

Measuring, Modeling, and Training Team Coordination

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Team cognition is an emerging property of team interactions that guides team actions and is therefore critical to team performance. Coordination, a team-level cognitive process, is a type of team cognition. More specifically, it is the timely and adaptive information sharing that occurs among team members. In the command-and control context, team coordination means getting the right information to the right person and the right time. Our most recent US Air Force-sponsored work, presented in this brown bag, explores team coordination, its measurement, acquisition, and retention and how it is affected by team composition and training regime. We first determine how to measure and assess team coordination through the development of a local optimal model of coordination. Then, in the first experiment we examine team coordination as it develops with experience and when teams return after a short or long break. We also look at the effects of new team members on team coordination and performance. We model the coordination changes over time using dynamical systems models which suggest that adaptive and stable teams may result from perturbations in the task environment. In the second experiment we test this prediction by training teams to coordinate in a prescribed and rigid fashion, through cross training, or by exposure to environmental perturbations. Analyses of the second experiment are ongoing, but suggest interesting benefits of perturbed coordination training. The results of this project 1) provide a method for quantifying and assessing team coordination, 2) demonstrate how dynamics can be applied to the modeling of team coordination to generate predictions, and 3) provide empirical evidence regarding the effects of experience, breaks, new team members, and training regime on team coordination.

Nancy J. Cooke is a professor of Applied Psychology at Arizona State University at the Polytechnic Campus and is Science Director of the Cognitive Engineering Research Institute in Mesa, AZ. She is also Editor-in-Chief of *Human Factors*. Dr. Cooke received a B.A. in psychology from George Mason University in 1981 and received her M.A. and Ph.D. in cognitive psychology from New Mexico State University in 1983 and 1987, respectively. Her research interests include the study of individual and team cognition and its application to the development of cognitive and knowledge engineering methodologies, human-computer interfaces, homeland security systems, remotely operated vehicles, and emergency response systems. In particular, Dr. Cooke specializes in the development, application, and evaluation of methodologies to elicit and assess individual and team cognition. Her most recent work includes empirical and modeling efforts to understand the acquisition and retention of team skill and the measurement of team coordination and team situation awareness especially through the analysis of communication. This work is funded primarily by the Air Force Office of Scientific Research, the Air Force Research Laboratory, and the Office of Naval Research. Dr. Cooke has co-edited *Human Factors of Remotely Operated Vehicles*, published by Elsevier and has co-authored a book with Frank Durso titled *Human-Technology Failures and Their Cognitive Engineering Solutions*, to be published by Taylor and Francis.