

Task 6:

Assemble a Proposal

Deliverables for this Task

A written Proposal **with all its parts** :

- Cover Sheet
- Project Summary Page (Summary, Intellectual Merit, Broader Impacts) – single spaced
- Project Description (Lit Review, Methods) – single spaced
- Reference List
- Appendix A: Background questionnaire
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- Project Timeline
- Investigators' Bio sketches

Step by step

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Overview

You've already identified what you want to research and how you want to do it. You've probably convinced yourself by this time that this is something interesting and maybe even important to do – especially if you can see that you're doing something that doesn't seem to appear in the literature.

Now you have to face a very significant roadblock. No matter how important you may think your project is, you cannot continue. You're simply not allowed to just do research. Before you move on, you have to get approval.

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You have to *convince or persuade other people* that your project is important.

To proceed with your research project, you will need approval, funding, or both. That's the whole point of a proposal: you definitely need permission to do your study and you often need financial help, too.

Permission. Approval comes from your supervisor and/or institution. After all, when it is published, their names will appear on it, too, so their reputations, as well as yours, are also at stake. Your supervisor will also have to decide whether your research project contributes to the overall goals of the research group that you are in and whether it is interesting enough to pursue. Your institution will also have to assess whether your work is consistent with its public image. It's no coincidence that Dr. Jekyll and Dr. Frankenstein were working on their own!

Remember: if your proposal is not approved the first time around, then you have to do *very much more work*, even before you get started with the research itself.

It's very important to get the proposal right the first time.

Funding. Funding is what pays the bills, quite literally, for researchers. Financial support for research varies very much but often includes not only expenses for equipment, but also operating costs (e.g., to keep the lights on) and your own salary. Researchers request funding or "financial support" by submitting a *grant proposal* to a funding agency, such as the National Science Foundation (NSF) or some private organization. In many cases, a grant proposal is like a researcher's job interview: if you get it right, then you have steady income for a while; if not, then you're on the street.

Outside of research, things work similarly. Social services and non-governmental organizations also survive this way – on "soft money" (unpredictable funding through grants and donations). For these organizations and businesses, an excellent proposal is frequently what makes the difference between survival and closing its doors. In large companies, departments and workgroups make similar proposals (for new products or new processes) to the administration, which has to decide whether or not to commit the resources needed. In business, the grant proposal is called a *business plan*. If your business plan is approved, you can do something that you think is important and get paid for it.

Did I remember to say that it's extremely important to do an excellent job on every proposal?

Your personal reputation is at stake and the people who review your proposals have a startlingly good memory!

Proposal writing. Grant and proposal writing are so important, in fact, that there's a whole industry of (expensive!) consultants and authors who publish books and provide services to help people produce effective proposals and business plans.

The first step in convincing others is to provide them with

- a) the information that they ask for,
- b) in the format that they requested.

Many agencies get literally thousands of proposals each time they issue a Call for Proposals (CFP). So they have adopted **very, very strict rules** about deadlines and formats. If your \$10,000,000 proposal arrives five minutes after the deadline or is 3 lines longer than the maximum length, it goes straight to the trash! Similarly, if it's missing a section or the writing is unclear, it gets eliminated in the first, most superficial, round of evaluations. Because of seemingly tiny mistakes, your months of effort on a proposal will be totally useless. The moral is: you have to follow all the instructions carefully.

For proposals, you have to follow all instructions, down to the tiniest detail, or your proposal will be mercilessly rejected.

Solicited and unsolicited proposals. In the world of grants, there are two basic types of proposals: Proposals that respond to the topic and goals of a particular solicitation or Call for Proposals ("solicited proposals"), and proposals that are simply submitted with the appropriate deadlines ("unsolicited proposals").

The key piece of information here is that for solicited proposals, the authors have to make very, very clear how the proposed research relates to the topic and goals of the solicitation, as well as how it relates to the goals of the funding organization.

For this Task, you will do an *unsolicited* proposal. That relieves you of the additional task of relating your research to other people's goals and allows you more time to make clear how the research relates to your own goals and to people in general.

Grant proposals. Grant proposals involve quite a bit more bureaucracy, the instructions are nothing less than overwhelming, and assembling them is very time consuming. The reasoning is, though, that if you can't follow instructions, then you can't do research.

One big difference for us is that grant proposals require a budget for the project. They also require a specification of facilities and equipment, letters of support from a range or collaborators or other sponsors, and other bureaucratic horrors.

Stress management. Does proposal writing seem *very* difficult? Are you scared of it? Well, welcome to the real world: *everyone* is scared of competing. School isn't very demanding, but professional life is. Competition is fierce, especially for "free" money like scholarships and research funding. You have a clear choice: either you compete and have a chance to do what *you* think is interesting and important (and get paid better) or you don't compete and you have to do what *other people* think is interesting and important (and get paid worse).

So, it's time to show everyone what you can do when you do your best. Start today! And relax: you won't always win, but if you're smart, you'll always *learn* to be better prepared for the next time.

This Task focuses on rewriting your literature review and methods as a research proposal. Yours is technically not a grant proposal because 1) you're not asking for funding, and 2) you're only asking your supervisor (me) – and not your institution – for approval. Note that this is a rather exceptional situation, specific to Research Methods classes and some thesis research.

It is very important to note that after your proposal is approved, you cannot make any major changes to the research.

This Task

For this Task, we will follow, roughly, the structure of the core of a grant proposal for the **National Science Foundation** and, to simplify, we will ignore most of the other, usual requirements. Your proposal needs to have the following parts:

- 1) Cover Page [see below]
- 2) [Project Summary](#) with these sections: Summary, Intellectual merit, Broader Impacts
- 3) [Project Description](#) with the following parts: Review of the Literature; Methods; References; Appendices; Project Timeline; Investigators' bio sketches

Note that you should use APA formatting but in grant proposals SINGLE SPACING is normal, to save space and paper. Some grant proposal forms just give you a little box to write in and you have to summarize your whole study in 10 lines, without going outside the box!

Also, use every single inch of space available to talk about your research – don't leave any space blank! If you have 7 pages, then use them *all* to provide relevant information that will convince your readers that this is important research to do.

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1. Cover Page

For most proposals, the institution that is accepting proposals provides a cover page that asks for basic information about the project. For this Task, use the cover page below and print it on a separate page (this is adapted from one used in the Psychology Department at UC Berkeley).

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DEPARTMENT RESEARCH FUNDING APPLICATION COVER SHEET

Title of Project: _____

Faculty Sponsor: _____

Applicant Name: _____ Student ID#: _____ e-mail: _____

Applicant Name: _____ Student ID#: _____ e-mail: _____

I am applying for (check all that apply): Psychology Department Research Fund
 Undergraduate Research Award

Please list all other obtained and pending sources of research funding:

Institutional Research Board Protocol Approval Number or Status: _____

Applicant's Signature: _____ Date: _____

Applicant's Signature: _____ Date: _____

Faculty Member's Signature: _____ Date: _____

2. Project Summary

In some sense, the Project Summary is the most important part of your proposal: many people will only read the Project Summary page and almost everyone will start with it. This is your chance to make a great first impression!

The Project Summary page can only be one page long. Don't forget to include the titles for the Summary, Intellectual Merit, and Broader Impacts sections. Under no circumstances go over the stipulated length for each section. That's often enough to disqualify your whole proposal.

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Tip: Write the Project Summary *after* you write the Project Description.

Summary. The Summary is a quick, one-paragraph description of the proposed research, like an abstract. It will include a two-sentence summary of the problem and lit review, and a two-sentence summary of the methods.

Here are some sample *Summary* sections. Students wrote some of them; professionals wrote others. For each Summary, ask yourself whether the author has convinced you that the project is both important and doable, and that the researchers really know what they're doing. What did they say (and how did they say it) when you felt convinced? Keep track of the techniques that you think are effective and use them in your own writing.

For each sentence, decide whether it helps you understand what the researchers will do and why they think it's important.

Summary (Sample 1)

The proposed line of research will illustrate the effect auditory distraction has on the reading comprehension of both introvert and extrovert personality types. Previous research has affectively addressed the effects that auditory distractions have on reading comprehension. However, there is still little known of the difference between introvert and extrovert comprehension when cognitive activity is paired with musical distraction. This general line of research will address the relationship between auditory distraction and personality type by assessing participants' abilities to comprehend text with the absence or presence of music. Sixty native English speaking college students between the ages of 18 and 24 will be asked to read the same standard text with or without the presence of an instrumental distracter. Each participant will then be asked to recall as much information as possible from the text. Researchers will play an instrumental distractor throughout the reading task for two of the four experimental conditions (introverts with musical distractor, and extroverts with musical distractor). All four experimental conditions will be administered identically with the exception of the presence or absence of an instrumental distractor. Finally, researchers will distribute a personality test (the International Personality Item Poll [IPIP] scale of extroversion) to each participant to determine extroversion or introversion.

Summary (Sample 2)

The effects of time constraints and television exposure have on reading comprehension may inhibit a person's ability to interpret texts properly and can negatively affect a reader's capability of performing at their highest level in the workplace and school. Forty adults read passages with or without time limits, and with or without television. The number of multiple-choice questions correct measured reading comprehension.

Summary (Sample 3)

Sleep loss decreases the effects of priming, the capacity and duration of short-term memory, and the central executive's ability to focus attention in working memory. Priming affects the information that is retrieved from long-term memory and brought into working memory. The present study will investigate the effects of sleep loss and priming on working memory. Participants will have twenty seconds to write down as many words as they can before they view a prime and after they view a prime, and the difference between the number of responses in the no-Prime condition and the number of related responses in the Prime condition will measure the effects of sleep loss and priming on working memory.

Summary (Sample 4)

This study will compare the effect of background speech and gender differences on an individual's attention capability with a reading task. The purpose is to understand how much conversations can distract a person when reading. Past cognitive studies on attention primarily focus on the auditory or visual fields. This study will push forward examining human cognitive attention toward reading. The aim will be to take the subjective experience of reading with a recorded speaker distraction and create objective quantifiable data. The analysis will examine any differences between gender regarding attending to the reading as well as between the control group and distractive group. The control group will receive only the reading without the recorded distraction.

Intellectual merit. In the *Intellectual Merit* section, convince the reader that this is a *good, doable* problem to study. This section will focus on theoretical, empirical, and methodological contributions of the proposed research. Answer briefly: How will future research benefit from the results of this research?

Here are some sample *Intellectual merit* sections. Students wrote some of them; professionals wrote others. For each sample, ask yourself whether the author has convinced you that the project is both important and that the researchers really know what they're doing. What did they say (and how did they say it) when you felt convinced? Keep track of the techniques that you think are effective and use them in your own writing.

For each sentence, decide whether it helps you understand what the researchers will do and why they think it's important.

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Intellectual Merit (Sample 1)

This line of research is cost-effective and does not require a large time commitment. With a study that involves introvert and extrovert reading comprehension with or without the presence of music, researchers will also be able to determine a relationship between personality type and susceptibility to auditory distraction. This line of research will provide other researchers with relevant, new data for future research that focuses on auditory distractions and personality types. Future programs that focus on the enhancement of reading comprehension will be better equipped with new data supporting two different personality types. Administrators and teachers will be able to incorporate these programs into school curricula to more affectively teach the millions of students enrolled in the school system.

Intellectual Merit (Sample 2)

This study will extend our theoretical understanding of human cognition, more specifically, attention capacity and/or limitations. Past research on attention have heavily weighted on the auditory and visual fields, this study explores a new methodological direction. Our study will explore the capacity to focus on reading when speaking distractions are present. There is limited data to either support or rebut our argument that a speaking distraction will adversely affect the ability to attend to reading. This study is a new path for future research; human attention is still abstract and not full understood. Future research will benefit with this studies result through new methods to test selective attention. This study is very doable; it will take one day to collect all data from the 60 voluntary participants and use of materials is limited.

Intellectual Merit (Sample 3)

This study will investigate the effects of getting six or seven hours of sleep per night on working memory to challenge the conclusion that only restricting sleep to less than five hours a night effects short-term memory. This study will provide researchers with more information about the cumulative effects of chronically restricting sleep to six or seven hours of per night for a period of a week on working memory.

This research will provide researchers with more information about the effects of sleep loss and priming on working memory. The number of responses provided will illustrate the speed and capacity of working memory and the effects of priming. This research will examine the type of responses that participants provide when they are given more time to respond and are not prompted to respond with particular information, challenging the conclusion of previous research that priming produces more conceptually related concepts than physically related concepts.

Intellectual Merit (Sample 4)

VITAL's design is based on research in three major areas: the developmental and cognitive psychology of children's mathematical thinking, successful practices for adult learning (particularly as it relates to teacher education), and the principles of instructional design and interactive media. Studies indicate that children already employ mathematical ideas and methods before the onset of formal education and that they filter what they learn in the classroom through their prior and informal understandings of mathematical concepts. VITAL introduces prospective and practicing teachers to this body of research to improve their understanding of how young children learn mathematics, with the anticipation that this will improve teacher performance. In the area of adult learning, research indicates that students who study video cases demonstrate an increased ability to apply relevant theoretical concepts about teaching and learning to their understanding of classroom practices, especially when they are given extended time and multiple opportunities to analyze and interpret the cases. Digital technologies provide such opportunities by allowing students, among other things, to instantly access segments of a video clip, annotate those segments, incorporate them into their analytical work, and share their essays with peers and instructors. Digital analytic and communication tools thus facilitate sophisticated reflection and discourse on video cases.

Intellectual Merit (Sample 5)

This catalyst proposal seeks to establish a state-of-the-art Science of Learning Center focusing on professional problem solving in engineering. The Center plans to analyze and conduct use-inspired research on problem-solving processes conducted by engineers. It is essential that we better understand the nature of the problems that all STEM workers and other professionals solve in the workplace before we can prepare students to solve them.

The Center will investigate workplace problem solving from four scientific perspectives: cognitive science, social psychological/group dynamics, learning sciences, and engineering education. Problem solving is a quintessentially cognitive process. Explicating the cognitive and metacognitive requirements for solving different kinds of problems encountered in engineering workplaces is necessary, but not sufficient for better preparing students. In professional work contexts, engineers rarely, if ever, solve problems individually. Rather, engineers must collaborate with myriad other workers in complex teams, posing serious social, organizational, and cultural risks and further complicating the nature of the problem solving. Research has shown that the social dynamics of workplace problem solving are frequently the greatest impediment to success for professional engineers. Therefore, the CSPA will also examine engineering problem solving from the perspective of social psychology and group dynamics.

Intellectual Merit (Sample 6)

PSLC researchers in Pittsburgh and worldwide will enhance scientific knowledge about robust human learning by

- 1) basing both theory development and instructional design on close, detailed, study of long-term student learning,
- 2) demonstrating the value of online intelligent tutors as research platforms that support learning experiment and theory development,
- 3) demonstrating a new synergy between use-driven research and theory-testing instructional design.

Broader impacts. In the *Broader Impacts* section, convince the reader that this is a *useful* problem to study. This section will focus on practical contributions and applications of the research. Answer briefly: How will society benefit from sponsoring this research? (The National Science Foundation's Guidelines on writing the *Broader Impacts* section are in [Appendix B.](#))

Here are some sample *Broader Impacts* sections. Students wrote some of them; professionals wrote others. For each sample, ask yourself whether the author has convinced you that the project is both important and that the researchers really know what they're doing. What did they say (and how did they say it) when you felt convinced? Keep track of the techniques that you think are effective and use them in your own writing.

For each sentence, decide whether it helps you understand what the researchers will do and why they think it's important.

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Broader Impacts (Sample 1)

The effects that auditory distraction, or irrelevant sound, has on cognitive tasks and performance of introverts and extroverts is an important aspect to the study of reading comprehension for many reasons. First, by including personality type as a factor; supervisors and professors alike will be able to distinguish differences in performance of employees and students while auditory distractions are present. Second, with this information, effective steps can be taken and programs can be developed to increase and improve an individual's level of comprehension. Third, once the level of reading comprehension is improved, cognitive job task performance of employees and reading comprehension of students while studying have the potential of significant improvement. There are currently millions of supervisors, professors, employees, and students who could benefit from such an improvement. With more information about this line of research, experimenters will be able to generalize their results and develop programs designed to fit individuals' personality types and therefore enhance readers' comprehension ability. When programs are designed specifically to enhance the level of reading comprehension of the individual, individuals will achieve higher levels of success in their careers, studies, and everyday activities.

Broader Impacts (Sample 2)

PSLC's LearnLab will dramatically enrich the scientific infrastructure by establishing unprecedented collaborations between existing and future laboratory scientists, computer scientists and instructional designers. It will provide authoring and analysis software to support learning researchers in the development, data collection, and data analysis of realistic extended duration "microgenetic" learning experiments. The Center will provide 50-100 pre-doctoral and post-doctoral students research experience in developing and using these tools to address challenging learning problems. PSLC will also have broad positive impacts on schools. Experimental manipulations that demonstrate substantial learning gains will be incorporated in LearnLab schools and eventually to many other schools. For instance, a LearnLab intelligent tutoring system for high school algebra is now disseminated by our partner Carnegie Learning, Inc. to over 170,000 students in 1700 schools nationwide, so experiments on it that increase robust learning can potentially increase the learning of tens of thousands of students within a year.

Broader Impacts (Sample 3)

The project will transform early and elementary mathematics education in the United States by developing a research-based model and Web-based learning environment for improved professional development. VITAL is used in courses at two levels, graduate (including both pre-service and practicing teachers) and undergraduate, and will be disseminated nationally after initial testing in private and state universities. Its influence on a diverse body of teachers, in turn serving a diverse range of students, will lead to its replication nationwide and to greater understanding of effective teaching strategies throughout the profession. Benefits in children's mathematical development will also extend to their later work through the full range of STM disciplines. The VITAL project's findings will be broadly disseminated to the academic community through scholarly publications, conferences, and workshops.

Broader Impacts (Sample 4)

Growing out of the cognitive, social dynamics, and learning science research on problem solving, the Center will also analyze workplace problem solving and conduct design research that will build and iteratively test learning systems and activities in university classrooms to better prepare undergraduates students to become better problem solvers. The learning science and engineering education researchers will collaborate with the cognitive and social psychology researchers to implement and test innovative learning systems in university classes and industrial workplaces that will better prepare pre-service and engineering workers.

Researchers will interact with practicing engineers and STEM workers while examining and better understanding problem-solving activities in workplace contexts. In addition to designing state-of the-art learning systems, the Center seeks to foster fundamental changes in engineering and STEM programs in universities by providing professional development activities to prepare engineering faculty to effectively prepare their students for solving workplace problems. The goal of all of these activities is to prepare university graduates to solve complex and ill-structured problems.

Better understanding workplace, laboratory, and classroom problem solving in the STEM disciplines will support the following intellectual and societal impacts:

- Reform of undergraduate science and engineering curricula in university programs.

- Reform of pedagogies and instructional strategies used by faculties in science and engineering programs in universities

- Development and dissemination of technology enhanced learning environments to support learning in science and engineering courses in universities.

- Development and enhancement of faculty teaching skills in science and engineering faculty members in universities around the country.

- Training and intellectual preparation of Ph.D. researchers capable of investigating problem solving from cognitive, social dynamic, and learning science perspectives.

- Training and intellectual preparation of designers of innovative, problem-based learning environment that can be used in science and engineering classes around the world

- Development of research capacity in STEM problem solving.

Broader Impacts (Sample 5)

This collaboration enhances the interdisciplinary perspectives of investigators from anthropology, psychology, and computer science, influencing future research, teaching, and continued public outreach. Importantly, it trains a new generation of scientists to combine methods, perspectives, and theoretical approaches from different fields. The Project will foster international ties with researchers in Mexico (Universidad Nacional Autónoma de Chiapas, México, Universidad Michoacana, and Universidad de Las Americas). It builds on established programs in Vanderbilt's Department of Anthropology to bring promising young scientists from Mexican communities to Vanderbilt for graduate study. And while the focus is on the dynamics of conceptual knowledge, a specific understanding of conceptual knowledge about folk medicine could contribute toward educating the public - especially our growing immigrant population - about scientific medical treatments. Furthermore, the project includes Vanderbilt Medical School personnel and will help train a new generation of medical staff to deal with the challenges of attending to an increasing number of patients from different cultural settings.

Broader Impacts (Sample 6)

This is important to study because attending to what one is reading is essential for many areas such as academics, business, politics and broadcasting. College students in particular can greatly benefit from this study concerning study habits. In the world of business, and politics, understanding the limitations of attention may provide employers with new business models to increase productivity and understanding while avoiding accidents among employees.

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Parts of the Project Description

The core of the proposal is the Project Description section, which is basically your Review of the Literature and proposed Methods – items (a) and (b) below.

The Project Description has these parts:

- a) Review of the Literature (without heading)
- b) Methods
- c) References
- d) Appendices (stimuli, test materials, etc.)
- e) Project Timeline
- f) Investigators' bio sketches (max 1/2 pg, single spaced, each)

The idea is to re-use and improve what you've already written.

However, in previous drafts you wrote the lit review to *inform* the reader and to describe your project; now you have to **rewrite** it to *persuade* the reader that the project is important. The same is true for the Methods section: now you need to show the reader how you thought the methods through to guarantee reliable, relevant data and analyses.

The emphasis in the project description is much more on **why** to do this research and **why** to use these methods than on **what** you'll do.

You need to **convince** (not just inform!) your reader that:

1) the problem is important and finding out more about it will be very useful;

In the Project Description, you need to develop the reasons why the project is important and useful, in detail, with plenty of support from the literature. You have to be particularly clear about what your goals are for the project and what other goals the research might support. The Intellectual Merit and Broader impacts sections of the Project Summary will summarize this information.

You already have some material about why the problem is important. Expand on it, deepen it, and make it more convincing. Provide more and more specific evidence for your arguments. Rewrite the rest of the lit review while thinking about how you can convince the readers with every sentence, not just inform them. For example, don't just say that some study found a difference; describe the details of the difference, so people can see that you understand what's going on. Relate the theoretical and experimental background to the importance of the problem.

Think ahead: explain why specific data or specific arguments *against* your hypothesis are (or might be) problematic. Undermine the reader's confidence in any objections to your hypothesis.

2) the method you have in mind will in fact yield the results that are needed;

Again, the material that you have *informs* the reader about what methods you will use. Now improve on that by explaining *why* you will use these methods and *how* they will help you get reliable, relevant data. Relate the details of the method to the problem and your goals.

Students sometimes state in their Methods drafts that the text or tests that they used were “valid”. Saying it doesn’t make it true. You have to explain *why* you think (or other people think) that your materials and/or choices are “valid”.

3) you (and your team) have the training and experience to get the job done;

This is what the investigators’ **bio sketches** (item (f) above) are for; just like a résumé. See the next section for more information.

Persuasive writing

In previous drafts, you wrote the lit review and methods sections to *inform* the reader and to *describe* your project. Now you have to rewrite them to *persuade* the reader that the project is important and that you know enough to carry out the project correctly. For the Lit Review section, you need to show the reader that you’ve thought about the evidence both for and against your hypothesis. For the Methods section, you need to show the reader how you thought the methods through to guarantee reliable, relevant data and analyses.

In a research proposal, the emphasis in the project description is much more on *why* to do this research and *why* to use these methods than in previous drafts. The question is HOW to do this?

There are several kinds of arguments that people make when they’re trying to persuade others. Some kinds are more reliable or better than others. Here’s a list of kinds of arguments to start with.

Strong evidence, based on data from research

Research results

Research methods, quality of data

Weak or indirect evidence, based on theory or intuition

(theoretical arguments) Logical consequences

(intuition-based arguments) Generalization from examples

(intuition-based arguments) Comparisons, analogies, metaphors

“Baloney”, not really evidence

Authority or ad-hominem arguments (“because someone important thinks so”)

Bandwagon or ad-populum arguments (“because everyone else thinks so”)

Unsupported opinions (“because I think so”)

Re-working your Lit Review

If you’re researching a factor, then by definition you think that it does affect your process. Otherwise, you’re really confused. That’s your “hypothesis”: that the factor(s) affect your process.

There are two basic ways of persuading your reader that your hypothesis is true: building arguments based on data and building theoretical arguments. For now, focus on data-based arguments about your research problem. Try out some theoretical arguments, too, just for discussion.

Theoretical arguments persuade the reader by showing *how* (not that!) your hypothesis is coherent with (i.e., does not contradict) other well-established hypotheses or with a particular, well-established theory.

Data-based arguments persuade the reader by providing reliable **data** that is consistent with your hypothesis and that is found in published research results.

When you explain the link between data and a hypothesis, that data becomes *evidence*.

In the research literature, you'll find three kinds of evidence related to your hypothesis.

1. Evidence in favor of your hypothesis. What research supports your view? Focus on this kind of evidence but do not ignore the evidence against your hypothesis.

2. Evidence against your hypothesis. What research does not support your view? Acknowledge that there is evidence against your hypothesis. Start from the assumption that people who have a different opinion from yours have good reasons for doing so. They're not idiots by definition!

But, you want to think carefully about what's wrong with the research that does not support your thesis. You want to help the reader decide to doubt that this research is true. Usually, there are methodological issues such as external validity (there are few studies, conflicting results, few participants, unrepresentative samples, etc.), construct validity (maybe they used global (not detailed) measures, or there was a questionable relation between the measures and the process), and internal validity (sometimes they use simplistic analyses, or investigated vaguely formulated questions).

3. Neutral evidence. Some research doesn't provide clear results about whether your factor affects your process or not. This kind of evidence can help you show that there is a good reason to do more research on your hypothesis.

Reorganize the studies in your Lit Review. Classify the studies that you've found in terms of what kind of evidence they give you. Some studies will go into more than one category. Some categories will have no studies, especially when everyone agrees. This also may mean that everyone *assumes* that a hypothesis is (or isn't) true; that assumption makes the hypothesis a good target for new research. Everyone might be wrong – it happens a lot.

Re-write your Lit Review to discuss each type of evidence together: first the evidence in favor of your hypothesis, then the evidence against your hypothesis.

Re-working your Methods

In previous drafts, you wrote the lit review and methods sections to *inform* the reader and to *describe* your project. For the Methods section, you need to show the reader how you thought the methods through to guarantee reliable, relevant data and analyses.

Notice in the sample below, that the authors included information (in blue) to show that they thought carefully about their methodological choices.

Participants

Sixty participants between the ages of 18 and 45 will volunteer to participate in this study. The examiners will separate the participants into two groups consisting of 30 people in each group. One group will consist of participants who got more than seven hours of sleep the night before the study. The other group will consist of participants who got less than six hours of sleep the night before the study. The amount of sleep participants got will be assessed using a background questionnaire. The examiners will recruit the participants on San Jose State University campus, using the sign up board in the Psychology building. College students will be chosen as participants because they are likely to regularly get less than eight hours of sleep per night.

Materials

Both groups will view the same picture Primes and carry out the same tasks. However, the order of the Primes and tasks will be different for each group. The picture Primes (see Appendices A, B, C, D, and E) include an apple, a pyramid, a book, a CD and a can of Coke. The Primes should cause the participants to write down words that are conceptually and physically related to the picture. [The conceptual and physical categories for related words were obtained from research showing that priming facilitates retrieval of conceptually and physically related words \(Freedman & Loftus, 1971\).](#) The list of conceptually and physically related words was created by showing the picture primes to ten people and prompting them to respond with as many conceptually and physically related words as they could. The only responses that were excluded from the list were words that were related to the color of the picture but were not related to any other aspect of the picture. The words fire truck and blood were excluded from the list of words related to the apple picture prime because the only relation between a fire truck or blood and an apple is the color red. In addition, the words nickel, dime, and quarter were excluded from the list of words related to the CD picture prime because the only relation between a nickel, dime, or quarter and a CD is the color silver.

4. Supplemental materials for the Project Description

References. This is a unified reference list of all of the material cited anywhere in the proposal. Of course, it has to be in *perfect* APA format, but single spaced. You don't want the reader to think that you do sloppy work or worse that you don't even know how to cite a reference, much less do an experiment.

Appendices. These are the appendices that you cite anywhere in the proposal, mostly the ones that you cited in the Methods section.

Project Timeline. One thing that will help convince the reader that the project is doable (and that you know exactly what you're doing) is to include a **Project Timeline** (item (e) above). Use three columns: Date (for project milestones), Activities (what you will work on), and Deliverables (what you will get done). [See the Timeline in the DECIDES proposal, on Psych*FM.]

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[1. Internal Validity](#)
[2. Measuring sub-process](#)
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[Design & Analyses](#)
[Writing up methods](#)
[Sample Methods](#)
[Resources](#)
[Sample Consent Form](#)

Here's a sample timeline. Yours should be printed on a separate page.

Appendix H: Project Timeline

Date	Activities	Deliverables
October 17, 2006 – October 30, 2006	Data Collection Planning Coding and Organizing Data	Data Collection Plan Draft Data
October 31, 2006 – November 6, 2006	Coding and Organizing Data	Data
November 7, 2006 – November 13, 2006	Statistical Analysis Graphs and Tables	Draft Results
November 14, 2006 – November 20, 2006	PowerPoint	Results
November 21, 2006 – November 27, 2006	Final Products	Draft Discussion
November 28, 2006 – December 4, 2006	Presentations and Posters	Discussion Presentations and Posters
December 5, 2006 – December 6, 2006	Presentations and Posters	Final Paper

Bio sketches. The investigators' **bio sketches** are just like a very short résumé. Only include information that is relevant to establish your credentials as a researcher: publications, grants received, research experience.

Of course, if you're just starting your research career, then it's hard to put together an impressive bio sketch. That's why your more experienced supervisor appears as the Principal Investigator (PI) and you show up as a research assistant.

You have to start somewhere. See what you can come up with about yourself. However, only include information that is relevant for your ability to do research.

Sample Student Research Proposal

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DEPARTMENT RESEARCH FUNDING APPLICATION COVER SHEET

Applicant Name: James Student Student ID#: 00123456

Applicant Name: Cynthia Pupil Student ID#: 00654321

Title of Project: _____

Faculty Sponsor: _____

Applicant's Address: _____

Applicant's Phone Number: _____

Applicant's E-mail: _____

I am applying for (check all that apply):
 Psychology Department Research Fund
 Undergraduate Research Award

Please list all other obtained and pending sources of research funding:

Institutional Research Board Protocol Approval Number or Status: _____

Applicant's Signature: _____ Date: _____

Applicant's Signature: _____ Date: _____

Faculty Member's Signature: _____ Date: _____

Summary

The proposed line of research will illustrate the effect auditory distraction has on the reading comprehension of both introvert and extrovert personality types. Previous research has affectively addressed the effects that auditory distractions have on reading comprehension. However, there is still little known of the difference between introvert and extrovert comprehension when cognitive activity is paired with musical distraction. This general line of research will address the relationship between auditory distraction and personality type by assessing participants' abilities to comprehend text with the absence or presence of music. Sixty native English speaking college students between the ages of 18 and 24 will be asked to read the same standard text with or without the presence of an instrumental distracter. Each participant will then be asked to recall as much information as possible from the text. Researchers will play an instrumental distracter throughout the reading task for two of the four experimental conditions (introverts with musical distracter, and extroverts with musical distracter). All four experimental conditions will be administered identically with the exception of the presence or absence of an instrumental distracter. Finally, researchers will distribute a personality test (the International Personality Item Pool [IPIP] scale of extroversion) to each participant to determine extroversion or introversion.

Intellectual Merit

This line of research is cost-effective and does not require a large time commitment. With a study that involves introvert and extrovert reading comprehension with or without the presence of music, researchers will also be able to determine a relationship between personality type and susceptibility to auditory distraction. This line of research will provide hundreds of researchers with new relevant data for future research that focuses on auditory distractions and personality types. Future programs that focus on the enhancement of reading comprehension will be better equipped with new data supporting two different personality types. Hundreds of thousands of administrators and teachers will be able to incorporate these programs into school curriculums to more affectively teach the millions of students enrolled in the school system.

Broader Impacts

The effect of auditory distraction, or irrelevant sound, has on cognitive tasks and performance of introverts and extroverts is an important aspect to the study of reading comprehension for many reasons. First, by including personality type as a factor; supervisors and professors alike would be able to distinguish differences in performance of employees and students while auditory distractions are present. Second, with this information, steps could be taken and programs could be developed to increase and improve an individual's level of comprehension. Third, once the level of reading comprehension is improved, cognitive job task performance of employees and reading comprehension of students while studying would have the potential of massive improvement. There are currently millions of supervisors, professors, employees, and students who could benefit from such an improvement. With more information about this line of research, experimenters will be able to generalize their results and develop programs designed to fit individual's personality types and therefore enhance the reader's comprehension ability. When programs are designed specifically to enhance the level of reading comprehension of the individual, individuals worldwide will achieve higher levels of success in their careers, studies, and everyday activities.

Auditory Distraction and Reading Comprehension

Recent studies on auditory distraction, specifically the presence of music, have presented researchers with a stronger understanding of the effect musical distraction has on reading comprehension. The effect auditory distraction, or irrelevant sound, has on cognitive tasks and performance of introverts and extroverts is an important aspect to the study of reading comprehension for three reasons. First, by including personality type as a factor; supervisors and professors alike would be able to distinguish differences in performance of employees and students while auditory distractions are present. Second, with this information, steps could be taken and programs could be developed to increase and improve an individual's level of comprehension. Third, once the level of reading comprehension is improved, cognitive job task performance of employees and reading comprehension of students while studying would have the potential of massive improvement. There are currently millions of supervisors, professors, employees, and students who could benefit from such an improvement.

Although previous research has addressed the effects that auditory distraction has on reading comprehension, there is still little known of the difference between introvert and extrovert comprehension when cognitive activity is paired with musical distraction. Most research on auditory distraction has focused on activities such as educational homework or cognitive tasks in the workplace. The research has not included personality types as a factor that affects reading comprehension. With a study that involves introvert and extrovert-reading comprehension with or without the presence of music, researchers will also be able to determine a relationship between personality type and susceptibility to auditory distraction. Furthermore, with the knowledge gained from this project, researchers will be better educated on information for developing programs that ensure the best atmosphere possible for individuals to obtain success.

Reading Comprehension

Unlike everyday systematic problem solving that an individual has the ability to control, comprehension is automatic (Kintsch, 1998). Aside from auditory distractions, there are a variety of outside factors, internal and external, that affect reading comprehension. According to researchers Miall (1989) and Oatley (1992), human emotion is one such factor that is capable of directly affecting comprehension. The emotional responses that arise when an individual reads a text are sometimes thought of as more important than the actual comprehension of the content. Reading comprehension involves an individual's understanding of a certain passage or particular text, and can be measured with reading rates. Reading rates are used to determine an individual's success at various levels of comprehension (Perfetti, 1985). Individuals may increase their level of reading comprehension by self assessment through summarizing, and by improving metacognition (Harris & Sipay, 1990). Metacognition is a process of self-regulated thinking, or thinking about one's own thinking (Jacobs & Paris, 1987). Reading comprehension can also be improved, as illustrated by Kintsch (1998), by using coherent text to build a coherent mental representation of the presented text. Reading comprehension consists of four major processes: (a) word recognition, (b) parsing, (c) semantic interpretation, and (d) knowledge integration. Results will give researchers a foundation to build on and begin focusing on which factors are affected, in what type of personalities and in what type of environment. This study will lead the way into further investigation on how different people (personalities) process the four steps in reading comprehension.

Word recognition is a prerequisite for comprehension and is an easier process for the more advanced reader (Lien et al., 2006). A reader may use past knowledge and visual cues around the word to be recognized to make sense of the meaning of the word. Parsing involves reading a text and being able to determine its grammatical structure (Clahsen & Felser, 2006). Lexical analysis, syntax analysis, and semantic analysis are the three stages involved in parsing.

Syntactic analysis involves making sure that words form proper and allowable expressions. There are two types of parsers: (a) top-down parsing, and (b) bottom-up parsing (Kintsch, 2005). Top-down parsing involves making a general hypothesis about a general structure and then comparing it to the fundamental structures in order to analyze unknown data in a text. Bottom-up parsing is the ability to first identify fundamental structures, and then produce superior structures in order to analyze text.

Semantic interpretation is the ability to interpret the various aspects of meaning contained in a form of representation such as language (Smythe, 1992). A reader uses semantic interpretation to identify and make sense of the text content. Knowledge integration is used to combine the understanding of a single subject in more than one way (Linn, 2006).

These reading comprehension processes require skill and concentration, and with the presence of an auditory distracter such as music, the reader might have difficulty comprehending the presented text. Not only will these crucial questions begin to be answered in this study, but the results will pave the way for further investigation in every process involved in reading comprehension. When research is narrowed to what type of people are more vulnerable to distraction, researchers are equipped to assess exactly what processes of reading

comprehension is affected and in whom it is affected. As a result, future research can begin focusing on which type of programs or developments will aid individuals in their pursuit to complete success.

Auditory Distractions

Auditory distractions can affect comprehension even if the sounds are ignored or unrelated to the cognitive task at hand (Campbell, 2005). Previous research such as Campbell's (2005) is precisely why this line of research is so important, because everyone is susceptible to the detrimental affects irrelevant sounds have on cognitive tasks, such as reading comprehension. Several studies show the decline in reading comprehension when auditory distractions are present (Banbury, Macken, Tremblay & Jones, 2001; Jones, 1999). Banbury, Macken, Tremblay & Jones (2001) found that irrelevant sounds often disrupt selective attention and impair cognitive performance. A similar study found reading comprehension levels decreased when irrelevant sounds were present during serial short-term memory tasks (Jones, 1999). In addition to an individual's inability to ignore unrelated sounds, auditory distractions that have nothing to do with the text being read still have a detrimental affect on cognitive performance. This past research demonstrates the importance of further investigating auditory distractions during reading comprehension tasks.

Another related study concluded that distractions occurring in one's natural environment required additional processing to the four complex processes already required for reading comprehension (Schroger, Giard & Wolff, 2000). The additional processing immensely affects reading comprehension. Auditory distractions affect different populations and different cognitive tasks (Beaman, 2005). These include reading and writing of children, adolescents and adults; and students and employees of all ages. Not all individuals execute cognitive tasks in a similar manner, and as a result, each individual experiences different outcomes. Consequently, it is imperative to examine the opposite affect as well.

Other research has focused more precisely on two different types of auditory distractions: vocal and instrumental, and the differing effects the two have on reading comprehension. This research suggests that not all irrelevant sound has a direct affect on complex cognitive tasks such as reading comprehension. Henderson, Crews, and Barlow (1945) observed that popular vocal music reduced participant reading comprehension. However, classical (instrumental) music had no affect on reading comprehension. In a similar study, Boyle and Colthart (1996) acknowledged that vocal sounds greatly interfered with participant recall, while instrumental music did not.

Contradictory to a majority of past research involving the effects of auditory distraction on various cognitive tasks, Oliver (1997) found that background music has been associated with improved performance of reading comprehension within a learning environment. Despite differing views provided in past research on the effect irrelevant sound has on cognitive tasks, the presence of auditory distraction clearly has an influence on reading comprehension. Even though there is a clear influence, the direction of the influence is still unclear. Therefore, the given line of research is important and needed to clarify the effect instrumental distracters have on reading comprehension of both introverts and extroverts.

Introverts and Extroverts

Empirical research has shown the differences between introverts' and extroverts' personality characteristics. The differences that make people unique also create a distinct way of performing certain tasks that are related to reading comprehension. For example, introverts outperformed extroverts on a reading comprehension task when the test was given in silence (Furnham & Allass, 1999). Issues such as these are important areas to research, specifically those that are related to reading comprehension. Researchers have begun studying these topics, but clearly more research regarding reading comprehension is needed. Although more research regarding reading comprehension is necessary, researchers have examined other areas that demonstrate differences between introverts and extroverts. Fouts and Click (1979) found extroverts to be more observational learners than introverts. They also suggested more powerful learning incentives may be considered for introverts as they benefit from nonsocial settings while learning. However, a contradictory study displayed extroverts as verbal learners and introverts as visual learners (Riding & Burt, 1982).

Although several studies illustrated differences between introverts and extroverts, many studies found no differences present. Aside from auditory distractions, extroverts and introverts performed similarly on reading comprehension tasks (Furnham & Strbac, 2002; Ylias & Heaven, 2003). In a similar study, researchers reported any differences between introverts and extroverts, in regards to reading comprehension, to be statistically insignificant (Furnham, Gunter & Peterson, 1994). As many studies vary in their results, many questions are left unanswered. An important issue such as personality needs to be reviewed to identify any affects personality may have on reading comprehension. Therefore, it is imperative to continue examining personality types and their relation to different cognitive tasks.

Personality Types and Musical Distractions

When personality types and musical distractions are examined together they greatly affect reading comprehension. Extroverts outperformed introverts on a reading comprehension test regardless of the change in music from vocal to instrumental (Furnham, Trew & Streade, 1999). Introverts also reported being distracted during a reading comprehension test with television noise present (Furnham, Gunter & Peterson, 1994). Not only are introverts distracted by music (vocal and instrumental), but they are also distracted by general background noise. Further research needs to occur before programs designed to enhance reading comprehension levels can be developed. Despite the type of distractions present, extroverts consistently outperformed introverts on reading comprehension tasks (Fouts & Click, 1979; Furnham & Allass, 1999; Furnham & Bradley, 1997; Furnham, Gunter & Peterson, 1994; Furnham & Strbac, 2002; Ylias & Heaven, 2003). Furnham, Gunter, and Peterson (1994) specifically stated that introverts admitted to being more distracted with the presence of noise. Personality types clearly have an affect on the way individuals read. Further research pertaining to personality types and musical distractions is important for improving the individuals' level of reading comprehension. With more information about this, researchers will be able to generalize their results and develop programs designed to fit individual's personality types and therefore enhance the reader's comprehension ability. When programs are designed specifically to enhance the level of reading comprehension of the individual, individuals worldwide will achieve higher levels of success in their careers, studies, and everyday activities.

Previous research has addressed the effect auditory distractions have on reading comprehension. However, the research has not effectively addressed the different effects that the presence or absence of music has on introverts' and extroverts' comprehension. The current line of research will address the relationship between auditory distraction and personality type by assessing participants' abilities to comprehend text with the absence or presence of music. The two groups of participants will both be tested on reading comprehension ability with or without the presence of music. Participants will take a personality test to distinguish introvert or extrovert personality type. This study seeks to produce useful information for researchers and social institutions that will help determine the relationship between auditory distraction and personality type.

Method

Participants

This study will include 60 native English speaking, college students between the ages of 18 and 24. Researchers will divide participants into two separate personality groups: introverts and extroverts. Introversion and extroversion will be determined with the use of the International Personality Item Poll (IPIP) scale of extroversion (Goldberg et al., 2006).

Materials

The IPIP is a 20-point scale that consists of 10 positively keyed items (extraversion characteristics), and 10 negatively keyed items (introversion characteristics). Participants will assign a numeric value to these 20 personality characteristics using a five-point Likert scale. Each participant will be asked to read the same text with or without the presence of music. The music that will be used as a distracter in this experiment is the second movement from Charles Ives' (1911) Trio for Violin, Violoncello and Piano. The text (see Appendix A) is a Native American folk tale used in Bartlett's (1932) experiments on the reconstruction of memories. This text is unfamiliar to the particular sample selected for this experiment. Each participant will be asked to recall as much information as possible from the text, and record it on a separate piece of paper that will be handed out simultaneously with the text. Participants will use designated writing materials. Researchers will play the instrumental distracter throughout the reading task for two of the four experimental conditions (introverts with musical distracter, and extroverts with musical distracter).

Procedure

Upon arrival, participants will read a standard set of instructions (see Appendix B), as well as read and sign the consent form (see Appendix C). In all four conditions, researchers will then present participants with both a copy of the text and a blank sheet of paper for responses. Each participant will be allocated a standard time, 1 min 45 s, to read the presented text with or without the presence of music. The allotted time was obtained by averaging the time it took pilot participants to read the text. After participants complete the reading, experimenters will collect the sheet of paper containing the text, and distribute designated writing utensils to eliminate the possibility of note taking. Participants will have 5 min (also obtained from pilot participant averages) to recall as much information as they can on the blank sheet of paper. Responses will then be collected, and the personality test (see Appendix D) will be distributed to each participant to determine introversion or extroversion.

All experimental conditions will be identically administered with the exception of the presence or absence of an instrumental distracter. Each participant's personality test, text, and blank sheet of paper will be individually numbered.

Design and Analysis

Experimenters will compare the responses to idea units (see Appendix E) previously identified by the experimenters. The idea units follow three main patterns: (a) noun, verb, complement, (b) noun, verb, and (c) noun, adjective. This experiment will be conducted using a two-by-two between-subjects design and will consist of four experimental conditions. Each of the four conditions will contain at least 15 participants, either introverts or extroverts. This experiment will take place in the same classroom setting for all four experimental conditions. The independent variables will include both personality types and the presence or absence of music. The measure of the dependent variable, reading comprehension, will be the total number of correctly recalled idea units. This measure represents the effect musical distractions have on introvert and extrovert reading comprehension levels.

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Appendix A: War of the Ghosts

One night two young men from Egulac went down to the river to hunt seals and while they were there it became foggy and calm. Then they heard war-cries, and they thought: "Maybe this is a war-party". They escaped to the shore, and hid behind a log. Now canoes came up, and they heard the noise of paddles, and saw one canoe coming up to them. There were five men in the canoe, and they said:

"What do you think? We wish to take you along. We are going up the river to make war on the people."

One of the young men said, "I have no arrows."

"Arrows are in the canoe," they said.

"I will not go along. I might be killed. My relatives do not know where I have gone. But you," he said, turning to the other, "may go with them."

So one of the young men went, but the other returned home.

And the warriors went on up the river to a town on the other side of Kalama. The people came down to the water and they began to fight, and many were killed. But presently the young man heard one of the warriors say, "Quick, let us go home: that Indian has been hit." Now he thought: "Oh, they are ghosts." He did not feel sick, but they said he had been shot.

So the canoes went back to Egulac and the young man went ashore to his house and made a fire. And he told everybody and said: "Behold I accompanied the ghosts, and we went to fight. Many of our fellows were killed, and many of those who attacked us were killed. They said I was hit, and I did not feel sick."

He told it all, and then he became quiet. When the sun rose he fell down. Something black came out of his mouth. His face became contorted. The people jumped up and cried.

He was dead.

Frederic Bartlett

Appendix B: Instructions

Please read the following instructions carefully:

After signing the consent form, put away all writing utensils and remove any objects from your desk. Experimenters will pass out two sheets of paper to each participant. Both sheets of paper will be numbered in the upper right-hand corner. Please make sure that the number from each sheet of paper matches. One sheet will contain a short story and will be given to you face down. DO NOT turn the sheet of paper over until instructed to do so. The other sheet of paper will be blank. Do not write on either sheet of paper. When instructed to do so, turn the sheet of paper over and begin reading the story. You will have 1 min 45 s to read the story. When the time allotted has elapsed, experimenters will collect the short stories and pass out pens. DO NOT write anything on the blank sheet of paper until instructed to do so. Once every participant has received a pen, you will have 5 min to write down as much information as you can remember from the story on the blank sheet of paper. Write down any and all words, phrases, quotes, or sentences you can remember. Please write as much as possible with the time allotted. When the 5 min has passed, experimenters will instruct all participants to cease writing and put all pens down. Experimenters will then collect your responses and pass out a short personality test. Make sure the number on your personality test matches the number that was printed on the two original sheets of paper given to you. Please read the personality test instructions carefully and complete the test. Once each participant has completed the personality test, experimenters will collect the tests and the pens. If you have any questions, they will be answered at this time. Following any questions, the experiment will be complete, and you will be dismissed. If you have any questions regarding these instructions, please ask them now.

*Note:

If you do not follow these instructions accordingly, you will not receive credit for participation in this experiment.

Appendix C: Consent Form

The information in this consent form is provided so that you can decide whether you wish to participate in our study. It is important that you understand that your participation is considered voluntary. This means that even if you agree to participate you are free to withdraw from the experiment at any time, without penalty.

This study is an investigation into some of the basic processes we use to understand text. For this study, you will read a text and write down as much as you can recall from it. Your individual responses will remain anonymous and will not be discussed with anyone.

This experiment poses no known risks to your health and your name will not be associated with the findings. Also, upon completion of your participation in this study you will be provided with a brief explanation of the question this study addresses. If you have any questions not answered by this consent form, please do not hesitate to ask.

Thank you for your time.

James Student (408-123-4567)

Cynthia Pupil (714-123-4567)

(Researcher's Signature)

(Researcher's Signature)

Consent Statement:

I have read the above comments and agree to participate in this experiment. I understand that if I have any questions or concerns regarding this project I can contact the investigators at the above location.

(Participant's signature)

(Date)

Appendix D: Personality Test

In the table below, there are phrases describing people's behaviors. Please use the rating scale provided to describe how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence. Please read each statement carefully, choose the best response, and fill in your responses using the corresponding number.

Response Options:

- 1: Very Inaccurate
- 2: Moderately Inaccurate
- 3: Neither Inaccurate nor Accurate
- 4: Moderately Accurate
- 5: Very Accurate

Statement	Response
Feel comfortable around people.	
Have little to say.	
Make friends easily.	
Keep in the background.	
Am skilled in handling social situations.	
Would describe my experiences as somewhat dull.	
Am the life of the party.	
Don't like to draw attention to myself.	
Know how to captivate people.	
Don't talk a lot.	
Start conversations.	
Avoid contacts with others.	
Warm up quickly to others.	
Am hard to get to know.	
Talk to a lot of different people at parties.	
Retreat from others.	
Don't mind being the center of attention.	
Find it difficult to approach others.	
Cheer people up.	
Keep others at a distance.	

Scoring the IPIP Scale (<http://ipip.ori.org/>):

- + keyed items represent extroversion characteristics
- keyed items represent introversion characteristics

20-item scale (Alpha = .91)

+ keyed items:

- Feel comfortable around people.
- Make friends easily.
- Am skilled in handling social situations.
- Am the life of the party.
- Know how to captivate people.
- Start conversations.
- Warm up quickly to others.
- Talk to a lot of different people at parties.
- Don't mind being the center of attention.
- Cheer people up.

- keyed items:

- Have little to say.
- Keep in the background.
- Would describe my experiences as somewhat dull.
- Don't like to draw attention to myself.
- Don't talk a lot.
- Avoid contacts with others.
- Am hard to get to know.
- Retreat from others.
- Find it difficult to approach others.
- Keep others at a distance.

Converting IPIP Item Responses to Scale Scores:

For + keyed items, the response "Very Inaccurate" is assigned a value of 1, "Moderately Inaccurate" a value of 2, "Neither Inaccurate nor Accurate" a 3, "Moderately Accurate" a 4, and "Very Accurate" a value of 5.

For - keyed items, the response "Very Inaccurate" is assigned a value of 5, "Moderately Inaccurate" a value of 4, "Neither Inaccurate nor Accurate" a 3, "Moderately Accurate" a 2, and "Very Accurate" a value of 1.

Once numbers are assigned for all of the items in the scale, sum all the values to obtain a total scale score.

Appendix E: Idea Units

Sentence 1:

men, go, hunt
men, go, one night
men, go, to hunt
men, hunt, seals
men, at river
men, young
men, two
men, from Egulac
while (men at river), (weather, foggy), (weather, calm)
(weather), foggy
(weather), calm

Sentence 2:

they, heard, war-cries
they, thought, war-party

Sentence 3:

they, escaped, to shore
they, hid, behind log

Sentence 4:

canoes, came, up
they, heard, noise
they, heard, paddles
they, saw, canoe
canoe, coming up, to them

Sentence 5:

five, men
men, in canoe
they, said
what, do you, think

Sentence 6:

we, wish to, take you
take, you, along

Sentence 7:

we, going up, to make war
we, make, war
war, on, the people

Sentence 8:

man, young
one, man
one, man, said
one man, said, I have no arrows
I, have, no arrows

Sentence 9:

arrows, in, canoe
they, said

Sentence 10:

I, will not go, along

Sentence 11:

I, might be, killed

Sentence 12:

relatives, do not know, where I have gone

Sentence 13:

you, may go with, them
he said, you may go
he turn, to other

Sentence 14:

man, young
one, man
one man, went
other man, returned, home

Sentence 15:

warriors, went, up river
warriors, went, to a town
warriors, went, to other side
warriors, went, to Kalama

Sentence 16:

people, came down, to water
people, came down, to fight
they, began, to fight
many, were, killed

Sentence 17:

young, man
young man, heard, warrior say
warrior, said, "let us go home"
we, go, home
warrior, said, "that Indian has been hit"
Indian, hit

Sentence 18:

he, thought, ghosts
they, are, ghosts

Sentence 19:

he, did not feel, sick
they, said,
he had been shot

Sentence 20:

canoes, went back, to Egulac
young, man
young man, went, ashore
young man, went, to his house
young man, mad, fire

Sentence 21:

he, told, everybody
he, said, "I accompanied ghosts"
he, said, "we went to fight"
I, accompanied, ghosts
we, went, to fight

Sentence 22:

many fellows, were, killed
many attackers, were, killed

Sentence 23:

they, said, I was hit
I, was, hit
I, did not feel, sick

Sentence 24:

he, told, it all
he, became, quiet

Sentence 25:

sun, rose
he, fell, down

Sentence 26:

something black, came out, his mouth

Sentence 27:

face, became, contorted
his, face

Sentence 28:

people, jumped up
people, cried
people, jumped up, cried

Sentence 29:

he, died

Rules for Coding the Recall of Idea Units:

- (1) One point is allotted for every correctly recalled idea unit.
- (2) Synonyms and class generalizations are acceptable and are allotted one point.
- (3) Faulty reproduction of idea units will not be accepted and will not be allotted any points.

Appendix F: Script for No Music Exposure

<Participants arrive>

“Hello everyone, please be seated”

<Participants sit down. Experimenters pass out instructions and consent form>

“I am going to pass out a set of instructions, and a consent form for this experiment. Please read the instructions and the consent form, and sign the bottom if you agree to further participate in this experiment.”

<Participants read instructions and sign consent form. Experimenters collect consent forms>

“I am now going to pass out two papers to you, one containing a story and the other blank. Please keep the paper with writing face down until instructed to turn it over.”

<Pass out both papers, blank and sheet containing text>

“You will have 1 min 45 s to read the text. After the time is up, turn the paper back over and I will come and collect them. When I collect your paper I will also give you a pen you will be required to write with. You will then write on the blank sheet what you remember from the story. You may now turn over your paper and begin reading.”

<Time 1 min 45 s>

“Stop. Please turn your paper face down and I will come collect them.”

<Collect the papers and pass out the pens>

“With the pen that was given to you please write what you remember from the story. When you are finished turn your paper face down and raise your hand. At this time I will come collect your answer and pen.

<Wait 5 min for participants to complete their responses. Collect the responses>

“I am now going to pass out a questionnaire, please answer the questions as accurately as possible. When you are finished turn it over and leave it on your desk.”

<Pass out questionnaire (personality test) and wait for participants to complete it>

<Collect the personality tests>

“Thank you for participating in this study. The goal of this study was to examine how personality types and musical distractions affect reading comprehension. Does anyone have any questions?”

<Answer any questions>

“Thanks for coming. You are free to leave at this time.”

<Study is complete>

Appendix G: Script for Music Exposure

<Participants arrive>

“Hello everyone, please be seated”

<Participants sit down. Experimenters pass out instructions and consent form>

“I am going to pass out a set of instructions, and a consent form for this experiment. Please read the instructions and the consent form, and sign the bottom if you agree to further participate in this experiment.”

<Participants read instructions and sign consent form. Experimenters collect consent forms>

“I am now going to pass out two papers to you, one containing a story and the other blank. Please keep the paper with writing face down until instructed to turn it over.”

<Pass out both papers, blank and sheet containing text>

“You will have 1 min 45 s to read the text. After the time is up, turn the paper back over and I will come and collect them. When I collect your paper I will also give you a pen you will be required to write with. You will then write on the blank sheet what you remember from the story. You may now turn over your paper and begin reading.”

<Turn on music and time 1 min 45 s>

“Stop. Please turn your paper face down and I will come collect them.”

<Turn off music, collect the papers, and pass out the pens>

“With the pen that was given to you please write what you remember from the story. When you are finished turn your paper face down and raise your hand. At this time I will come collect your answer and pen.

<Wait 5 min for participants to complete their responses>

“I am now going to pass out a questionnaire, please answer the questions as accurately as possible. When you are finished turn it over and leave it on your desk.”

<Pass out questionnaire (personality test) and wait for participants to complete it>

<Collect the personality tests>

“Thank you for participating in this study. The goal of this study was to examine how personality types and musical distractions affect reading comprehension. Does anyone have any questions?”

<Answer any questions>

“Thanks for coming. You are free to leave at this time.”

<Study is complete>

Appendix H: Project Timeline

Date	Activities	Deliverables
October 17, 2006 – October 30, 2006	Data Collection Plan, Coding and Organizing Data	Draft Data
October 31, 2006 – November 6, 2006	Coding and Organizing Data	Data
November 7, 2006 – November 13, 2006	Statistical Analysis Graphs and Tables	Draft Results
November 14, 2006 – November 20, 2006	Posters and PowerPoint	Results
November 21, 2006 – November 27, 2006	Final Products	Draft Discussion
November 28, 2006 – December 4, 2006	Presentations and Posters	Discussion Presentations and Posters
December 5, 2006 – December 6, 2006	Presentations and Posters	Final Paper

Appendix I: Bio Sketches

James Student:

James is currently an undergraduate student at San Jose State University working towards a bachelor of arts in Behavioral Science, with an emphasis in Psychology. He is currently a member of Psi Chi (The National Honor Society in Psychology), the San Jose State University Psychology Club, and Sigma Alpha Lambda (The National Leadership and Honors Organization). James also volunteers once a week for the Department of Mental Health.

Cynthia Pupil:

Cynthia Pupil is currently attending San Jose State University in pursuit of her bachelor of arts in Psychology, and a minor in Sociology.

Further Resources on Assembling a Proposal

- Krathwohl, D. 1988. *How to prepare a research proposal*. Syracuse, NY: Syracuse University Press.
- Leedy, P. & Ormrod, J. 2005. *Practical Research: planning and design [8th Edition, Ch. 6]*. Upper Saddle River, NJ: Prentice-Hall.
- Mitchell, M. & Jolley, J. 2005/2007. *Research Design Explained [Ch. 15]*. Belmont, CA: Thompson Wadsworth.
- Salkind, N. 2006. *Exploring Research [Ch. 13]*. Upper Saddle River, NJ: Prentice-Hall.

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Appendix A:

Real Proposal Guidelines

These are the guidelines offered by the Medical Research Council of South Africa for medical research project proposals (<http://www.mrc.ac.za/researchdevelopment/grantwrite2.htm>). They are quite typical of the guidelines for grant proposals in many other fields.

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Writing a Research Grant Proposal

Short description of the project, Background, Methodology, Budget, Outcomes of your study, Institutional approval

Short description of the project (abstract)

This section should include information relating to:

- The purpose of the research
- The importance of the research
- The background and feasibility of your project
- A brief description of relevant information, the target population, hypotheses, and methodology
- A brief description of methodology and expected results
- A description of the contributions your research will make to the field of knowledge and health outcomes.

Background

- Make certain that your background discussion remains focussed on the issues your research will address. At the end of each topic, point out to the reader how your proposed findings will help resolve important issues in the field.
- The background section should contain:
 - Information about the scope of the problem i.e. why it is widespread, serious, or important.
 - A critical review of the relevant literature, including highlights of ongoing research and gaps in knowledge. As a general rule, citations older than 10 years should not be used unless they are absolutely necessary in making the case for the proposed study or, if they are seminal works that should not be omitted.
 - An explanation of why this study needs to be done, and why this research is relevant and necessary for the target population. The work must be placed in context. Use statistics and prevalence rates to emphasise the need. Spending some time to conduct a small pilot study before you submit your proposal will increase your chances of getting funded. If pilot data is unavailable, specifically mention data relating to similar projects that support any of the ideas or hypotheses of the proposed study.
 - A well-grounded theoretical basis for your study or project; remember that reviewers tend to look favourably upon projects that have strong theoretical underpinnings. You need to convince the reviewer that you are planning to test hypotheses, not simply collect data to confirm your favourite hypotheses, and that you are open-minded enough to reject your hypotheses if the experimental results do not support your hypotheses.

- The long-term uses of this research, including the contributions to the existing pool of knowledge.

Methods

The goal of the research design and methods section is to:

- Minimize the number of assumptions reviewers must make about your project.
- Show that you are using scientifically sound approaches.
- Make sure that the study you describe corresponds with the specific objectives you listed earlier in the proposal.
- Make sure that the underlying science and methods behind your plan are sound, feasible and complete as possible.
- Give details of:
 - The design of the study (e.g. descriptive, comparative, longitudinal, case-control, quasi-experimental, randomised) and explain why that design was chosen.
 - Data collection procedures (how will the data be collected, who will collect the data, what procedures will be used?).
 - The procedures for training of researchers or interviewers.
 - Access to specialised facilities or equipment where applicable.
 - Procedures for handling of participants and confidentiality issues.
 - Procedures and approval for working with animals where applicable.
 - Possible hazards to research personnel and study participants and procedures to prevent dangerous situations.
- Briefly discuss the limitations of the proposed study, and alternative methodologies for carrying out the proposed research plan if these limitations impact negatively on your ability to conduct the study as planned.
- Give a timeline for tasks to be completed during the project period. The timeline must accurately reflect what was planned for in the study and be consistent with the requested budget.
- Statistical Considerations

Researchers that do not have a sound working knowledge of statistics are advised to consult with a biostatistician to ensure that the procedures for sampling, data collection and data analysis are scientifically valid.

Ensure that the following have been fully considered in your methodology section:

- What data will be collected and the frequency of data collection.
- The inclusion and non-inclusion criteria for subjects or participants.
- The source of recruitment of subjects or participants is clearly indicated.
- The nature of the control group, if any, indicating whether it will be simultaneously studied or whether it will be a historical reference group.
- The research instruments and data collection forms. If these have already been developed, include a copy of each instrument in an appendix. Include details of previous reliability and validity data for the instruments.
- The sample size. Indicate whether this is sufficient in the light of the expected difference and the variance within the control and test groups. What power does this sample size give you for addressing the objectives of the study? How long will it take to obtain this sample size?
- Data analysis and evaluation. The data collection should address all the objectives of the study and the statistical analysis should consider all the data collected. Indicate the statistical procedures and methods that you will use to analyse the data for each hypothesis

you are testing and explain how will you deal with missing data. The methods to be used for statistical analysis must be appropriate and documented.

Budget

- Include all other sources of funding for the proposed study.
- Provide a justification for all categories of funds requested.
- Reviewers can recommend budget cuts when they think that expenses are overly high or unwarranted. The budget must accurately reflect the plan for data collection, data analysis, and data write-up.
- If you are just beginning as an independent investigator, do not ask for a very large grant. Demonstrate that you can complete a good small project with a relatively smaller amount of money and establish a good track record before applying for larger research grants.

Outcomes of your study

- Consider the following questions:
 - Why are you doing this research?
 - What are the long-term implications? Who will benefit from these findings and who might be deprived or harmed as a result of the study?
 - What will happen with the research findings?
 - What is the ultimate application or use of the research?

Institutional approval

Ensure that your proposal has the necessary ethics and institutional approval before submitting to the funding agency. Incomplete proposals could be returned to you and will delay the review of your proposal.

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Appendix B:

NSF Guidelines for Describing Broader Impacts of a research project

These are the guidelines offered by the National Science Foundation for describing the Broader Impacts of a research project (see <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>)

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Merit Review Broader Impacts Criterion: Representative Activities

Proposals submitted to the National Science Foundation are evaluated through use of two merit review criteria, which all proposals must address explicitly. Experience shows that while most proposers have little difficulty responding to the criterion relating to intellectual merit, many proposers have difficulty understanding how to frame the broader impacts of the activities they propose to undertake. The examples provided below are organized by the set of potential considerations used in assessing the broader impacts of the proposed activity. They illustrate activities that, when successfully incorporated in a project description, will help reviewers and NSF program staff address the broader impacts criterion in the review and decision process. The list is not intended to be exhaustive, nor is any particular example relevant to all proposals. Proposers can draw from the examples but are urged to be creative in their approaches to demonstrating the broader impacts of their projects. Proposers already undertaking similar kinds of activities should carefully consider how to link these examples to the research and education projects they are proposing for funding. Proposers also should consider what types of activities best suit their interests, while enhancing the broader impacts of the project being proposed. The components of the broader impacts criterion as defined by the National Science Board are listed below. The list is followed by short sections on each component that provide background information and representative activities.

Broader Impacts Criterion: What are the broader impacts of the proposed activity?

- How well does the activity advance discovery and understanding while promoting teaching, training and learning?
- How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)?
- To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks and partnerships?
- Will the results be disseminated broadly to enhance scientific and technological understanding?
- What may be the benefits of the proposed activity to society?

Advance Discovery and Understanding While Promoting Teaching, Training and Learning

Background: Integration of research and education is one of "three core strategies that guide [NSF] in establishing priorities, identifying opportunities, and designing new programs and activities.... Effective integration of research and education at all levels infuses learning with the excitement of discovery and assures that the findings and methods of research are quickly and effectively communicated in a broader context and to a larger audience" (NSF GPRA Strategic Plan 2001 - 2006)

Examples of Activities:

- Integrate research activities into the teaching of science, math and engineering at all educational levels (e.g., K-12, undergraduate science majors, non-science majors, and graduate students).
- Include students (e.g., K-12, undergraduate science majors, non-science majors, and /or graduate students) as participants in the proposed activities as appropriate.
- Participate in the recruitment, training, and/or professional development of K-12 science and math teachers.

- Develop research-based educational materials or contribute to databases useful in teaching (e.g., K-16 digital library).
- Partner with researchers and educators to develop effective means of incorporating research into learning and education.
- Encourage student participation at meetings and activities of professional societies.
- Establish special mentoring programs for high school students, undergraduates, graduate students, and technicians conducting research.
- Involve graduate and post-doctoral researchers in undergraduate teaching activities.
- Develop, adopt, adapt or disseminate effective models and pedagogic approaches to science, mathematics and engineering teaching.

Broaden Participation of Underrepresented Groups

Background: One of NSF's five-year strategies is to "broaden participation and enhance diversity in NSF programs. At present, several groups, including underrepresented minorities, women, certain types of academic institutions, and some geographic areas are less than full participants in the science and engineering enterprise. NSF is committed to leading the way to an enterprise that fully captures the strength of America's diversity." (NSF GPRA Strategic Plan 2001-2006)

Examples of Activities:

- Establish research and education collaborations with students and/or faculty who are members of underrepresented groups.
- Include students from underrepresented groups as participants in the proposed research and education activities.
- Establish research and education collaborations with students and faculty from non-Ph.D.-granting institutions and those serving underrepresented groups.
- Make campus visits and presentations at institutions that serve underrepresented groups.
- Establish research and education collaborations with faculty and students at community colleges, colleges for women, undergraduate institutions, and EPSCoR institutions.
- Mentor early-career scientists and engineers from underrepresented groups who are submitting NSF proposals.
- Participate in developing new approaches (e.g., use of information technology and connectivity) to engage underserved individuals, groups, and communities in science and engineering.
- Participate in conferences, workshops and field activities where diversity is a priority.

Enhance Infrastructure for Research and Education

Background: The NSF Act of 1950 authorizes and directs the Foundation "to foster and support the development and use of computer and other scientific and engineering methods and technologies, primarily for research and education in the sciences and engineering..." "NSF investments provide state-of-the-art tools for research and education, such as instrumentation and equipment, multi-user facilities, ... telescopes, research vessels and aircraft, ... Internet-based and distributed user facilities, ... research networks, digital libraries and large databases." (NSF GPRA Strategic Plan 2001-2006)

Examples of Activities:

- Identify and establish collaborations between disciplines and institutions, among the U.S. academic institutions, industry and government and with international partners.
- Stimulate and support the development and dissemination of next-generation instrumentation, multi-user facilities, and other shared research and education platforms.
- Maintain, operate and modernize shared research and education infrastructure, including facilities and science and technology centers and engineering research centers.

- Upgrade the computation and computing infrastructure, including advanced computing resources and new types of information tools (e.g., large databases, networks and associated systems, and digital libraries).
- Develop activities that ensure that multi-user facilities are sites of research and mentoring for large numbers of science and engineering students.

Broad Dissemination to Enhance Scientific and Technological Understanding

Background: "NSF advocates and encourages open scientific communication. NSF expects significant findings from supported research and educational activities to be promptly submitted for publication.... It expects PIs to share with other researchers, at no more than incremental cost and within a reasonable time, the data, samples, physical collections and other supporting materials created or gathered in the course of the work. It also encourages grantees to share software and inventions . . . and otherwise to make the innovations ... widely useful and usable." (GPG; NSF 01-2a)

Examples of Activities:

- Partner with museums, nature centers, science centers, and similar institutions to develop exhibits in science, math, and engineering.
- Involve the public or industry, where possible, in research and education activities.
- Give science and engineering presentations to the broader community (e.g., at museums and libraries, on radio shows, and in other such venues.).
- Make data available in a timely manner by means of databases, digital libraries, or other venues such as CD-ROMs.
- Publish in diverse media (e.g., non-technical literature, and websites, CD-ROMs, press kits) to reach broad audiences.
- Present research and education results in formats useful to policy-makers, members of Congress, industry, and broad audiences.
- Participate in multi- and interdisciplinary conferences, workshops, and research activities.
- Integrate research with education activities in order to communicate in a broader context.

Benefits to Society

Background: NSF is committed to fostering connections between discoveries and their use in service to society. The knowledge provided by NSF-funded projects offers a rich foundation for its broad and useful application. For example, projects may contribute to understanding the environment, commercial technology, public policy, health or safety and other aspects of the public welfare. (NSF GPRA Strategic Plan 2001- 2006)

Examples of Activities:

- Demonstrate the linkage between discovery and societal benefit by providing specific examples and explanations regarding the potential application of research and education results.
- Partner with academic scientists, staff at federal agencies and with the private sector on both technological and scientific projects to integrate research into broader programs and activities of national interest.
- Analyze, interpret, and synthesize research and education results in formats understandable and useful for non-scientists.
- Provide information for policy formulation by Federal, State or local agencies.