Overview

The Department of Psychology at The Ohio State University houses a diverse community of scholars doing cutting-edge research in all major areas of psychology. Two of the many areas of excellence in our Department are the programs in Quantitative and Cognitive Psychology.

All faculty members in these two programs share the conviction that quantitative methods, formal analyses, and/or computer simulations are indispensable tools for understanding the human mind. Cognitive modeling is particularly well represented, with this program ranking among the leading programs in the USA. This includes models in the domains of perception, action, learning, memory, language, speech, cognitive neuroscience, decision making, and cognitive development. We develop models using all major methodologies, including Bayesian models, neural network models, cognitive architectures, stochastic processes, and simulations.

Researchers in Quantitative Psychology are experts in model selection, psychometrics, multivariate statistics, neural network modeling, and judgment and decision making.

The Cognitive group conducts research on topics such as memory, language, attention, simple decision making, cognitive aging, motor control, and auditory and visual perception.

Admission

Admission to the Cognitive and Quantitative programs is selective. Only applicants who intend to pursue the Ph.D. degree are admitted. You need not have an undergraduate psychology degree. Applications must be on file with us on or before December 1 for domestic applicants and November 30 for international applicants. Most successful applicants typically receive funding for 5 years.

Graduate and Postdoctoral Research

Our research areas provide a wide range of single approaches and combinations of approaches and methodologies including behavioral experimentation, psychophysics, mathematical analysis, computational modeling, electrophysiological recordings (ERPs), eye tracking, and others. The computing infrastructure is excellent and includes access to the Ohio Supercomputer Center.

A major focus for graduate students is the development of their own individual research specializations. There is considerable flexibility in course requirements, and students are encouraged to obtain interdisciplinary training appropriate for their topic of research. The goal is to train students to be top-notch scientists using the state-of-the-art methodologies that address central issues in the field.

The Cognitive and Quantitative Programs maintain close ties to other programs in our department including Behavioral Neuroscience, Developmental, Clinical, and Social, and there are many ongoing collaborations. There is also extensive interaction with The Center for Cognitive Science, The Mathematical Biosciences Institute, and affiliated departments including Computer Science and Engineering, Linguistics, Speech and Hearing Science, Statistics, Public Health, and The College of Optometry.

We especially encourage applications from students with strong quantitative, linguistic, and/or neuroscience backgrounds. But any background is of interest, especially if the student wants to acquire a wide range of skills. Students with undergraduate degrees in computer science, physics, engineering, mathematics, linguistics, etc. are welcome. Prospective applicants should contact a faculty member to discuss the program and the application process.
Research Domains

Memory
Memory is a component of cognitive architecture that underpins people’s ability to perform practically all higher level processing. Within the program, we study human memory using behavioral, neuroscientific and computational modeling methodologies. We focus on short and long term episodic memory and memory for sentences and text. The impact of age and disorders on memory processes is also strongly represented.

Perception and Action
Perception and action have a reciprocal relationship in that perception guides action, which in turn influences perception. Topics of research in this area involving numerous faculty in psychology and engineering include sports activities, vehicular control, the analysis of 3D structure from 2D image data and the recognition of objects and faces. A central theme in all of these areas is to develop computational models that can simulate the essential characteristics of perceptual and motor performance, and to test those models with appropriate behavioral experiments.

Language and Speech
Research at Ohio State spans the spectrum of inquiry, from basic processes of phonetics and phonology, through morphological and lexical phenomena, to the study of syntax, semantics and discourse. Using event-related potential laboratories, we investigate the time course of syntactic processing. Using behavioral paradigms, we explore the way in which people recognize spoken words, resolve anaphora and perform inferential processing. Computational modeling and the analysis of language corpora play a central role in our approach to psycholinguistics. We also have strong ties to the Ohio State Linguistics Department, one of the top programs in the US.

Psychology faculty and colleagues in the Colleges of Medicine, Law, Business, and Social and Behavioral Sciences, Development, and Public Health provide a wealth of research opportunities.

Psychometrics
The core areas of research in psychometrics include factor analysis, hierarchical linear models, item response theory, and structural equation modeling. The faculty have active areas of research which extend these core areas to more advanced topics such as dynamic factor analysis, multidimensional item response theory, and nonlinear latent variable modeling. Faculty members have strong ties to colleagues in areas such as Education, Public Health, and Statistics.

Cognitive Modeling
Many of the faculty in the Cognitive and Quantitative programs believe that insight into cognitive processes can only be derived through the construction and appreciation of computational models that enforce consistency and reveal the impact of interactions among component processes. At Ohio State, we place a strong emphasis on development, analysis and evaluation of cognitive models across a wide range of domains of inquiry.

Cognitive Neuroscience
Exploration of the manifestation of cognitive processes in the brain is made possible by neuroimaging techniques, in particular functional magnetic resonance imaging (fMRI) and electroencephalography (EEG). The Siemens 3T Trio magnetic resonance imaging Total Imaging Matrix (TIM) system at the Center for Cognitive and Behavioral Brain Imaging (CBBBI; http://cbbi.osu.edu) is available for structural and functional MRI studies. It is equipped with a state-of-the-art projection system, EyeLink II eye tracker, and a commercially compatible high-definition audio system. Several fMRI setups are also available.

Faculty
Dirk Bernhardt-Walther, Ph.D., California Institute of Technology. High-level visual, and natural scene perception; object recognition visual cognitive neuroscience; visual attention.
Robert Cudeck, Ph.D., University of Southern California. Applications of structural equation models and random coefficient models to psychological data.
Wil Cunningham, Ph.D., Yale University. Affective neuroscience, affective decision making, attitudes and preferences.
Michael DeKay, Ph.D., University of Colorado at Boulder. Judgment and decision making, repeated decisions, information distortion, risk perception, environmental and medical applications.
Simon Dennis, Ph.D., University of Queensland, Australia. Human memory and learning, natural language processing, connectionist models of cognition, information retrieval.
Michael Edwards, Ph.D., University of North Carolina at Chapel Hill. Measurement, with a focus on item response theory and factor analysis.
Richard J. Jagaciński, Ph.D., University of Michigan. Engineering Psychology, behavioral applications of control theory, decision making in dynamic systems, aging, environmental and social effects of technology.
Gail McKown, Ph.D., University of Colorado. Psycholinguistics, reading, memory, aging.
Jay I. Myung, Ph.D., Purdue University. Cognitive and mathematical psychology, model selection, Bayesian methods, connectionist modeling.
Thomas E. Nygren, Ph.D., University of Illinois. Mathematical and cognitive psychology, mathematical models of decision making, measurement, psychological scaling.
John E. Opfer, Ph.D., University of Michigan. Conceptual development, representation, categorization and induction, mathematical cognition.
Ellen Peters, Ph.D., University of Oregon. Judgment and decision making, risk perception and communication, affect and emotion, numeracy, aging.
Alexander Petrov, Ph.D., New Bulgarian University. Perceptual learning, reinforcement learning, connectionist models of relational structure, analogy, and computational cognitive neuroscience, cognitive architectures, spatial vision.
Mark A. Pitt, Ph.D., Yale University. Psycholinguistics, spoken word recognition, mathematical modeling.
Roger Ratcliff, Ph.D., University of Auckland, New Zealand. Mathematical modeling of memory and cognitive processes, simple decisions and reaction time, aging and reaction time, neural modeling of single cell recordings.
Per B Sederberg, Ph.D., University of Pennsylvania. Computational models and cognitive neuroscience of human memory and cognition.
Vladimir Sloutsky, Ph.D., University of Moscow, Russia. Higher-order cognition, including categorization, reasoning, and problem solving, and interrelationships between cognition and language.
Julian Thayer, Ph.D., New York University. Physiological and psychological effects of stress on anxiety, depression and heart disease, music and emotion.

Research in cognitive development focuses on the development of attention, learning, memory, language and concept acquisition, and interactions among these components. Faculty study cognition in infants and young children using preferential looking, habituation, EEG, and microgenetic approaches, as well as traditional experimental techniques and physiological measures.

Cognitive Development
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