**Title of Proposal:** Collaborative memory: Maximizing the benefits and minimizing the costs of working in groups

**Description of proposed research project or creative activities.**

We spend most of our lives working, learning, and playing in groups. Despite this being the dominant norm across cultures, cognitive psychology has spent the vast majority of the last 150 years of research on memory looking at how individuals learn in isolation. Only recently have memory researchers begun looking seriously at what happens in the more ecologically valid group setting (usually 3 or more individuals working together on a memory task). The findings show both gains and losses occurring in collaborative groups compared to the isolated individual (For a review see, Rajaram, 2011). Most people report that group work with spouses, family, and friends is advantageous and after working with strangers report that group work with those strangers is just as advantageous (Dixon, Gagnon, & Crow, 1998).

Contrary to this intuition of group recall being superior, collaborative group recall fails to reach the potential of the group members. That is, a 3-person group will have better recall than a single individual, but the group recall never reaches the combined recall of 3 individuals working alone (often referred to as a nominal group and used as a control group in memory studies). This failure to reach the group’s potential is known as collaborative inhibition and is often explained by retrieval disruption. For example, as one group member is preparing to retrieve information, another group member elaborates on items from the list and after the active group member is finished the waiting member can no longer remember their retrieval strategy, i.e. what they were going to say or their plan for retrieving it. At the same time this individual’s forgetting is going on, learning occurs in the group recall setting and individuals show improvement in their memory after group recall (re-exposure).

This summer’s project will focus on improving collaborative memory by establishing best practices for group work. At encoding (the study phase) and at retrieval (the recall or recognition phase) directions will be manipulated to control for social contagion and to improve error pruning. We will be working with 3 independent variable conditions (group recall, nominal recall, and individual/traditional recall as a baseline group) and 3 conditions with different directions for controlling social contagion and error pruning (only at encoding, only at retrieval, or both at encoding and retrieval). Multiple dependent variables will be collected to see how directions (warnings) affect memory in positive and negative ways. The main findings students will be looking for are in the areas of social contagion and error pruning. Social contagion is a phenomenon in which participants are exposed to incorrect memories from group members at retrieval and later remember those memories as true. Error pruning is a proactive phenomenon at
retrieval in which group members make efforts to correct false memories by challenging false
recalls in the group. A reduction in social contagion and an increase in error pruning go hand-in-
hand and would greatly improve collaborative work if understood. Directions or creating an
environment for dealing with each of these phenomena has implications for creating productive
groups in both education and work environments. A 3x3 ANOVA is well within the students
abilities after our quantitative methods course and will be a great opportunity to work with real
data and be re-exposed to the statistics.

To help you understand the process the students will be going through in data collection I
am outlining the procedure below with an estimated 210 participants (10 data points in each
condition).

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<tr>
<th>Solicitation of volunteers. Consent and random assignment of volunteers to treatment conditions.</th>
<th>With 9 treatment conditions we will need to collect data on at least 210 participants. This is a great opportunity to develop the organizational skills needed to run a psychology lab at an R1 university.</th>
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<td>All treatment conditions will be presented stimuli visually to be recalled later, 50 word lists. The word lists will be developed using a variety of categories, this allows for the greatest opportunities to make social contagion errors and is the norm in the literature.</td>
<td>Students will program software to provide directions (3 conditions) and present words to be remembered in a controlled environment. (for example, random presentation of 50 words, each presented for 3 seconds with a 1 second interval between presentations.</td>
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<td>First recall opportunity</td>
<td>Students will develop a program to capture group recall at times 1 and 2. This recall will contain info about veridical recall (words from the list earlier), false recall (later providing opportunities to observe social contagion), and error pruning (words recalled, but not accepted by the group).</td>
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<td>A distractor task</td>
<td>Necessary so that the students may prepare the second recall opportunity. Each groups 2nd memory test will be unique because of the false recalls at time 1.</td>
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<td>Second recall opportunity</td>
<td>This recall will capture the data showing social contagion errors and will indicate whether or not the manipulation of directions at encoding and or retrieval reduced these errors.</td>
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<td>Debriefing</td>
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**Significance of the proposed work.**
The recent identification of the most fundamental variables in collaborative memory now lead us to investigate how they can be manipulated in a more applied setting (for a review see Rajaram
We now know that collaborative group work comes with a cost (disruption of memories via social contagion errors and it causes forgetting through socially shared retrieval induced forgetting). Additionally, we know that it improves memory (through re-exposure effects and error pruning). While this data provides insight to the factors that influence collaborative memory, it is unclear how to best apply these ideas in an educational or work setting. Developing directions or environments that control to match our goals in the lab will provide a novel means of improving learning gains and productivity in educational and work settings. As an applied illustration of the potential significance, PTSD and trauma counseling provides a good example of how this basic research may be utilized in a real world setting. PTSD sufferers often recall mainly the highly emotional, stress producing parts of events that are shared. This produces their debilitating anxiety and flight or fight response. Research by Wessel and Moulds (2008), indicates that collaborative recall of traumatic events can help regulate emotions and that the emotional memories of the PTSD sufferer may be regulated by having the other person share memories that downplay the emotional events of the episode. The other person’s recall alters the PTSD sufferer’s recall of traumatic memories, improving the quality of their life dramatically.

Goals and expected products.
The goals of our project are to help clarify the literature and further refine the theory of collaborative memory. Although many aspects of collaborative memory have been identified, little work has gone into trying to manipulate these variables to amplify the good qualities or to reduce the bad qualities. This work could lead to the establishment of best practices for group work. The minimum goal is to have the students present at the Southeastern Psychological Association, and if the research has more to offer the literature we will go to a national conference run by the Association of Psychological Science (I have taken many students to both regional and national conferences depending on the quality and contribution of their work). In addition, given the scarcity of peer reviewed data in this area, a quality publication with the students is highly probable. I will encourage a submission by the students to the Psi Chi Journal of Undergraduate Research. And finally, these projects have always been huge confidence builders for our students and motivate them to pursue graduate studies.

Plan for faculty-students collaboration and mentorship.
I will have the full week for the duration of the fuse project to work with the students on creating, implementing, and analyzing their project. I plan to meet with the students at least twice a day and will be spending a great deal of time in the lab with them as the stimuli are developed and programmed (either in Superlab or E-Prime). Learning to program the presentation of stimuli and to capture responses is a very important skill students need as they apply to graduate programs. Students that have these skills are much more likely to get accepted into high quality graduate programs. These pieces of software are integrated with the hardware of the computer and provide exceptionally accurate timing, aiding in experimental control. We will meet in the morning at 9 to discuss the goals for the day and review articles and we will meet again after lunch to make corrections to our goals and focus on the afternoons work. While I have closely defined the nature and design of the research, the students will have ample opportunity to make it their own within the area of social contagion and error pruning by writing directions, building stimuli, and creating a recall paradigm for the episodic memory test that allows for the identification of social contagion errors. I am currently pilot testing some ideas in our cognition lab this spring and I think that experience in this area with other students will allow me to be a better mentor this summer to Domi and Morgan. What we find in lab this spring will help set
boundary conditions for successful work this summer and allow us to be more focused. We are putting together reading lists and will have some examples of programs that may or may not work as manipulations. This will be valuable for getting a successful project completed by the end of the FUSE program, although a high level of involvement and a great student experience is the main goal of the summer. I am committed to finishing the project with the students over the next year and we will do it correctly, even if it takes longer and requires more work than we can cram into the summer. Domi and Morgan will be full collaborators in the project and will greatly benefit the opportunity to present their research and potentially publish their research.

III. Budget and timeline (1 page max.)
The Cognition lab has the computer equipment, the software, and other equipment necessary to collect the data. The only additional needs are those that will allow us to collect the large amount of data over the summer needed for testing. Group data collection will require us the move out of the lab and probably move to many different classrooms and meeting rooms when classes are not in session. I am proposing the purchase of a portable projector (I have a screen) to maximize data collection time and to keep the presentation controlled for quality. The Cognition lab foundation will pay for the expense of the projector and all other equipment needed beyond the $500 allocated by FUSE.
Optoma HD20 High Definition 1080p DLP; $750 at Amazon

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<th>Week</th>
<th>Task Description</th>
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<td>Week 1</td>
<td>Review literature and develop protocols (directions at encoding and retrieval) for a testable hypothesis that the students are interested in pursuing. The project should be expected to contribute to the literature in a meaningful way. A limited number of articles about social contagion are in the literature and our review together of those articles will allow for a project making a significant contribution. Additionally, this time developing expertise in the area will allow the students to become full collaborators and make creative contributions.</td>
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<td>Week 2</td>
<td>Revamp the complete study and re-submit any changes in design or directions to the IRB for an expedited review. Begin programming of stimuli and recall interface. Set up the lab space.</td>
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<td>Week 3</td>
<td>Continue programming and reading the literature. Develop a plan for soliciting volunteers for the study from summer classes.</td>
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<td>Week 4</td>
<td>Pilot testing and refinement of the directions and program. Begin data collection.</td>
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<td>Week 5</td>
<td>Data collection.</td>
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<td>Week 6</td>
<td>More data collection. Begin building the SPSS database for analysis.</td>
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<td>Week 7</td>
<td>Finish data collection and input into the database.</td>
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Week 8

Analyze results, decide where to submit the project, and make plans for continuing the research in the fall. Lab party to celebrate a job well done.

IV. Certifications

Faculty certification.
“I hereby certify that Dr. Chuck Robertson will teach no more than 8 course hours during each summer session spanned by the FUSE program. Dr. Chuck Robertson is committed to mentoring Dominique and Morgan on a continual basis during the period of the FUSE program.”

Students certification.
“I hereby certify that I, Dominique Thomas, will commit at least 40 hours per week to the scholarly project described in this application. I also certify that I am not enrolled in more than 4 course hours during each summer session spanned by FUSE. I am aware that failure to comply with these two requirements may result in the forfeiture of my summer stipend.”
“I hereby certify that I, Morgan Hale, will commit at least 40 hours per week to the scholarly project described in this application. I also certify that I am not enrolled in more than 4 course hours during each summer session spanned by FUSE. I am aware that failure to comply with these two requirements may result in the forfeiture of my summer stipend.”

References