Gabriel Tucker

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**Technical Experience**

**Carnegie Mellon University – Functional Modeling Systems Group**

*Research Associate (Data Science) | Jun 2023 – Nov 2024*

• Implemented supervised neural network model for intrusion detection, achieving 93% threat identification accuracy and 81% classification accuracy on the NSL–KDD dataset.

• Developed modular supervised training system integrating ACT–R cognitive architecture, achieving 91% accuracy with only 10 training instances per threat type, reducing data dependency for classification tasks.

• Implemented SelectKBest and Random Forest–based feature selection algorithms; automated visualizations and presented model efficiency comparisons for publication-ready figures.

• **Publication:** “Comparison of Cognitively-Inspired Salience and Feature Importance Techniques,” *Proc. SPIE 13054.*

**University of Southern California – Social Affective Neuroscience of Decision–Making Lab**

*Research Associate (Data Science) | Jun 2022 – Jun 2023*

• Built agent-level models of personality-driven behavior using reinforcement learning in the *Emergent* framework, enabling high-fidelity behavioral forecasting and generative simulation without prior behavioral data.

• Designed modular front–end interface to streamline neural network architecture updates and layer dynamics experimentation, improving iteration speed and model adaptability.

• Integrated a Go-based neural network with a C# simulation via a custom interlanguage communication system, enabling real-time agent interaction and improving model interoperability across Go and C#.

• Implemented a spatially embedded, multi–agent Unity simulation in C#, allowing the neural network to learn temporal dynamics and spatial interactions in 3D environments.

• Authored *gostack*, a modular Go library with 55 parametric functions and 648 tests, reducing boilerplate by 87% via generic Card/Stack abstractions and enabling expressive, pointer–safe, shape–aware, and callback–driven data pipelines with matrix and deep traversal support | **GitHub:** github.com/gabetucker2/gostack

• **Presented:** "A Neural Network Model for the Structure & Dynamics of Personality Across Simulated Environments"

– **Psychonomics 2022** (*Boston, MA*) – Designed and presented a research poster to 20 professors and researchers.

– **MathPsych 2023** (*Amsterdam, NH*) – Delivered an oral presentation to 40 professors and graduate students.

**The Ohio State University – Computational Cognitive Modeling Lab**

*Research Assistant (Neural Network Training) | Aug 2021 – May 2022*

• Funded by Air Force Research Lab to annotate English corpora to improve neural network semantic parsing accuracy.

• Developed Python script to visualize fMRI data in 3D, improving artifact detection across imaging dimensions.

**Education**

**The Ohio State University** – *Dual Degree | Aug 2020 – Dec 2024*

• B.S. Psychology (Computational Focus), major GPA: 3.8

• B.A. Philosophy (Analytical Focus), major GPA: 3.6

• Honors & Affiliations: President, Psi Chi (Psychology Honor Society) | VP, Collaborative Software Development Club

988 Crisis Line Responder | Laureate, Chimes Junior Honorary | President, The NeuroLaw Group

**2024 Cohort – Buckeye Leadership Fellows**

• Selected as 1 of 30 from 200+ for competitive interdisciplinary honors program focusing on technical consulting.

• Implemented statistical regression model to consult Grove City Mayor on tax abatement projections.

**2024 Gold Medalist – OSU Quantitative Finance Competition**

• Led 3–person team in developing multi–strategy trading simulation; placed 1st for best statistical analysis and Sharpe ratio–adjusted return out of 15 teams, simulating portfolio growth from $20K to $124K over 10 years.

• Built sentiment–driven trading model using regression on lagged price volatility features.

• Implemented Geometric Brownian Motion and Black–Scholes–based strategies for baseline comparison; visualized feature importance using SelectKBest and Random Forest.

*Skills: Python, SQL, C#, Go, R, Machine Learning (Supervised, Unsupervised, Reinforcement), Neural Networks, Git,*

*Scikit-learn, NumPy, Pandas, Matplotlib, Feature Selection (SelectKBest, Random Forest), Statistical Regression*