

HONORS EXPERIENTIAL LEARNING PROJECT PROPOSAL FORM

Basic Information

Full Name: Batsheva Serota

UC Email: serotabr@mail.uc.edu

College: A&S

Major: Psychology

Title of Project: Tap With Me: Interpersonal Motor Coordination and Sequence Learning

Thematic Area: Research

Expected Project Start Date: January 30, 2013

Expected Project End Date: August 30, 2013 + potential conference in summer semester

Project Information

1. Provide a detailed abstract of your proposed honors experiential learning project.

For this project, I will be investigating the implications of social coordination and motor learning.

Project description: I will be conducting a study investigating the effects of interpersonal movement coordination on implicit motor learning and social connectedness. Using a touch-screen table-top display, participants will be instructed to tap small blue targets in a specified sequence together with another co-participant. The tapping sequence will be specified to one of the two participants (i.e., the “leader”) by indicator lights situated above one of the participant’s target locations (the “follower” will not be able to see these indicator lights). The tapping sequence will consist of 550 taps that will either be completely random or will contain an 8, 10, or 12 sequence pattern that will be continuously repeated. Participants will be instructed to complete the sequence at a self-selected pace, while coordinating their taps/movements together. Of particular interest is whether (aim 1) participants implicitly learn the imbedded motor sequences and (aim 2) whether this learning occurs for the follower via interpersonal coordination (i.e., does the follower learn the sequence as well as the leader). Accordingly, the participants’ tapping movements will be recorded during the experiment to measure (1) whether their tapping movements become faster over the course of a repeated sequence trial compared to a completely random sequence trial and (2) whether this increase is correlated with the stability of the interpersonal coordination that occurs between co-participants. A group of individual participants will also complete the experiment alone in order to obtain a baseline measure of motor sequence learning.

The experimental design will be a 2 (Group: individual vs. interpersonal) x 4 (Sequence: random sequence or an 8, 10, 12 repeated sequence) design. The experimental measures will be inter-tap interval and between participant asynchrony. Participants in each group will complete 4 trials, one for each type of sequence. 12 individuals and 12 pairs will participate in the study (36 total). All of the equipment necessary for the study is kept in my advisor’s (Dr. Richardson) Perceptual Motor Dynamics Laboratory in the Department of Psychology and will be available for this project.

Project significance and implications: Social motor coordination increases rapport and reduces perceived social differences and prejudice. Social motor coordination is important to how we share time with others and can break down in pathologies such as premature birth, autism, and schizophrenia. Given its broad ranging impact, understanding the processes by which social coordination occurs and what implications it has for interpersonal connectedness is important and has implications across a wide range of disciplines (e.g., cognitive science, perception-action psychology, social psychology, clinical psychology, movement science, human-computer and robot interaction).

The itinerary throughout my project will involve the following steps:

1. Conduct a background literature review on social coordination and motor learning.

2. Pilot test the study procedure and learn how to use the necessary lab equipment (i.e., tabletop display, motion tracking equipment).
 3. Collect and analyze the research data.
 4. Write a final research paper and submit for publication.
 5. Present work at a national conference over the summer.
 6. During steps 1-4, I will also be reflecting on the research in a lab notebook
- *My time commitment for this project will be 10hrs/week for 30 weeks.**

The main goal of this experiment is to study how individuals coordinate with each other. I have always been interested in social psychology, which, in a nutshell, studies how the behaviors of those around us affect our behavior. This experiment tests this phenomenon at the most basic level, through examining how our movements synch up with others' movements without us even realizing it. This, to me, is fascinating, so from this project I hope to get a better look into the extent of how we coordinate in a social setting with other people. I will use what I have learned via this research to investigate through naturalistic observation how often we coordinate with others in a social setting. This will allow me to see firsthand the implications of this research in every day situations.

This project is personally meaningful to me because it will finally give me a chance to take the reigns and conduct my own research study, from collecting participants to sharing what I have learned. I plan on applying to graduate school for clinical psychology, which will involve a significant amount of research, contact with statistical software, and paper writing skills—this project will help me develop the skills so that I can be successful with all of this. This will not only give me experience that will be useful in graduate school, but it will also bring me one step closer to my goal of running my own research lab. Running my own research experiment will provide me with the independence and control so that I will be able to take initiative when I am following through with my career aspirations.

I am also passionate about helping my fellow students achieve their academic goals. I have done so in the past as a Supplemental Instruction Leader (SIL) through holding psychology review sessions for students, and I am also achieving this goal as a RECON mentor. By conducting and completing this research study, I will be able to provide the students I teach and mentor with more advice and information. For the SI program, specifically, I will be able to gain insight into empirical methods of conducting data that I can share with my students. By having concrete examples, they will be able to have tangible examples of the terms they are learning in the textbook, which is important when applying concepts. In terms of my work as a RECON mentor, this project will allow me to provide students with examples of experimental research available on campus as well as give them advice for how to get into a research lab and do a good job taking initiative and demonstrating their professional competencies.

Clearly and thoroughly address how each of the following elements will be exhibited in your work:

2. Connection to Learning Outcomes within the Honors Thematic Area (identified above)

As a research assistant at the Perceptual Motor Dynamics (PMD) Laboratory, I have certain responsibilities and tasks that I personally have that help keep the lab running smoothly. It is my job to take participants, which is essential in order to get data for analysis. I also attend weekly lab meetings in which the team and I can update each other on our experiments—this allows me to share my work with others in addition to learning more about the lab by hearing about other projects. By hearing about what other researchers are working on, I can use this knowledge to learn more about motor dynamics and the research involved. As a research assistant, I have to maintain a level of professionalism, reliability, and organization. Because a research assistant is the most important position that an undergraduate student can hold in a psychology research lab, there is a large amount of responsibilities and expectations included in the job that are held to a very high standard. These expectations involve a variety of tasks, but the most important of these is helping the professor and graduate students manage the lab in whatever ways they need.

Because I am starting my research by reading past articles relating to interpersonal coordination and motor control, I will be developing an awareness of literature in the relevant fields before I start collecting data—this will also allow me to come up with a proper research question and hypothesis. The research I will review involves motor learning, social coordination, interpersonal synchronization, and joint action. A thorough understanding of past research will allow me to better understand the experiment as well as get the solid background knowledge needed to write a research paper.

Another learning outcome I will achieve is applying appropriate methodologies to design a complete research study and collect and analyze data, because I will be investigating what methods and equipment I can use to collect the most relevant data that I can. Not only that, but I will become familiarized with the process of running undergraduate research participants through the experiments. Running participants involve a series of steps, which include the following:

1. Inputting available times into the SONA system via a researcher account
2. Setting up the experiment (getting equipment & materials ready) before participants arrive
3. Pick up the participants and bring them into the room where the study will take place
4. Read participants a script about the instructions for the experiment
5. Have participants sign a consent form & record the participant numbers
6. Run the experiment
7. Debrief the participants and answer any questions they may have
8. Record the data
9. Approving students' research credit on SONA

I will also learn the mathematical and statistical techniques needed to perform a data analysis; getting acquainted with typical statistical software (e.g. SPSS) is an important part of this process. My advisor will assist me in looking at the data analysis and helping me decipher it; this will help me figure out how to connect the quantitative, numerical data that I collect with an actual psychological phenomenon. The main part of the data analysis is to help me see how the numbers we collect connect to what actually happened in the experiment.

Finally, I will disseminate the research results and the knowledge gained through a research paper and a poster presentation. Writing a research paper will give me insight into the process of writing up a the results and analysis of a research experiment, as well as teach me how to connect past research with the current data findings. Completing a poster presentation will give me important practice in taking a whole research project and condensing it into a single poster, picking out the most important parts and applying it to real life. By doing this, I will also gain experience relaying my research to an audience.

From this experiment I hope to not only learn the specifics of the research process, but also be able to take what I have done and use it to learn more about how humans coordinate in a social environment. Therefore, I will be able to use my knowledge to look past the research and see how social coordination plays a part in our everyday lives, whether it be through menial tasks, just walking around, or simply having a conversation with another human being.

3. Connection to Goals and Academic Theories

I will be applying to graduate school in the field of psychology within the next year, so research experience is an important part of being prepared for this type of degree. By following through with this project, I will not only gain experience running a research study and taking participants, but I will also gain knowledge regarding how to turn collected data into a cohesive and complete research paper. This is directly related to my professional development because I hope to run my own lab someday. Because of this, my project will lay the groundwork for my research experience and help me achieve my goal.

Through the completion of this project, another one of my goals is to be able to better assist the UC students that I work with in the SI program as well the RECON mentor program.

One of my professional aspirations is to become a professor, so I try to get as much experience as possible working with students. As an SIL, I hold review sessions for students in introductory psychology. Through the completion of this project, I will be able to learn new things about research methods that I will be able to share with my students. That way, they can understand the research methods in psychology as well as what processes are involved when conducting research in a more applied way, as opposed to just reading the textbook.

This project directly relates to my role as a RECON mentor, which involves getting undergraduate students connected with research opportunities. While I work on this project as well as after I finish it, I will be able to use what I am learning and doing to demonstrate to students not only what research at UC can involve, but also the amount of work, initiative, and dedication it takes to follow through with an independent research project. This is personally valuable to me because I greatly enjoy helping my fellow students succeed.

Below are a few articles I will be reading so that I will have a solid background on social coordination before I begin collecting data— I will review approximately 20 to 25 published articles/chapters for this project in total. I will use the library's website to search for peer-reviewed journals in addition to reviewing the research that my advisor and his graduate students have already done on this topic. Each of these articles/chapters will be related to motor learning, joint action, interpersonal coordination, and synchronization of actions, including the works listed below.

Coe, C. A., Varlet, M., & Richardson, M. J. (2012). Coordination dynamics in a socially situated nervous system. *Frontiers in Human Neuroscience*, 6, 1-12.

The above article, co-written by my project advisor, explores the notion that neural processes should not necessarily be the go-to explanation for social behavior. This relates to the current study because they both involve exploring the processes by which social coordination occurs.

Schmidt, R. C., & Richardson, M. J. (2008). *Dynamics of interpersonal coordination*. In A. Fuchs, & V. K. Jirsa (Eds.), *Coordination: neural, behavioral and social dynamics* (pp. 281–308). Berlin, Heidelberg: Springer.

The above article serves as a review of the workings of interpersonal coordination, which provides a solid informational base for under social movement and synchronization.

Sebanz, N., Bekkering, H., & Knoblich, G. (2006). Joint action: Bodies and minds moving together. *Trends in Cognitive Sciences*, 10, 70–76.

The above article explains joint action and indicates experiments in which it is studied. Reading this will give me insight into what other methods are used to study motor learning and interpersonal coordination.

The topic of coordination dynamics relies upon the theory that social interaction does not merely consist of neural activity influencing all our actions; in fact, there is an alternative explanation that involves the body working *with* the mind to produce joint action and synchronization. I hope to learn more about this theory throughout my research both in the lab and by reading past studies.

4. Initiative, Independence, and Creativity

About a year ago, I decided to switch my major from biology to psychology. This was a huge step for me, mainly because I was always so set on going to medical school after graduation. Once I did this and

realized I was about to hit my third year at UC, I knew that I had to get the ball rolling to figure out what job opportunities were out there in the field of psychology. Once I was pretty much set on graduate school for clinical psychology, I understood that I would need to get some research experience—fast. Once I secured a teaching assistant position with a member of the psychology faculty (who, incidentally, was one of the reasons I switched my major), I immediately asked him for advice. He pointed me in the direction of a language cognition lab, where I worked for a semester. However, I knew this was not enough experience, so I emailed a graduate student who taught my Research Methods course, and she happened to work for Dr. Mike Richardson. He was incredibly helpful and enthusiastic about helping me get published. I indicated that I was confident that I would be able to take the reigns on my own project, and in a few short weeks I got the ball rolling on this tapping project. Because I knew what was required of me in terms of graduate school admissions, I was able to take the initiative to get some research experience, and ended up here, running my own project.

I will be demonstrating independence during the actual research process in this project for several reasons. First of all, I will be conducting background research about motor learning and social coordination, which will involve actively searching for related articles and publications as well as closely reading them and incorporating them into my own project design. I will use the libraries website, Google Scholar, and other academic websites to find articles related to the topics at hand—I will also be looking for research done specifically by my advisor. Not only that, but I will be collecting data and running participants on my own. I will also be independently writing and editing the first draft of the research paper for publication so that I will fully understand the consequences and relevancy of the current experiment, in addition to gaining experience disseminating a research project.

5. Reflection

I will be keeping a lab notebook as I run participants so that I can demonstrate and reflect on what is working well, what is not working, challenges I face, as well as things that stand out. I will also indicate what surprising, shocking, and challenging things I discover while conducting a research experiment as I go along. Since I have never completed a full-on research study before, all the way from running participants to analyzing the data, I am sure that I will learn many new things that I will reflect upon as I get my project up and running, all the way through the final dissemination. The purpose for keeping a lab notebook is two-fold. The first reason is to document everything for my own future reference as I begin analyzing the data and writing the paper. The next reason is much more dynamic—I plan on keeping a journal where I can reflect, as well, in which I will detail how this research will allow me to help other undergraduate students.

The main question I will keep in mind as I write my reflection is, “In what way will I be able to use my research experience to help my fellow students?” I will do this in two ways—through my work with the Supplemental Instruction (SI) program as well as through my role as a RECON mentor.

As a Supplemental Instruction Leader for an introductory psychology course, I strive to give my students real-life examples so that they can learn to apply their knowledge and answer application questions on an exam. Through the completion of this project, I will be able to do this in several different ways. Firstly, introductory psychology, of course, extensively covers research methods in psychology not just in one chapter, but throughout the entirety of the book. Therefore, I will be able to use my experiences to teach my students specific ways that data is collected and analyzed in a research setting. I will also be able to explain to my students the concept of experimental research by using real-life examples from my laboratory experiences. Not only that, but I will be able to connect the concepts of motor learning in the sensation and perception chapter as well as social coordination in the social psychology chapter to an actual experiment and data set. This will not only demonstrate to my students the applied nature of psychology firsthand, but it will also allow them to understand ways to answer and understand application questions on exams. So, throughout this project I will indicate which aspects and information I can relay to my students—I will do this in a reflection journal.

In this reflection journal, I will also keep in mind how I can use my experience to enrich my role as a RECON mentor. RECON mentors aid undergraduate students in finding research opportunities. So, I will be able to indicate things that come up throughout my research that I will want to share with the students I mentor, so that they can paint a better picture of what it means to be a research assistant and run a project independently. I will be able to use what I am doing to explain to students how I got where I am today—in charge of my own research project—and how they can get there, too. I can use my own challenges and problems that I encounter to come up with advice that I can give them in the future.

One final thing that I will consider in my reflection is documenting when I see the effects of social coordination in my daily life. One example that I can think of right now is when we walk next to another person we tend to walk in stride with them at the same pace without even realizing it. This is just one example of social coordination in day-to-day situations, so I will keep this in mind when I am writing in my reflection journal, trying to be constantly on my toes and looking for real-life examples.

6. Dissemination

The projects will be written up as a research publication and will be submitted to a peer-reviewed journal. Potential journals and reasons for each particular selection are included below.

- *Journal of Experimental Psychology: Human Perception & Performance*

This journal specializes in action control and perception. This ties into my project because action control involves how we may implicitly coordinate with others.

- *Human Movement Science*

This journal includes any research done on human movement, which includes motor learning and synchronization of actions, which I will be studying in terms of how my participants move to tap the screen.

- *Motor Control*

This journal also examines human movement, which is relevant for the same reasons as *Human Movement Science*.

- *Psychological Science*

This journal publishes research articles that span the entire field of psychology. Social coordination is of particular interest right now in the field of psychology, so this would be an ideal source for publication.

Not only will I be working on publishing an article, but I also plan on presenting the research at a national conference over the summer. My reasoning for wanting to get published in a peer-reviewed journal and presenting at a conference lies upon my hopes for this research to be accessible and relevant. I want my findings to be available to those working in the field of psychology, as well as people specifically studying motor learning and social coordination—these are the professionals who will be able to appreciate and utilize my paper the most. I am choosing this specific audience as an outlet because my research data and analysis will be most relevant when presented to those who are studying similar things. However, although I believe it is important to publish my research so that those in the field can utilize the findings, it is also important to me to disseminate my work to the UC community using other outlets.

There are two ways in which I plan to share my research with the UC community. First and foremost, I will be submitting an abstract to the Undergraduate Research Conference so that I can create a professional poster presentation to share with the rest of campus. In order to do this, I will contact Heather Baker, the program coordinator, and send her an abstract of my project in hopes of presenting at the URC. This opportunity will allow me to share what I have done students interested in research as well as faculty. I am choosing this dissemination form and audience not only because I would like to have

experience presenting a poster, but also because I would like to network with faculty members as well as show interested students what kind of research is out there in the field of psychology. Because joint action is not what people typically think of when prompted with the word “psychology,” I would like to have the chance to dispel these stereotypes and demonstrate the breadth of topics that the field of psychology covers.

The next way that I will share my research with the UC community is through my work with the RECON program as a mentor. As a mentor, I aid students in developing their CVs as well as exploring potential research opportunities. This is a particularly unique opportunity because it will allow me to disseminate and share my research experience not only once it is complete, but also during the project. As I meet with students and discuss research with them, I will be able to share with them what step I am on in following through with a personal research project. This will give me the opportunity not only to share with them the type of research they could end up working on, but also allow me to give them some insight into how I got to the point of being in charge of my own project. Students who are actively seeking mentors are a great audience because they are interested in pursuing research and serious about their education, so I will hopefully be able to use my experience to help them as much as I can.

7. Project Advisor (list the person’s name, title, and contact information)

Dr. Mike Richardson, Ph.D., Associate Professor, Department of Psychology
Michael.Richardson@uc.edu
(513) 556-5592

8. Budget (if applicable)
10 hrs/week, 30 weeks