Advances in the Social, Behavioral, and Economic Sciences

Moderated by:
Dr. Frank A. Gomez
Executive Director, STEM-NET
Office of the Chancellor

https://www2.calstate.edu/impact-of-the-csu/research/stem-net
Speakers

John E. Yellen, National Science Foundation
Funding Opportunities in the Social Behavioral and Economic Sciences at the National Science Foundation

Pablo Gomez, Cal State San Bernardino
Interaction of Sensory and Response Processes in Decision Making

Lora Stevens-Landon, Cal State Long Beach
From Molecule to Migration: Improving the Use of Fecal Biomarkers in Archaeology

Albert D. Gonzalez, CSU East Bay
LatinXperimental Archaeology is on the Agenda!

Stephanie Ries, San Diego State
What is the Brain Doing When We are Speaking?
Funding Opportunities in the Social Behavioral and Economic Sciences at the National Science Foundation

John E. Yellen– National Science Foundation

Dr. John E. Yellen
National Science Foundation, Program Director
Division of Behavioral and Cognitive Sciences
jyellen@nsf.gov
National Science Foundation (NSF)

- Independent federal agency created in 1950
- NSF funds fundamental science
- NSF Mission
  - To promote the progress of science;
  - To advance the national health, prosperity, and welfare;
  - To secure the national defense
  - Fiscal year 2022 budget: $8.8 billion
NSF Supports Multiple STEM Fields

- Biological Sciences
- Engineering
- Mathematical & Physical Sciences
- Computer & Information Science & Engineering
- Geosciences (including Polar Programs)
- Integrative Activities
- Education & Human Resources
- Social, Behavioral & Economic Sciences (SBE)
- International Science and Engineering
Social, behavioral and economic (SBE) sciences advance scientific knowledge about people and society. This knowledge furthers NSF's mission to advance U.S. health, prosperity, welfare, and defense — it is critical for the country's well-being.

SBE sciences explore human behavior and social organizations. They look at how economic, political, environmental, social, and cultural forces affect the lives of people from birth to old age — and how people in turn shape those forces.
Before you apply… READ!!!
Review the SBE Programs Page: https://nsf.gov/funding/programs.jsp?org=SBE
Different types of competitions

Programs:
Clear disciplinary: economics, sociology, archaeology
Cut cake somewhat differently: Science of Organizations, Human Networks and Data Science

Program director; proposals grouped together, normally considered by discrete panels; discrete funds allocated to programs.

Cross Cutting:
Postdoctoral research fellowships
Research experiences for undergraduates
SBE-UK Collaborative Research

More complicated:
multiple review processes;
sometimes essentially program approach specific funds set aside, proposals grouped together, sometimes proposals distributed to “disciplinary programs; reviewed by them in program context

Makes sense to contact relevant program official to gain insight into review context.
Build and Broaden: Enhancing Social, Behavioral and Economic Science Research and Capacity at Minority-Serving Institutions

Build and Broaden supports fundamental research and research capacity across disciplines at minority-serving institutions and encourages research collaborations with scholars at MSIs.

Smart Health and Biomedical Research in the Era of Artificial Intelligence and Advanced Data Science

The purpose of this interagency program solicitation is to support the development of transformative high-risk, high-reward advances in computer and information science, engineering, mathematics, statistics, behavioral and/or cognitive research to address pressing questions in biomedical and public health communities.
Review the SBE Programs Page:
https://nsf.gov/funding/programs.jsp?org=SBE
Who is the Program Director?

How do you contact the Program Director?

How do you apply?

Program Description vs. Solicitation

When do you apply?

Target date or deadline?

Find the Right Program (e.g., DS program webpage)
How do I know if my research is relevant to a particular program? 

Click this!

Find the right program: (scrolling down....)
Find the Right Program: Awards recently made

- Adolescent Information Management with Parents and Siblings
  Award Number: 1817540; Principal Investigators: Nicole Camacho Blair, Co-Principal Investigators: David Schramm, Sarah Kilburn; Organization: University of Missouri-Columbia; NSF Organization: ECS Start Date: 07/11/2018; Award Amount: $273,658.00; Relevance: 48.0;

- Collaborative Research: Stress, Acute Outcomes, and Health Outcomes among Language Breakers
  Award Number: 1811330; Principal Investigators: Su Young Kim, Co-Principal Investigators: Heather Lopez; Organization: University of Texas at Austin; NSF Organization: ECS Start Date: 06/15/2017; Award Amount: $155,644.00; Relevance: 48.0;

- Collaborative Research: Stress, Acute Outcomes, and Health Outcomes among Language Breakers
  Award Number: 1811330; Principal Investigators: Katherine Slevin; Co-Principal Investigators: Organization: University of Arizona; NSF Organization: ECS Start Date: 06/15/2017; Award Amount: $34,053.00; Relevance: 48.0;

- Expanding access to webcam-based online data collection for developmental research
  Award Number: 1839191; Principal Investigators: Kimberly Scott; Co-Principal Investigators: Laura Schultz; Organization: Massachusetts Institute of Technology; NSF Organization: ECS Start Date: 09/11/2018; Award Amount: $158,445.00; Relevance: 48.0;

- CAREER: Uncovering the Underpinnings of Statistical Language Learning in Infants
  Award Number: 1312443; Principal Investigators: Jill Lamy; Co-Principal Investigators: Organization: University of Notre Dame; NSF Organization: ECS Start Date: 03/02/2014; Award Amount: $75,126.95; Relevance: 48.0;

- Neural measures of social reward and information value in infants
  Award Number: 1707668; Principal Investigators: Rebecca Saxe; Co-Principal Investigators: Organization: Massachusetts Institute of Technology; NSF Organization: ECS Start Date: 07/15/2016; Award Amount: $900,000.00; Relevance: 48.0;

- Exploring the relation between non-spatial skills and mental rotation from infancy to pre-K
  Award Number: 1210349; Principal Investigators: Marcella Caves; Co-Principal Investigators: Lisa Cock, Vanessa Laily, Felicia Theis; Organization: Cornell University; NSF Organization: ECS Start Date: 02/01/2013; Award Amount: $716,655.00; Relevance: 48.0;

- A lifespan developmental model of ethnic-racial identity
  Award Number: 1729711; Principal Investigators: Esther Cadelano; Co-Principal Investigators: Adrienne Umane-Taylor; Organization: University of Texas at Austin; NSF Organization: ECS Start Date: 06/01/2017; Award Amount: $24,309.00; Relevance: 48.0;

- After-School Activities: Identifying Risk and Protective Factors for Community Violence Exposure
  Award Number: 1448957; Principal Investigators: Rosina Coladonato; Co-Principal Investigators: Stephanie Edles; Organization: University of Michigan; NSF Organization: ECS Start Date: 06/01/2014; Award Amount: $474,957.00; Relevance: 48.0;

- The Development of Relational Processing in Infancy
  Award Number: 1749702; Principal Investigators: Susan Haigh; Co-Principal Investigators: Catherine Seeley, Kenneth Fischo; Organization: Northwestern University; NSF Organization: ECS Start Date: 08/01/2016; Award Amount: $250,000.00; Relevance: 48.0;

- SRE-ICMI: CompCap: Modeling the Development of Phonetic Representations
  Award Number: 1542299; Principal Investigators: Islam Feldman; Co-Principal Investigators: Organization: University of Maryland College Park; NSF Organization: ECS Start Date: 09/01/2017; Award Amount: $500,000.00; Relevance: 48.0;

- Motor Exploration and Motor Learning in Young Children
  Award Number: 1549259; Principal Investigators: Poriannos Ha, Su San; Co-Principal Investigators: Organization: Michigan State University; NSF Organization: ECS Start Date: 09/01/2017; Award Amount: $500,000.00; Relevance: 48.0;

- Collaborative Research: Science of Learning Center: Visual Language and Visual Learning (VL2)
  Award Number: 1814796; Principal Investigators: Thomas Allen; Co-Principal Investigators: Organization: California University; NSF Organization: SRA Start Date: 10/01/2016; Award Amount: $88,804,960.00; Relevance: 48.0;

- SRE: Collaborative Origins of Itinerant Perceptions and Attitudes Across Diverse Contexts
  Award Number: 1720080; Principal Investigators: Krista Pasley; Co-Principal Investigators: Organization: University of Hawaii; NSF Organization: ECS Start Date: 08/01/2017; Award Amount: $30,458.00; Relevance: 48.0;

- Supporting Undergraduate Participation at the International Conference on Infant Studies: 2016-2018
  Award Number: 1511220; Principal Investigators: Marta Artzberry; Co-Principal Investigators: Organization: University of California; NSF Organization: ECS Start Date: 03/01/2016; Award Amount: $25,900.00; Relevance: 48.0;
### Find the Right Program: Abstracts of Awards Recently Made

You can review the abstracts of awards made through a particular program.

<table>
<thead>
<tr>
<th>Program Manager</th>
<th>Chandra Rigat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BEE Division Of Behavioral and Cognitive Sci</td>
</tr>
<tr>
<td></td>
<td>BEE Direct For Social, Behav &amp; Economic Sci</td>
</tr>
<tr>
<td><strong>Start Date:</strong></td>
<td>September 1, 2018</td>
</tr>
<tr>
<td><strong>End Date:</strong></td>
<td>August 31, 2021 (Estimated)</td>
</tr>
<tr>
<td><strong>Awarded Amount to Date:</strong></td>
<td>$55,655.00</td>
</tr>
<tr>
<td><strong>Investigator(s):</strong></td>
<td>Marcanda Casasola <a href="mailto:mc272@cornell.edu">mc272@cornell.edu</a> (Principal Investigator)</td>
</tr>
<tr>
<td></td>
<td>Lisa Oakes (Co-Principal Investigator)</td>
</tr>
<tr>
<td></td>
<td>Vanessa Louise (Co-Principal Investigator)</td>
</tr>
<tr>
<td></td>
<td>Felix Theanmae (Co-Principal Investigator)</td>
</tr>
<tr>
<td><strong>Sponsor:</strong></td>
<td>Cornell University</td>
</tr>
<tr>
<td></td>
<td>273 Pine Tree Road</td>
</tr>
<tr>
<td></td>
<td>Ithaca, NY 14853-2920 (607)255-5014</td>
</tr>
<tr>
<td><strong>NSF Program(s):</strong></td>
<td>D5 - Developmental Sciences</td>
</tr>
<tr>
<td><strong>Program Reference Code(s):</strong></td>
<td>1698</td>
</tr>
<tr>
<td><strong>Program Element Code(s):</strong></td>
<td>1698</td>
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</tbody>
</table>

**Note:**
- Program Manager
- Duration
- Awarded amount
- Co-funded?
- Topic area

### ABSTRACT

Mental rotation, the ability to mentally manipulate a visual representation of an object and recognize its appearance from a different orientation, shows stability from infancy through preschool. This ability predicts mathematical achievement in kindergarten and beyond as well as entry into the Science, Technology, Engineering, and Mathematics (STEM) fields. The present work focuses on identifying how non-spatial processes contribute to mental rotation abilities. Findings will help identify ideal time points for intervention, advance understanding of the factors that contribute to mental rotation, and address how individual differences in mental rotation during infancy predict later abilities. This work will involve the creation and refinement of measures that can be used to trace the development of mental rotation from infancy into preschool; thereby, not only contributing new tools to the field, but also yielding insights that can inform current theoretical conceptions of mental rotation and its relation to non-spatial processes.

The critical research question is as follows: What are the non-spatial processes that contribute to mental rotation abilities and their development? Associations between mental rotation, object features, processing bias, and motor experience will be examined using a cross-sequential design with overlapping age cohorts. The investigators will recruit an infant cohort at 6 months, a toddler cohort at 20 months, and a preschool cohort at 3 years. Each cohort will be assessed at three time points -- every six months for infants (i.e., 6, 14, and 20 months), every 8 months for toddlers (i.e., 20, 28, and 36 months), and every year for preschoolers (3, 4, and 5 years). When examined at a specific age, the sample will provide a snapshot into the association between mental rotation and non-spatial skills (i.e., object features, processing bias, and motor experience). The longitudinal design will allow the investigators to follow participants across infancy, toddlerhood, or the preschool years. This approach provides an opportunity to understand how non-spatial skills, such as more precocious motor skills during infancy, may shape mental rotation over time. Such findings are central to bolstering understanding of the possible mechanisms by which particular types of...
Next Steps

After you have narrowed down to programs that match your area of research and you have read the program page and (solicitation):

Reach out to the Program Director by EMAILING a 1-page summary of your planned research project (IM and BI). Get feedback about project fit with program goals

Email ALL relevant programs in a SINGLE email.

Request a phone meeting if the program is a good fit

- Get in touch EARLY (well before the deadline)
- Follow-up if you have not heard back within 1- week
- Ask about other relevant programs and initiatives
Questions?

Contact Information:

Name: John E. Yellen
Campus/Department: National Science Foundation
Email: jyellen@nsf.gov
Interaction of Sensory and Response Processes in Decision Making

Pablo Gómez - California State University, San Bernardino (Palm Desert Campus)
University of California, Irvine

Pablo Gómez, Associate Professor
CSUSB Palm Desert, Department of Psychology
pablo.gomez@csusb.edu
Dual Goals

Scientific Goals

New approaches to studying perceptual decision making with neurophysiological and modeling tools.

Human Capital Development

The first academic endeavor in the Coachella Valley.
Interaction of Sensory and Response Processes in Decision Making

Scientific Goals

1. We address the questions of whether and how sensory signals gain direct access to the motor system.
2. We establish the temporal relations among figure-ground segregation, spatial attention, and response planning as a function of different classes of stimuli and task demands.
3. We develop and assess a trial-by-trial EEG chronometric analysis.
4. We apply the EEG chronometry to paradigms with both priming and negative-priming (contrast) effects to understand the locus of opposing behavioral phenomena.
5. We provide a first-ever assessment of the time-course of object recognition in tactile perception.
6. We make use of novel cognitive studies of tactile perception to understand whether the interplay between perception, attention, and response planning generalizes across the sensory scene.
1. Our goal is to enhance STEM opportunities for underserved students at Palm Desert Campus of CSUSB by integrating the research and training programs of UCI Cognitive Sciences (PI Srinivasan and PI Rouder), with PDC (PI Gomez). PDC students are overwhelmingly Latinx (>80%), with 79% first-generation and 56% receiving Pell Grants.

2. We provide an opportunity for PDC students to gain STEM skills and to gain knowledge by contributing to active state-of-the-art research in cognitive neuroscience.

3. We help them discover new future research opportunities and directions at R1 universities and develop career goals in STEM fields.

4. We provide opportunities for UCI graduate students to develop teaching skills for students who may have fewer STEM opportunities in primary school.
How do we make decisions using sensory information, and how does context affect such process.

- Flanker task

- Morphed flanker task

- Tactile
As a driver approaches a traffic light, a decision to brake or accelerate is made.

- The classic sequential account is that the driver first identifies the color and position of the traffic light and then decides on what motor action to take (Donders, 1868; Luce, 1986; Ratcliff, 1978; Sternberg, 1969).
- In contrast, a parallel account of decision-making posits that perceptual and motor processing are engaged in a dynamic interaction as the driver approaches the intersection.
Interaction of Sensory and Response Processes in Decision Making

Summer Irvine Fellowship

- Students from CSUSB came to Irvine to be apart of a part of summer experience
- Students were apart of enrichment days where they learned about current research in neuroscience and how it goes along with the current research at hand
- Students were able to expand and create their own research project
- Challenges with COVID
## Summer School Schedule (1 of 2)

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 19</td>
<td>Welcome meeting Virtual</td>
<td>All</td>
</tr>
<tr>
<td>July 20 – 21</td>
<td>EEG laboratory skills</td>
<td>PDC</td>
</tr>
<tr>
<td>July 25-28</td>
<td>EEG laboratory skills</td>
<td>PDC</td>
</tr>
<tr>
<td>August 1</td>
<td>EEG SOP presentation by PDC students</td>
<td>UCI</td>
</tr>
<tr>
<td>August 1</td>
<td>Demonstration of EEG recording (by PDC students with feedback from UCI students)</td>
<td>UCI</td>
</tr>
<tr>
<td>August 2</td>
<td>Basics of EEG signal processing using Python</td>
<td>UCI</td>
</tr>
<tr>
<td>August 2</td>
<td>Introduction to design of experiments and metacontrast masking</td>
<td>UCI</td>
</tr>
<tr>
<td>August 3</td>
<td>Implementation of a metacontrast masking experiment</td>
<td>UCI</td>
</tr>
<tr>
<td>August 3</td>
<td>Introduction to R for data analysis</td>
<td>UCI</td>
</tr>
</tbody>
</table>
## Interaction of Sensory and Response Processes in Decision Making

### Summer School Schedule (2 of 2)

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 8-11</td>
<td>EEG experiments on Flanker task</td>
<td>UCI</td>
</tr>
<tr>
<td>August 8-11</td>
<td>Behavioral pilot studies on metacontrast masking</td>
<td>PDC</td>
</tr>
<tr>
<td>August 15</td>
<td>R data analysis of behavioral data</td>
<td>UCI</td>
</tr>
<tr>
<td>August 15</td>
<td>R data analysis of EEG data</td>
<td>UCI</td>
</tr>
<tr>
<td>August 16</td>
<td>Discussion of Fall research plan and NeuroFest</td>
<td>UCI</td>
</tr>
<tr>
<td>August 16</td>
<td>R data analysis of EEG data</td>
<td>UCI</td>
</tr>
</tbody>
</table>
Interaction of Sensory and Response Processes in Decision Making

Students at UCI Fellowship
Experiments Underway

- At UCI
  - Studies related to the grants first specific goal: the effects of unattended stimuli on decision making using variations of the flanker task.

- At CSU
  - Three students are currently working on their honors theses, using paradigms that extend the experiments proposed in the grant.
One project that is in development makes use of novel cognitive studies of tactile perception to understand whether the interplay between perception, attention, and response planning generalizes across the sensory modalities.

Students develop the tactile interfaces for experiments.
Interaction of Sensory and Response Processes in Decision Making

Student Conducting Experiment
Neurofest

- Students will create a science-based science fair where they will show the community what they have done with their experiments. This will bring the community more awareness of the fields of research in neuroscience. The community will also be exposed to science research and the benefits of it. This will be held in early Spring 2023 in the Coachella Valley.
Challenges

- COVID
- Recruiting students at the beginning was quite a challenge; but once a critical mass was achieved, it stopped being a problem; now PDC lab has 8 undergraduates consistently working on projects
- CSU system teaching load
- Adjusting expectations
Thank you for your time!
Questions?

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Website: https://pdc-cognitive-neuro.academic.csusb.edu
Phone #: (909) 537-8108
Email: pablo.gomez@csusb.edu
From Molecule to Migration: Improving the Use of Fecal Biomarkers in Archaeology

Lora Stevens-Landon– Cal State Long Beach

Lora Stevens-Landon, Professor
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Varenka Lorenzi, PhD
CSULB, IIRMES
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AJ White, PhD candidate
UC Berkeley, Dept of Anthropology
adam_white@berkeley.edu
Research Question

Ancient agricultural practices
(Bull et al., 1999; Jardé et al., 2007; Birk et al., 2011; Prost et al., 2017)

Presence of humans (migration patterns)
(Briles et al., 2019; Vachula et al., 2019; Schroeter et al., 2020)

Human demographic changes
(D’Anjou et al., 2012; White et al., 2018, 2019)

How do we know the coprostanol we measure is really from humans?
How do we know changes in coprostanol through time reflect changes in demographics?
Can we use the isotopic composition of stanol suites to reconstruct major dietary shifts?
Research Design/Activities

Fecal Biomarkers in Archaeology

Bison (H)
Wolf (C)
Black bear (O)
Coyote (O/C)

Wildebeest (H)
African elephant (H)
Painted Dog (C)
Hyena (C)
Warthog (O)
Chimpanzee (O)

Asian elephant (H)
Gibbon (H/O)
Sunbear (O)
Dhole (C)
Asian crocodile (C)
<table>
<thead>
<tr>
<th>Research Design/Activities</th>
<th>Fecal Biomarkers in Archaeology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stanol composition of select animal feces</td>
<td>Controls on stanol movement /preservation in sediment</td>
</tr>
<tr>
<td>Stanol-specific carbon isotopes in feces</td>
<td>Who makes what and how much?</td>
</tr>
<tr>
<td>How do stanols move on the landscape?</td>
<td>Can isotopes track dietary changes?</td>
</tr>
</tbody>
</table>

- Grad student E. Jackson sampling feces
- V. Lorenzi spreading pig feces in test plot
- Bear feed from Zoo Montana
Wolves have coprostanol values similar to humans.
Wolves have a distinct stanol fingerprint
Fecal Biomarkers in Archaeology

Early Results

Wolf feces have a distinct isotopic signature
Lessons Learned

Fecal Biomarkers in Archaeology

- Coprostanol is produced by all tested animals but stanol fingerprint may link to feeding strategy (herbivore/omnivore/carnivore)
- Wolves (and their dog descendants) are likely complicating factors in fecal biomarker applications
- Carbon-isotopes of feces show promise in identifying stanol source
Fecal Biomarkers in Archaeology

Long-term Plans

First Arrival:
Tracking the movements of early peoples in California

Migration and shifts in subsistence strategies: Do subsistence strategies change as different cultural groups occupy Cahokia (or any area)?

Balter, 2015. Science.org

Image courtesy of Cahokia Mounds Historic State Site. Painting by William R. Iseminger
Fecal Biomarkers in Archaeology

Contact Information:
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CSULB—Earth Science
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Follow us on:
Instagram @ iirmes_csulb and
https://www.youtube.com/c/PoopyArchaeology

Onyx: Photo courtesy of Zoo Montana
LatinXperimental Archaeology is on the Agenda!

Experimental adobe archaeology

Culturally sustaining research methods

Research that’s accountable to Latinx stakeholders

Albert Gonzalez, PhD
LatinXperimental Archaeology is on the Agenda!
Experimental Adobe Archaeology as High Impact Practice

• Creating community in northern New Mexico

• The Ranchos de Taos yearly enjarre.

• Replicating the work in research and to facilitate student success
LatinXperimental Archaeology is on the Agenda!
LatinXperimental Archaeology and Student Success

STUDENT SUCCESS
IN THE MAKING
LatinXperimental Archaeology is on the Agenda!

Turley’s Mill: Site Introduction

Turley’s Mill and Distillery

Inset into Hillside

Adobe 2nd story

Stonemasonry

First Story

Built 1831 • Destroyed 1847
Latin Xperimental Archaeology is on the Agenda!

Turley's Mill: Site Introduction

Turley's Mill Excavation Loci
LatinXperimental Archaeology is on the Agenda!

Turley’s Mill: Site Introduction

Human 5-year-old for scale

15 m

Room 2

West Wing

Turley’s Mill and D

Legend:
- Documented Site
- Architectural Plan
- Undocumented Site
- Architectural Plan
- Room Designation
- Architectural Floor Designation

RIO HONDO
LatinXperimental Archaeology is on the Agenda!

Turley’s Mill: Historical Background

• Anglo Arrival in NM and Local Work / Construction
• The Rise and Fall of Turley’s Mill
  • Curbing an Industrial Revolution
  • The Research Question: WHY?
LatinXperimental Archaeology is on the Agenda!

**Turley’s Mill: Research Sub-Questions**

RQ: *Why* did the Rebels Choose Turley’s Mill?

- Was the industrial writing on the wall?
- Laborers = *nodes* in a communicative *network*
- Landscape (wood/water) = aspect of field that spurs nodes to *action*
LatinXperimental Archaeology is on the Agenda!

**Turley’s Mill: Research Sub-Questions**

RQ: Why did the Rebels Choose Turley’s Mill?

- Sub-Question 1: Construction person hours?

Disruptive  Sacred to Profane

LatinXperimental research methods
Latin Experimental Archaeology is on the Agenda!
High Impact Pedagogy, Low Impact Archaeology

- Brick Collection at NM Earth (Albuq.)
- Foundation excavation / construction
LatinXperimental Archaeology is on the Agenda!
High Impact Teaching, Low Impact Archaeology

- Mortar excavation and mixing
- Wall construction
LatinXperimental Archaeology is on the Agenda!
High Impact Teaching, Low Impact Archaeology

Plastered and Looking Good
LatinXperimental Archaeology is on the Agenda!

Thanks to:
LatinXperimental Archaeology is on the Agenda!

Questions?

Contact Information:
Albert D. Gonzalez
Department of Anthropology, Geography and Environmental Studies
California State University - East Bay
albert.gonzalez@csueastbay.edu
Uncovering the Neural Dynamics of Speech Monitoring Processes During Language Production

Stephanie Ries – San Diego State University

Collaborators:
Jerry Shih, Ashkan Ashrafi, Melissa Navaro, Zed Sehyr

Stephanie Ries, Assistant Professor
San Diego State University, School of Speech Language and Hearing Sciences
sries@sdsu.edu
Project Overview

- Speech monitoring is a critical mechanism for efficient language production.
- It depends on 2 main loops:
  - The outer loop of speech monitoring allows us to detect and correct our errors once speech has been produced.
  - The inner loop of speech monitoring allows us to detect and correct our errors before we have started speaking.
- There is debate as to whether the inner loop of speech monitoring depends on speech perception mechanisms similarly as the outer loop or on other mechanisms.
Scientific Activities

• We use Stereotactic Electroencephalography (SEEG) offering combined excellent spatial and temporal resolution to provide unprecedented insight on how we monitor language output in real time.
• The results will allow us to know when and where brain activity takes place relative to speech, and therefore which brain region supports inner versus outer speech monitoring.

Outreach Activities

• We are developing an outreach program on language and the brain for K-12 students to increase the accessibility and the participation of traditionally marginalized and linguistically diverse individuals in cognitive neuroscience.
• We are extending this outreach program to the neurosurgical patients participating in this research and their families providing them with structured information about the research performed and solicit their feedback on study design and objectives.
Preliminary Results

• My past investigations have led to the identification of electrophysiological correlates of speech monitoring and the proposal that inner speech monitoring is supported in part by a medial frontal domain-general action monitoring mechanism.

• By contrast, the electrophysiological activity recorded above the temporal cortices appears to peak later, which would be in agreement with a later involvement of the speech perception mechanisms in speech monitoring.

• These results are central to this proposal as they lay the groundwork for investigating the intracranial electrophysiological correlates of speech monitoring and testing our hypothesis.
• It takes a village! Having a good group of collaborators and students is critical to a project’s success from inception to completion.

• Very grateful for SDSU’s DRI and the workshops organized by John Crockett on grant writing and the NSF CAREER award in particular, and for the grant reviewer system which allowed to compensate an internal reviewer for their time reading my application and providing critical feedback.

• A thousand thanks to Simon Fischer-Baum at Rice for sharing his application materials as an example.

• So grateful to Jonathan Fritz, NSF’s Cog Neuro’s Program Officer, for meeting with me, providing his invaluable insight, and supporting me through this process.
Next Steps/Long-Term Plans

- Next steps: Launching this funded NSF project: completing the IRB, hiring personnel, getting the paradigm ready, starting data collection.

- Longer term plans:
  - Investigate individual differences in the neurobiology of speech monitoring and word retrieval processes.
  - Investigate the neurobiology of speech monitoring and word retrieval at a more fine-grained neurological level.
  - Bridge the fundamental knowledge acquired to understanding how speech monitoring and word retrieval may be affected by neurological conditions such as stroke.
  - Help design individualized treatment strategies that make use of this acquired knowledge.
Questions?

Contact Information:

Name: Stephanie Ries
Campus/Department: SDSU, School of Speech, Language, and Hearing Sciences
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Next Steps/Closing Remarks

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