What Research Tells Us?
Hawai Kwok
Director of Supplemental Instruction

The City College of New York (CUNY)
SEEK Department
HOW WE GOT HERE AND WHERE DO WE GO FROM HERE

SEEK RESEARCH FELLOWS (SRFs)

CCNY SEEK
CCNY Overview

- ~13,500 Undergraduates
- Urban Commuter Campus
- Diverse Population
- Competitive Engineering School
- Competitive Architecture School
- Sophie Davis Medical School
CCNY SEEK Overview

- ~830 SEEK Students-Annualized Average
- SEEK students have lower SES
- Less academically prepared
- SEEK students are offered
  1. Academic support
  2. Assigned counselors
  3. Additional year of TAP
Tutoring Appointments
500/week 42% - Unique - 20% Freshmen
What can tutoring appointments tell us?

Significant Results

ATTENDED SESSION = Higher A-C grades
                   Lower C-/D/F/WU
Where else do we see the effects?

Scholarships

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<td>30</td>
<td>51</td>
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Where else do we see this effect?

Tutors who are SEEK Students

Fall 10 8%
Fall 11 20%
Fall 12 26%
Fall 13 20%
Fall 14 30%
Fall 15 44%
Fall 16 50%
For the first time in almost 50 years

1. Increased Retention
2. Decreased at-risk-students
3. This trend has persisted since

4. Four Nominated Valedictorians
5. Two Salutatorians
6. Two Valedictorians for a Division
So, what is next?
Collaboration
SEEK Research Fellowship (SRF) (2016-2017)

Jin Hong
Biochemistry
SEEK Junior

Principal Investigator

Ruth E. Stark, Ph. D
Chair - Distinguished Professor, Chemistry and Biochemistry

Summary

Fatty acids are important physiologically for energy storage and metabolism, membrane structure, and intracellular signal transduction. Fatty acid-binding proteins are small water-soluble proteins with well-characterized binding specificities and affinities for hydrophobic ligands but incompletely understood physiological function. Dr. Stark's lab is studying the three-dimensional conformation and internal dynamics of fatty acid-binding proteins and associated complexes, including both wild-type proteins and site-directed mutants.

Experience

Jin works under May Poh Lai, a Ph.D. candidate, and Francine Katz, a Senior Research Associate, who are interested in studying the interaction between fatty acid binding protein (FABP) and peroxisome proliferator-activated receptor alpha (PPARalpha). The mechanism by which the FABP delivers fatty acids to the PPARalpha is still unknown. Since the PPARalpha in N-terminally His-Tag construct is insoluble after purification, Jin is attempting to make it soluble with a C-terminally His-Tag construct in order to investigate this process. She is now learning the purification steps for PPARgamma using different techniques such as sonication, HisTrap column, and size exclusion chromatography.

SEEK Research Fellowship (SRF) (2016-2017)

Andrew Kempadoo Umadat
Pre-Med
SEEK Sophomore

Principal Investigator

Timothy Ellmore, Ph. D.
Associate Professor, Psychology

Summary

One theory of working memory capacity is limited. This means, in the span of a few seconds humans can only remember a few items. Some researchers think the limit is 4+/-1 item, while others claim it may approach 7 items or beyond. The limitation of previous studies is that they have used simple stimuli like colored boxes or letters. It was hypothesized that as memory load increased, performance would reach a plateau and that performance would be higher for black and white images and blurry images as they contain less detail to store in a limited capacity working memory.

Experience

To examine working memory capacity with more naturalistic stimuli, Andrew analyzed data from a scene working memory task where the number of scenes that were presented varied in amount and color. He learned how to import, clean, and analyze behavioral data from Superlab, which is a program used to present cognitive tasks. He used this program to calculate behavioral outcomes including hits, misses, correct rejections and false alarms in order to plot a signal detection measure of sensitivity from 31 subjects. Analyses are ongoing, but trends indicate that working memory capacity for scenes is higher than would be predicted based on the past studies that have used more simple stimuli.
SEEK Research Fellowship (SRF) (2016-2017)

Rainiel Baez
Chemical Engineering
SEEK Senior

Principal Investigator

Marco Castaldi, Ph. D
Associate Professor, Chemical Engineering

Summary

Rainiel’s project was based on the analysis of fuel obtained through pyrolysis, a thermo-decomposition process that breaks down feedstock in the absence of oxygen. The oxygen-free environment prevents combustion, therefore, no carbon dioxide is produced during this process. The feedstocks for the analyzed fuel were non-recyclable plastics and tires. The overall goal was to use pyrolysis plants as waste to energize facilities whose feedstocks are extracted from landfills.

Experience

To successfully complete the analysis, Rainiel was required to learn the principles of a bomb calorimeter. This equipment helps measure the heating values (energy released per mass), and the percentage of weight residue after the usage of the fuel. Besides thermodynamic properties, one studied its physical properties such as density, and viscosity. Furthermore, the challenge of this summer was to understand and troubleshoot a Mini Gas Lab Turbine. With another mechanical engineering student, Rainiel troubleshooted the non-operating turbine until it was safe to run. The turbine will extend the research into determining the fuels’ efficiency and emissions.

SEEK Research Fellowship (SRF) (2016-2017)

Luz Maria Valdiviezo
Chemical Engineering
SEEK Senior

Principal Investigator

Ilona Kretzschmar, Ph. D
Department Chair, Professor, Chemical Engineering

Summary

Janus particles are of great interest because they have both hydrophobic and hydrophilic hemispheres. A Physical Vapor Deposition (PVD) machine is used to coat half of a silica particle monolayer with gold. Next, the gold hemisphere is modified with dodecanethiol. The Janus particles are placed on a Langmuir trough, where they are compressed and expanded to examine their optical properties, their isotherms, and the layer’s collapse mechanism at the air-water interface.

Experience

The objective in Luz Maria’s summer research was to synthesize Janus particles of various sizes that ranged from 1µm to 100nm and observe their behavior at the air-water interface. One of the hurdles was generating a feasible technique to make monolayers from nanosized particles. Particle monolayers were successfully made for 1µm and 500nm Janus particles. The 500nm Janus particles show an unusual cracking pattern with a deep red to brown color, whereas a darkened spider-like webbing pattern was observed for the 1µm Janus particles.
SEEK Research Fellowship (SRF) 
(2016-2017)

Xue Ru Chen 
Computer Engineering 
SEEK Junior

Principal Investigator

Jizhong Xiao, Ph. D 
Professor, Electrical Engineering

Summary

The CCNY SmartCane system is a robotic white cane with a mobile device navigation software for the visually impaired. The system includes software for Google Tango devices that utilizes Simultaneous Localization and Mapping (SLAM) to guide a visually impaired user to waypoints within indoor environments. A control panel is mounted on the standard white cane that enables visually impaired users to communicate with the navigation software and is used to provide navigation instructions via haptic feedback.

Experience

Xue Ru learned the mechanics of motion sensors and how to pass the data from a motion sensor to MATLAB. In order to reduce error in the live graph, he had to make sure that the rate of the motion sensor passing data was the same as the MATLAB connecting data by using delay function in both Arduino and MATLAB, and restricting some data passed by the motion sensor. As a computer engineering major, he was afforded the opportunity to work with electrical engineers. On this project, while the electrical engineers were dealing with the circuits of the SmartCane, the computer engineers had to make sure that the data was received and processed by the computer.

SEEK Research Fellowship (SRF) 
(2016-2017)

Kevin Nogacz 
Mechanical Engineering 
SEEK Junior

Principal Investigator

Yiannis Andreopoulos, Ph. D 
Professor, Mechanical Engineering

Summary

The goal of the StarWind project is to redesign traditional wind turbines in hopes of increasing its efficiency. Traditional turbines have problems such as blade vibration. The newer wind turbine solves these problems by creating smaller blades and making the turbine elongated. There are many parameters, such as blade length, blade curvature, and body shape, that were discussed in optimizing the power output.

Experience

The main task given to Kevin was to determine how to measure the dynamic torque in real time. He was a part of building, calibrating, and troubleshooting a 3-D printer. This included configuring steps/mm for motors, optimizing extrusion/retraction settings, and wiring a processing board that controls where the current/voltage is sent. More research was done, focusing on creating a larger printer and a test plan. He gained a lot of knowledge about 3-D printers, how they work, their problems, how to fix them and how to critically think about design solutions.
**SEEK Research Fellowship (SRF) (2016-2017)**

**Ashley Arango**  
Biology  
SEEK Junior

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**Principal Investigator**

Timothy Ellmore, Ph. D.  
Associate Professor, Psychology

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**Summary**

The levels of processing theory states that deep processing leads to better memory than shallow processing. Deep processing results in a more durable memory, while shallow processing results in a less durable memory trace. The behavioral hypothesis states that assigning meaningful semantic labels to novel complex visual information will result in better short- and long-term memory than a strategy of relying on visual perceptual memory while repeating a distracting word that is semantically unrelated to the scene. The second hypothesis is that a maintenance strategy of rehearsing the self-generated semantic labels will result in elevated neural activity, which is hypothesized to be the neural mechanism responsible for the better memory.

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**Experience**

Using SuperLab, I assisted with creating the memory tasks for this experiment. This experiment included two working memory tasks during which scenes were labeled and rehearsed, and a recognition task that tested the participant’s long-term memory for previously rehearsed scenes. I guided the participants through task practice trials. I also helped record the EEG data of each subject. I learned how to load an EEG cap with electrodes after measuring the circumference of the participant’s head to figure out which cap size to use for the experiment. The last part was processing the EEG data, which included identifying muscle artifacts and eye blinks. Behavioral and EEG data analysis are ongoing but preliminary results indicate a slight advantage for rehearsal with a semantic label.

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**SEEK Research Fellowship (SRF) (2016-2017)**

**Diana Yeung**  
Undeclared  
SEEK Sophomore

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**Principal Investigator**

Timothy Ellmore, Ph. D.  
Associate Professor, Psychology

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**Summary**

The theory of embodied cognition postulates that brain areas involved in action also influence memory for those actions. This hypothesis is based on findings in literature which shows that eye movements made before memory retrieval result in better memory performance, but the advantage only exists for subjects who are strongly right handed. The experiment tested whether eye movements made before viewing novel scenes differentially affects scene memory depending on handedness. Left handed subjects are thought to have a higher baseline of interhemispheric neural transmission, so making eye movements will be detrimental to scene memory.

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**Experience**

Diana tested college undergraduates who volunteered to earn extra course credit. Each was seated in front of a monitor on which were displayed new scenes, which were simply color photographs of outdoor environments. After the short-term memory task subjects took a ten minute break and then performed a recognition memory task to assess how many scenes they remembered. Diana learned how to interact with human subjects, how to operate and calibrate an eye tracking system to record pupil location, and data analysis. She imported behavioral files into Excel to determine how memory for the scenes was influenced by the subject’s handedness, which was assessed separately before the scene memory task using the Edinburgh Handedness Inventory.
Ahmed Elwakil  
Biology  
SEEK Sophomore

**Principal Investigator**

Adeyinka Akinsulure-Smith, Ph. D., ABPP  
Associate Professor, Psychology

**Summary**

This study revolves around the experiences of women and girls from sub-Saharan Africa that have undergone female genital cutting (FGC), a procedure performed on girls at a young age for cultural purposes. The aims are to identify and measure the health and psychological impact and consequences of FGC and to describe experiences, knowledge, attitudes, and practices regarding FGC among health professionals who provide physical and mental health services to female West African immigrants from countries with an FGC prevalence rate of over 65%.

**Experience**

As a research assistant, Ahmed’s responsibilities were to transcribe interviews done with healthcare providers that have treated patients with this condition. He has learned a lot about the kinds of research that occur outside a laboratory, and how psychology intersects with the medical field. Some of his other responsibilities involve obtaining contact information from African organizations so that the Dr. Akinsulure-Smith can perform outreach to community members to get more participants.

Andres Arreaga & Steven Guererro  
Electrical Engineering  
SEEK Seniors

**Principal Investigator**

Bruce Kim, Ph. D  
Associate Professor, Electrical Engineering

**Summary**

This project entailed a proposed design for an energy-ion collider (EIC) integrated with a Relativistic Heavy-Ion collider (RHIC). Dubbed the eRHIC, it would be the world's first electron-nucleus collider, and the first fully polarized electron-ion collider where both the electron and proton/ion beams are polarized. The eRHIC design also considered a new specialized detector which would analyze collision results, possibly improving RHIC’s existing STAR and PHENIX detectors to make key precision measurements.

**Experience**

Steven and Andres worked on a special project associated with Brookhaven National Laboratory. Along with another member, they were in charge of improving and altering the proposed pre-amp design which would amplify the results of a 5 to 10 GeV electron ring. Electrons would be accelerated by two stacked energy recovery linear accelerators (ERLs) and collide with heavy ions or protons circulating in one of the existing RHIC accelerator rings.
SEEK Research Fellowship (SRF)  
(2016-2017)

Kevin Vittini  
Psychology  
SEEK Junior

Principal Investigator

Adeyinka Akinsulure-Smith, Ph. D., ABPP  
Associate Professor, Psychology

Summary

This study revolves around the experiences of women and girls from sub-Saharan Africa that have undergone female genital cutting (FGC), a procedure performed on girls at a young age for cultural purposes. The aims are to identify and measure the health and psychological impact and consequences of FGC and to describe experiences, knowledge, attitudes, and practices regarding FGC among health professionals who provide physical and mental health services to female West African immigrants from countries with an FGC prevalence rate of over 65%.

Experience

As a research assistant, Kevin’s responsibilities are to transcribe interviews done with healthcare providers that have treated patients with this condition. He has learned a lot about the nature of this procedure as well as the medical perspective on this topic, and it is impressive how little it is known within the medical or any health field. Some of his other responsibilities involve obtaining contact information from African organizations so that the Dr. Akinsulure-Smith can perform outreach to community members to get more participants.
OK, what is next?
More Collaboration
SRFs + Global Research