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Group Support Systems and the Speech Act Theory

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Abstract: The Speech Act Theory and Language/Action Model provide a useful perspective for understanding how people use communication to coordinate group activities. This paper presents an overview of the Speech Act Theory and the Language/Action model. The limitations of the Language/Action model as a Group Support System (GSS) model are highlighted. Possible modifications and directions for future research are suggested.

1. Introduction

Research and development of computer and communication support for collaborative work is progressing in two parallel streams (Weber, et al, 1997). The focus of the two streams of research has been on different aspects of collaborative work. The fundamental difference between the two approaches stems from the nature of collaborative activity (task and context) that is being studied and supported. Those interested in modeling, re-engineering, and supporting the organizational processes focus on workflow (Dourish, et al, 1996; Glance, et al, 1996; Winograd, 1994; Suchman, 1994). Whereas, the target of the other stream of research, Group Support Systems, is the facilitation of group communication and decision making (Jessup & Valacich, 1993; Bostrom, et al., 1992).

Speech Act Theory has had a significant influence on the research and development of Workflow systems (Winograd & Flores, 1986; Winograd, 1988). Based on the insights provided by Speech Act Theory, Winograd developed a Language/Action Model to describe how people communicate to make actions happen. The Language/Action Model has served as the guiding principle of the design of at least two systems: Coordinator™ and Action Workflow. Coordinator™, a direct incarnation of Language/Action Model, is a formalized messaging and work coordination system. Whereas, ActionWorkflow, a relatively recent product, may be used for relatively less formalized (ad hoc) projects (Orfali, et al, 1996). In these systems, each step in the work process is viewed as a recurring pattern of conversations or negotiations between the parties involved.

The Language/Action Model has not been adopted in research and development of GSS. Even though research with asynchronous, distributed groups that work together over extended periods of time has been on going since the early seventies (Hiltz & Turoff, 1978; 1993), most research and development in the area of GSS has been on supporting synchronous (face-to-face or non-face-to-face) group meeting processes (Nunamaker, et al, 1991; Dennis and Gallupe, 1993).

A majority of real life tasks are neither so cut-and-dry as to be easily modeled by workflow systems, nor are they so equivocal and complex (Daft & Langel, 1986) and of short duration that they would be best suited to a meeting in a decision room equipped with GSS technology. It is evident that there is a need to fill the gap between the two technologies (GSS and Workflow). Synchronous and asynchronous use of GSS for a long duration task/project may be seen as a workflow process. The question arises, should Language/Action Model be adopted for guiding the design, development, and research with GSS? This paper addresses this question and provides direction for future research.

2. Overview of Speech Act Theory

Speech Act Theory has its root from Wittgenstein's *ordinary language philosophy*. Wittgenstein suggested that people follow rules to accomplish things with language in everyday life. It is the rules make people

able to understand each other and perform tasks. Later Austin developed the basic ideas of Speech Act Theory (Littlejohn, 1996).

Speech Act Theory makes a distinction between language symbols used for communication and the intended meaning of the symbols. What is important in Speech Act Theory is the act the speaker wants to accomplish. The truth-value of a sentence is not central in Speech Act Theory. Searle states that "speaking a language is engaging in a rule-governed form of behavior." (quoted from Littlejohn, 1996, p. 88) The meaning of language is governed by rules that are understood mutually by both parties. A speech act must meet some preconditions and has its consequence. A speech act is successful if the listener can understand and respond to the speaker's utterance. Background information and mutual agreement are vital in the success of speech act (Winograd & Flores, 1986).

An utterance has illocutionary points, illocutionary force, and propositional content property. The importance of illocutionary points is that they specify the meaning of communication between speaker and listener. Searle had listed five fundamental types of illocutionary points: assertives; directives; commissives; expressives; and declarations.

2.1 Language/Action Model

Winograd (1986, 1988) argues that languages are the primary dimension of human cooperative activity, that is, people act through language. Winograd calls this view Language/Action perspective. It emphasizes the pragmatics of language. Speech Act Theory is the starting point of Language/Action perspective. Winograd notes that directives and commissives acts always deal with future actions. These illocutionary points constitute patterns of commitments between speaker and listener. Winograd has identified several kinds of recurrent conversation patterns: conversation for action, conversation for clarification, conversation for possibilities, and conversation for orientation.

An important example of conversation structures is 'conversation for action.' A state transition diagram can be drawn as a formal representation of conversation for action (Figure 1). This state transition diagram is not the model of mental states of a speaker or listener, but shows how the conversation is performed. Each circle in the diagram represents a possible state of the conversation and the lines represent speech acts. In the diagram, person A initiates a conversation requesting person B to do something. This request also specifies some conditions of satisfaction of the action. After receiving the request, B has some alternatives: accepting the conditions, rejecting them, or asking for changes of the conditions. A can also withdraw the request or change the conditions before B's response. If we replace 'request' in the link of state 1 to 2 with 'offer', then we will have a state transition diagram that represents the conversation of A promises B for action.

Each action leads to a new state and new possibilities of actions. After B performs the task and A declares satisfaction, the conversation will reach a satisfactory terminal state. We can think of this diagram as a plan of actions that can take place when A and B are engaging in a conversation for action.
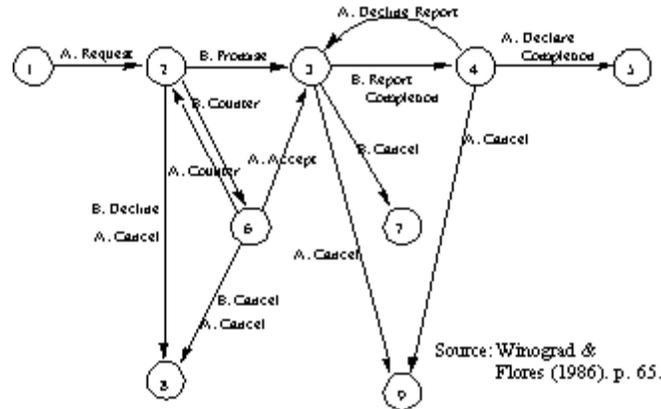
Figure 1: *State transit diagram of conversation for action*

3. Limitations of Language/Action Model as a GSS Model

The Language/Action Model has generated a lot of debates in computer supported cooperation research. The key issue of the debate is: should computer based information systems preserve the formal conversation structures stressed by the Language/Action Model. The formal representation of conversation states is a two-edged sword. On one side, it enables the information system to act on information intelligently. On the other side, it limits what people can do on the system (Baecker, et al, 1995).

To apply the Language/Action Model into a GSS study, an understanding of its limitation is essential. In the following subsections we discuss four inter-related limitations of the Language/Action Model and provide direction for making it suitable for GSS.

3.1 Completeness of Language/Action Model

Winograd (1986, p. 65) points out that the diagram only contains acts that are directly relevant to the completion of a conversation. However, there are acts that are relevant to the completion of conversation, are missing. Flores and colleagues (1988) added several new features into the Coordinator™ in a later paper. A key feature is the ability to link several conversations together by delegating task to other people.

Under close observation, we can find that once both parties agree on the conditions of satisfaction, i.e. enter node 3, then there is no way to change the conditions except canceling the current conversation and starting a new conversation. The thread of conversation is broken. This limitation can be easily fixed by adding links from node 3 back to node 2 and node 6.

Another problem is that Language/Action Model only considers two-party dialogs. However, there are times when the conditions of satisfaction are not determined by two-party negotiation but by multi-party negotiation. For situation like mediation by a third party, we can add another node that links node 2, 3, and 6. It becomes more and more difficult to link all parties in the conversation under Language/Action Model when more parties are involved in the conversation because the number of possible states will increase exponentially as the number of parties increases.

3.2 Language/Action Model and Tasks

A group task refers to a purposeful activity that the groups engage in. Several task classification schemes have been proposed in GSS researches (Shaw, 1973; Hackman, 1968; Hackman & Morris, 1978; Laughlin, 1980; McGrath 1984). According to one of the task classification schemes (Rana, et al, 1997), five types of group task can be identified along their coordination dimension: parallel, pooled, concurrent, sequential,

and reactive. Parallel tasks require very little synchronization and are high in modularity and flexibility. Concurrent tasks require more synchronization and are low in modularity and flexibility.

It is clear that Language/Action Model is more suited for parallel, pooled, or sequential tasks but not for concurrent or reactive tasks. The high synchronization requirement and low modularity of tasks make it hard for members in a group to commit to a set of completion conditions without depending on the outcomes of other members' tasks. If one member failed to meet the conditions, it might cause a cascaded breakdown of the whole workflow. Since it is hard to renegotiate the conditions in Language/Action Model, everybody has to cancel and start over the whole conversation. This becomes inconvenient for groups whose tasks are highly interdependent.

A possible approach to rectify this limitation is to incorporate shared space into the Language/Action Model. This shared space could be used to incorporate status changes and reflect upon current situation. However, the integration of a shared space into Language/Action Model conversation structure is a complicated issue. This is mainly due to the lack of multi-party support of Language/Action Model noted earlier and it is a subject of further research.

3.3 Language/Action Model and Context

The context is defined by a combination of individual characteristics of group members (i.e., cognitive, behavioral, etc.), the characteristics of the group which they are a member of (i.e., structural, normative, developmental, etc.), and the characteristics of the larger social unit (norms, work practices, culture, goals, etc.) in which the group is embedded.

McGrath (1991, p. 166) points out that "acts have situated, rather than generic, meanings in relation to the modes, functions, and paths of group activity." Suchman (1987) also argues acts are situational. Although one can always construct an action plan in retrospect, it is impossible to construct the action plan in advance without the risk of breakdown. A plan is never complete because it can not take all aspects of context into account. In that sense, we can never build a complete state transit diagram in advance to enumerate all possible states.

Suchman (1994) further suggests that Speech Act Theory decomposes acts without a specific context. In order to build an action plan in advance, some background information and context must be chosen by the designer. Suchman argues that the choice of background information and context only reflects what the designer has in his/her own mind but it may not be the actual context people are working in.

If the actual context matches the implicit context in Language/Action Model, the conversation can be carried out without breakdown. On the other hand, if the actual context does not match the implicit context, the model breaks down and there is no way to fix it because the action plan in the Language/Action Model is static. The Language/Action Model forces people to use the context the designer has chosen.

Since the meaning of messages are best understood by the users, the possible actions are best determined by the users rather than by the designer. A GSS based on Speech Act Theory can provide the users some basic conversation structures to build their own action plan on the fly. This approach also addresses the first two limitations. The designer does not need to build a complete states transit diagram if the user can build the action plan.

3.4 Language/Action Model and Group Maintenance Functions

Although the main purpose of a group is to get the work done, the group also needs to engage in activities that maintain the wellbeing of individual members and the whole group. The group will lose its cohesion and will not work together if it fails to perform maintenance functions. (Hoffman, 1979; Hoffman & Stein, 1983; McGrath, 1991)

The Language/Action Model is build around actions to complete tasks. A group's maintenance functions are not the primary concern of Language/Action Model. Thus, an agreement on task completion conditions can not reflect the true socio-emotional status of group members. There is also no support in the model to find out the reason why people have disagreements. If people just try to get jobs done without promoting mutual understanding, i.e., failing to perform one of the group maintenance functions, the group processes will breakdown eventually.

The group maintenance aspect is still a relatively less explored territory in GSS research. Given the implicit nature of how group performs maintenance functions, it would be challenging to incorporate them into an explicit model.

4. Conclusion

The Language/Action Model is a powerful model because it gives us a perspective to view how people use communication to coordinate their work. However, it has limitations as a GSS model. In a dynamic and complex environment, Language/Action model is not effective because it fails to capture the complete action plan.

We suggest that for Speech Act Theory and its derivative model (i.e., Language/Action Model) to serve as a guiding framework for designing effective GSSs, research should focus on developing multi-parity speech act structures, suited for task/context specific needs, yet allow users to alter/define their own conversation structures.

Reference available upon request from authors.