Chapter 12
Conversation Analysis of Coalition Communication in Network Centric Operations

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ABSTRACT

Team verbal communication is a central component of coalition operations. Investigating the nature of (mis)communication in coalition operations, we conducted analyses based on both natural discourse data recorded during mission execution exercises, and the data collected through interviews of experienced coalition personnel. The authors' analyses shows that pragmatic aspects of language use are essential parameters to successful understanding of communication threads, which demonstrate the ineffectiveness of purely semantic-similarity-based approaches to conversational data. This analysis provides insights into the strengths and weaknesses of current computational approaches such as Latent Semantic Analysis as a methodology for analyzing conversational discourse. As a result, the authors propose a computational framework that incorporates both LSA and computational pragmatics for automating the analysis of coalition communication to support the concept of network-centric operations.

INTRODUCTION

Current major military deployment almost always involves collaborations among multiple nations with groups and team members from diverse backgrounds (Pierce 2002a, 2002b; Chiarelli and Michaelis 2005).

The success of coalition operations requires highly effective and efficient communication between teams and team members. In a network centric environment in this Information Age, human communication constitutes an important dimension of the human networks, interacting with other types of networks such as communication networks and information networks. The degree of effectiveness of

DOI: 10.4018/978-1-61520-855-5.ch012

human communication will impact on the degree of the coalition interoperability, determining the effectiveness of coalition forces. However, it has been recognized that diverse backgrounds among multinational groups and team members have presented serious challenges in coalition communication (Pierce 2002a, 2002b; Chiarelli and Michaelis 2005). The challenges include frequent miscommunication among coalition teams. The related issues have been studied from various perspectives and methods including automated methods and techniques. In recent years, statistical or numerical text analysis methods such as Latent Semantic Analysis (henceforth LSA, Landauer et al. 1998) have been used to automate analysis and measurement of team communication conversation and discourse. In this chapter, we examine this human dimension of the coalition network in a network-centric context. In particular, we investigate the nature of miscommunication in coalition operations by exploring computational approaches to conversation analysis. Language is used in complex ways involving linguistic, cognitive, cultural and contextual differences. We focus on linguistic variations and variations of language use in Command and Control (C2) and planning in military coalition teams, especially among teams and members from English-speaking countries. We conduct an exploratory analysis of the discourse data resulting from a mission execution simulation commonly known as the Singapore Data.[1] We also report our analysis of data collected from interviews of UK and US military officers who had experienced miscommunications with coalition partners during multination training and operations.

Our analyses suggest that many relevant issues are largely pragmatic in nature, beyond not only lexical and grammatical differences but also "semantic" (topic) similarity of the communication content. This supports our on-going efforts to develop a computational pragmatics methodology. Departing from conventional computational approaches to language, this approach aims to understand the use of language in a social and communicative context by incorporating social, discourse and contextual information following the tradition advanced by Austin (1962) and Grice (1978, 1989), among other researchers. We believe that pragmatic dimensions such as speech acts (Austin 1962; Searle 1969) and conversation sequence patterns (Sacks 1992) are important parameters to successful understanding of the true nature of communication threads, especially the evaluation of communication effectiveness.

This chapter is organized as follows. In Section 2, we briefly review current computational approaches to the analysis of conversational data, in particular, Latent Semantic Analysis (LSA). We will discuss its general strengths and limitations from a theoretical point of view. In Section 3, we present a detailed description of the Singapore Data. In Section 4, we first provide background information about the Text Representation Using Subspace Transformation (henceforth TRUST, Booker et al. 1999) and the Starlight Information Visualization System (henceforth Starlight, Risch et al. 1999, see Figure 1). We then describe our analysis methods, and present the results of our preliminary analysis. In Section 5, we will discuss the implications of this analysis, particularly the need to incorporate pragmatic aspects of human team communication such as speech acts and conversation patterns including patterns of speech act sequences. In Section 6, we discuss the aspects that are important to a computational analysis of team communication, sketching an approach that incorporates both LSA and computational pragmatics methods. Finally in Section 7, we will conclude by outlining the issues and topics for future work.

PREVIOUS AND CURRENT COMPUTATIONAL APPROACHES

Evaluation of team communication and communication performance has largely relied on human