Connecting Scholarly Literature to Your SHINE Research

- Research Question
- Literature Review
- Methods
- Results/Discussion
- Communication: Peer Review, Poster
R1 University Labs

• 1 or 2 BIG research question(s)
• Several smaller research questions pursued by different lab members.

How to use this information:
• When thinking about your role in your lab this summer
• When reading scholarly literature
When thinking about your role in your SHINE lab:

• Remember IMRAD
• Identify your lab’s big question. Ask yourself: "What problem is my SHINE lab trying to solve?" Why are they pursuing an answer to this question in their particular field? This helps you focus on why your lab’s research is being done.
• Summarize your lab’s background. Is there research question brand new, or does the lab have a history of working on this question? What are other labs working on related questions doing, and how does your lab differ? What questions does your lab hope to answer next? You need to be able to succinctly explain what research your lab has already done in order to understand the research the lab is currently doing.
• Identify the specific research question(s) you will be helping to answer this summer. What exactly is your lab trying to answer with your research? How is that related to your lab’s BIG question?
• (adapted from Dr. Jennifer Raff’s “How to read and understand a scientific article)
3 sentence challenge: Articulate the general research question your SHINE lab is asking. Then, articulate the specific research question your will contribute to answering.

Challenge Parameters:

• Use **ONLY 3** sentences
• Use language a layperson can understand

Ask yourself: What should I include? What can I leave out? What’s most important to convey for a lay reader?
Spend 10 minutes drafting response, then upload to Google Doc
Link shared via Slack

We will check back with these responses at a later date.
R1 University Labs

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• Several smaller research questions pursued by different lab members.

How to use this information:
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• When thinking about your role in your lab this summer
Scholarly Readings, cont’d:

SHINE 2019 Assigned Readings

Resources

- How to read a Scientific Paper -- Handout
- Useful link on How to Read a Scientific Paper
- Overview of Scholarly Literature

Reading Assignment

- SHINE 2019 Annotated Bibliography Assignment Due 7/17/19
- Link to upload your Annotated Bibliography Assignment

Aerospace
Tips for reading scholarly literature:

• Remember IMRAD and read strategically.
• Identify the big question. Not "What is this paper about?" but "What problem is this entire field trying to solve?" This helps you focus on why this research is being done. Look closely for evidence of agenda-motivated research.
• Summarize the background in five sentences or less. What work has been done before in this field to answer the big question? What are the limitations of that work? What, according to the authors, needs to be done next? You need to be able to succinctly explain why this research has been done in order to understand it.
• Identify the specific question(s). What exactly are the authors trying to answer with their research? There may be multiple questions, or just one. Write them down. If it's the kind of research that tests one or more null hypotheses, identify it/them.
• Now, ask yourself why your SHINE lab assigned you this reading. How is it related to your SHINE research?
• (adapted from Dr. Jennifer Raff)
The article is titled "NIH kills alcohol trial, starts hunt for other suspect studies." It discusses how senior officials at the National Institutes of Health (NIH) in Bethesda, Maryland, secretly and improperly wooed the alcoholic beverage industry to fund a study of the potential heart benefits of moderate drinking. NIH Director Francis Collins last week shut down the $100 million trial after it was revealed that the study protocol was skewed to find benefits of moderate drinking. Industry—in all, beverage companies would contribute $68 million—and had seen it that a principal investigator (PI) whom the officials favored ran the trial. Three days later, Collins announced that a working group of external advisers would review the trial. In May, NIH suspended enrollment after 105 participants had signed up.

The advisers' 165-page report concludes NIAAA staffers broke NIH rules by directly manipulating the grant application process to ensure that a favored scientist—Kenneth Mukamal of Beth Israel Deaconess Medical Center and Harvard Medical School in Boston—won awards to plan and then run the trial. Mukamal, who had given presentations to industry groups stressing the “unique opportunity” such a trial presented, was the only applicant for both grants.

“Many of the [NIH staff] who have seen the working group report were frankly shocked to see that so many lines were crossed,” Collins said. It was clear, he said, that backers of the study had shaped the trial protocol to ensure an outcome favorable to the sponsors. NIH epidemiologists who reviewed the study said it did not enroll enough people or follow them for long enough to determine whether moderate alcohol consumption increases cancer risks, potentially offsetting any heart benefits. They also faulted the protocol for not including heart failure—which can be caused by alcohol—as a primary endpoint. The MACH trial, they concluded, “could show benefits while missing the harm.”

Mukamal responded with a vigorous defense of the trial's integrity. In a statement “on behalf of the [MACH] investigators,” he wrote: “We stand fully and forcefully behind the scientific integrity of the [MACH] trial protocol and team. ... Every design consideration was carefully and deliberately vetted with no input or direction whatsoever from private sponsors.” NIAAA has spent $4 million of the $20 million it had committed to the trial, and the foundation has disbursed $11.8 million in industry funds.
For more tips:

• Check out PDF created specifically for SHINE on Readings page: https://viterbipk12.usc.edu/shine/readings-2019/
• Drew Dennis’s “How to Read Scientific Papers Quickly and Efficiently”: https://medium.com/@drewdennis/how-to-read-scientific-papers-quickly-efficiently-e7030c4018fa
• Dr. Jennifer Raff’s “How to read and understand a scientific article”: https://violentmetaphors.files.wordpress.com/2018/01/how-to-read-and-understand-a-scientific-article.pdf
• Ashley Hamer’s “How to Read a Scientific Paper in 5 Steps”: https://curiosity.com/topics/how-to-read-a-scientific-paper-in-5-steps-curiousity/
USC Viterbi SHINE 2019
Prep for Library Day on 6/28/19
Searching as Strategic Exploration
Searching as Strategic Exploration

• Handout prepared by Cari Lyle and Dr. Shalini Ramachandran
• Assignment can be completed w/o library log-in credentials
• We hope to have log-in credentials for you by next week.
• But if this doesn’t happen, please use the search function, select articles, and have your SHINE mentor track down the articles for you
Searching as Strategic Exploration:
Library Searching Assignment

Purpose
This assignment will introduce you to searching and refining your search for scholarly literature using a university catalog. The librarians will then build off this assignment during our in class session, which will prepare you for your annotated bibliography assignment.

What is Scholarly Literature?
Scholarly literature is written by experts in the field. They usually publish their research in academic journals and are employed by universities and other educational or research institutions. They submit their articles to editors of academic journals, who decide on whether or not the article should be published. This peer review process means that before the article is accepted and published, it will be reviewed by several other experts in the field, who suggest changes and/or make the recommendation to publish the article.
## Scholarly Journal vs. Popular Periodicals

<table>
<thead>
<tr>
<th>Scholarly Journal Article</th>
<th>Popular Magazine Article</th>
</tr>
</thead>
<tbody>
<tr>
<td>Published in an academic journal, described also as refereed or peer-reviewed.</td>
<td>Published in a popular, general interest, or news magazine.</td>
</tr>
<tr>
<td>Author is an expert on the topic or a scholar.</td>
<td>Author may be a lay reporter.</td>
</tr>
<tr>
<td>The piece is written to a specialized audience of peers or students.</td>
<td>The audience includes the general audience.</td>
</tr>
<tr>
<td>Includes: in text citations of sources or footnotes, and bibliography</td>
<td>Sources may not be cited formally.</td>
</tr>
<tr>
<td>Vocabulary is complex and technical</td>
<td>Vocabulary is familiar, non-technical.</td>
</tr>
<tr>
<td>Graphics are used to illustrate a point</td>
<td>Graphics are used for visual impact.</td>
</tr>
<tr>
<td>Titles may include the words <em>Journal</em>, <em>Review</em>, or <em>Annals</em>; and/or refer to a field of study.</td>
<td>Titles are often general, usually catchier.</td>
</tr>
<tr>
<td>Examples: <em>Anthropology &amp; Education Quarterly</em>, <em>Journal of Higher Education</em></td>
<td>Examples: <em>People</em>, <em>Newsweek</em>, <em>GQ</em></td>
</tr>
<tr>
<td>Published monthly, quarterly, semi-annually, or annually</td>
<td>Published weekly or monthly.</td>
</tr>
</tbody>
</table>

[https://dornsife.usc.edu/writingcenter/handouts/](https://dornsife.usc.edu/writingcenter/handouts/)
Proprietary Access: USC Libraries pay for access to various databases

SERVICE ALERT: As of July 9, 2018, everyone on campus and off will need to log in with USC NetID credentials in order to use online journals and databases through the USC Libraries. Learn More
• Finish assignment for homework
• Bring it to cohort-wide meeting on Friday 6/28/19
Library Session Next Friday 6/28

With Cari Lyle and Dr. Shalini Ramachandran

9:30am – 1:30pm in LVL 17 Basement of Leavey Library
MATLAB next week!

• Tuesday 6/25/19 – Part 1
• Wednesday 6/26/19 – Part 2
Welcome Prof. Zavaleta!
Annotated Bibliography Assignment – Due 7/18

As you participate in the research process here in SHINE, you are refining important skills by researching scientific literature on a topic that interests you. Starting in Week 1, you have been reading peer-reviewed studies assigned to you by your professors. Next Friday (7/6) and Monday (7/9), we will meet with Science Librarians Shalini Ramachandran and Sheree Fu to learn how to use the USC library database plus some proprietary databases. Their aim is to prepare you to conduct your own literature searches and delve more deeply into your area of SHINE research or any research topic that interests you. The databases you will explore are convenient sources of published literature, but access to them also costs money, so you will need to have access to an institutional subscription, which USC provides. Your Ph.D. mentors can help you access these special databases—just ask for help. You can also ask mentors about how they themselves conduct a literature search, which databases they find useful, and how they use a literature search.

On Wednesday, July 18, we ask you to please submit an Annotated Bibliography of 2 – 3 sources you found that interest you. If you’d like, you can search the databases for more studies by your professor or Ph.D. student mentor, or you can look up a reference in any of the articles you have already read, or you can look up an entirely different field to satisfy your curiosity about other areas of research. It doesn’t matter what you select for your topic. Next, we want you to learn what an Annotated Bibliography is and practice writing one. This skill is widely applicable: you will use it when you create a poster for the final Poster Session and you’ll use it in college and beyond. Here are some links that explain writing Annotated Bibliographies, their purpose, and their format. The format for citations we use in science is APA (American Psychological Association), and every single comma, period, capital or lower case letter is specific. But don’t worry, because all the links below grant you access to sites that can help you format your references correctly using APA style.

By practicing creating an Annotated Bibliography and using APA format, you will be ahead of the curve even as a first year college student, which is when these skills are usually taught.

https://owl.english.purdue.edu/owl/resource/614/01/
http://guides.library.cornell.edu/annotatedbibliography

Upload your Annotated Bibliography here by July 18, naming your file in this way: LAST NAME – Annotated Bibliography 2018: https://uscviterbi.qualtrics.com/jfe/form/SV_enCTa4CzLbMLTuJ

Open office hours with Dr. Herrold – Wednesday 7/11 from 10-11 and Thursday 7/12 10-11 at Tudor Hall Café (RTH). Stop by and say hi, let me know how the research is coming along, ask any questions, check in!
Annotated Bibliography on topic of your choice: Due Wednesday 7/17

Sample APA Annotated Bibliography


Ken Battle draws on a close study of government documents, as well as his own research as an extensively-published policy analyst, to explain Canadian child benefit programs. He outlines some fundamental assumptions supporting the belief that all society members should contribute to the upbringing of children. His comparison of child poverty rates in a number of countries is a useful wake-up to anyone assuming Canadian society is doing a good job of and/or protecting children. Battle pays particular attention to the National Child Benefit (NCB), arguing that it did not deserve to be criticized by politicians and journalists. He outlines the NCB’s development, costs, and benefits, and laments that the Conservative government scaled it back in favor of the inferior Universal Child Care Benefit (UCCB).
Development of Multi-Electrode Neural Probes for Rat Hippocampal Recordings

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University of Southern California, Department of Biomedical Engineering

Introduction
The primary purpose of MEMS is to engineer extremely minute technology which can be implemented in the medical field. Our research objective is to facilitate a neural probe designed to observe the neural network responsible for the formation of memories in the hippocampus. The process to create a device capable of recording electrical signals within a rat's brain is a long and complex process. We created neural probes using the process of photolithography. We designed and fabricated flexible, multi-electrode Parylene probes to record spikes from the CA1 and CA2 regions of the rat hippocampus. This array of eight, custom, flexible neural probes with eight recording sites per probe, targets particular hippocampal cell layers. The array also enables long-term high-frequency recordings of rats as they interact with complex, environmental spatial cues. The flexibility of the probes enables better integration with surrounding brain tissue and decreases any damage to neurons when compared to damage caused by metal microwires. Since the probes are flexible, they may be temporarily stiffened in order to insert into brain tissue. The research utilizes a block of biocompatible adhesive, Polyethylene Glycol (PEG), to temporarily decrease the effective length of the probes, enabling them to penetrate brain tissue. In parallel to helping to develop an effective insertion technique, I designed and fabricated a printed-circuit board to connect the electrical traces on our probe to the appropriate electrical recording system.

Objectives
1. Fabricate flexible neural probes:
   - Making probes is a traumatic event for the brain, which causes a scar and dead zones to form around the recording sites and limits the probe's ability to obtain neural signals.
   - Using a more flexible material, rather than the traditional metal substrates, can alleviate this damage.
   - We use Parylene, a UASP Class VI material that is flexible and biocompatible to construct the devices.

2. Test various techniques to provide temporary stiffness to neural probes:
   - Flexible probes must be temporarily stiffened during insertion in order to penetrate brain tissue.

3. Design a printed-circuit board to connect probes to electrical recording system:
   - We will be using software to design our printed-circuit boards, which will be part of our electrical connection scheme.

Neural Probe Fabrication
- Probes were manufactured using photolithographic techniques (Fig. 5).
- Parylene served as the base insulator and sputtered insulation for our devices.
- Platinum electrode recording sites, traces, and contact pads will be holographically patterned on top of the base layer using a beam deposition at a thickness of 2,000 Å, followed by lift-off.
- Electrodes and contact pads will be subsequently exposed by DRIE and the probes will be cut out from the substrate.

Research Process

Optimizing Insertion of Probes into Brain
- Temporary stiffening techniques range from coating probes with a displaceable, biocompatible stuffer to using microscaffolds to support the probes during insertion.
- We evaluated the use of Polyethylene Glycol (PEG) blocks to temporarily stiffen flexible probes during insertion into brain phantom gel (Fig. 9).
- The process of creating these PEG blocks involves the use of molds made from polydimethylsiloxane (PDMS) cut-outs. We used a three-layer mechanism, with the first layer as a base. The second layer served as a cover for our implant tool (black rectangular object). The third layer contained an opening for the PEG to be poured into.
- In collaboration with the Berger lab, we inserted our sham probes into the rats. First, these rats were exposed to sterile and clean. Next, we applied anesthetics to the rat with the correct quantity, ensuring that the rat will have a painless experience.
- The sham probes were carefully positioned above the proper insertion zone.
- We used dental cement to secure the probes in place. When we retracted our insertion apparatus, the probe would remain robust and secure. The procedure was concluded to be successful, as the probes inserted properly without any failures.
- A device was performed to drain the blood by flushing formation inside through the rat's body, known as a perfusion.

Reliability to My STEM Coursework
The research we did at the lab involves heavy use of theoretical knowledge to comprehend. For example, when we were exploring different options of inserting our probes into the brain phantom gel, we came up with the possibility of utilizing magnetics. Background knowledge from my Advanced Placement physics class provided valuable insights. Without this knowledge, I would not have been able to communicate with my fellow peers in the lab. In addition, our lab group wanted to find the force of insertion of the probe. Again, my experience from Advanced Placement physics provided me the ability to suggest mechanics-based solutions to the given problem. Such solutions included the use of an impulse-momentum formula, as well as Newton's second law. The scientific method was also presented to me at a higher level. Overall, my research abilities were greatly enhanced and also increased in formality. In high school, this will give my lab reports an edge compared to my other peers. The scientific integrity of my lab report will increase, due to the overlapping factors between high school and university science. Overall, my background knowledge from high school courses was beneficial in my participation.

Future of Project
The device will undergo many revisions, particularly to perfect the electrodes and traces. After the device is successfully fabricated, it will be tested on a live rat. The device is expected to analyze brain waves and neuron firing in the rat's hippocampus. This beneficial data will contribute to the study of the formation of memories in the brain. Eventually, if the project proves to be efficient, there is a possibility of commercialization. This may benefit millions of lives, including but not limited to, people who suffer from Alzheimer's disease. Other memory-related disorders may also be treated with this device.

Acknowledgements
Dr. Ellis Meng, Ahuna Wellman, David King, Huiying Xu, Craig Timms. Dr. Kate Mills, Luping Wang, Biomolecular Microsystems Lab, Kenny Chee.