

Battleships: A Distributed Decision Making Exercise and associated Analysis Tools

Chris Porter‡

Chris Turley*

Simon Dennis*

John Hansen‡

Michael Webb‡

Jason Scholz‡

University of Adelaide*

Defence Science Technology Organization‡

Network Centric Warfare (NCW) doctrine advocates the use of robust networking to increase information dissemination, improve shared situational awareness (SSA) and increase mission effectiveness. A key to understanding and supporting decision making in networked environments is the ability to track natural language communications. We exploited automatic technologies for extracting semantic content from language to visualize decision making across a network. Teams of three played a distributed version of the Battleships game. In a turn, each participant was required to make a shot and received feedback on their own shots. In order to build situation awareness and plan subsequent actions they communicated either via text chat or via voice over IP. They were also required to mark a copy of the board with their understanding of the current situation. Overall performance as measured by total score or number of turns to completion improved as a function of experience, but was not significantly different as a function of communication channel. However, communicated intent changes decreased as a function of experience in the case of voice, but increased for text. The number of discrepancies in situation awareness across participants decreased as a function of experience, but was always greater in the case of text. Analysis of the communications suggested that the number of distal confirmations (confirming feedback from earlier turns) differed little by channel, but proximal confirmations (confirming information from the current turn) occurred much more frequently in the voice channel. In addition, we have built a decision analysis tool that allows us to visually track user supplied concepts across the network as a function of time. Language technologies such as Latent Semantic Analysis allow us to do this regardless of how those concepts are expressed without relying on specific knowledge engineering. We used this tool to isolate breakdowns in the communication of both intent and awareness within the Battleships scenario. The objective of the project is to be able to determine the impact of channel characteristics on human performance, to diagnose where human communication failures have resulted in suboptimal performance and ultimately to be able to automatically route communications to the personnel who need knowledge based directly on the message content.