Samyukta Jayakumar

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Professional Summary

Diligent researcher with over 4 years of experience running quantitative studies centralized on understanding mechanisms of vision perception using gamified approaches and analyzing data to turn them into actionable insights. Advanced knowledge of Cognitive Psychology and expertise in research planning and management. Passionate about continuous scientific exploration with an analytical mindset.

Education

Ph.D. Candidate, Psychology (Cognitive)   **expected, June 2024/ earlier**
University of California, Riverside   California, USA
CGPA: 3.93/10

M.A., Psychology (Cognitive)   **June 2021**
University of California, Riverside   California, USA
CGPA: 3.93/10

B.Tech., Biotechnology   **April 2017**
Rajalakshmi Engineering College   Chennai, India
CGPA: 8.66/10

Experience

Graduate Student Researcher   **September 2019 - Present**
University of California, Riverside

- Played a key role in the conceptualization, development, and launch of two applications (iOS and PC builds) centered around visual training paradigms with the primary objective of advancing open science and reaching out to underserved populations in a remote setting

- Developed and implemented experimental paradigms integrating eye tracking (Eyelink, VPixx, Tobii) and psychophysics techniques to assess low-level vision perception and quantify their impact on higher cognitive functions

- Collaborated with multiple laboratories, spearheading a cohesive effort to ensure the meticulous conduct of studies. Led collection and synthesis of data from multiple sites, leveraging strong analytical skills to interpret results effectively. Facilitated seamless communication of research findings through insightful briefings to stakeholders and leadership, providing a comprehensive understanding of project goals and outcomes. Additionally, played an instrumental role in establishing robust pipelines for data analysis, optimizing efficiency and accuracy in data processing and interpretation

- Published peer-reviewed findings in journals and presented results to field professionals

Project Associate   **June 2017 - May 2019**
Indian Institute of Technology, Madras, India

- Developed a computational model to characterize the effects of different environmental geometries on grid cell representations in rodent hippocampus

- Further expanded the model to account for object specific vector representations
- Adapted a cortico-basal ganglia system for simulating various rehabilitation strategies for Hemiparetic stroke patients
- Published two first author journal articles highlighting key findings from above mentioned studies

Research Projects

- **Quantifying the breadth and depth of Vision Perception training in healthy young adults**
  University of California, Riverside; University of Wisconsin Madison
  Prof. Aaron Seitz; Prof. Shawn Green
  - Evaluating the generalizability of diverse visual perception training methods through the implementation of standard, visual attention and multi-sensory learning paradigms in healthy young adults
  - Examining the effect of individual differences in training profiles by administering questionnaires that target personality measures and cognitive factors between and across age span
  - Managed and contributed to creating an open-source application (PLFest) for designing and testing visual perceptual learning paradigms
  - Observed robust test-retest reliability and validity of vision tasks on the iPad in comparison to performance observed on conventional computerized testing platforms
  - Preliminary training results pointed to key differences between paradigms indicating generalization to higher order visual and cognitive tasks

- **Understanding the factors in learning and plasticity in healthy individuals with simulated central vision loss**
  University of California, Riverside; University of Birmingham, Alabama
  Prof. Aaron Seitz; Prof. Kristina Visscher
  - Designed visual tasks that train peripheral vision under conditions of simulated central vision loss
  - Designed experiments using MATLAB Psychtoolbox and successfully integrated them with VPixx eye tracking software
  - Utilized real-time eye tracking to generate a blind spot simulating central vision loss
  - Utilized GitHub version control to ensure code compatibility across multiple platforms/sites
  - Evaluating the effect of training paradigms on peripheral attentional mechanisms and higher cognitive tasks
  - Preliminary results pointed towards improved behavioral compensatory strategies

- **Characterizing Contrast Sensitivity Function in Healthy Individuals**
  University of California, Riverside
  Prof. Aaron Seitz
  - Developed and compared four different techniques to measure Contrast Sensitivity quickly and efficiently in healthy young adults
  - Provided data-driven algorithms to develop robust adaptive techniques that can estimate the Contrast Sensitivity function
  - Structured and utilized the QUEST tool on MATLAB to compare and estimate the efficiency of the different techniques implemented

- Performed test-retest reliability for each of the proposed techniques
- Currently exploring Machine learning algorithms to estimate Contrast Sensitivity function efficiently and accurately in healthy individuals

- **Designing, Testing and Validating a computerized training paradigm for effective rehabilitation of visual disorders in Schizophrenia patients**
  University of California, Riverside; University of Rochester
  Prof. Aaron Seitz; Dr. Pamela Butler; Prof. Steven Silverstein

  - Designing an adaptive training algorithm that focuses on improving low, mid, and high-level visual perception in both neurotypical individuals and Schizophrenia patients
  - Analyzing, interpreting, and utilizing data driven models to improve training algorithms to benefit patients
  - Understanding the interaction of low-level visual tasks with higher order cognitive processes and assessing the effect of the adopted visual training method on these processes in both groups
  - Exploring the use of statistical and machine learning tools to characterize training and assessment differences between neurotypicals and patients

- **Optimization of subjective eye contact experience in video conferencing platforms**
  University of California, Riverside; University of Washington, Seattle
  Prof. Aaron Seitz; Steven Seitz (UW Reality Lab)

  - Identified key questions to address the lack of eye contact experience in video conferencing platforms like Zoom and Google Duo
  - Devised a method to collect, assimilate and stratify data from human actors to simulate eye gaze in controlled environments
  - Designed a psychophysical experiment to measure subjective perception of eye contact while viewing human actor faces simulated in a real-world video conference setting
  - Integrated the use of eye tracking to obtain objective measures of eye contact perception
  - Developing effective tools and methods to compare overall experiences when viewing human faces vs AI generated faces

- **Analyzing the effects of Traumatic Brain Injury (TBI) on Eye Movements**
  University of California, Riverside; Oregon Health and Science University
  Prof. Aaron Seitz; Dr. Tyler Duffield

  - Analyzing the implications of TBI on eye movement data while performing a working memory task
  - Implementing analysis pipelines to extract appropriate eye tracking data
  - Developing computational tools to isolate relevant information from the data collected using Tobii Eye tracker

Skills

- **Programming Languages and Softwares:** MATLAB, R, Python
- **Statistical Tools/ Softwares:** Excel, SPSS, JASP
- **Machine Learning:** Numpy, Pandas, MATLAB, CNN, RNN, DNN

Fellowships and Awards

- Dean's Distinguished Fellowship Award   2019 - 2024
- Campbell Endowed Fellowship for Research Excellence, $3000   2022
- Diversity Travel Grant, Biennial Perceptual Learning Workshop, $3000   2022

Publications

- **Published/ In pipeline**
  - *Performance on a Contour Integration Task as a function of Contour Shapes in Schizophrenia and Controls* - (In Revsion - Vision Research)
    Jayakumar, S.*, Silverstein, S., Butler, P.D., Thompson, J., Ahmed, A.O., Seitz, A.R.
  - *A Computational Model that explores the effect of Environmental Geometries on Grid cell Representations* - (Frontiers in Neural Circuits)
    Jayakumar, S.*, Narayanamurthy, R.*, Ramesh, R., Soman, K., Muralidharan, V., Chakravarthy, V.S.
  - *A Cortico-Basal ganglia model for choosing an optimal rehabilitation strategy in Hemiparetic Stroke* - (Scientific Reports, Nature)
    Narayanamurthy, R.*, **Jayakumar, S.***, Elango, S., Muralidharan, V., Chakravarthy, V.S.
  - *Dont Look at the Camera: Perceived Eye Contact* - (Submitted to CHI)
    Gao, A.*, **Jayakumar, S.**, Maniglia, M., Hong, Y., Fish, D., Chang, M., Roth, J., Farmer, B., Baltazar, N.C., Seitz, A.R., Schlizerman, I.K., Curless, B., Seitz, S.R.
  - *Contrast Response Function Estimation with Nonparametric Bayesian Active Learning* - (Accepted in JoV)
    Marticorena, D., Wong, Q.W., Browning, J., Wilbur, K., **Jayakumar, S.**, Davey, P., Seitz, A.R., Gardner, J.R., Barbour, D.L.
- **In Preparation**
  - *Reliability and Validity of PLFest: A cross platform application to support open science in vision perception*
    Jayakumar, S.*, Maniglia, M., Stavropoulos, T., Collins, C., Carillo, A., Guan, H., Green, S., Seitz, A.R.
  - *Characterization of training profiles between individuals with schizophrenia and healthy individuals on contrast detection and contour integration tasks*
    Jayakumar, S.*, Silverstein, S., Butler, P.D., Thompson, J., Ahmed, A.O., Seitz, A.R.

Conference

- **Talks**
  - *Perceptual Learning for Contrast Detection and Contour Integration in Schizophrenia* -(7Th Biennial PL Workshop, 2022)
    Jayakumar, S.*, Yaghoubi, K., Silverstein, S., Butler, P.D., Thompson, J., Ahmed, A.O., Seitz, A.R.
- **Posters**
  - *PLFest: A cross-platform application to support open science in perceptual learning research* - VSS 2023
    Jayakumar, S.*, Maniglia, M., Stavropoulos, T., Guan, H., Green, C.S., Seitz, A.R.

- *Nonparametric Bayesian Estimation of Contrast Sensitivity Functions* - VSS 2023
  Barbour, D., Marticorena, D., Shaffiey, S., Wong, Q.W., Wilbur, K., **Jayakumar, S.**, Davey, P., Gardner, J., Seitz, A.R.
- *Performance on a Contour Integration task as a function of Contour Shapes: A comparison study between individuals with schizophrenia and Neurotypical Individuals* - VSS 2022
  Jayakumar, S.*, Yaghoubi, K., Silverstein, S., Butler, P.D., Thompson, J., Ahmed, A.O., Seitz, A.R.
- *Characterization of training profiles between individuals with schizophrenia and healthy individuals on contrast detection and contour integration tasks* - VSS 2022
  Yaghoubi, K.*, **Jayakumar, S.***, Silverstein, S., Butler, P.D., Thompson, J., Ahmed, A.O., Seitz, A.R.
- *The relationships between visual acuity, crowding and spatial attention in the selection of the PRL during simulated central vision loss* - VSS 2022
  Marcello, M., Demirayak, P., **Jayakumar, S.**, Visscher, K.M., Seitz, A.R.
- *A Cortico-Basal ganglia model for choosing an optimal rehabilitation strategy in Hemiparetic Stroke (2019)* - Sfn
  Narayanamurthy, R.*, **Jayakumar, S.***, Elango, S., Muralidharan, V., Chakravarthy, V.S.
- *A velocity driven oscillatory network model for object vector cells (2019)* - Sfn
  Elangovan, J., Prakash, M., Aziz, A., Narayanamurthy, R., **Jayakumar, S.**, Chakravarthy, V.S.
- *A Cortico-Basal ganglia model for Bimanual reaching in Hemi-paretic stroke* - Bernstein Conference 2017
  Narayanamurthy, R.*, **Jayakumar, S.***, Gupta, R., Muralidharan, V., Unni, M.P., Sinha, A., Chakravarthy, V.S.

* First/ Co-first Author publications and presentations

References

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