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Modeling the Effects of Culture on Military Performance:
An Agent-based Implementation

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Abstract

Researchers seek to improve the ability of the U.S. Army to perform in joint, interagency, and multinational (JIM) operations by better understanding the cultural differences among military personnel of different nations. In the near future, cultural competence will not only be a key enabler of decision making in complex command and control (C2) configurations but it will also form the basis of adaptability and performance [9].

Investigating and predicting the link between performance and culture passes through coming up with mathematical formalisms that would effectively link human characteristics to those of non-human systems. However, outcomes for achieving this aim are still far away from what is desired [7]. In the sphere of military applications, there have been quite a few qualitative studies exploring the effects of cultural differences on military performance [6][9]. There has even been less number of studies confronting the challenge of modeling systems with an emphasis on human characteristics [2][3].

Agent-based models are simulations based on the global consequences of local interactions of members of a population. Agent-based models have been around for a while to act as tools that provide opportunities to mathematically investigate complex behavior posed by humans in various spheres. While they are being used for some time now, the use of agent-based models on exploring high level social concepts such as culture are quite new. Also, most of such research is involved with the transmission of cultural traits in a certain population rather than on the effects of culture on performance [1] [4] [5].

In an effort to respond to current motivations for exploring the problem of culture-performance relationship, an agent-based model of a real life based combat situation, between the forces of two nations is presented in this paper. Through this model it is demonstrated once again that regardless of the technologies used by two opposing forces, culture based behavior patterns of human performers can play drastic role in shaping possible military outcomes. It is also proposed that, to a certain degree, agent-based models can be utilized to investigate and predict the suggested relationships between cultural traits and military performance.

The paper presents an agent-based computational model of a real-life battle case that took place in the 1973 October War, between Israeli and Egyptian tanks [8]. The agent-based model consists of artificial adaptive agents (tank operators) who inhabit a digitized version of the 1973 October War landscape. Agents are assigned rules of behavior for determining shooting and defense strategies, based on their cultural characteristics. The model is run for a certain number of times, and each run of the model generates a unique history of the battle, and outcome patterns. Results from a large number of runs are then gathered and compared to the actual outcomes involving the battle.
Reference:


