Ancillary Unit Annual Report
Reporting Period: July 1, 2019 – October 31, 2020

Deadline for submission to Reporting Administrator: November 20, 2020
This report is required by FAM 105.4 (FSD 87-17.R6) -- POLICY GUIDELINES FOR THE FORMATION AND REVIEW OF INSTITUTES AND CENTERS. The report is due by November 20, 2020 this year. **Please make sure to sign and forward scanned signed copies of the report. Thank you.

Basic Information	
Ancillary Unit's name	Learning Research Institute (LRI)
Director(s)	Jason Reimer and Hideya Koshino, Professors of Psychology
Administrator to whom the unit reports ("Reporting Administrator")	Rafik Mohamed, Dean – College of Social & Behavioral Sciences
Purpose and goals of the Ancillary Unit	The CSUSB Learning Research Institute (LRI) promotes an interdisciplinary scholarly focus on the student learning experience and how it may be improved. The Institute supports this focus by sponsoring and conducting research activities that examine the cognitive, neurobiological, and environmental variables that contribute to the academic success of our diverse student body. In addition, the Institute contributes to a campus culture supportive of student learning by hosting invited speakers, collaborating with other campus institutes, providing students the opportunity to be directly involved in the research process, and disseminating our research findings to the local and global communities.

Advisory Board (if applicable)	
Member	Affiliation
Jean Peacock	CSUSB
Barbara Quarton	CSUSB
Young Suk Hwang	CSUSB
Rowena Santiago	CSUSB

Activities during reporting period (2019 – 2020)		
Activity (please describe)	Funds spent	Goal advanced (and extent)
In the reasoning project, Dr. Ricco, Koshino, and CSUSB students conducted a follow-up	$0.0	Designed experiment, collected and analyzed data.

experiment based on reviewers' comments on the manuscript on analytical thinking and conditional reasoning that was submitted in the previous year, Fall-Winter, 2019.		
In the mindfulness meditation project, a study investigated breath counting as a measure of sustained attention in mindfulness meditation, data analysis and manuscript writing phase. Fall-Winter 2019.	$0.0	Analyzed data, and wrote a manuscript.
In the emotional attention project, a study investigated effects anxiety on distractor processing in a negative priming task, Fall-Winter 2019.	$0.0	Collected and analyzed data.
Hideya Koshino and CSUSB students presented two posters at the 60th Annual Meeting of the Psychonomic Society in Montreal, Québec, Canada, Fall, 2019. **See Attachment 2**	$2173.68	Dissemination of research, support of student and faculty professional growth, and enhancing partnerships between CSUSB and psychology community.
Hideya Koshino presented a poster at the 50th Annual Convention of the EDRA, NY. **See Attachment 2**	$1540.24	Dissemination of research, and faculty professional growth.
In the reasoning project, Dr. Ricco, Koshino, and four CSUSB students published a manuscript, Summer 2020. **See Attachment 2**	$0.0	Dissemination of research, support of student and faculty professional growth, and enhancing partnerships between CSUSB and psychology community.
In the mindfulness meditation project, Dr. Clapper, Koshino, and three CSUSB students submitted a manuscript for publication, Fall, 2020. **See Attachment 2**	$0.0	Dissemination of research, support of student and faculty professional growth, and enhancing partnerships between CSUSB and psychology community.
In the attention project, Hideya Koshino and two CSUSB students submitted a manuscript for publication, Fall 2020. **See Attachment 2**	$0.0	Dissemination of research, support of student and faculty professional growth, and enhancing partnerships between CSUSB and psychology community.
Jason Reimer and CSUSB students presented a poster at the 60th Annual Meeting of the Psychonomic Society Montreal, Québec, Canada. **See Attachment 2**	$0.0	Dissemination of research, support of student and faculty professional growth, and enhancing partnerships between CSUSB and psychology community.
Effects of Spatial Organization on Working Memory and Cognitive	$0.0	Designed experiments, constructed experimental stimuli, programmed

Control, Planning/Study Phase, Summer-Fall 2019		experiments, wrote computer code for a Tobii eye-tracking system.
Effects of Spatial Organization on Working Memory and Cognitive Control, Data Collection Phase, Fall 2019	$0.0	Collected behavioral (response times and accuracy rates) and eye-tracking data from 90 CSUSB research participants.
Effects of Spatial Organization on Working Memory and Cognitive Control, Data Analysis Phase, Winter and Spring 2020	$0.0	Analyzed behavioral and eye-tracking data from cognitive control experiment. Ran a set of correlational and regression analyses.
Inhibitory Control Task Validation Study, Planning/Study Design/Organization Phase, Summer 2019	$0.0	Designed experiments, constructed experimental stimuli, programmed experiments, wrote computer code.
Inhibitory Control Task Validation Study, Data Collection Phase, Fall 2019	$0.0	Trained CSUSB student research assistants and collected behavioral data (response times and accuracy rates) 114 CSUSB research participants.
Inhibitory Control Task Validation Study, Data Analysis Phase, Winter 2020.	$0.0	Analyzed behavioral and eye-tracking data from cognitive control experiment. Ran a set of correlational and regression analyses.
Jason Reimer gave an invited talk at Claremont Graduate University. January 2020. **See Attachment 2**	$0.0	Dissemination of research, support of student and faculty professional growth, and enhancing partnerships between CSUSB and psychology community.
Working Memory Task Validation Study, Planning/Study Design/Organization Phase, Winter 2020	$0.0	Designed experiments, constructed experimental stimuli, programmed experiments, wrote computer code.
Working Memory Task Validation Study, Data Collection Phase, Winter 2020	$0.0	Trained CSUSB student research assistants and collected behavioral data (response times and accuracy rates) 82 CSUSB research participants.
Working Memory Task Validation Study, Data collection and Data Analysis Phase, Winter – Fall 2020	$5000	Analyzed behavioral and eye-tracking data from cognitive control experiment. Ran a set of correlational and regression analyses.
Working Memory Task Validation Study, Data Report Phase, Winter/Spring 2020	$0.0	Submitted an abstract based on the results of the study to an international cognitive psychology conference. The abstract was submitted and will presented at this year's virtual meeting. Also, preparing a manuscript based on the data.

Measures of Inhibitory Control Study, Planning/Study Design/Organization Phase, Fall 2020	$0.0	Designed experiments, constructed experimental stimuli, programmed experiments, wrote computer code.

Please also describe planned activities for the current academic year:

The mission of the LRI is to work toward a better understanding of student learning and classroom performance. Given the diverse educational backgrounds of CSUSB students, the planned activities of the LRI for the current academic year are designed to contribute to the improvement of learning in our students by studying the role that cognitive factors play in the learning process. During this year, CSUSB students will continue to play a significant role in the Institute's research activities. The LRI provides support for students through scientific research education, training, and participation. A large amount of Institute resources is invested in students to provide them with the necessary research experience required for their advancement to academic and educational careers. At the LRI, we take great pride in the amount of support we provide to students and are committed to work hard to include as many CSUSB students as possible in our research in the future.

This academic year, we have identified a set of activities that we believe are critical to the central mission of the LRI. As Co-Directors of the LRI, we have made significant progress on a number of research projects. For example, through LRI research activities we have assessed the working memory capacity of more than 700 CSUSB students. This is important because it allows us to better understand the cognitive abilities of the CSUSB student population. It is our hope that such an understanding will contribute to the development of strategies that will improve classroom performance and overall academic success in our students.

This year's projects largely coalesce around four specific goals: 1) To better understand the role of cognitive processes such as working memory and executive functions in learning, especially reasoning and attention, 2) To better understand the neurobiological underpinnings of these basic processes, 3) To develop effective interventions for improving these processes, resulting in greater academic success, and 4) To build a foundation for a future University Center for Brain Sciences. In order to achieve these goals, we have identified a number of specific research projects. These research projects are intended to be conducted in collaboration with multiple campus entities including, students, faculty, departments, and faculty of other universities, institutes, and centers, as well as the local community. In addition, these research activities are intended to serve the entire campus community by bringing leading experts to CSUSB so that they can interact with CSUSB students and faculty.

So far this year, multiple undergraduate and graduate CSUSB students have been involved in LRI activities as research assistants. Each is working closely with us and is receiving in-depth training on all aspects of scientific research. Some of these students will present their research virtually at an international research conference, The Annual Meeting of the Psychonomic Society. At this conference, students will give presentations on research findings generated by the LRI. Experiences like these have proven to be incredibly valuable to our students, as many of them have gone on to attend MA- and PhD-level graduate programs after graduating from CSUSB.

Continuing Research Projects

1. **Emotional Attention:** In this project, we investigate interactions between emotion and attention. Effects of emotion on cognition have long been ignored in the traditional cognitive psychology, because traditional cognitive psychology is based on the information processing paradigm, which is a computer metaphor of the human mind. However, recent years have seen a huge increase in the number of studies investigating relationships between emotion and cognition. We plan to continue focusing on the effects of anxiety on attention, because the proportion of people suffering some form of anxiety has been increasing in recent years, especially among college students. We all know that anxiety impairs our learning and cognition; however, how anxiety interferes with cognitive functions is not very well understood yet. Therefore, our short-term goal is to enhance our understanding of the interactions between anxiety and attention, but our long-term goal is to develop some intervention methods to help students who suffer from anxiety, including test anxiety and math anxiety. We submitted a manuscript, and it is under review.

2. **Educational Neuroscience:** In this project, we investigate the underlying mechanisms of mindfulness meditation. Mindfulness meditation has attracted attention in recent years in many areas, including clinical settings, companies, and educational institutions. They claim that mindfulness meditation improves our attention control, emotion regulation, self-control, and reduces anxiety and depression. However, the underlying mechanism of mindfulness meditation is not well known yet. We investigate what kinds of cognitive, physiological, and social factors affect mindfulness meditation. Also, we plan to continue working on another long-term goal, which is to develop the Center for Brain Science, which includes fMRI and other brain science techniques. Toward that goal, we plan to start using heart rate variability as a physiological measure this year. This project is conducted in collaboration with Drs. John Clapper and Michael Lewin. Based on the experiments we conducted in the past years, we submitted a manuscript for publication, and it is currently under review.

3. **Reasoning and working memory:** This project is being conducted in collaboration with Dr. Bob Ricco. Here, we investigate relationships between reasoning and working memory based on the dual process framework (e.g., Kahneman, 2012). The dual process framework claims that there are two types of processing: Type 1 processing and Type 2 processing. Type 1 processing is heuristic, intuitive, reflective, and doesn't require working memory resources, whereas Type 2 processing is algorithmic, logical, reflexive, and requires working memory resources. We investigate roles of working memory and other thinking abilities and dispositions in various reasoning tasks, including conditional reasoning, denominator neglect, base rate neglect, and mathematical reasoning. Based on the experiments we conducted in the past years, we published a manuscript in the journal "Thinking and Reasoning".

4. **Inhibitory Control Tasks Validation Study:** The purpose of this study is to assess the reliability and validity of a newly redesigned task of inhibitory control. This will be accomplished by having participants complete a redesigned, tablet-based measure of selective attention and inhibitory control. The central questions being addressed in the study are 1) does this new task have adequate test-retest reliability, and 2) does this new task have adequate criterion validity. This is

being accomplished by testing participants twice on the task and comparing performance on the new task with another (more standard) task of executive functioning and inhibitory control. For this project, we are collaborating with Dr. Aaron Seitz, Director of the Brain Game Center and Professor of Psychology at UCR. Since August 2019 we have collected data from more than 114 CSUSB research participants.

5. **Working Memory Tasks Validation Study:** The purpose of this study is to assess the reliability and validity of newly redesigned tasks of working memory. This will be accomplished by having participants complete multiple redesigned, tablet-based measures of working memory. The central questions being addressed in the study are 1) does this new task have adequate test-retest reliability, and 2) does this new task have adequate criterion validity. This is being accomplished by comparing performance on the new task with another (more standard) tasks of working memory. For this project, we are collaborating with Dr. Aaron Seitz, Director of the Brain Game Center and Professor of Psychology at UCR. Since Winter 2020 we have collected data from more than 80 CSUSB research participants both in the lab and remotely, using Zoom and web-based data collection software.

6. **Components of Inhibitory Control Study:** This study is designed to assess the reliability and validity of a redesigned, tablet-based measure of inhibitory control, and to better understand how common measures of inhibitory control relate to each other and work together to measure the inhibitory control construct. As part of the study, participants complete eight different inhibitory and working memory tasks and a set of questionnaires remotely using Zoom and web-based data collection software. Participants complete three, 1-hour testing sessions across three sites (CSUSB, UCR, and UCI). The goal is to test a total of 360 college students. For this project, we are collaborating with Dr. Aaron Seitz, Director of the Brain Game Center and Professor of Psychology at UCR, and Dr. Susanne Jaeggi, Director of the Center for the Neurobiology of Learning and Memory and Professor at UCI.

7. **Effects of Spatial Organization on Working Memory and Cognitive Control:** This project is designed to 1) extend recent research that demonstrates how the physical organization of the learner's environment affects his or her ability to internally represent aspects of that environment and 2) investigate ways in which the physical organization of information presented in the classroom may help to improve working memory and cognitive control functions. This research involves assessing cognitive control through traditional behavior measures, as well as through the use of eye-tracking technology. The project is being conducted in collaboration with Dr. Gabriel Radvansky, Professor of Psychology at the University of Notre Dame.

   As part of this project, we have already collected eye-tracker data from a total of 200 participants. The study is designed to examine how college students use attentional processes during cognitive control tasks. The data will be used to examine the role that strategies play in controlled processing. Two manuscripts based on the effect of spatial organization on working memory are currently being prepared for publication, and Jason gave an invited talk based on the study at Claremont Graduate University in January 2020 **(see Attachment 2)**.

Additional Current Year Goals
Prepare External Grant Proposals
Provide support for the colloquium series of the department

Use of funds during the reporting period *On a separate sheet, provide an itemization of A., B., and E.* ****See Attachment 1 for itemization****				
	Internal funds		External funds	
	Reporting Period	Current academic year (projected)	Reporting Period	Current academic year (projected)
A. Salaries	$43090.15	$20,000	$	$
B. Assigned time	$0	$0	$	$
C. Telephone/fax	$0	$0	$	$
D. Office supplies	$0	$0	$	$
E. Other	$11,319.68	$0	$	$
Total	$54,409.83	$20,000	$	$

Hideya Koshino

Co-Director Name

Co-Director Signature

Jason Reimer

Co-Director Name

Co-Director Signature

Attachment 1

A. Salaries

Payments made to student research assistants: $25,762.10. Student research assistants are involved in various aspects of experiments, including recruiting and posting for research participants, testing human research participants on computer-controlled perceptual and cognitive assessments (i.e. administering paperwork, setting-up the computer program, explaining instructions, supervising participants during the experiment itself, and administering feedback), administering vision assessments, using iPads for assessments and experiments, doing some preliminary analyses and data entry, attending regular weekly lab meetings, and helping out with a variety of miscellaneous tasks as they arise.

One-month summer salary (summer 2018) for the Institute Co-Directors Dr. Hideya Koshino and Dr. Jason Reimer: $17,328.05. The LRI continues to operate during the summer months. These funds are used to compensate Hideya and Jason for the work they do during that time. Work during summer includes activities such as conducting research studies, designing and developing research projects, computer programming in preparation of future data collection, and setting up computer equipment in preparation for data collection.

B. Assigned Time: No funds were spent by the LRI on assigned time.

E. Other

Travel to research conferences: $3,713.92. Dissemination of research, support of student and faculty professional growth, and enhancing partnerships between CSUSB and the psychology community.

Materials for research (computers, computer software): $7,605.76. These materials are necessary to conduct psychological research on student learning. For example, we use computers to present stimuli in our experiments and to collect participant responses. In addition, we use commercial experimental software and devices for experiment design and execution. This year we have purchased a laptop computer, web-based commercial experimental software (INQUISIT Web), and other science-based programs.

Attachment 2

List of publications, presentations, and manuscripts from July 1, 2019 to October 31, 2020 (Student author in **Bold**)

Bonsel, J., and Koshino, H. (2019) The Effect of Anxiety on Spatial Negative Priming. Poster Presented at the 60th annual meeting of the Psychonomic Society, Montreal, Québec, Canada.

Bonsel, J., and Koshino, H. (2020) The Effect of Anxiety on Spatial Negative Priming with Emotional Stimuli. Poster Presented at the 100th annual meeting of the Western Psychological Association (Virtual).

Bonsel, J., Monteza, J. V., Owens, D-N., Ricco, R., and Koshino, H. (2020). Dual Processes in Conditional Reasoning. Poster Presented at the 100th annual meeting of the Western Psychological Association (Virtual).

Clapper, J., **Ware, S.,** Koshino, H. **Jong-Martinez, F., & Benitez, K.** (under review). Breath Counting as a Measure of Sustained Attention in Mindfulness Meditation and its effects on mood.

Kita, A., & Koshino, H. (2019). A Study on the Furnishing of Seats and Work Efficiency. Paper Presented at EDRA50 Brooklyn, New York, NY.

Koshino, H., **Tsukahara, J., & Buitron, D**. (under review). Effects of perceptual load on performance in a Simon task.

Olid, P., and Koshino, H. (2020). Effects of Math Anxiety and Working Memory Capacity on Numerical Processing and Math Performance. Poster Presented at the 100th annual meeting of the Western Psychological Association (Virtual).

Pahor, A., Reimer, J. F., Seitz, A. (in preparation). Validation of new measure of inhibitory control and working memory.

Reimer, J. F. (2020, January). Ocular signatures of cognitive control: Goal representation and encoding. Invited talk presented at Claremont Graduate University, Claremont, CA.

Reimer, J. F., Radvansky, G. A., Lorsbach, T. C., & **Armendarez, J. J.** (in preparation). The influence of event structure on modes of cognitive control within a virtual environment.

Reimer, J. F., **Sierra, A.**, **Mobly, K**, **Perez-Martinez, A.**, & **Rivera, A**. (in preparation). Ocular measures of cognitive control: Can eye movements predict the use of reactive and proactive modes of control during the AX-CPT.

Reimer, J. F., **Sierra, A.**, **Perez-Martinez, A.**, **Mobly, K.**, & **Rivera, A.** (2019). Eye Movements During the AX-CPT Predict Modes of Cognitive Control. Poster Presented at the 60th annual meeting of the Psychonomic Society, Montreal, Québec, Canada.

Ricco, R., Koshino, H., **Bonsel, J.**, and **Ware, S.** (2019). Effects of Analytical Thinking on Base Rate Neglect. Poster Presented at the 60th annual meeting of the Psychonomic Society, Montreal, Québec, Canada.

Ricco, R. B., Koshino, H., & **Sierra, A. N. Bonsel, J., Monteza, J. V., & Owens, D-N**. (2020). Individual Differences in Analytical Thinking and Complexity of Inference in Conditional Reasoning. *Thinking and Reasoning.* 1-31.

Unit Reporting Person recommendation	
Name and title:	
	Keep on active status.
	Move to probationary status.
	Move to inactive status.
Recommendations and comments including the criteria and data reviewed. Please attach additional page(s) as necessary.	
Unit Reporting Person Signature **Date**	

FORWARD A SCANNED COPY OF THIS REPORT TO sylvia.myers@csusb.edu AND SEND THE ORIGINAL COPY TO THE FACULTY SENATE AD-155. THE SENATE OFFICE WILL TAKE CARE OF THE REMAINING PORTIONS OF THE REPORT. THANK YOU.

Educational Policy and Resources Committee recommendation (if applicable)	
	Keep on active status.
	Move to probationary status.
	Move to inactive status.
Recommendations and comments including the criteria and data reviewed. Please attach additional page(s) as necessary:	
EPRC Chair Signature **Date**	

Provost recommendation (if applicable)	
	Keep on active status.
	Move to probationary status.

	Move to inactive status.
Recommendations and comments including the criteria and data reviewed. Please attach additional page(s) as necessary:	
Provost Signature **Date**	

President decision (if applicable)	
	Keep on active status.
	Move to probationary status.
	Move to inactive status.
Recommendations and comments including the criteria and data reviewed. Please attach additional page(s) as necessary:	
President Signature **Date**	