature, you will determine what is already known about a particular topic, what types of methods are typically deployed to study this topic, and better grasp which specific, relevant questions have not yet been addressed.
2. By meeting regularly with your advisor to discuss your ideas, you will determine how to best develop and revise your ideas into a testable question (or set of questions) and which approaches are best suited to studying this topic further.

For instance, many students join a lab in the Department of Psychology and contribute to that lab's ongoing program of research during their Junior and Senior year. In that case, the student's research question evolves from discussions with their advisor and is closely related to other active experiments in the same lab.

Other students elect to pursue a research question that is more independent from their advisor's ongoing work. In this case, the biggest challenge student's often face is developing a research question and hypothesis can be properly advised within the faculty member's areas of expertise and are of an appropriate scale for a Senior independent project. Therefore, in either case, it is extremely important to work closely with your advisor while developing your research question.

## Conducting and Writing an Experimental Thesis

While each thesis option is valuable, there are typically more steps to be aware of and more standard formatting to follow when conducting and writing an experimental thesis.

### *Conducting an Experimental Thesis*

After you have identified your specific, open research question and generated a hypothesis, you must design an experiment that can appropriately explore that question and test your prediction. This is an extremely important part of the process that cannot be completed at the last minute, so please keep these steps in mind:

1. **Design:** You should discuss the design with your advisor and make sure the design adequately tests your hypotheses *before* collecting data. Part of this process also involves identifying the specific statistical tests you will conduct and the appropriate number of participants to gain sufficient statistical power.
2. **Obtain approval:** Before you collect data from humans or animals, you must obtain approval from the University's Institutional Review Board (IRB) or Institutional Animal Care and Use Committee (IACUC), respectively. See the section below on Resources for additional information about the IRB process.
3. **Data collection:** After you have designed your experiment and received approved from the IRB or IACUC, you will collect your data. In advance, make sure you and your advisor discuss various methods for participant recruitment and data collection, as well as how long data collection may take given your sample size.
4. **Data analysis:** Once the data are collected, you will analyze it and perform appropriate statistical tests to make inferences about your data and determine if the results vary significantly from what was expected by chance. To make your results easier to interpret and evaluate, you will visualize your data in graphical formats. There is a great range of statistical tests, and you will have to discuss with your advisor to decide which is appropriate. Statistical tutoring is available through the Department of Psychology. For more information on tutoring and workshops, contact the Department of Psychology [Undergraduate Program Manager](#).

Regardless of your experimental design, please remember that research does not always go according to plan. For instance, after your experiment has been conducted, it may be necessary to collect additional data. Perhaps some participant data is not useable due to an error in data collection and more participants are required to reach your target sample size. Or, if your results shed light on an interesting phenomenon, your advisor may suggest conducting a follow-up study.

In all cases, we recommend that you start early, be organized, and be prepared for research to take longer than you initially anticipate.

## Guidelines for the Written Experimental Thesis

An experimental thesis typically includes four sections:

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<b>Introduction</b>	<p>The Introduction presents a comprehensive review of the relevant scientific literature. This comprehensive review should be organized in a clear and coherent manner, presenting a narrative that explains and develops the reader's understanding of the literature as it relates to your research question.</p> <p>Your comprehensive literature review will typically include many references, sometimes as many as 50 or more. However, the synthesis of this research is essential for achieving clarity in your writing and coherence among your arguments. That is, you should not discuss every article in exhaustive detail, but instead provide sufficient information to make your point. This may mean that you describe and cite the main finding for one article or a set of articles (e.g., to emphasize one aspect of your argument) while providing more details on others (e.g., to highlight a contrasting point). By drawing connections between and synthesizing previous research on your topic, your introduction will present evidence in a coherent manner, flowing logically to your closing statements and setting the stage for your research study.</p> <p>At the conclusion of your introduction, you will briefly lay out your research plan, describing how your study is the next logical step in the research. Here, you will summarize what your study adds to the literature (i.e., your rationale), how you plan to examine the unanswered question (i.e., brief overview of your method), and what you expect to happen (i.e., your hypothesis).</p>
<b>Method</b>	<p>The Method section provides step-by-step instructions so that someone else could carry out a reasonable replication of your study without your help.</p>
<b>Results</b>	<p>The Results section provides an objective description of your findings. Include descriptive statistics (such as means and standard deviations), inferential statistics (p values and statements of statistical significance), and graphs that display the data as clearly as possible.</p>
<b>Discussion</b>	<p>The Discussion section provides readers with a meaningful commentary about the interpretation, importance, and larger implications of your findings.</p> <p>When starting your Discussion, it is important to remind the reader of your main hypothesis (i.e., what was it and did your data support it?) and then place your own findings within the context of the prior literature you reviewed in the Introduction (i.e., how does your finding fit in with or relate to past findings?). Last, you will reflect on what could have been done better (i.e., what are the potential weaknesses of your study that you might change if you were to repeat it?) and what future researchers should consider in light of your findings (i.e., how can future experiments gain more insight about the topic?), placing your research in a greater context to show how or why it is important.</p>

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## Resources

### *Your Adviser*

The adviser is a student's most important resource. You should meet with your adviser as soon as possible to get started on the independent work and discuss their expectations about your research collaboration.

Below are a few important issues you should consider as you start the collaborative relationship with your adviser.

- What exactly are the senior thesis requirements?
  - ⇒ If they are written down, you may still want to clarify them with your adviser.
- What is your adviser's area of expertise?
  - ⇒ Consider which parts of your adviser's guidance you will need for each part of the research and writing process.
- Can you meet to brainstorm about ideas or get recommendations for reading? Will they read work in progress or only polished drafts? Should you write a cover letter that directs your adviser to questions you have about the written work you submit?
  - ⇒ Talk with your adviser to clarify and establish any expectations for the research and writing process that either of you have.
- Is it essential to meet weekly or biweekly? How many drafts of the paper will your adviser read? When should you submit drafts and when will they return feedback?
  - ⇒ Talk with your adviser about your schedule. You are likely to be more productive if you establish deadlines for submission of work and establish expectations for receiving feedback.
  - ⇒ Consider what you want to accomplish in individual meetings with your adviser. You might suggest an agenda for each meeting.
- How will you decide which advice to accept and which to reject? How will you negotiate between your vision of the senior thesis and your adviser's if that becomes an issue?
  - ⇒ Anticipate that there may be different ideas about how best to approach your senior thesis topic. Be prepared to defend the decisions you make about the work and your adviser's feedback.

### *Library Resources*

As a Psychology **major**, you have access to an extensive collection of books and journals relevant to psychology in the [Lewis Science Library](#). Many databases and journals are also available electronically and can be searched and read full text from any computer on campus or through VPN or proxy service when off campus. **For example, you have access to** databases such as PsycINFO, PubMed, Web of Science, Lexis Nexis Academic, Mental Measurements Yearbook, PEP Archive (Psychoanalytic Electronic Publishing), Scopus, MIT's Cog Net, as well as the Online Catalog, and numerous other information retrieval systems.

Additionally, [Meghan Testerman](#) (schedule appt [here](#)), the Psychology librarian at the Lewis Library, is also available to help you with library research. Meghan has also created a [helpful guide](#) for Psychology majors that covers things like finding literature and APA Style.



### *Writing Center*

Housed in Whitman College, the [Writing Center](#) offers free one-on-one conferences with experienced fellow writers trained to consult on assignments in any discipline.

Special 80- minute conferences are available for JP and Senior Thesis writers, who may sign up to work with a graduate student fellow from the department of their choice.

Daily 50-minute conferences for those at any stage of the writing process are also available seven days a week, with drop-in hours.

### *Statistics Tutoring and Consultation*

The Department of Psychology holds ongoing individual consultations on statistical analysis for empirical theses. Participation is voluntary. You will receive emails from the graduate student statistics consultants about how to schedule a consultation.

The University [Data and Statistical Services library](#) also makes statistical consultants available by [appointment](#) to help you in downloading, formatting, reshaping, or analyzing data. If you need assistance in identifying and locating data, contact a [subject specialist](#).

### *Training for the Ethical Use of Human Subjects/Animal Subjects*

#### Human Subjects Certification Program

Every research institution, including Princeton University, has an Institutional Review Board (IRB) whose purpose is to protect the rights and welfare of human research participants. The purpose, design, procedures, and other features of all proposed human studies must be fully approved by the IRB before they can be conducted. Researchers must complete and submit copies of questionnaires and be certified by completing the Collaborative Institutional Training Initiative (CITI).

Students receive training on how to complete the IRB questionnaire and prepare for the certification in an extensive workshop that is mandatory for those conducting experimental theses. The workshops are offered throughout the academic year, but students will attend sessions only during the weeks in which they are actually preparing and submitting their study applications to IRB. The workshop sessions will guide students through IRB procedures and provide them with detailed supervision and feedback for their particular IRB applications, from start to finish (i.e., from their initial writing of the application until their study eventually receives IRB approval).

#### Use of Animals in Research

All research involving non-human animals must be reviewed and approved by the University's Institutional Animal Care and Use Committee (IACUC). Students who plan to use animals for their research must contact the faculty member who is supervising the research project in order to abide by both Princeton University and government regulations.

## **Standards and Grading**

Independent work is expected to show independence of thought. When learning of this, students often ask (or wonder), "*Just how independent does the thinking need to be?*"

Because psychology is a scientific discipline with a large and complex literature, we do not expect students to propose major new theories or make breakthroughs. Instead, for experimental work, independence means that the student has read enough background literature to propose a creative experiment and to design and conduct the experiment thoughtfully without the advisor having to micromanage each step. For a theoretical paper, independence means that the student has read and synthesized the published literature on a topic, summarized it intelligently, and added some thoughtful critique or perspective.

### ***Junior Paper***

**Junior students receive a single grade on their transcripts in the Spring semester for Fall and Spring independent work, which reflects a combination of the Fall JP (40%) and Spring JP (60%) grades.**

- The Fall JP grade is based on a combination of the fall Midpoint Presentation grade (counting for 10%, evaluated by the faculty member present at the presentation) and the final fall paper grade (counting for 90%, evaluated by the student's advisor).
- The Spring JP grade is based on a combination of the spring Midpoint Presentation grade (counting for 10%, evaluated by the faculty member present at the presentation) and the final spring paper grade (counting for 90%, evaluated by the student's advisor).

### ***Senior Thesis***

#### **Written Component**

The Senior Thesis grade is determined jointly by two readers, the student's advisor and the second reader assigned by the department. The advisor and second reader will confer with each other to determine a final grade for the written component of the Senior Thesis, which will be communicated to the student after the Senior Departmental Exam. The student will receive written comments from both readers ahead of the Senior Departmental Exam. The grade will appear on the transcript as the "Senior Thesis Grade."

#### **Senior Departmental Exam**

The primary reader (advisor) and second reader will determine a grade based on the quality of the presentation and the student's ability to answer questions. The grade will appear on the transcript as the "Senior Departmental Exam Grade."

## Grading Categories

<b><i>Unacceptable (F)</i></b>	The student did not submit the independent work or submitted work of such poor quality that it satisfies none of the expectations.
<b><i>Minimally Acceptable (D range)</i></b>	<p>The student has reviewed some or all of the recommended material or completed some of an empirical study. No independent thought is evidenced. The work has one or more of the following problems:</p> <ol style="list-style-type: none"> <li>1. Coverage of the relevant material is insufficient given expectations that the faculty member established with the student. There is little evidence that the student has critically analyzed the primary literature.</li> <li>2. The presentation of the material is poor (lacking organization and/or unclear or incoherent writing).</li> <li>3. If experimental, any empirical research is inadequately conducted, given the expectations that the faculty member established with the student. The methodological approach is unacceptable and the interpretation of the data is incorrect.</li> </ol>
<b><i>Adequate (C range)</i></b>	Relevant material is covered and reasonably clearly described. Any empirical research is completed and presented in a manner at least partially consistent with expectations that the faculty member established with the student. However, the student does not exhibit independent thought either in bringing the material together or in responding to it.
<b><i>Good (B range)</i></b>	Meets expectations for the assignment. Relevant material is covered. Empirical research is completed consistent with the expectations that the faculty member established with the student. The presentation shows at least some independent thought. However, it lacks complete follow-through or may fail to communicate entirely clearly.
<b><i>Excellent (A range)</i></b>	The student has exceeded expectations in some way. There are clear signs of independent thinking, an attempt to try out new ideas. The student has framed a scientific research question and organized the relevant material in a way that shows support for the question. The student critically analyzes the primary scientific literature. Any empirical research is of high quality, including the use of appropriate methodological design and statistical analyses, and the findings are interpreted and discussed meaningfully. The presentation of the material is clear.
<b><i>Outstanding (A+)</i></b>	The student has presented genuinely novel insights or ideas, well supported by scholarly and/or empirical research, that changes the fundamental nature of psychological theory. The research meets all of the criteria to be published in a top-tier psychological journal.

## Late Policy

Extensions are rarely granted for junior papers or for senior Theses. The criteria include either the student's illness, for which a written medical excuse must be provided, or a family emergency. Extensions must be approved by the Director of Undergraduate Studies and the student's advisor. For help regarding extensions, students may also ask their residential Dean or the Department of Psychology [Undergraduate Program Manager](#).

If an extension is not granted, a penalty will start to accrue on the student's grade beginning with the day following the deadline. Grade penalties for unauthorized late submission follow a schedule wherein 1/3 of a letter grade is automatically deducted for every 48 hours (or part thereof) that the work is late, weekend days included. Work that is not received within two weeks of the deadline date will be given a grade of F. After the University deadline, no written work can be accepted for a passing grade without approval from the Dean of the student's residential college.

If either fall or spring junior papers are not submitted, the student will fail the junior independent work for the year. Likewise, if any of the components of the Senior Thesis are not submitted, the student will fail the Senior Thesis work for the year.

## Funding for Independent Work

When conducting research for their Independent Work, students may require funding for numerous reasons.

- Some may recruit participants and thus require funding to compensate their expected sample size.
- Some may need to make copies of flyers for participant recruitment or travel to research sites where they are conducting a study.
- Others on financial aid may need to be on-campus during the summer to conduct their research.

For these reasons and more, limited funding is available through a variety of mechanisms for students conducting Independent Work in the Department of Psychology.

### *Where to Start*

As you consider your potential funding needs, please note that **the first step in all cases is to design your research project with your advisor**. Then, depending on your needs, please consider the following primary sources for funding: your advisor, the Office of Undergraduate Research (OUR), and the Department of Psychology.

The following information and sources of funding pertain to conducting experimental research. **If you are seeking funding to attend or present your research at a conference**, we recommend that you speak with your advisor and consult the Office of Undergraduate Research's page on the [Undergraduate Fund for Academic Conferences \(UFAC\)](#).

### *Primary Funding Sources*

#### **Advisor Funding**

If you are completing an experiment in a Princeton lab within the context of your advisor's research, then the first likely source of funding will be your advisor's lab grants.

*Before you apply for funding from the Office of Undergraduate Research and/or the Department of Psychology, please speak with your advisor to determine whether your work will require these additional resources.*

#### **Office of Undergraduate Research (OUR) Funding**

Through their [Senior Thesis Research Funding](#) program, the Office of Undergraduate Research supplies funding during the following periods throughout the year:

- **Summer:** in the spring, **juniors** may apply for funding to conduct thesis research during the summer between their junior and senior years.
- **Fall:** in the early fall, **seniors** may apply for funding to conduct thesis research over the fall break / semester of their senior year.
- **Spring:** in the mid fall, **seniors** may apply for funding to conduct thesis research from December through the end of March of their senior year.

OUR provides a detailed list of expenses covered and the **maximum amount of funding** that may be granted for each. You can review this list on their [Thesis Funding](#) page, under “Expenses Covered.” Additional details regarding eligibility, when and how to apply, and review and award processes can be found on the [Office of Undergraduate Research](#) website.

### **Department of Psychology Funding**

The Department of Psychology fund for Independent Work may be used to pay for research participant fees, equipment fees, or supplies. It cannot be used for housing, living expenses, or travel-related expenses.

**Psychology students can receive up to \$1,000 in departmental funds in total**, which may be used to support their Senior Thesis, Junior Independent Work, or a combination of the two.

- For example, a student may apply to use their funding during the summer between junior and senior year to pay participants recruited for their Senior Thesis.
- Or, a student may apply to use a portion of their funding during junior year to conduct a pilot study as part of their Junior Independent Work, which may later support their Senior Thesis. Then, they may apply to use the remainder of their funds during senior year to pay participants recruited for the Senior Thesis.

Finally, please note that departmental funding is awarded based on the merit of the proposal and the need for funds. Due to this policy, students conducting research in well-funded labs may be less likely to receive departmental funding.

### ***Applying for Funding***

If funding from the Office of Undergraduate Research and/or the Department of Psychology is needed, you may apply through the [Student Activities Funding Engine \(SAFE\)](#) in consultation with your advisor. As a reminder, you will also require IRB approval before you can conduct any research with human subjects. For questions about IRB approval, you may ask our Human Subjects Administrator, [RoseMarie Stevenson](#).

In SAFE, you will find a set of funding opportunities open to Psychology majors. Students should be prepared to submit a full account of their proposed research, a detailed budget, envisioned timeline, and a planned itinerary (if applicable) with their application. Please note that if you apply for the [Office of Undergraduate Research Senior Thesis Research Funding](#) program, you will be required to apply for all departmental and programmatic funds for which you are eligible in **one single application**.

**Please keep the Office of Undergraduate Research and Psychology’s respective funding limits in mind when designing your experiment and discuss this with your advisor.** It is part of the challenge of practical science to keep the costs down, and we encourage you to take this opportunity to demonstrate your creativity and resourcefulness as a psychological scientist. For example...

- You may be able to reduce the number of participants by streamlining the experimental design.
- You may be able to borrow laptops or tablets via a University loaner program.
- You may be able to access software or cloud storage for free or at a discounted rate via OIT.

Please check [SAFE](#) for the time window for submitting proposals and look through [OUR's FAQ help pages](#) for SAFE. The application periods for Psychology funding closely follows the Office of Undergraduate Research Senior Thesis Research Funding cycles (see When to Apply on the [Office of Undergraduate Research website](#)).

### ***Additional Information and Funding***

If you are curious about additional funding opportunities, we encourage you to check [SAFE](#) for other funding opportunities open to Psychology majors. There, you may see opportunities such as those funded by:

- [Center for Culture, Society and Religion](#): junior and senior independent research projects in the study of religion.
- [Efron Center for the Study of America](#): research in the fields of American studies, Asian American studies, and/or Latino studies.
- [Martin A. Dale '53 Summer Awards](#): sophomore summer funding to pursue project opportunities for personal growth, foster independence, creativity, and leadership skills, and broaden or deepen some area of special interest.
- [Princeton Research in Experimental Social Science \(PRESS\)](#): small-scale experimental projects that include treatment and control conditions that have clear implications for political processes or form a bridge between their home department and politics.
- [Program for Community-Engaged Scholarship](#): community-engaged research conducted during the summer between junior and senior year or either semester senior year.

If you have further questions about funding or SAFE, please set up a meeting with the Department of Psychology [Undergraduate Program Manager](#).

## Departmental Contacts

Name	Title	Contact Information
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