

## SOAR Research Proposal – Summer 2013

### Title: Free Recall as a Teaching Exercise: Changes in Memory Organization Over Time

#### Faculty Information

Name: Sarah Johnson

Rank: Assistant Professor

Department/Program: Psychology

#### Student Information

Name: Samuel Ansman

Expected graduation: May, 2014

Email Address: stsa02@moravian.edu

Name: Alexandra Giacoletti

Expected graduation: May, 2015

Email Address: stal11@moravian.edu

Start date: May 6, 2013 (10 weeks; ending July 12, 2013)

#### Description of Project

Mr. Ansman and Ms. Giacoletti will be working on a project that has both basic psychological value and applied educational value. The goal is to explore the use of a brief free-recall exercise as both a method of looking at the development of networks of information over the course of learning, and as a pedagogical tool for the classroom. This project will involve collaboration with a number of classes over May term and summer session I. We have already identified a number of instructors who are interested in taking part in this project across a range of disciplines (psychology, mathematics, political science, and neuroscience). We plan to work with 3-4 classes during each term.

Free recall is the act of retrieving memories with minimal cues. In this case, it refers to retrieving key course concepts in a free-association format, producing as many concepts as possible in whatever order they come to mind with no further constraints. The important aspect of free recall for our purpose is that retrieval follows mental organization. If certain concepts are associated with others in one's knowledge (an idea referred to as semantic networks), then we can see these associations through free recall: associated words will be recalled together in clusters. A great deal is already understood about such networks, including the importance of repeated exposure to concepts together to strengthen associations, the automatic nature with which activation of one concept leads to the activation of its neighbor concepts, etc. Researchers have studied how semantic networks in general might develop in children (e.g., Sauzeon et al., 2004); however, little work has focused on how a particular network changes over the course of learning a new area of information. This is the first goal of our project. By taking free-recall responses from students (henceforth referred to as "learners" to avoid confusion) at varying points throughout their semester (e.g., on a weekly basis), we will look at how the clustering in their responses changes from reflecting less meaningful associations to more meaningful ones. For example, in a Neuroanatomy class, learners might start by clustering terms that sound similar, such as recalling together the brain regions "cerebellum" and "cerebrum", which have very different functional roles despite having phonetically similar names. Over time, we would hope to see learners' responses reflect deeper relationships, such as clustering "cerebellum" with "basal ganglia" because both structures play vital roles in motor learning. The objective is to pilot test the feasibility of using free-recall responses to explore such changes in semantic network organization in a real-world learning situation. The SOAR students and I will explore possible qualitative analyses that could be used to study these responses, as well as evaluating which types of information might provide the best opportunity for a full scale study of this kind of change over the course of a regular semester (allowing for more time and a larger sample size).

The second goal of our project is to evaluate the pedagogical use of this free-recall technique as one that might benefit both instructors and learners alike. This use of free recall is similar to the idea of concept mapping,

which involves having learners intentionally create maps of key concepts and the links between them as a method for learning (e.g., Chang et al., 2002), except that rather than focusing on the creation of these networks (i.e., the learning or encoding end of the process), as is the case in concept mapping, we will focus on learners' retrieval via these networks. This part of our project will involve three basic components: 1) collaboration with instructors and learners to understand the clusters we are seeing (e.g., talking to instructors about what concepts would fit together in a meaningful network, and talking to learners about what concepts they noticed fitting together for them); 2) interactive sessions with classes, where desired by instructors, to discuss the idea of a semantic network and encourage learners to evaluate their own understanding of the concepts by looking at their free-recall responses; and 3) assessment via surveys given to instructors and learners about the value of the exercise.

As part of this third goal, we will write a paper over the course of the SOAR period, to be submitted for publication in a journal on teaching (e.g., *Teaching of Psychology*, or *College Teaching*). Both SOAR students will contribute substantively to the writing of this article, be co-authors, and help determine the target journal.

To summarize, the multi-faceted goals of this research project include:

- 1) Conducting free-recall sessions approximately once per week with at least three courses during May term and at least three courses during summer session I.
- 2) Evaluating the responses to determine where clusters are occurring, in collaboration with the instructors and learners in the courses, and looking at changes in clustering over time.
- 3) Providing interactive sessions in the classroom (contingent on instructor interest) to explain the role that semantic networks play in free recall, and helping learners and instructors use this brief activity to better diagnose learning (identify missing concepts, understand the associations that are present, etc.) and improve studying.
- 4) Gaining feedback from learners and instructors about the value of this exercise, and writing a pedagogy-focused paper for publication.

### Students' roles and responsibilities

The two SOAR students will be working collaboratively on this project, but also focusing on different themes within the project. Sam will be focusing on the basic research questions regarding the changes in organization of semantic memory over the course of learning. Sam has taken courses in cognitive psychology/neuroscience and has a fundamental understanding of this system of memory. Alexandra, having less background knowledge on cognitive psychology at the outset, will focus on the pedagogy end of the project. Both students will expand their understanding of their portion of the project through readings of primary and secondary literature, conducting literature searches, and writing integrative reviews of their topics. The students and I will meet as a group regularly, such that they will both become well versed in all of the ideas pertinent to the project, not just the ones relevant to their own topic. Both students are expected to contribute to discussions about how to best plan a larger-scale version of this project better suited to studying the memory mechanisms involved.

Both students will be actively involved in the hands-on aspects of the project, from planning, to data collection, to qualitative and/or quantitative analysis of the recall responses. They will conduct the free-recall sessions with the students in the May and summer session classes. Some of these sessions may be done in groups (written recall), and others one-on-one with the learners (oral recall). In addition, both students will be asked to lead sessions in classes about using free recall as a study technique.

The written output of the project will be the brief article co-authored by the three of us, focusing on free recall as a pedagogical technique. However, the students will also create presentations (either combined or individual) to submit to Scholars day and/or the LVAIC Undergraduate Psychology Conference next spring.

Schedule of activities:

#### **Week 1-3 (May Term)**

- **Data collection:** Sam and Alexandra will be entering classes in the first week of May term. We will conduct the informed consent process and then hold our first free-recall session during that week (as individual class schedules permit). They will continue to hold free-recall sessions weekly, and at the end of the May term, they will distribute surveys to students and faculty to assess the value of the exercise.
- **Background research:** Sam will read background research on semantic clustering within free recall and the structure of semantic networks, and Alexandra will focus on pedagogy research that emphasizes cognitive/memory interventions. We will all meet regularly to discuss these readings.

#### **Weeks 4-6 (Summer session I)**

- **Data collection:** They will conduct informed consent, followed by free-recall sessions, in the summer session I courses, mirroring the process used for May term. Sam and Alexandra will be encouraged to discuss and institute changes to our procedure based on our experiences with the May term courses—keeping within the boundaries of our approval from the HSIRB (or pending approval of an addendum, if necessary). We will begin coding the May term responses by the end of this period. Both students will contribute to the process of developing the relevant coding categories and using them to code actual data.
- **Background research/writing:** They will explore the content of several candidate journals for our pedagogical publication, and continue readings on their prospective topics, with additional readings shared by both students about the process of conducting qualitative research. The purpose of this aspect is both to confront the possibilities for (and difficulties of) analyzing our free-recall responses, and also to support connections for Sam and Alexandra between this research and their own interests (in forensic and clinical psychology, respectively). Weekly meetings to discuss the background research will continue. At the end of this timeframe we will outline and begin writing our proposed pedagogical article.

#### **Weeks 7-10 (Summer session I cont'd, and wrap-up week)**

- **Data collection/coding/analysis:** Sam and Alexandra will continue to collect free-recall responses and will distribute student and faculty surveys at the end of the summer session, as in May term. We will begin coding the summer session data.
- **Background research/writing:** The students will continue to do some readings but will shift their emphasis toward writing during this final period. They will each write an integrative review of the research they read over the SOAR period, as well as developing their own ideas for changes to the free-recall procedure based on their readings and hands-on experience. In addition, each student (as well as I) will be responsible for writing some portion of the pedagogical article, sharing feedback on each other's writing, and working through the revision process, to be completed by week 10.

Additional project-related expenses

*None anticipated*

Project Title: Free Recall as a Teaching Exercise: Changes in Memory Organization Over Time  
Name: Sam Ansman  
Major: Psychology  
Expected graduation: May 2014  
Faculty mentor: Sarah Johnson  
On campus housing requested during project: yes

### Statement of purpose

There is very little more valuable to the learning experience of a student than hands-on experience. The ability to do actual work in one's field of study is a fantastic opportunity and one that goes a long way toward gaining a deeper understanding of one's field. When I was asked to participate in Dr. Johnson's summer research project, I recognized it as an experience that would provide a fantastic learning opportunity and would give me valuable real world experience in psychological research. While the subject of this study may not seem to have a strong connection with my personal area of interest, forensic psychology, I believe the knowledge gained from this research will be easily transferable and valuable to my field of study. In forensic psychology, you examine the mindset and cognitive processes of those who violate the law and who have behavior patterns that can cause them to present a danger to society. As a forensic psychologist, one must study these abnormal behavior patterns and try to design treatment plans for these kinds of people so that they can learn how to be functioning members of society. By conducting research on how a person learns, more specifically how they form cognitive connections between related pieces of information, I will be able to use this information to try and make my own connections between the experiences of criminals and how these experiences can affect their behavior and cause them to act in ways that negatively affect the community.

Not only will this research benefit me in my own personal endeavors, but the information gained may help many other students at Moravian. By examining how students process and

organize information taught in a class compared to the professors who teach the class may offer insight into the teaching style of professors and how it relates to the learning experience of the students. While this is only a pilot study for more in-depth research to take place over the course of a full semester, it will be based on the information gained in this study. As a student of Moravian college, I feel it would be a great benefit to the Moravian community for me to have this research opportunity and gain a greater understanding of students' learning processes. TO be able to give back to the Moravian community by possibly offering information which could be used to improve the educational experience here at Moravian College would be a greatly rewarding experience. Not only will this research benefit Moravian College, but the psychological community as well. Research about learning in classroom settings is still a relatively new topic of study in the field of psychology. There is even less research done on how a person understands and learns a specific subject matter over time. Since research into the cognitive processes associated with learning is still new, there is not a whole lot of information available on the subject. By conducting this research, we will be able to provide another piece to the puzzle and hopefully provide future researchers with information they can use toward their own research.

At the conclusion of this project I hope to have a greater understanding of both the cognitive processes included in learning and the methodologies used to collect and analyze this information. We also hope to have an article about our research published in *Teaching of Psychology* or in a similar journal. While this is not directly related to the learning experience, being published as an undergraduate can go a long way toward being accepted into a graduate program in your desired field of study.

Project Title: Free Recall as a Teaching Exercise: Changes in Memory Organization Over Time

Student: Alexandra Giacoletti

Major: Psychology and English

Expected graduation: May 2015

Faculty: Dr. Sarah Johnson

On campus housing requested during project: yes

My rationale to participate in this project is firstly, to better understand the research process in the discipline of psychology in its entirety. Although I created my own experiment in Psychology 211 and completed this research in Psychology 212, the SOAR program would allow me to expand my knowledge in advanced research processes. Working on this project would give me insight into how researchers in the field of psychology conduct quality studies, in addition to introducing me to the practice of publication of psychological research. Because it is Dr. Johnson's plan to write and submit our research to a psychological journal, I would experience firsthand how to draft a quality paper for submission. As a part of the submission process, I would be involved in selecting an appropriate journal to submit our work to, according to the specific goals of the project. In addition, I would directly aid in collecting, analyzing and reporting data, while drafting a coherent argument for a psychological paper.

Secondly, because it is my hope to continue my higher education by pursuing a doctoral degree in clinical psychology, this type of invaluable experience would prepare me for future research opportunities in graduate school. While this SOAR project involves conducting a study in the area of cognitive psychology, and my specific interest is in clinical psychology, the research I would help Dr. Johnson conduct is considered to be applied research. In the area of clinical psychology, applied research is commonly used, in order to relate research findings to treatment for patients. For this reason, participating in a SOAR project that specifically utilizes applied research would be greatly beneficial to me. Furthermore, there will be a focus on qualitative data in this project, which I have never collected or analyzed. Working on this study will allow me the opportunity to see the data analysis process in a new way, one that could potentially be relevant to clinical work that I am interested in pursuing in the future. This project would also prepare me for a career in clinical psychology by enhancing my interpersonal skills. When conducting my Psychology 212 project, I knew many of my participants, which might not be the case when working on this SOAR project. This experience would teach me how to work with participants that I do not know, which would prepare me for the clinical psychology field that involves interacting with and forming relationships with clients.

Finally, being a part of this experience would be very useful to me personally. As a student, it is always beneficial to understand how you learn best. Because this study is exploring the way people think and how the associations they have can change over time, I would be able to apply

this information to my learning in future classes. This project would help me to better understand not only the way others learn, but how I learn as well. Additionally, as a clinical psychologist, I would be working with individuals who have abnormal patterns of thought, including disordered thinking in schizophrenia, negative thoughts in depression, and obsessive and compulsive thoughts and behaviors in obsessive-compulsive disorder. Knowing and understanding the basic principles of how thoughts are organized and how learning can change our organization of those thoughts would be relevant to clinical psychology. Understanding normal thought patterns would help me to better comprehend why clients' thoughts are unusual and how to help them through therapy. Overall, this experience would be invaluable and extremely beneficial to the rest of my time at Moravian College and my future career plans.