TASKS MATTER: MODELING GROUP TASK PROCESSES IN EXPERIMENTAL CSCW RESEARCH

Brian E. Mennecke Bradley C. Wheeler
BMENNECK@IUBACS BWHEELER@IUBACS

Decision & Information Systems, Graduate School of Business
Indiana University, Bloomington, Indiana 47405

ABSTRACT

This paper presents a model of how individuals process tasks in a group setting. We review the literature on task and integrate this literature in the context of experimental collaborative group work. The bulk of the task literature suggests that a workable and valid classification system must be built both on characteristics that are innate to a task and on characteristics of the task performer. Based on this framework, plus work done by Hackman (1969), a model of group task processing is proposed. As part of this model, a relatively unused type of task called a hidden profile task is documented and contrasted with other tasks which have been used in computer supported group research. Hidden profile tasks have much to offer group laboratory research. These tasks distribute task relevant information among group members to induce heterogeneity within the group. We argue that the use of hidden profile tasks in laboratory research will help to "close the gap" between field and laboratory research since groups in field settings generally come together with heterogeneous information and perspectives.

1 Introduction

The term Computer Supported Collaborative Work (CSCW) has been used to address many areas of technological support for groups and teams. This research stream has been written about under the broad classifications of Group [Decision] Support Systems (G[D]SS), Electronic Meeting Systems (EMS), and computer-mediated communications systems and under the specific technologies of electronic mail, computer conferencing, and groupware (Johansen, Martin, Mittman, Saffo, Sibbet, & Benson, 1991). Much of the research in the CSCW area has been conducted as controlled laboratory experiments or field studies. Dennis, Nunamaker, & Vogel (1991) have extensively documented important differences between CSCW laboratory experiments and field studies. They note three differences which stand out: 1) group characteristics; 2) organizational contexts; and 3) tasks.

For example, the characteristics of groups that have taken part in many experimental assessments of CSCW technologies have often been very different from natural groups in organizations (Mennecke, Hoffer, & Wynne, 1992). Experimental groups are often composed of ad-hoc collections of university students who have little or no experience with CSCW work tools nor with critically examining complex problems. University students have been the most extensively used subject population in laboratory research because of their easy accessibility (see Gordon, Slade, & Schmitt, 1986, 1987; Greenberg, 1987).

In terms of contextual issues, Dennis, Nunamaker, & Vogel (1991) have also pointed out that laboratory groups have usually been logically smaller than field groups. The logical size of the group will be much less than the physical size of the group if the members come from a common culture and possess overlapping domain knowledge. This small logical size appears to be a common characteristic of many laboratory groups. Groups in most field studies, however, have often been logically large, consisting of members with heterogeneous task knowledge and perspectives regarding the group's work. Further, subjects in laboratory experiments are often directed to perform group activities in an artificial context that is likely to be quite different from the natural contexts of organizations (e.g., in terms of an absence of political issues, the interrelatedness of problems, power and status differences). In addition, experimental tasks are used in laboratory experiments to function as surrogates for *natural tasks*; that is, tasks which *natural groups* encounter in *natural settings* (McGrath, 1984). Unfortunately, experimental tasks too frequently lack many of the characteristics of natural tasks (e.g., high task complexity, low information clarity) and therefore may represent poor surrogates for these tasks. This potentially limits the external validity and generalizability of many laboratory experiments and likely accounts for much of the contradictory findings reported between field and laboratory research (e.g., Dennis & Gallupe, 1993; Dennis et al., 1991).

The problems of access to sufficient numbers of natural groups for laboratory experimentation and the near impossibility of inducing organizational-like contexts in the laboratory are particularly challenging to laboratory researchers. The type of experimental task and the logical size of the group, however, are discretionary choices of the researcher, and therefore, present a controllable dimension whereby the external validity of CSCW research can potentially be improved. Since it is often the case that groups in organizations are brought together to share unique domain knowledge and expertise, the external validity of experimental tasks may well be enhanced by constructing the task so as to increase the logical size of the group.

The purpose of this paper is threefold: first, we will examine the nature of group tasks in the context of these issues to identify how improvements can be made in experimental task design for CSCW laboratory research; second, we will propose a model of group task processing which is designed to explain how tasks are processed in a group setting and to guide laboratory researchers in choosing tasks to increase external validity; and third, we will introduce an example of a task, based on the model of group task processing, which we feel addresses several of the shortcomings associated with many of the current experimental tasks.

2 Task Literature

The task facing a group has proved to be one of the chief moderators of group behavior and effectiveness (Hackman & Morris, 1975; McGrath, 1984; Poole, Siebold, & McPhee, 1985). Since groups engage in many different collective activities, a number of task typologies have been presented in the literature in an effort to better understand and define the critical role of experimental tasks and associated group processes. A thorough understanding of how groups process various tasks is an essential precursor to assessing the impacts of CSCW technologies.

2.1 Hackman's Task Framework

Hackman (1969) proposed a framework for examining how individuals process tasks. Hackman focuses on two issues that he suggests are important for distinguishing between definitions of tasks: 1) the degree to which the task is conceptually distinguished from the situational context; and 2) whether the task is considered to be extrinsic (imposed by the researcher) as opposed to being intrinsic to the subject as he/she redefines the task. An important issue associated with defining tasks relates to task *redefinition.* Hackman points out that the task becomes "what the group members subjectively define it to be" (Hackman, 1969; p. 102) rather than that which the researcher necessarily intended the task to be. This presents obvious problems in defining tasks (especially group tasks) since the redefinition of the task will vary at an individual and group level.

Hackman (1969) reviewed and synthesized four frameworks for task descriptions originally put forth by McGrath and Altman (1966) and Ferguson (1956). The four frameworks are labeled *task qua task*, *task as behavior requirement*, *task as behavior description*, and *task as ability requirement* (Table 1). After reviewing these methods for describing tasks, Hackman concludes that the *task as behavior requirement* represents the best basis for defining tasks since it differentiates tasks based on the critical behaviors required for success (which will remain relatively constant for a task across subjects). The *task as behavior description* and *task as ability requirement* approaches are unsuitable since they rely on characteristics of task performers (which vary across individuals for any one task). He also finds that the *task qua task* approach is unsuitable because an almost infinite number of potential stimuli and task dimensions exist which makes it difficult to identify which characteristics should be used to define the task.

Hackman's (1969) task framework is built on the work by Gagné (1964) on *external problem situations.* External problem situations include three components: stimuli (i.e., the task objects and components), instructions (i.e., designed to define objectives, rules, contexts, and processes), and verbal directions (i.e., designed to direct subjects to the stimuli and instructions). The three important components of Hackman's model are 1) the stimuli present in the task, 2) the instructions about operations, and 3) the instructions about goals. From this conceptualization, combined with the notion that individuals will redefine tasks, Hackman proposed a framework for analyzing how individuals process tasks (see Figure 1). This framework attempts to map the 1) inputs which are brought into a task scenario (e.g., the task stimuli, instructions, individual characteristics), 2) the redefinition process (individual interpretation of the task), 3) the development of strategies and tactics for completing the task, 4) execution of the task, and 5) the impact which task execution has on outcomes, perceptions, and learning. The important components of this framework will be discussed in greater depth in Section 3.1 where this framework will be adapted to tasks in the context of groups.

<u>Task Qua Task</u>: *What pattern of stimuli are impinging on the subject?* These are the objective dimensions of the task such as the physical nature of the task, its subject matter, characteristics of the stimuli.

<u>Task As Behavior Requirements:</u> *What responses should the subjects emit, given the stimulus situation, to achieve some criterion of success?* These are the critical success factors that are needed to complete the task successfully.

<u>Task As Behavior Description:</u> *What responses does the subject actually emit, given the stimulus response?* These are the actual behaviors that people engage in when they are confronted with the task.

<u>Task As Ability Requirement:</u> *What are the patterns of personal abilities or traits which are required for successful task completion?* These are the individual physical, psychological, and background characteristics which are necessary for successful job performance.

Table 1
Task Description Frameworks
(after Hackman, 1969)

2.2 McGrath's Task Circumplex

One of the most frequently cited classifications schemes in CSCW research is the Task Circumplex advanced by McGrath (1984). The Task Circumplex integrates the work of Hackman and Morris (1975, 1978), Laughlin (1980), Shaw (1973), Davis (1980), and others into a conceptually and visually elegant framework for classifying group tasks.

Hackman (1968) and Hackman and Morris (1975, 1978) identified *production* (generate alternatives), *discussion* (dealing with issues), and *problem-solving* (generating plans for action) task types based on the behavioral and performance processes required to complete the task (i.e., using the *task as behavior requirement* framework). McGrath built on Hackman's observations and described four general processes (depicted as quadrants): *Generate*, *Choose*, *Negotiate*, and *Execute*. Within these general processes he incorporated more specific sub-tasks based on the *task qua task* framework (Figure 2). For example, the model includes Laughlin's (1980) distinction between *intellective* tasks, which have a demonstrably correct answer, and *decision-making* tasks, which have no correct answer.

McGrath designed the Task Circumplex categories to be 1) mutually exclusive between categories, 2) collectively exhaustive, 3) logically related, and 4) useful for comparing similarities and differences of various tasks used in group research. The circumplex is divided on two dimensions: the horizontal axis defines the conceptual/behavioral dimension while the vertical axis defines tasks in terms of conflict/cooperation. These axes are defined using the *task as behavior description* framework since these axes define, at least in part, behaviors which are likely to be produced by the tasks which project on these behavioral dimensions. An important limitation of the circumplex is that it does not provide a means for objectively measuring the degree to

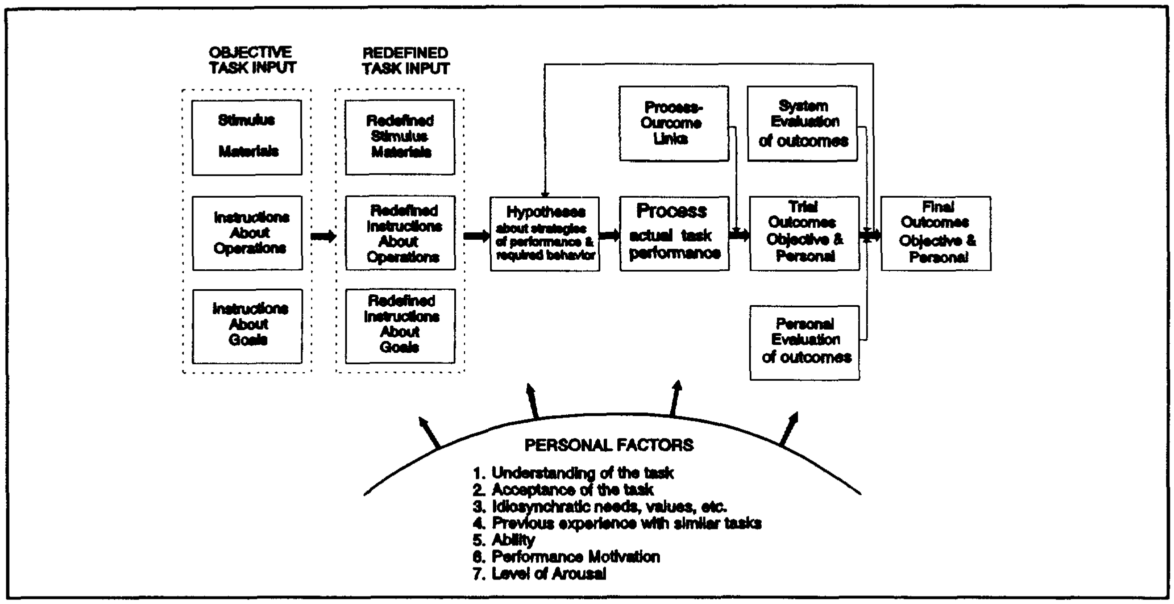

Figure 1
Hackman's Task Framework
(after Hackman, 1969)

which tasks in each wedge of the circumplex differ both from tasks within the same category and also in other categories. The next section reviews a more micro-level task typology based on task complexity.

2.3 Wood's Model of Task Complexity

Wood (1986) presents a general theoretical framework which can be used to derive three dimensions of task complexity. The framework is designed in the context of individual task performance but can be adapted to group tasks. Wood's framework posits that all tasks contain three components: 1) products, 2) (required) acts, and 3) information cues. Products are the measurable results of task related acts which can be used to identify and differentiate tasks and which set the requirements for the behaviors needed for task performance. Acts are patterns of behavior which have some identifiable purpose or direction and which form "the basic unit of behavioral requirements" (Wood, 1986; p.65). *Required* acts represent basic task components (required for task completion) and are independent of an individual task performer. Information cues are components of information about task stimuli attributes which task performers can use to make the judgements (i.e., conscious discriminations) required for task completion.

Acts and information cues represent task inputs and since these characteristics vary from one task to another, Wood suggests that the construct of task complexity may represent a useful means for differentiating tasks (Wood, 1986; p.66). Three distinct types of task complexity are defined in Wood's framework: *component complexity*, *coordinative complexity*, and *dynamic complexity*. Component complexity is defined as 1) the number of distinct acts and 2) the number of distinct information cues that must be processed for task completion. Total component complexity is defined to be a function of the number of distinct acts required for task completion, the number of sub-tasks present in the task, and the number of information cues that need to be processed. The larger the number of each of these components and the lower the component redundancy (i.e., the degree of overlap among demands imposed by different task inputs). for any act or cue, the greater the component complexity of the task.

Coordinative complexity is defined as "the form and strength of the relationships between information cues, acts, and products, as well as the sequencing of inputs" (Wood,

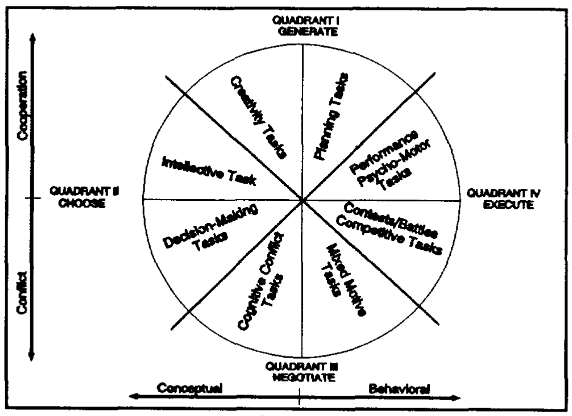

Figure 2
McGrath's Task Circumplex

1986; p. 68). Total coordinative complexity is defined to be a function of the number of *turning points* (i.e., non-linear sequences in the structure) in the relationship between task inputs and the task product. Coordinative complexity will be higher as more interactions in sequencing, timing, intensity, and in the frequency of acts are required.

Dynamic complexity is defined as the complexity which results from changes in the relationships between task inputs and products. Changes in the required set of acts and information cues or in the relationships between inputs and products can change the required skills and knowledge needed for completing the task. Dynamic complexity will be a function of the stability of the task input-product relationship and will be larger for tasks that are performed over longer periods of time or which are relatively unique (Wood, 1986; p. 73).

Because of interactions between the different types of complexity, total task complexity cannot be precisely stated as a simple linear function of the three types of complexity. Further, as defined by Wood, the task complexity construct applies to individuals rather than groups (Wood, 1986; p. 66). However, we conclude that since the model of task complexity is built on the *task as behavior requirements* and *task qua task* frameworks (frameworks which are independent of the task performers), that the task complexity construct can be applied to group tasks as well. The important distinction that must be made in applying this model to groups is that although total complexity will not change in a group context (since this is inherent to the task), the average perceived complexity (i.e., the complexity per individual) will vary as the number and skill levels of group members vary. Figure 3 portrays our expectations regarding how the average perceived complexity varies with increasing group sizes. We expect that as group size increases, the average perceived component and dynamic complexities should decrease while the average perceived coordinative complexity should increase. We also expect that these relationships will be influenced by computer support.

2.4 A Behavioral Perspective on Classifying Tasks

McGrath (1991) has proposed a theory of time, interaction, and performance (TIP). Commenting on previous group research, McGrath observed, "*... there are some serious limitations to much of that earlier work...[it reflects] an analytic paradigm that presumes directional causal relations among isolated factors with little regard for physical, temporal, or social context*" (McGrath, 1991; p. 148). Of particular importance is the notion that previous descriptions of (group) tasks, including those cited above, have largely been concerned with task characteristics or task/group outputs and have failed to consider the socio-emotional issues associated with processing a group's task. In contrast, TIP theory recognizes that a group engages in a *member support function* and *group well-being function* in addition to the much discussed *production function* (i.e., the outcomes that the group passes to a higher level system; e.g., a superior or organizational unit). These three contribution functions are served by three levels of purposeful activities: *projects* (a mission directed activity towards a goal), *tasks* (a sequence of activities necessary to complete a project), and *goals* (an activity that is part of a task). McGrath (1991) notes that groups serve the member support function, the group well-being function, and the production function while engaging in multiple projects that overlap in time, place, and membership. Therefore, when group members process a task, they do more than just work on the task, they weave into the task those behaviors which are designed to support members and foster the well being of the group.

TIP theory's most significant contribution in terms of understanding and classifying tasks is the notion that group tasks should not be viewed outside of the context of group process and the group's reaction to the task. In other words, what TIP theory does is bring us back to the issue of describing tasks in terms of the reactions which the task generates in the task performer(s) (i.e., task descriptions based on the *task as behavior description* framework) and how the performer(s) re-interpret and process the task. Hackman (1969) and others have convincingly argued that the *task as behavior description* framework is unsuitable for providing an *analytical* framework for classifying tasks because it uses a dependent variable (the task performer's response to the task) as an independent variable and this lacks construct validity. However, while this criticism is valid when we look for an objective means of classifying tasks, when our goal is to understand and interpret, for instance, subject behaviors, then the *task as behavior description* may become a relevant framework for examining tasks. For example, when a task manipulation is used in order to observe resultant behaviors, the tasks will often be chosen on the basis of the behaviors that the task is expected to elicit rather than on the basis of specific task components. Again, consider the distinction made between intellective and decision-making tasks in McGrath's Task Circumplex (1984) and Hackman's (1968) model. These distinctions are made based on both the content of the task (i.e., the presence or absence of an objective solution) and on the behaviors they will invoke in subjects (i.e., tapping more of the analytic, critical thinking behaviors for intellective tasks and subjective, value-based perceptions for decision-making tasks).

3 Summary of Task Frameworks

This review points to two important issues that should be considered in understanding and using group tasks for experimental research: 1) the need to understand how human perceptions and intra-group processes influence individual and group task processing and 2) the importance of distinguishing between tasks based on objective task characteristics. Both of these issues are addressed below.

3.1 A Model of Task Processing in Groups

Hackman's task processing model (Hackman, 1969) suggests that individuals will redefine tasks through interpretation and reinterpretation into their own framework and mental system. This redefinition process becomes important in experimental research since the way that redefinition occurs will depend on the characteristics of the subjects. Since this redefinition process has the potential to substantively influence task outputs, an understanding of how individuals process tasks within groups would be helpful for academics and practitioners alike. In this section we propose a model which is designed to improve our understanding of how task, individual, and group level variables influence how groups process tasks.

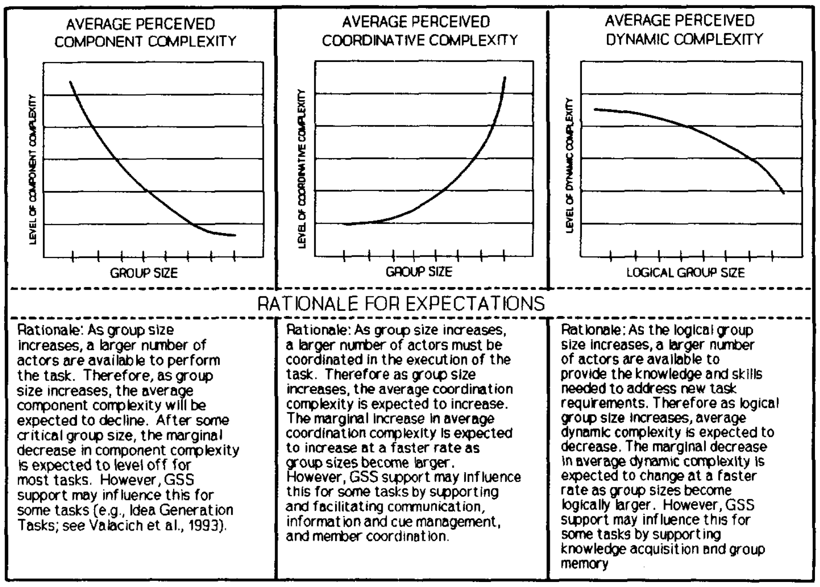

Figure 3
Expected Relationship of Task Complexity for Changing Group Sizes

The model we propose is an input-process-output model (Figure 4) (see Bostrom & Anson, 1988; Mennecke et al., 1992) which is adapted from Hackman's model (Hackman, 1969) of individual task processing and our own observations of subjects engaged in experimental tasks. As with Hackman's model, we suggest that tasks fundamentally consist of three components: the task stimuli, instructions about operations, and instructions about goals.

We expect that individual group members will redefine the task and that they will individually develop hypotheses about how to accomplish the task objectives. In this context, a task becomes what the group as a whole and individuals uniquely perceive and agree that it should be. As Hackman noted: *"Since the information included in the objective statement of task must be perceived and coded by the subject before it becomes useful to him, all of the factors which affect the dynamics of perceptions (e.g., needs, values etc.) potentially will contribute to task redefinition"* (Hackman, 1969; p.119). Hackman (1969) further points out that four factors are likely to be important in the redefinition process: a) the degree to which the individual task performer *understands* the task, b) the degree to which the individual *accepts* the task and is willing to cooperate with its demands, c) the *idiosyncratic needs and values* of the individual, and d) the impact of *previous experiences* with similar tasks. According to Hackman, individual level variables have a significant potential to effect task processing. For instance, individual characteristics such as a person's need for cognition (Petty & Cacioppo, 1986) are likely to influence the mental energy that task performers exert in the process of task completion. In addition, an individual's preference for procedural order (Putnam, 1979) is likely to influence the hypotheses that are formulated at an individual level about methods for completing the task. These individual level considerations are included as inputs to the meeting process and are diagrammed in the model using a layered appearance in order to represent multiple group-member perspectives. In addition, we also portray the objective task inputs in a layered manner to represent 1) multiple roles (i.e., asymmetry of information), 2) multiple instructions about goals which might be given to the group (e.g., mixed-motive negotiation tasks), and 3) multiple instructions about operations which might be given to the group (e.g., tasks where the heuristic given to the group is manipulated).

These multiple perspectives represent the inputs which are brought into the meeting and they are used to moderate the group's consensus view of the task stimuli, the instructions about goals, the instructions about operations, and the hypotheses about completing the task. This group consensus view of the task components will be defined and, perhaps, redefined through on-going group interaction and discussion as the group endeavors to execute the task. In a group context, the redefinition process is made even more complex because of the perceptual issues associated with successful and accurate communication between individuals. In addition, several group level and environmental variables will also become important. For instance, factors such as the group's history, the presence or absence of leadership, and the depth and breadth of experience and knowledge present in the group can significantly influence which group member's task definition becomes the focus of the group's efforts. Also, variables such as the presence or absence of imposed heuristics or computer support and the experience which group members have in solving similar tasks can influence the hypotheses for solving the task which the group develops.

Finally, Hackman (1969) suggests that when individuals generate an outcome they will evaluate whether the outcome has satisfied the individual and objective criteria for adequacy. Our model includes these considerations, plus we

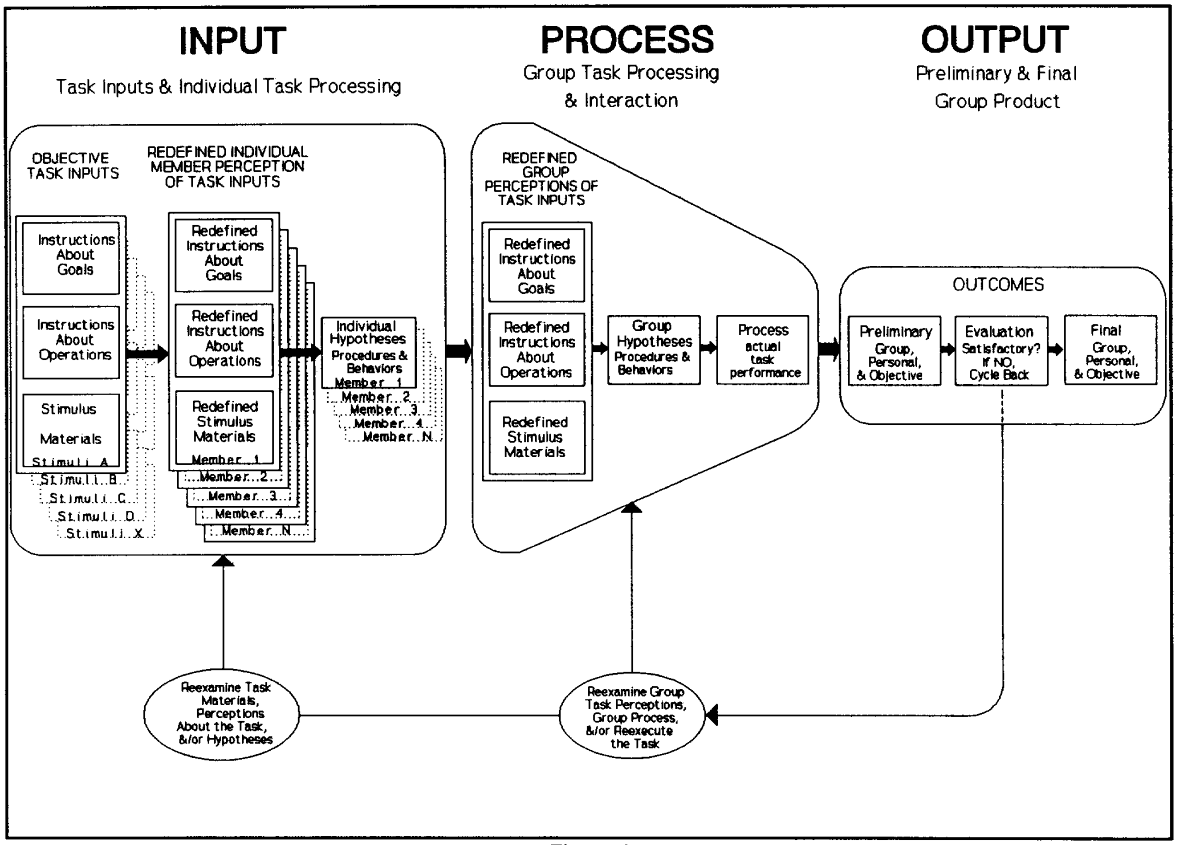

Figure 4
A Proposed Model of Group Task Processing

have included group level concerns about task outcomes (e.g., potential implications of the outcomes on all or most group members). The model predicts that if results are unsatisfactory and the group has the time and motivation to do so, then members will cycle back to either reexamine the inputs (e.g., the task stimuli: i.e., they will reread the case) and then reprocess the task or they will attempt to reprocess the task directly (e.g., redefine the task or re-perform the task). At this stage, issues such as the valance of potential solutions (i.e., Valance Theory; Hoffman, 1979), the presence of real or perceived time constraints (Gersick, 1988, 1989), and the presence or absence of intrinsic and/or extrinsic sources of motivation can influence whether groups expend the effort to cycle back to reprocess the task.

This model represents a concise framework for examining how individual level task processing can be integrated within a group context. An important contribution of this model is the notion that tasks will be reprocessed both at the individual level and at the group level. This review and the model of group task processing illustrate the complexity inherent in interpreting the behaviors and outcomes that groups exhibit while processing experimental tasks.

3.2 The Importance of Experimental Tasks Characteristics

The second issue which this review highlights is the importance of defining a useful and objective means of distinguishing between tasks. This becomes extremely important in terms of providing a means of comparing laboratory-based research findings across studies and to field research. Hackman (1969) suggests, however, that the *task qua task* framework, the framework for describing tasks which is based on objective task characteristics, is not a useful means for classifying tasks because of the multitude of dimensions of task characteristics which can potentially be used. However, the breadth of these dimensions can potentially be reduced if a justification can be found for focusing on a useful subset of task characteristics (Wood, 1986). Dennis et al. (1991) provide such a justification by noting several succinct dimensions across which the tasks encountered by groups in the field differ from those used in the laboratory. These distinctions really represent three groups of issues: 1) the context of the task (e.g., extra-group demands for task outputs, the organizational culture); 2) temporal issues (e.g., the duration of time over which the task is completed, the number of sessions); and 3) task characteristics. In terms of the characteristics of the task,

TASK TITLE	RELEVANT CITATIONS	LOGICAL SIZE	TASK TYPE
Automatic Post Office Problem	☛ Goel & Pirolli, 1989† ☛ Olson et al., 1992	Small-Medium	Creativity
The Parking Problem	☛ Connolly et al., 1990 ☛ Fellers, 1989 ☛ Gopal, 1991 ☛ Jessup et al., 1988† ☛ Robichaux, 1991	Small	Creativity
The Foundation Task	☛ Cass et al., 1991 ☛ Dennis, et al., 1989 ☛ DeSanctis, et al. 1989 ☛ Dickson et al., 1989 ☛ Tan et al., 1991 ☛ Watson, 1987† ☛ Zigurs et al., 1989	Small-Medium	Decision Making
Legislative Dilemma	☛ Wachter et al., 1992†	Small	Decision Making
The Palo Verde Vintners Inc. (PVVI) Suite of Four Decision-Making Cases	☛ Chidambaram, 1989† ☛ Miranda, 1991	Small	Decision Making
Tidewater College Task	☛ Whetten & Cameron, 1984† ☛ Sambamurthy, 1989	Small	Decision Making
Bonanza Business Forms	☛ Gallupe, 1985†	Small	Intellective
Company Profile Task	☛ Hollingshead, in progress†	Medium-Large	Intellective
International Admissions Task	☛ Tan et al., 1991 ☛ Zigurs, 1987†	Small	Intellective
Lost at Sea	☛ Gabrenya & Barba, 1987† ☛ Herschel, 1991 ☛ Wachter et al., 1992	Small	Intellective
Microcomputer Policy Decision	☛ Dennis, 1991†	Small	
Parasol Assembly Task	☛ Hoffman, 1979† ☛ Venkatesh, 1990	Small	Intellective
Parkway Drug Case	☛ Dennis et al, 1990†	Small	Intellective
Product Mix Task	☛ Raghaven, 1990 ☛ Winniford, 1989†	Medium-Large	Intellective
Strategy Design & Implementation Task	☛ Anson, 1990†	Small-Medium	Intellective
University of Georgia Admissions Task	☛ Dennis, in progress†	Small	Intellective
Whirlwind Aircraft Corporation Case	☛ Hwang, 1989†	Small	Intellective
Multi-Attribute Negotiation Task	☛ Foroughi, 1990 ☛ Jones, 1988†	Medium	Mixed-Motive
International Trade Negotiation Case	☛ Park, 1990†	Medium	Mixed-Motive

†Indicates the source or original user of the task

Table 3
Selected Tasks Used in CSCW Research Classified by Logical Group Size

three are noted: 1) the complexity of the task; 2) the clarity of the task, and 3) the symmetry of information in the task (i.e., the distribution of information). Since task characteristics can easily be modified, manipulation of the research task represents an important vehicle for potentially increasing the generalizability of experimental laboratory research. The important influence which task characteristics have on experimental research can be understood by examining the characteristics of the tasks which have been used in prior CSCW research (see Table 4). This table highlights the fact that experimental researchers have almost exclusively used tasks which have high symmetry and which therefore are more likely to generate a small logical group size. We will discuss the issue of task symmetry in the next section and introduce a new task which has an asymmetrical distribution of information and which we feel addresses many of the shortcomings of some of the previously used experimental tasks.

4 Hidden Profile Tasks: Tasks With An Asymmetrical Distribution of Information

A task with an asymmetrical distribution of case-relevant information is called a *hidden profile* task. Stasser defined a hidden profile scenario as a situation where *"the superiority of one decision alternative over others is masked because each member is aware of only one part of its supporting information, but the group, by pooling its information, can* *reveal to all the superior option"* (Stasser, 1992; p. 49). Hidden profile tasks are a type of conjunctive task since the success of the group is dependent on the contributions of the individual member who is least likely to share information with the group. In other words, hidden profile tasks are structured so that each group member does not receive the same information and the information that each member does receive is not adequate by itself to optimally address the problem. However, collectively the group has enough information to find the optimum solution. Therefore, hidden profile tasks have the potential to increase the logical size of groups within laboratory environments. In addition, inclusion of an asymmetrical distribution of information in the group adds a new dimension of complexity to experimental tasks because individual group members must now not only process the task materials that are shared among the groups participants, but they must also successfully communicate unshared information via verbal or technologically-enabled communication channels.

4.1 Why Hidden Profile Tasks?

We contend that hidden profile tasks have the potential to address some of the important "disconnects" between laboratory experiments and field CSCW research that have been noted by several authors (e.g., Chidambaram, 1989; Dennis, Easton, Easton, George, & Nunamaker, 1990; Dennis & Gallupe, 1993; Dennis et al., 1991; Mennecke et al., 1992). Specifically, these tasks provide experimenters with a way to manipulate the logical size of the experimental group. Nunamaker, Vogel, & Konsynski (1989) note that *"A physically large group from a common culture ... may have a high degree of overlapping domain knowledge that results in the group being logically small. Conversely, a physically small multi-cultural group exhibits characteristics of a much larger group because its members have multiple and often conflicting perspectives, points of view, diverse knowledge domains, and opinions that make it logically large"* (Nunamaker et al., 1989; p.147). In many organizational group meetings, members often come from different disciplines and units from within the organization. The very reason that these groups meet is to bring together individuals with a variety of skills and domain knowledge to address a task or project. Therefore members of these groups will often possess different conceptions of the problem or task and they also may view the task from diverse perspectives. Nunamaker et al. (1989) and Dennis et al. (1991) suggest that many, if not most, field studies have probably looked at groups which are much larger in logical size than the typical experimental groups of comparable physical size. This difference is made more pronounced by the fact that experimental subjects in the laboratory generally receive tasks that are "neatly packaged and small in scope" (Dennis et al., 1991; p. 116) with the same instructions and information presented to each participant. We feel that the logical size of experimental groups can be increased by the use of hidden profile tasks and that this offers the opportunity to extend the generalizability of experimental research. This is potentially one step towards meeting the challenge posed by Dennis et al. (1991) to "model the real world ... as closely as possible, in order to maximize the ability to generalize findings" (p. 125) to organizational contexts. The next section will describe a new hidden profile task for CSCW research that is designed to address logical group size, task complexity, group member assumptions, and the "messy" information differences which exist between laboratory and field research.

3.3 The School of Business Policy Task

Given that students have been and are likely to continue as a source of experimental subjects, research tasks should be designed to capitalize on the characteristics of these groups. The School of Business (SOB) Policy Task (Wheeler & Mennecke, 1992a, 1992b) is a new hidden profile task that was designed to provide a task environment that allows greater generalizability to organizational settings. To accomplish these goals, the task was designed to address the following objectives: (1) the task should be interesting and engaging to student subjects and should create a perceived stake among group members in the outcomes of the task; (2) it should require behaviors and knowledge that are within students' knowledge domains; (3) it should distribute unique domain knowledge and perspectives about the task issues among group members; (4) it should evoke students' assumptions and biases; (5) it should contain sufficient task complexity to simulate "wicked" problems (Dennis et al., 1989) found in natural tasks; (6) it should yield a meaningful index of solution quality.

The task contains five unique roles that have a stake in the policies of the business school. Each participant is given some general information that is common to all members and some unique information that is specific to an individual role. To increase task complexity, some of the case-relevant information is split across two or more of the roles and it can therefore only be utilized through a conjunctive group effort. Finally, the problems which the group must address are not yobviously identified which increases both the realism and complexity of the case. In terms of Wood's model of task complexity (Wood, 1986), the task ranks high in complexity on all three dimensions. For instance, approximately 75 unique facts are presented in the case which implies that component complexity is relatively high. Further, coordinative complexity is high since these facts are distributed among group members such that each member has only a subset of the relevant facts. This requires groups to identify and surface unshared information, a process which has been shown to be difficult for groups to do successfully (Stasser & Titus, 1985, 1987; Stasser, Taylor, & Hanna, 1989). Finally, dynamic complexity is moderately high since the nature of the group problem and focus shifts as *new* information is shared and the group recognizes new issues that need to be addressed. Solution quality which possesses high face validity has been scored for this task by judges using a multi-attribute rating procedure whereby judges evaluate each solution in terms of each of the problems and constraints that bound the feasible solution space (see Wheeler & Mennecke, 1992b).

Based on our experiences with this task, it appears to be suitable for experiments in group decision making, information sharing, idea generation, and negotiation. Both quantitative scoring (e.g., number of ideas entered, decision time, number of votes taken) and qualitative observations (e.g., experimenter observations, subject comments) clearly support our contention that the SOB task generates high interest and engages student subjects. It evokes knowledge and reasoning skills that are within students' knowledge domain and works especially well to surface the non-task related personal biases that individuals bring to meetings. In general, this task possesses several of the characteristics described by Dennis et al. (1989) that are associated with the *wicked* types of problems frequently undertaken by organizational groups. As with any experimental task, further research will be needed for a thorough validation and to understand how research findings can be applied to organizational contexts.

5 SUMMARY AND RECOMMENDATIONS

In this paper we propose a behavioral model of group task processing which considers, among other things, how the differences that may exist in objective task inputs (i.e., instructions about goals, instructions about operations, and stimulus materials) can be used to explain some of the inconsistent findings observed when field studies are compared to studies conducted in controlled laboratory experiments. In particular, we conclude that organizational groups often process tasks that have associated with them heterogeneous task inputs while, on the other hand, experimental laboratory groups have often engaged in experimental tasks which have homogeneous task inputs. Group researchers who are exploring the impacts of computer-supported collaborative work are encouraged to carefully consider the use of hidden profile tasks in their research designs as one important step towards enhancing the external validity of their findings. And since a wealth of research demonstrates that task matters, consumers of all types of CSCW research are encouraged to carefully consider the importance of task influences on group process and group outputs in both interpreting research findings and applying them to other domains.

Author's Note: We wish to acknowledge and thank Alan Dennis, Starr Roxanne Hiltz, Andrea Hollingshead, Len Jessup, Shaila Miranda, Barry Robichaux, Marianne Storrosten, Marianne Winniford, and Ilze Zigurs for their assistance in compiling and collecting some of the tasks that are discussed in this paper.

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