With the rise of human-agent teaming (HAT), a new cycle of scientific discovery commenced. Through scientific discovery, a number of theories of constructs in HAT were developed, however, an overarching model is lacking that elucidates the importance of these constructs together in terms of human performance. The main objective of this research was to develop a HAT model of simulated military HAT and to validate it against selected empirical data. Experimental data borrowed from four simulated military HAT studies were used to test the proposed Core model. The Core model was assumed to be directly affecting task performance and consisted of constructs related to Task Composition, Task Perception, and the qualities that each team member (Human/Agent Qualities) brings to the team. The available experimental data were tested against the null model: everything, within and between these Core sections, is an equal contributor to hit rate. Furthermore, in order to validate the Core model, a validation approach was developed based on relative importance, wherein the outcome was a proportional value and followed a beta distribution (Ferrari & Cribari-Neto, 2004). This new modeling approach consisted (1) application of dominance analysis (DA; Azen & Budescu, 2003; Budescu, 1993) to determine the most important contributors to task performance, (2) establishing robustness and generalizability of the dominance outcome through bootstrap procedures (Azen & Budescu, 2003; Efron, 1981), and (3) combining the dominant predictors into a full beta regression model to evaluate the fit and significance of the model (Ferrari & Cribari-Neto, 2004).

DA of all four experimental studies examined in this research led to rejecting the null hypotheses. Constructs in the proposed Core model were not equally important to performance in these simulated military HAT studies. Results showed consistently similar yet different dominance patterns in relation to human performance. Attempts were made to elucidate the most important predictors of task performance. Analyses unveiled the importance of taking task difficulty into consideration when employing the developed validation approach.

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The public is welcome to attend.