George R. Brown School of Engineering
Department of Mechanical Engineering

Rice Computational Neuromechanics Lab Expectations and Policies

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I. Introduction

Imagine a world where neurorehabilitation and orthopedic interventions are custom tailored to the patient, similar to the way suits can be custom tailored to the business executive. Rather than receiving an "off the rack" treatment, each patient receives a personalized treatment fitted to his or her unique clinical needs using a patient-specific computational model. Each model is constructed from the patient's pre-treatment movement, neural control, and imaging data and is used to perform state-of-the-art simulations that predict the patient's post-treatment function. Clinicians combine subjective clinical experience with objective computational predictions to determine which treatment and associated parameters will maximize the patient's functional outcome. In some cases, common treatment options are rejected. In others, less common treatment options are modified to improve their effectiveness. In yet others, entirely new treatment options are designed. The end result is millions of patients whose quality of life and longevity are greatly improved through the use of computational technology.

As a research assistant in the Rice Computational Neuromechanics Lab (RCN Lab), you will play an important role in turning this futuristic scenario into reality. The current emphasis of the lab is on using computational models to maximize a) walking function for individuals undergoing pelvic cancer surgery, knee osteoarthritis rehabilitation, or stroke neurorehabilitation, and b) upper extremity function using rehabilitation robotics for individuals undergoing stroke neurorehabilitation. The primary technical fields used for this endeavor include multibody dynamics, numerical methods (especially optimization), contact mechanics, and computer programming (primarily Matlab and C++).

Contact information for the lab director and the lab is listed below:

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http://www.getcampusmaps.com/rice-university/ryon-engineering-laboratory/

II. Expectations

A. Academic performance

1. Grades

Students in the lab are expected to perform well in all of their courses. We want other faculty in the department to view the students in our lab as some of the best students in the department. One of the best ways to achieve this goal is for every student in the lab to perform well in every course. While it may not be possible to obtain an “A” in every course, I expect every student to give his or her best effort in each course taken.

2. Attitude

All students in the lab are expected to relate to their professors with the utmost respect and with a positive attitude.

3. Honesty

Every student in the lab is expected to behave with the utmost integrity and honesty in all academic endeavors. Cheating of any kind will not be tolerated in the lab. Any student caught cheating on an exam or course assignment will be dismissed from the lab, including loss of funding.

4. Courses

To be updated based on the graduate course offering at Rice.

B. Research performance

1. Progress

The most important yardstick of your research performance is research progress. Each research assistant in the lab is expected to make significant research progress each semester. Expected progress will be discussed and agreed upon between you and me at the start of each semester, and expectations will be based on the amount of time available that semester for research (i.e., coursework or teaching assistant responsibilities will reduce expectations). When research goals are not met, we will discuss the situation in light of the additional performance expectations listed below. Our goal will be to determine whether poor progress was due to unavoidable circumstances, poor communication or advising on my part, or poor performance by the research assistant. My goal is to provide each student with whatever resources and support he or she needs to be successful in research. *The renewal of the research assistantship each semester will be contingent upon demonstration of satisfactory research progress at the semester review meeting.*

2. Motivation

Every research assistant in the lab is expected to be self-motivated. The best PhD students push their projects forward on their own and do not require me to push them. If I have to motivate you to make research progress, then the PhD program is not for you. I do not have the time or energy to push forward underperformers in the lab.

3. Independence

One of the biggest limitations you will encounter in your research is my availability. Unfortunately, faculty members have a wide variety of time pressures (teaching, research, administrative service, graduate student supervision). Most of these activities are valuable, and graduate student supervision is one of the activities that I enjoy the most. However, if you wait until you can meet with me to discuss a problem you are encountering with your research, it will take you a long time to resolve each problem. Instead, my goal is for each research assistant to learn to work independently without my supervision to the fullest extent possible. This goal means that you will need to learn to take initiative to resolve problems on your own. Some suggestions for how to resolve research problems without my assistance are provided in the next section below.

My hope is that each of you will learn how to work independently and think creatively to solve whatever problems you encounter in the course of your research. I am here to help as well, but my goal is that you will be able to use your own problem solving skills to resolve the majority of issues that you encounter in your research.

4. Resourcefulness

Research is full of obstacles that will prevent you from making progress. When you hit an obstacle, I expect you to think through all of the different ways that you could resolve the problem on your own. Then I expect you to try each possibility, and repeat the process until the problem is resolved. A specific suggestion for how to do this is as follows:

1. Make a list of three possible approaches that you can take to resolve the problem or understand it better (e.g., search the web, read a book or journal article, talk with other students in the lab, attack the problem using two different approaches).
2. Try each possibility, and make detailed notes on what you learn.
3. Based on what you learn, make a new list of three possible solution approaches, and repeat the process.

When you meet with me to discuss problems you are having in your research, the first thing I will do is ask to see your lists of possible solutions and what you learned by trying them. In many instances, you will be surprised to learn that you will be able to resolve your problems on your own without my assistance. That said, I am glad to provide assistance when necessary, and I realize that you will not be able to resolve every research problem by yourself.

5. Responsibility

Your research progress is ultimately your responsibility. If there is something that you need to move forward with your research (e.g., software, a journal article), figure out on your own how to get it. Most journal articles can be downloaded for free through the Rice library website (library.rice.edu – off campus, connect first using Rice VPN). Software or other items can be purchased using my work credit card (I will provide the number as needed). If there is a problem that is blocking you from moving forward, figure out how to resolve it. Again, do not wait for me to figure things out for you. Make your best effort to keep your research moving forward on your own, and I will be glad to help you when you are truly stuck.

6. Cooperation

There is a great deal of knowledge available from other students in the lab. Older PhD students are expected to help the newer students with questions and other "ramp up" tasks. At the same time, newer students are expected to be sensitive to the time constraints of older students, especially as they approach graduation. Overall, I want the lab environment to be a mutually supportive one.

Cooperation also means contributing to the general upkeep of the lab. Upkeep includes basic issues such as vacuuming the floor, cleaning up the lab area, working with IT Support to have software on the computers updated, or maintaining the automatic backup system in the lab.

7. Integrity

As with course work, each research assistant is expected to maintain the highest standards of integrity in your research work. The falsification of data, improper data selection, use of another person's work without permission, plagiarism, and any conduct that intentionally misleads constitutes scientific misconduct. Any student who knowingly engages in scientific misconduct is subject to dismissal and may also be subject to university regulations and penalties.

III. Policies

A. Time

1. Work hours

Graduate students in the lab receiving a paid salary, either from a grant obtained by me or a scholarship/fellowship provided by the University or some external source, are considered employees of Rice University under my supervision. As such, you are expected to work *a minimum of* 40 hours per week, just like any other Rice University employee. In reality, you will normally work much more than 40 hours per week as I do. During the semester, the 40-hour minimum is split between a minimum of 20 hours for research (or 10 hours for research and 10 hours for teaching assistant duties if you are a TA) and 20 hours for class work. Your research time is why you will typically take 9 instead of 12 or more credits per semester. Between semesters, over breaks (e.g., Christmas break and spring break), and during the summer, the entire 40+ hours per week is to be used for research. Note that while Christmas and other breaks are a break from classes, they are not a break from work. In fact, breaks are one of the primary times during the academic year to make significant research progress due to the lack of course assignments and other distractions.

I provide these minimums not because I am going to check up on anyone but rather as basic guidelines so that you can determine if you are putting in the time on your project that you should be putting in. I have found in the past that research assistants sometimes do not view their projects as a priority and so do not put in even this minimum number of hours. However, the reality is that your research project is the primary reason for your funding.

I realize that some weeks will be more difficult than others due to exams and class assignments, so the expectation is that you *average* the above hours *as a minimum*.

2. Work schedule

Given that I expect all students in the lab to be self-motivated and self-directed, I do not require you to work any specific hours but instead allow you to set your own work schedule based on when you find you are most effective. For example, I get my best writing done either early in the morning or late at night. Consequently, I sometimes take time off in the afternoon to do other things, since afternoons are lower productivity times for me. I also do not expect you to work in the lab all of the time. If you are more productive working at home, at the library, in Brochstein Pavilion, or anywhere else, that is fine with me. *Remember, however, that it is results, not effort, that counts.* If you work at home consistently but are unable to make acceptable research progress, then I will require you to work in the lab, where you can get input from other researchers and will have fewer distractions.

3. Vacation

Rice University has no official vacation policy for graduate student employees. Some advisors do not give their students any vacation time, which I believe is unreasonable. I have decided to give every student in the lab two weeks of paid vacation time, to be used whenever you would like subject to prior approval by me (for planning purposes). Two weeks is the standard vacation time in the United States. However, we work hard in academia, so I am happy to consider requests for a third week if I feel you have been making exceptional progress in your research.

Keeping track of your vacation time is done by each research assistant individually on the honor system. I will not micro-manage anyone but will trust the honesty of each of you. I consider the vacation cycle to run on the academic year calendar starting in mid August.

Official Rice University holidays (e.g., Thanksgiving Day, Christmas Day, New Year's Day) can be taken off and will not count against your vacation time.

4. Deadlines

When I ask someone to do something for me by a particular time, I mean it. It is not a suggestion or a request. Basically, I am the employer (hopefully a benevolent one) and the research assistants are the employees being paid to work for my company (CN Lab). Since you are being paid to provide service to the lab, if I ask you to do something for me related to work in the lab, I expect you to do it. If some extenuating circumstance prevents you from doing what I request, I am reasonable as long as you communicate the situation to me.

B. Publications

1. Authorship

In academia, a frequent question is who will be the first author, and what the order will be of the remaining authors, on any journal or conference papers generated by the student. My philosophy on this issue is as follows:

- If you do the work and you write the paper (with my input on both the work and writing of course), then you are first author.
- If you do the work but do not write the paper, and I have to write the paper, then I am first author, and you become second author.
- If you contribute significantly to the work, then you are included as a co-author (the determination of "significantly" is made by me).
- If you do the work and write the paper, but the paper is rejected, and I have to do significant additional work and writing on my own to get the paper published (e.g., because you graduated and were no longer available to work on the paper), then I am first author and you are second author. However, if you perform all of the additional work and writing needed to get the paper published, then you remain first author.

In general, every paper that comes out of the lab will have multiple authors. Author order will be in order of significance of contribution, with the most significant contributors being listed first, and students being listed before professors. My name will typically go at the end of the author list as the corresponding author. Post-doctoral researchers will be treated like professors if they are only advising the lead author and like students if they are also actively contributing to the research (e.g., writing Matlab code,

performing modeling or analysis tasks). Before submission of a manuscript to a journal, I will notify all authors on the author list of the planned authors and order and provide them with the opportunity to suggest changes. The final decision on author order will remain mine.

2. Manuscript preparation

All students in the lab will be required to use the following standards when preparing journal or conference papers for submission:

- Microsoft Word will be used for all text, including the title page, abstract, body of the manuscript, references, and figure and table captions. All of these items will be included in a single Word document.
- All figures will be provided as Adobe Illustrator files. If you generate your figures in a program other than Illustrator, you will need to figure out how to transfer them to Illustrator in a way that the line types and text can be edited in Illustrator. Matlab can export figures as encapsulated postscript (.eps) files that can be read by Illustrator. No figures should be mixed in with the text in the main Word document. If you don't know how to use Adobe Illustrator, now would be a good time to start learning it. Rice provides free Illustrator licenses to all students and staff, so all computers in the lab have it. You can also obtain an Illustrator license from Rice for your personal computer.
- All tables will be provided in a separate Microsoft Word document. No tables should be mixed in with the text in the main Word document unless indicated by journal formatting standards.
- The student who is the lead author will check the journal web site for a manuscript template or required formatting standards (e.g., page size and margins, word count limitations, reference formatting), all items that must be submitted with the manuscript (e.g., copyright transfer agreement, list of suggested reviewers), and any other requirements imposed by the journal.

It will be the responsibility of the student who is the lead author to ensure that all of these guidelines are followed. Please take these requirements seriously. I will return any journal manuscripts or conference papers that do not meet these guidelines, and if we are under a deadline, I will expect you to do whatever it takes (e.g., drop travel plans, miss sleep and/or meals, as I have been forced to do more times than I would like to admit) until the problems are corrected. Details on how to write a journal manuscript are provided in section IV below.

3. Conference travel

Research assistants will be selected for conference travel based on the following criteria: (1) acceptance of paper for presentation, (2) research relevance, (3) research productivity, and (4) availability of travel funds. The student will serve as a representative of CN Lab and is expected to maintain the utmost professionalism. The proper forms for travel authorization forms may be obtained from the research advisor and must be submitted prior to travel. The travel allowance is the standard university allowance.

C. Products

The main products produced by our lab are data, software, computer models, and computational results. All products that you generate or to which you contribute while working in the lab will remain the property of the lab upon your departure. This policy means that when you leave the lab, all of your research products will remain in the lab for use by other students in future projects. This policy is critical since achievement of the lab's goals (as noted in the Introduction) requires that new students in the lab be able to build upon the foundations laid by previous students in the lab. Some lab advisors do not allow their graduating students to take their research products with them to their new positions. I do not agree

with this policy and instead allow my graduating students to take whatever they have developed themselves with them to help them in their future research endeavors. Products that were developed collaboratively with other students in the lab should still be discussed with me if you wish to use them after you leave the lab. Overall, my research philosophy and experience is that sharing of software, data, and models does not result in getting "scooped" by other researchers but rather results in building a positive reputation within the academic research community. At the same time, sharing of research products during and after you time in the lab (apart from research products that you developed solely) should be done only with my prior approval to ensure that the mechanisms of sharing are both strategic and legal (for example, sharing of software, data, and models should almost always be done through a journal publication that can be referenced by those who use these research products for their own research and publications). My NIH-funded Knee Grand Challenge project is a prime example of the effectiveness of this open research philosophy.

D. Operations

1. Data safety

As noted above, the main products produced by our lab are data, software, computer models, and computational results. Consequently, it is critical that everyone in the lab backs up his or her data on a regular basis. A co-worker of mine in industry used to have the following phrase displayed in bold letters on his computer: HARD DISKS DIE!!! The purpose of this display was to remind him to back up his data regularly.

Each student in the lab is responsible for ensuring the safety of his or her research data (software, models, data, results). Back up your data at least every two weeks. We will explore an automated backup system for the lab, but even when such a system is in place, it is important that you perform your own backups on a regular basis in case the automated system fails (which happened to me once in industry – my hard disk died, the automated system somehow missed my computer, and I had not done my own backup – my boss was not happy!).

2. Software distribution

If you receive a request from someone outside the lab for software we have developed in the lab (e.g., Matlab or C/C++ code), models we have developed in the lab (e.g., MotionGenesis/Autolev or OpenSim models), or data we are using in the lab (e.g., gait, CT, or MRI data), please do not respond until you have talked with me. This policy applies during and after your time in the lab, apart from any software developed solely by you during your time in the lab.

I will assess all requests for software, models, and data and determine which ones we can and should respond to. UNDER NO CIRCUMSTANCES IS ANYONE IN THE LAB TO DISTRIBUTE SOFTWARE, MODELS, OR DATA TO ANYONE OUTSIDE THE LAB WITHOUT MY PRIOR CONSENT.

3. Lab security

If you are the last person in the lab, ALWAYS lock the lab door behind you when you leave the lab, even if you are only going down the hall to get a drink or go to the bathroom. I have never had any important items stolen from the lab yet, and I would like to keep it that way.

4. Lab relationships

Rice University is committed to sustaining a positive and caring work environment between individuals in inherently unequal positions of authority. Romantic or sexual relationships between such individuals have the potential to impact the work environment in a negative manner through a conflict of interest, exploitation, favoritism, or an abuse of power. Such relationships are often less consensual than the individuals believe, plus relationships can change such that previously welcome conduct is no longer welcome. Even when such a relationship ends, there remains the risk of actual or perceived bias for or against the former romantic partner long after the relationship ends.

For these reasons, romantic or sexual relationships between individuals in unequal positions of authority are prohibited in the lab, in line with Rice University policies. Within the context of the lab, this prohibition specifically applies to romantic or sexual relationships between post-doctoral researchers/ staff members and graduate/undergraduate students, regardless of any potential similarity in age.

E. Dissertation proposal

This section refers only to PhD students working in the lab. When the time comes to form your PhD dissertation committee, schedule your dissertation proposal, and select your dissertation topic, you are expected to follow the guidelines below.

1. Committee formation

Develop an initial list of individuals inside and outside the department who you think would be worthwhile to have on your PhD dissertation committee. Try to identify faculty members whose research is in some way related to what you are planning to propose, and then share your list with me for feedback. Once we have converged on whom to ask to be on your committee, contact those individuals by e-mail (cc me) with a gracious message letting them know the general research area in which you will be working and asking them if they would be willing to serve on your committee.

2. Committee scheduling

Once you have successfully recruited your committee members, schedule the time and place for your dissertation proposal. Scheduling should be done by creating a Doodle poll (https://doodle.com/en/) for each committee member to complete. The poll should provide no more than two contiguous weeks of meeting time options, where each potential meeting slot should be two hours long. Since only one meeting slot will be selected in the end, potential two-hour meeting slots should overlap by one hour (e.g., 10:00-11:00 am, 11:00 am-12 noon).

3. Topic selection

The goal of your dissertation proposal is to define the scope and specific research efforts for your dissertation project. In essence, your proposal will define the "target" that you will need to "hit" to graduate. To prepare for your dissertation proposal, you should follow the steps below:

a. Identify the general research area for your dissertation project and at least three specific research efforts within that general area where you could potentially make significant technical contributions.
b. Arrange a meeting with me to discuss your proposed general research area and three related specific research efforts.

c. Write up a one-page summary of your proposed general research area and three related specific research efforts.
d. Prepare a 5-slide PowerPoint presentation containing a visual representation of the ideas in your one-page summary. You could include the following slides:
   Slide 1: One introduction/context/motivation slide - why is the proposed work worth doing?
   Slide 2: One overview slide describing three related research areas related to a common theme or goal (should be a figure) - how do the pieces of the proposed work fit together within the larger goal?
   Slides 3-5: Three slides on details of your three research areas (one journal article each to be the main chapters in your dissertation) that fit within the overview - what are you proposing to do in each of the three research areas?
e. Arrange a follow-up meeting with me to give your 5-slide presentation to me and to discuss your one-page summary document.

IV. Writing a Journal Manuscript

A. General principles

1. Plan figures and tables

Plan all figures and tables that you will need to include to make it as easy as possible to tell the "story" that you want to tell in your journal manuscript. You can even sketch figures by hand on a sheet of paper to plan the best way to present your results in a visual format.

2. Develop a storyline

Generate rough drafts of all figures and tables and determine your "storyline," which is the story that you want to tell using your figures and tables. If you cannot explain the storyline of your journal manuscript using your rough figures and tables, then you are not yet ready to start writing.

3. Write manuscript sections in suggested order

A journal manuscript typically has five sections that occur in the following order: 1) Abstract, 2) Introduction, 3) Methods, 4) Results, and 5) Discussion. However, it often works best to write the sections of your manuscript in a different order so as to minimize the amount of re-writing you will have to do. Here is the suggested order for writing:

1) Methods – Explain what you did. You will often have an experimental section and a computational section, and sometimes a statistical section as well. The Methods section is usually very straightforward to write, since you know exactly what you did to perform the research. It is for this reason that I suggest starting the formal writing process with the Methods section.

2) Results – Present what you found WITHOUT any interpretation of your results. Simply present your findings in an organized and logical way. A friend of mine once said, "In the Results section, you report the news. In the Discussion section, you interpret the news." Another way to view the difference is that the Results section should be entirely objective, while the Discussion section should be both objective and subjective.

3) Discussion – Interpret the significance of your results and discuss broader implications of what you found. The first paragraph should always start with a paragraph that briefly reviews what you did and what you find, ending with your first subjective comments about the outcome of the study. What important implications might your findings have? Oftentimes, the last part of the opening paragraph will contain a sentence that starts out with, "The findings suggest that . . ." You should include paragraphs that compare and contrast what you did with what other researchers did before you, and you should also include a paragraph that provides a discussion of any findings that were surprising or difficult to understand. In the next to last paragraph of the Discussion, you should also include a discussion of the limitations of your study. Finally, in the last paragraph, provide any high-level conclusions with which you want to leave the reader. Some journals require a specific Conclusions section.

4) Introduction - The Introduction is often the hardest section of a journal manuscript to write (the Abstract is the other difficult section to write). I try to have my students follow a four-paragraph Introduction formula:
Paragraph 1 – What is the real-life problem to be solved, and why has it not been solved yet?
Paragraph 2 – What are the most common approaches that researchers have used to try to solve this problem, and why have they not succeeded?
Paragraph 3 – What is a promising new approach for attacking this problem, and what information from previous studies suggests that this new approach could be helpful?
Paragraph 4 – How does this manuscript use this promising new approach to address the original real-life problem? The first sentence in this final paragraph often starts out as, "This study . . . " followed by words such as investigates, explores, proposed, or seeks to develop.

5) Abstract – The Abstract is the other difficult section to write. The Abstract should start out with one or two sentences that explain the real-life problem and why it has not been solved yet. The next sentence should provide a high-level description of what we do new or differently in the current study to address this problem. The next few sentences provide a high-level overview of what was done for the study. The subsequent one or two sentences present the results again from a high level. The final paragraph is a subjective statement about the potential value or utility of the results and often starts with "These results suggest that . . ."

4. Write a topic sentence for every paragraph

Start every paragraph in your journal manuscript with a clear topic sentence that introduces the reader to the content of the paragraph. Before writing large chunks of text, write an initial topic sentence for *every* paragraph in the section on which you are working. You can modify each topic sentence later as you flesh out the text of your manuscript, but for now, these topic sentences will help you plan the material that you will present in that section.

5. Create a bulleted list of ideas under each topic sentence

Under each topic sentence, create a bulleted list of ideas that need to be included in that paragraph. Don't worry about the order of the ideas initially – just get all of the ideas that need to be covered written down. Once you have completed a bulleted list of ideas under a particular topic sentence, re-arrange the order to create a logical flow of ideas in the list.

Congratulations! You now have the "skeleton" for writing your journal manuscript. Now all you have to do is put flesh on your skeleton and fill out your ideas.

6. Write a concluding sentence for each paragraph in the Introduction

Like in the rest of the manuscript, every paragraph in the Introduction should begin with a clear topic sentence. However, unlike the rest of the manuscript, it is often helpful to end each paragraph with a concluding sentence that naturally leads the reader to the topic sentence of the subsequent paragraph. This approach gives the Introduction a logical flow that is easy to follow. By following this approach, you are basically building your case for why the research presented in the manuscript was both necessary and valuable.

7. Write mostly in the passive voice

Different labs have different opinions on whether journal manuscripts should be written primarily in the passive voice or the active voice. I prefer that manuscripts in the lab be written primarily in the passive voice. However, there are times when it is necessary to write in the active voice, so most manuscripts will have at least a few sentences written in the active voice. A common example is a sentence that begins with "To do such and such, . . ." Only people can "do such and such," so the next word in this sentence will typically need to be "we," though something like "this study" could also be an option in some cases. "To do such and such, a complex simulation method was used" would not be a correct sentence, since "a complex simulation method" cannot, on its own, "do such and such." This sentence would need to be re-written as, "To do such and such, we used a complex simulation method."

B. Journal selection

Before filling in your manuscript "skeleton," identify the journal to which you plan to submit your manuscript. This step is important since different journals have different length and formatting requirements. Some journals even provide a Word document template that must be used as a starting point. Try to identify a journal with a high impact factor. Most journals in our field have impact factors in the range of 1.7 to 4 – the higher the better. A good way to identify an appropriate journal is to look through the list of references from your manuscript and identify journals where other researchers working in a related area have had their research published. Journal impact factors can be found at https://jcr.clarivate.com. Note that you must be connected to the Rice Owls network, either directly or through Rice VPN or Rice EZproxy, to access this information.

C. Manuscript feedback

Before doing any major writing, you should develop the initial "skeleton"of your manuscript by formulating all headings and subheadings and writing a topic sentence for every paragraph that you plan to write. At this point, STOP. DO NOT PASS GO. DO NOT COLLECT $200. Arrange to meet with me to review and provide feedback on your initial skeleton draft along with all figures and tables. Only after you have implemented my suggested changes should you proceed with the subsequent steps of the writing process.

Once you have completed your first draft of the manuscript, have someone else in the lab read through your entire manuscript to provide feedback based on the guidelines above. Does every paragraph start with a clear topic sentence? Does the concluding sentence of each paragraph in the Introduction provide a logical and smooth transition to the topic sentence of the next paragraph? Are the tasks described in the Methods section clear and easy to understand? Are the Results organized in a logical fashion? Do the

Results only "report the news" and not "interpret the news"? Does the Discussion section provide a subjective assessment of the results, compare the current results with findings published in other studies, explain any surprising or difficult-to-understand findings, and state study limitations? If you are working under the direction of a post-doctoral researcher in the lab, then have that individual read through your manuscript to give you feedback. If you are not working under the direction of a post-doctoral researcher, then have another PhD student in the lab read through the manuscript and provide comments.

Once you have updated your manuscript to address the comments you received from another researcher in the lab, you will arrange the first
to meet with me on three separate to discuss your manuscript draft verbally. This approach is much more efficient for both you and me than having you e-mail the manuscript to me and then waiting for me to make extensive editorial comments and changes to your manuscript draft.

Note that I will provide feedback in three phases, where each phase will be covered during a separate meeting with me. In the first phase meeting, I will provide high-level feedback along the lines of the questions in the previous paragraph. You will then 1) create and e-mail to me a bullet list of changes that you need to make to your manuscript, and then 2) update your manuscript to address my first-phase comments. Then in the second phase meeting, I will first make sure that you completed all of the changes in your first phase bullet list, and then I will provide low-level feedback on more detailed writing issues. After you finish updating the manuscript to address my low-level comments, you will e-mail the manuscript to meI will give the manuscript one final look before we submit it.

As you can see from this description, the journal manuscript writing and editing process is a substantial amount of work! But unless we publish the research we perform, it will never become useful to other researchers or for the ultimate health-related applications where we hope it will be used.

D. Manuscript revisions

I have never heard of a journal manuscript that was accepted with no changes on the first submission. Consequently, you should always expect the reviewer to require at least a small number of changes. If a reviewer asks for a large number of changes but the requested changes are clearly made in the spirit of making the journal manuscript better, then that's a good thing, even though it takes more work. On occasion, you will get a reviewer who realized the manuscript is good enough to be published, but clearly does not want it to be published, as evidenced by unreasonable critiques or requests for changes.

In all cases, responses to reviewers should be gracious and tactful. It does no good to get a reviewer mad at us! At the start of each response to each reviewer critique, start with a topic sentence that acknowledges the reviewer's comment in a positive way. Wherever possible, try to do what the reviewer asks. If you do what the reviewer asks, then you can pretty much be assured that the reviewer will not bring up that issue again.

In some cases, what the reviewer asks would take a huge amount of work and, in our opinion, would not improve the manuscript. In such cases, I suggest responding along the following lines. "[Topic sentence acknowledging the reviewer's comment.] While it would be possible for us to perform the additional analyses requested by the reviewer, we do not believe that inclusion of those additional results would improve the manuscript. [Now graciously describe why not.] If the reviewer still feels strongly that these

additional results are critical to the manuscript, we would be glad to include them in the next revision. In that case, we would welcome additional input from the reviewer to help us explain in the manuscript why these additional results are relevant and important to include." Nine times out of time, when you give a response along those lines, the reviewer will not make you do the additional work (though one time out of ten he or she will still make you do it).

In some cases, you may feel that a reviewer's comment is invalid. In such cases, try to put yourself in the reviewer's shoes so that you can understand why he or she made the comment. Then when you acknowledge the comment at the start of your response, you can do it in a way that demonstrates you heard the reviewer and took the comment seriously. Invalid comments often arise for issues that go beyond the scope of the manuscript. A response along the following lines often works well in such cases: "[Acknowledge the reviewer's comment.] However, the current manuscript is focused on [describe the focus of the manuscript], and consequently, [the reviewer's critique] goes beyond the scope of the current manuscript. That said, this issue would be valuable to address in a future study, and a statement along those lines has been added to the Discussion section of the manuscript." Reviewers like such a response since their critique is still addressed in some way in the revised manuscript. Invalid comments can also arise simply because the reviewer is wrong! In such cases, it is okay to stand your ground and argue logically, graciously, and tactfully for why the comment is not correct. Sometimes your role in the responses is to educate reviewers on concepts that they may not understand well. Again, if you can somehow incorporate the reviewer's comment in the Discussion section, even if the comment is inaccurate or incorrect, then reviewer will look more favorably on the response.

When revising a journal manuscript, you should follow the process outlined below:
1) Lead author creates a Word document with all of the reviewer critiques in it.
2) Lead author meets with PhD advisor(s) to discuss the critiques and ideas for responses.
3) Lead author takes the first pass at writing a response to every reviewer critique. When describing changes to the manuscript in the response, the lead author should write as though the indicated changes have already been made. In fact, it is a good idea to include the text of the changes in the responses document.
4) Lead author circulates the proposed responses to reviewer critiques to the co-authors for feedback.
5) Lead author meets with PhD advisor(s) again to discuss feedback from co-authors and to finalize the responses and manuscript changes.
6) Lead author takes the finalized changes described in the responses document and copies and pastes them into the revised manuscript with Track Changes turned on to help the reviewers see where changes were made. This step should be completed ideally at least two weeks before the resubmission deadline to give the PhD advisor(s) time to perform the next step.
7) PhD advisor(s) performs any necessary editing of the revised manuscript to address any remaining organizational, writing, or grammar issues.
8) Lead author circulates the advisor-revised manuscript to any co-authors who wish to comment on it before resubmission.
9) Lead author addresses co-author comments in revised manuscript, reviews final changes with PhD advisor(s), and submits the revised manuscript along with responses to the reviewers.

E. Additional comments

Two additional comments may be helpful for this section. First, these recommendations for how to write a journal manuscript were developed specifically for technical manuscripts. At times, individuals in the

lab will also write clinical manuscripts based on analysis of clinical data. Clinical manuscripts will follow a different pattern for the Introduction, and the Methods section will have a different emphasis.

Second, the Resources page on the lab website (http://rcnl.rice.edu/resources.html) contains three helpful documents that provide further suggestions on how to write a journal manuscript. Please read all three of these documents before you embark on writing your own manuscript.

V. Conclusion

I believe that the expectations and policies listed above are very reasonable. If you have any questions about any expectation of policy, please let me know. I have developed these guidelines gradually over several years, but they are continually evolving as the lab moves forward. I would welcome any comments on how we can make things work better. I want each of you to have a rewarding experience working in the lab, and my goal is to do whatever I need to do on my end to empower each of you to be successful in your projects.