

WORKSHOP

EXPLANATORY MULTIPLICITY: LEVELS OF ANALYSIS AND TYPES OF QUESTIONS FROM ARISTOTLE, TINBERGEN, AND MARR TO RECENT EXPANSIONS

Marco Antonio Correa Varella

University of São Paulo, São Paulo, Brazil

macvarella@gmail.com

ABSTRACT

For the researcher in Human Ethology, as important as having technical, methodological or statistical skills is to have conceptual skills related to the kinds of research questions asked and the analytic levels of scientific explanations. This workshop explores explanatory multiplicity, the principle in which the best route for an integrated and comprehensive understanding of human behavior and cognition emerges from making multiple and complementary questions and explanations rather than relying on a single explanatory lens. We will examine foundational frameworks from Aristotle (the four causes: material, formal, efficient, and final), Tinbergen (the four questions in ethology: causation, development, function, and evolution), and Marr (three levels of analysis in computational neuroscience: computational, algorithmic, and implementational). We will also discuss how these classical approaches have been expanded in contemporary research, integrating perspectives from ethology, cognitive science, evolutionary psychology and culture evolution. Beyond merely distinguishing between proximate (how?) and ultimate (why?) explanations, we will stress the necessity of fully grasping the spatio-temporal dimension of explanations and integrating it with the different kinds of questions that can be asked. We will conceptually dissect terms with multiple meanings such as function and adaptation. We will further address modern extensions and updates of classic frameworks, and incorporate sociocultural perspectives. Through case studies (e.g., sex, language, art-making), participants will practice offering multiple explanations, enabling them to apply these frameworks to their own research topics. Graduate students will acquire renewed explanatory frameworks and conceptual tools to structure their questions, critique literature, and design interdisciplinary human ethological studies.