

Modeling The Communication Dynamics in Human-Autonomy Teams: Insights from Search and Rescue Scenarios

Carlos Bustamante-Orellana^{1,*}, Lucero Rodriguez Rodriguez¹, Yun Kang¹

¹Arizona State University, Tempe

cbustam3@asu.edu

Effective communication has always been a cornerstone of human cooperation and coordination, influencing success in various domains such as software engineering and business projects. Recent advancements in technology are extending our communication landscape to include interactions with autonomous agents, raising questions about the dynamics of human-agent communication. Mathematical modeling has traditionally been a valuable tool for understanding human interactions, ranging from linear and nonlinear equations to discrete and continuous time models. However, can these models be adapted to capture the dynamics of human-agent teams? Motivated by experiments involving urban search and rescue (USAR) teams, we present a continuous-time mathematical model inspired by Gottman's marital models. This two-dimensional model is tailored to describe communication dynamics in task-oriented teams and can be validated using empirical data. Through this research, we aim to uncover the factors influencing team performance, their impact on varying performance levels, and the characteristics of high-performing teams.