

# Teams: It's All in The Planning

BY LAWRENCE HOLPP

*Why do many companies form teams, only to dissolve them at the first sign of trouble? Maybe because they didn't plan properly. Here are 10 questions to help determine whether creating a team is worth it.*

**M**ANY PEOPLE are still paying homage to teams, teamwork, empowerment, and self-management, but others have become disillusioned.

In the last year, dozens of firms have halted team-development efforts because they were too costly, didn't provide quick enough results, or were poorly understood by line management.

Here are some examples of real organizations that dropped the teamwork ball.

▶ A major aerospace manufacturer developed a five-day training program for managers of team leaders. It was designed to help managers understand the dynamics of the high-performance work groups that were forming spontaneously in the ranks.

After two pilot sessions, a training program, and a train-the-trainer course, the training was blessed by management but never delivered. Boxes of books and tapes now sit in a warehouse. At another location, the same company trained team facilitators to guide teams, then failed to provide them with any internal guidance or structure to work with the teams.

▶ A national home-improvement retailer built a massive 500,000-square-foot facility with the latest technology at its new distribution center. The retailer wanted to hire the best people and make sure they could work well together. After a selection procedure, a leadership program for management and team leaders, and a team-training program for all new employees, it abandoned the effort when technical systems crashed.

▶ A major North Carolina insurance company, fascinated by the concept of employee empowerment, had made headway in team development. Until, that is, its market share began declining. Now, talk of teams is dead, and employees already working in teams wonder where the support went.

"Management never commits the time and effort it takes. And everybody is already overworked," says Terry Mueller, HR manager for Terex Worldwide Parts Distribution Center, Southaven, Mississippi. "Management waves its wand and expects teams to form. It sees only the work and doesn't realize that teams can pay dividends in the long run."

Mueller, a veteran of several abandoned team programs, acknowledges that management has good intentions but poor follow-through due to pressures from upper management to produce quick results.

Why do successful companies like those get started with teams and then drop the effort at the first sign of inconvenience? Many of the reasons involve a lack of planning. In working with organizations that have experimented with teams, some successfully and some not, we found that if they had asked and answered a few questions beforehand, they could have increased their chances for success.

Jim Stevens, director of human resources for Alberta Pacific Forest Products says, "We spent one year planning how our teams would be organized, before we put them in place. We thought about where they would be located, who would be on them, how much technical and team training they would get, and when they would get it."

But many companies don't have the luxury of planning for a year before start-up. For companies contem-

plating teams, teamwork, or an empowerment strategy, here are a few questions to ask before hand. Answering, or even just discussing these questions, will give you a feel for the planning required.

**What are teams?** It's a simple enough question, but one that's seldom asked. We all think we know intuitively what teams are. Guess again. Here are some questions to help define team configurations.

- ▶ Are the teams going to be natural work groups or project- and task-oriented?
- ▶ Will they be self-managed or self-directed?
- ▶ Will they exist temporarily or last for years?
- ▶ How many people will be on the teams; who's in charge?
- ▶ How will the teams fit into the organization's structure if it shows only boxes and not circles or other new organizational forms?

It's important to have a written definition of the teams' purpose and status and how the teams will fit into the organization. The definition should address these issues:

- ▶ the number of people on a team
- ▶ whether the team is natural (functional), cross-functional, or project-based (short-lived)
- ▶ the key roles of members, leaders, managers, and others who may affect the success of the team
- ▶ team boundaries, and the kind and amount of autonomy and authority team members will have.

By defining terms, you, as an HR professional, can deliver an important message about your company's values on how people work and what's expected of them.

**Why do you want teams?** If teams are just a convenient way to group under one manager a lot of people who used to work for several downsized supervisors, don't bother. But if the teams can truly take ownership of work areas and provide the kind of up-close knowledge that's unavailable elsewhere, then full speed ahead.

By answering the question Why teams? you consider which business issues teams should address. Without that, you place the teams on shaky ground.

Without a strong business purpose, team efforts will be among the first projects to suffer in the event of a downturn or scarcity of resources.

Having to justify teams from a business perspective makes you consider the nature of your own work—how tasks are divided, your organizational strategy and design, and your staffing. Teams challenge functional silos—uncommunicative work groups that should be interacting.

Thinking about teams as a business strategy can cause an organization to rethink its overall business strategy. Teams are only part of a larger picture that includes products, services, customer relationships, competitive position, and broader economic issues.

**Where do you plan to use teams?** Too often an organization uses teams in areas in which a lot of people are milling about doing similar things. "Hum," some dreamy-eyed manager says, "looks like a team to me."

Not everyone in the organization is going to be on a team. Or, maybe everyone is; it's up to the organization. But everyone will be anxious until they know how they'll be affected.

It's important to identify the areas and groups conducive to teams because of their work or the organization's business requirements. Let them know about the team effort and give them a timetable and expectations. Let others who aren't involved directly know what their roles will be and whether they will participate in the overall effort.

Few organizations switch to a team-based structure in one swoop. For example, traditional power bases can threaten the success of teams in power-based units or other departments. Helping non-threatening units understand their roles with respect to teams and the importance of the effort can persuade them to support teams.

Here are a few guidelines. They are by no means universal, but they can help, especially if the organization has a trust-based relationship with employees.

- ▶ Is work subject to decision making on the spot by experienced people who deal directly with customers?
- ▶ Is there a need for cross-training so that, in time, everyone can do all of the jobs in a specific work area?

▶ Are employees in the targeted work area already functioning like a team by sharing information, solving problems, and raising important issues?

▶ Do the people in the area like and respect each other?

**What do you expect from teams?** It's rare that seasoned business managers implement a costly strategy, purchase a million-dollar piece of equipment, or sponsor an expensive move from one office to another without clearly articulated expectations. Yet, businesses enter into costly, risky, and sometimes poorly planned team programs without once stating in writing the results they want. If an organization expects higher productivity, lower costs, improved quality, or a reduced workforce, it should say so. And don't forget to set targets and goals.

Without clear goals it's difficult to assess team performance—unless things go really badly or really well. Without goals, comparing unit performance before and after team implementation is like contrasting the effectiveness of gasoline versus solar power. Both produce energy, but their start-up maintenance and long-term costs are different.

**What are the timetables and milestones?** It has often been suggested that a successful team effort can take three to five years. But if you wait that long to decide whether the effort has been a success, you may get a surprise.

Team development does take a long time, and many things change—including management, membership, technology, and business goals. How can you measure the effectiveness of a work unit that may have turned over once or twice, that is reporting to new management with new goals, and that has changed its principal focus and responsibilities?

You should plan to measure regularly whether you use standard metrics like productivity and quality, development indicators like the degree of authority in decision making, process measures like opinion surveys, or a combination of all three.

Identify indicators before starting. Brainstorm a list of things you expect from teams for the next one or two years. When the time comes to take your readings, be honest. Share results

with the team and establish new benchmarks based on what you learn. **What are the leaders' roles?** The importance of roles cannot be overstated. Leaders who don't have a clear vision (and the training to support it) of their roles in achieving consensus, gaining commitment, and developing people are likely to revert to the behavior of traditional frontline supervisors.

Leaving the roles of managers, supervisors, or team leaders to chance can cause ambiguity and confusion. Without clear roles and expectations, managers and supervisors will steer clear of anything that smacks of teams. They're likely to hope that the whole business just goes away.

Many organizations have taken the bold, cost-cutting step of eliminating

layers of supervisors or managers in favor of teams. But many have also been forced to backtrack and reinstitute some form of leadership. The first step in creating a team may have little to do with the team itself. But a great deal has to do with how people are managed.

Changing the role of the leader from commander to collaborator will get a work group functioning like a decision-making body. As the leader becomes more skilled at developing decision-making abilities within the team, he or she can step back and assume other duties while the team takes on leadership responsibilities.

Leaders may not change their behavior overnight, but the change process must start with guidelines that lead to new roles.

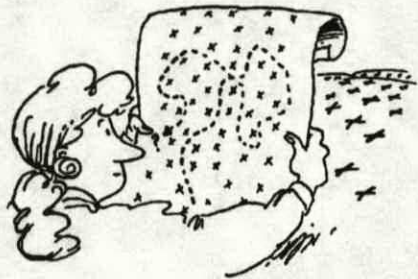
**How will you assess performance?** Of all the traditional norms that teams may endanger, the one-on-one, boss-subordinate relationship is perhaps the most critical and personal. Most organizations have a long-standing tradition of appraising lower-level employees not on their results, but on their traits and behaviors, including job skills, safety awareness, personal characteristics, friendliness, and assertiveness. Some of those factors are job relevant; some are not. But most focus on individuals, on a case-by-case basis.

Will you treat a team as a unit whose members are responsible for each other's performance? Or, will you focus on individual skills and abilities? And who manages the focus—the team, the team leader, or management? Perhaps a combination of team measurement and individual appraisal is best. But still, who conducts the performance appraisals—the boss or the team? And how is a team supposed to deal with different work styles among its members. Should members learn to tolerate differences and appreciate diversity? Or, should they seek a standard work style with little variation and uniform output?

At the prospect of becoming an empowered work group, employees face many intriguing decision-making opportunities—such as hiring, firing, disciplining, rewarding, and appraising each other.

Few teams make those decisions. Most concentrate on doing the work,

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leaving such tasks to managers and supervisors. But those that do become involved in performance management need the same training as supervisors and managers. Training can take a week or longer, and requires skill practice, on-the-job coaching, and monitoring. In short, don't give teams responsibilities you aren't able to train them to accept.

**How will you compensate teams?** Because it can be a tricky issue outside management's control, team compensation is often ignored until problems arise.

Although many companies have skill-based pay or special-incentive bonus programs, others fail to address compensation issues at all. The result can be that team members work together but are offered incentives only for their individual contributions. Some teams lose interest when they're asked to do more with less and then aren't rewarded. They require monetary and symbolic non-monetary rewards such as cups, celebratory dinners, and plaques.

**What resources do you need?** This question represents not so much a plea for funds from a greedy training department, but a realistic appraisal of the costs of launching teams.

It's essential to be accurate about the amount of training, meeting time, and resources needed for a team effort. For example, in one organization, the one-hour-a-week meeting that teams expected turned into two to three hours per person as team members followed up on meeting assignments, prepared for meetings, and learned new procedures.

All teams should learn more about communicating and problem solving. But they also need trial-and-error practice as they become self-managed. Effective supervisors aren't trained in a day; neither are teams. During its first year, a new team may require five to 10 percent of its budget for training, meetings, and team-related activities. Those expenses can cut into productivity and discourage managers who haven't considered all of the costs.

**What is the overall affect of teams?** This final question may not be easy to answer, especially at the start of a team effort. But it is worth considering. Typically, teams change an

organization's culture.

Restructuring for teams means that the traditional systems for employee hiring, firing, appraisal, and career development change. Teams mean rethinking and probably rewriting HR policies, job descriptions, performance-appraisal forms, union agreements, and many other elements.

If your organization is moving in the

direction of teams, don't let it stumble along by trial and error. Taking an active role will help avoid pitfalls, and you'll be able to claim some responsibility for the success of teams. ■

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solution. We must learn to live with uncertainty and learn from it. Flexibility is required so that we can be open to the potential of what is now unknown.

5. *Learn the art of barn raising.* Barn raising was a tradition of the pioneering culture. A group came together to help someone build a barn.

This is one tradition we can use in our work and life. The emphasis on teamwork is not a passing fad. It is a recognition of this basic need to work with and through others. Today integrative approaches are fueled by the development and diffusion of information-based technologies. And, it is, as it was in barn raising, the shared purpose that motivates individuals to contribute their energy, skills, and abilities. The art of barn raising gives us the ability to work with and through others, a necessary step on our journey to becoming leaders.

6. *Give it away.* The more we try to hold on to something, the more likely we are to lose it. If we operate from a perspective of scarcity, we are likely to hoard resources, whereas if we view the world as abundant, we become affluent. Viewing people as abundant, renewable resources and giving away authority allows the full power of individuals to be realized. The potential of teams and organizations can likewise be multiplied and actual results far exceed expectations. This is done through a process of ennobling, enabling, empowering, and encouraging ourselves and others. Empowerment fails if it is attempted without ennoblement and enablement first. And, it will fail if people are not encouraged to learn from their mistakes. We must relentlessly pursue the release of authority and control.

7. *Let the magic happen.* The last principle of leadership in the age of interaction requires letting go of the demands of our ego. This does not mean that we must always "get out of the way." We must become a member of the team and utilize our skills and abilities, joining in the shared purpose, to help the team achieve its maximum potential. There are always three choices: lead, follow, or get out of the way. The wisdom of leadership in the age of interaction is to know which action to choose for each situation.

These seven principles, when applied over time, will allow individuals to transform themselves. Only then can organizations complete their transformations. EE

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GEORGE HEURING AND ANGELA IOCOLANO

# Better Way to Work



*Teams of two are an optimum combination for performance and satisfaction.*

IS ANYTHING MORE IMPORTANT than performance today? No, but because of the way work is designed and practiced, performance and satisfaction are limited, even in the best companies. To know why, we have to look at the way we work.

When you look closely at work, you see solitary workers in a solitary system. Individuals are hired alone, promoted alone, transferred alone, allotted their own responsibilities, and when things go wrong, are fired alone. People are assigned to their own workstations or offices and given their own supplies and tools. Rewards are individually distributed. In most cases, work is solitary work.

But what about teams? When you look closely at teams, you find a group of individuals with their own ideas and agendas. And after team meetings, members take away their own action items and return to their own jobs. High performance teamwork is a noble objective that, when attained, can generate outstanding results. However, the complexity of simultaneously developing and maintaining multiple relationships makes creating—and sustaining—high performance teamwork extremely difficult.

## **Solitary Stumbling Blocks**

Limited performance and satisfaction are seldom caused by individuals performing the work. Rather, performance and satisfaction are limited by the inadequacies, inefficiencies, barriers, and problems inherent to solitary work. The solitary stumbling blocks include: isolation, poor communication, inaccurate informa-

tion, wasted talent, learning limitations, discrimination, devaluation, alienation, persistent problems, political competition, suspicion, and excessive ownership.

Problems persist in solitary systems because permanent solutions lie beyond the scope of individual solutions.

## **Solution: Teams of Two**

The good news is that there is a solution. We observe that teams of two consistently outperform all other work group combinations. Why? TwoWork partners—such as law enforcement officers, pilots, emergency medical teams and entrepreneurs—are able to overcome the solitary stumbling blocks. They transform the solitary work disadvantages into 10 binary advantages: help, interpartner

communication, opportunity, teaching, valuing, commitment, collaborative thinking, reinforcement, trust, and sharing.

TwoWork partners help each other; they accomplish more; they communicate more effectively; they become better informed; they create opportunities for each

other; they increase creative freedom; they teach each other; they gain knowledge and apply it more rapidly; they value each other; they respect their diversity; they become more committed to each other; they become more motivated; they engage in collaborative thinking; they generate new solutions and product advancements; they reinforce each other; they acquire more influence; they build trust; they develop greater confidence; they share resources.

Much of life works in twos. The bad news, however, is that in the absence of training for workplace partnering, people rely on the only partnership model they have—a social model. And social partnerships in the workplace often decrease performance and satisfaction.

We are now free to create the optimum design for performance and satisfaction at work—teams of two. EE

George Heuring and Angela Iocolano are co-founders of TwoWork Corporation and authors of *Lions, Tigers & Pairs: How to Make Work Work*.

*TwoWork partners are able to overcome the solitary stumbling blocks.*

## EFFECTS OF LEADERSHIP STYLE AND PROBLEM STRUCTURE ON WORK GROUP PROCESS AND OUTCOMES IN AN ELECTRONIC MEETING SYSTEM ENVIRONMENT

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Organizations are increasingly utilizing electronic meeting systems to enhance work group process and outcomes. Because leadership is a key group attribute, it is important to examine how behaviors of leaders influence work groups using electronic meeting systems. Results of a laboratory experiment indicated that (a) Participants made more supportive remarks under a consultative form of participative leadership than directive leadership; (b) Participants proposed more solutions and made fewer critical remarks for a fairly structured problem than for a moderately structured problem; (c) Participative leadership was more conducive to proposal of solutions for a moderately structured problem, while directive leadership was more conducive for a fairly structured problem; and (d) Frequency of solution proposals in turn affected group productivity and satisfaction. Implications for personnel practitioners and research on leadership in electronic meeting environments are presented.

Whether conducting brainstorming sessions to gather information for strategic planning or training employees in participative decision making, personnel practitioners are often responsible for developing methods to enhance group productivity and satisfaction. The growing prominence of work groups in organizations coupled with reductions in workforce have increased the motivation for personnel practitioners to identify ways to enhance the productivity and satisfaction of work

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groups. A number of personnel scholars and practitioners have identified Electronic Meeting Systems (EMS) as a useful methodology for enhancing group productivity and satisfaction (e.g., Ilgen, Major, Hollenbeck, & Sege, 1993). EMSs combine computer, communication, and decision technologies to support decision making and related group activities (DeSanctis & Gallupe, 1987; Nunamaker, Dennis, Valacich, Vogel, & George, 1991). Organizations using EMSs to support group efforts, such as IBM, Burr-Brown, and Greyhound Financial Corporation, have reported achieving higher quality decisions, reduced meeting time, and increased group satisfaction (Nunamaker et al., 1991).

We expect the performance of a work group using an EMS to depend on whether the style of its leader is compatible with the nature of the group's task. Specifically, prior contingency theories of leadership (e.g., Fiedler, 1967; House & Mitchell, 1974; Vroom & Jago, 1988) have indicated that the effectiveness of a leader's style depends in part on the structure of the problem being addressed. The current study explores how leadership style and problem structure affect group processes and outcomes in computer-mediated interaction by examining (a) the effects of a consultative form of *participative* versus *directive* leadership style and *problem structure* on the comments generated during electronic brainstorming; (b) the moderating effect of problem structure on the relationship between leadership style and the comments generated; and (c) the relationship of those comments to group productivity and member satisfaction.

This study fits within Hollingshead and McGrath's (1995) framework for studying computer-aided group work. According to their framework, various input factors (i.e., attributes of the work group and its members, task, and the communication technology) and a work group's operating conditions influence group process, which in turn influences group outcomes. Leadership style and problem structure are important group and task attributes that can affect a group's process. Comments generated during an EMS supported meeting reflect a group's process. Group productivity and satisfaction are considered important work group outcomes (Hollingshead & McGrath, 1995).

Examining participative and directive leadership styles in EMS contexts is important for at least three reasons. First, both participative and directive leadership can be associated with high levels of work group performance. For example, establishing clear rules for behavior in work groups (directive leadership) and soliciting new ideas from group members (participative leadership) have each been associated with high performance work groups (Katzenbach & Smith, 1993). Second, directive and participative leadership styles have a close relationship to the typical styles observed in EMS facilitation (Clawson, Bostrom, & Anson, 1993).

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Although the directive role of an EMS facilitator has received some attention (e.g., Dickson, Partridge, & Robinson, 1993), the participative role has not been examined in prior research. Third, a study of participative and directive leadership styles can form the basis for examining more complex leadership styles in EMS contexts (Bass & Avolio, 1994).

#### *Comparison of Current Study to Prior Leadership Studies in EMS Contexts*

Very few studies have examined leadership effects in EMS contexts (e.g., George, Easton, Nunamaker, & Northcraft, 1990; Hiltz, Johnson, & Turoff, 1991; Ho & Raman, 1991). Our study differs from prior studies in at least two ways. First, prior studies examined the effects of *assigned* or *elected* leadership on group process and outcomes without manipulating or measuring leadership behavior. Consequently, it is not clear whether any leadership behavior was displayed, and if displayed, what leadership style was displayed and how it facilitated group process and outcomes. Without knowing the leadership style that was displayed, our ability to draw conclusions from prior leadership studies in EMS contexts is limited. To overcome this shortcoming, we manipulated the leadership behavior in this study to be participative or directive, and examined a path model linking leadership style to group productivity and satisfaction. Second, prior studies did not examine the moderation of leadership effects in EMS contexts by situational variables, such as problem structure. We examined leadership effects across two levels of problem structure.

#### *Theoretical Background*

Adaptive Structuration Theory (AST) provides the general theoretical framework for this study (see DeSanctis & Poole, 1994). According to AST, the interaction of social structures provided by an EMS and a group's social context (e.g., its leader and task) determines the group's process and outcomes. Social structures are defined as rules and resources that serve as templates for planning and accomplishing a group's task (DeSanctis & Poole, 1994). An EMS' structure can be described in terms of: (a) the structural features (i.e., the actual design characteristics of the EMS) that influence how information is gathered, manipulated, and managed by users, and (b) the spirit of the EMS' set of structural features, which pertains to the system's normative framework for appropriate behaviors (DeSanctis & Poole, 1994).

AST proposes that appropriation of structures, defined as actions taken on structures (e.g., interpreting them or using them), determines group process (DeSanctis & Poole, 1994). For example, desired group



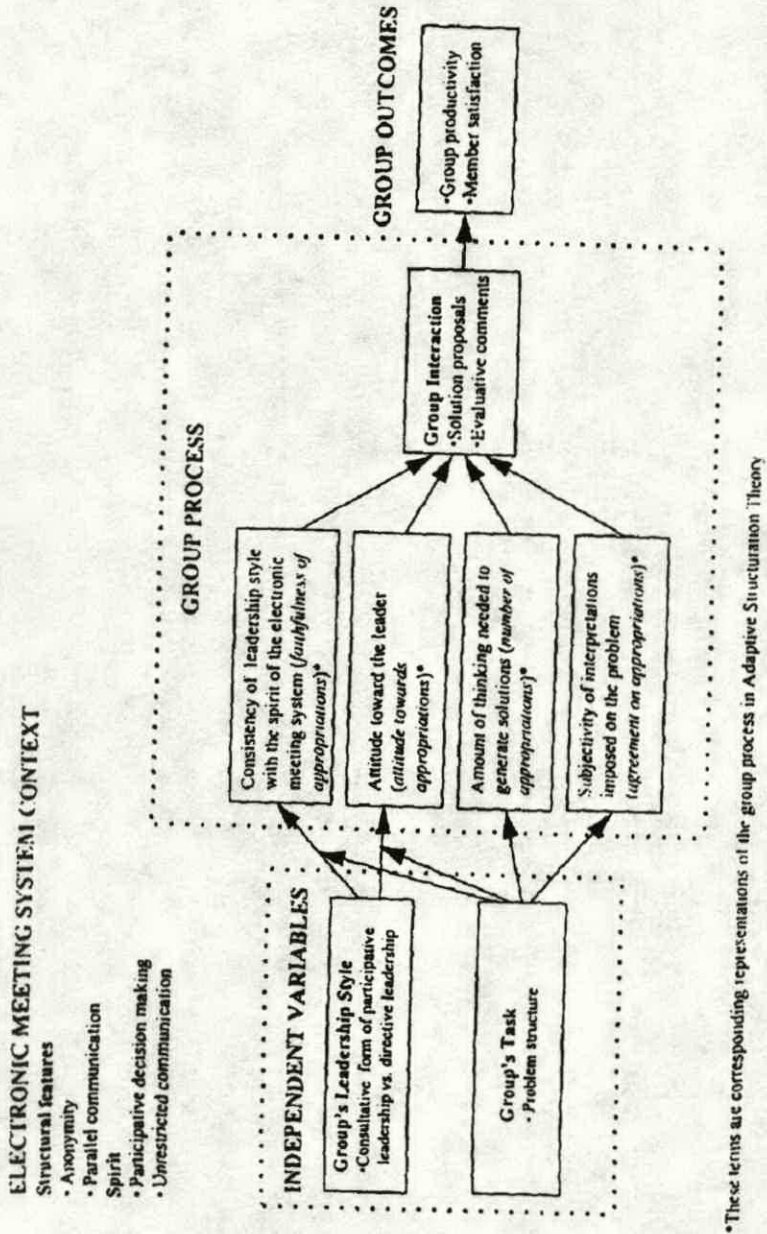


Figure 1: Adaptive structuration theory based model of effects of leadership style and problem structure on group process and outcomes in an Electronic Meeting System Context

processes are more likely to occur when (a) the appropriations are consistent with EMS' spirit, and (b) the appropriations promote a positive attitude toward the source of structures. Furthermore, decision outcomes will improve only if a group's decision processes are suitable for its task.

Based on AST, we propose the general framework shown in Figure 1, to predict the effects of participative versus directive leadership styles and problem structure on group process and outcomes in an EMS context. The effect of leadership style on group interaction depends on (a) the consistency of the leadership style with the spirit of the EMS and (b) the attitude that group members have toward the leadership style.

Problem structure moderates leadership style's effect on group interaction by influencing both the effect via consistency of leader's style with EMS' spirit and the effect via attitude toward the leader. Problem structure also can influence group interaction through the amount of thinking needed to generate solutions, and the subjectivity it promotes in participants' interpretations of how to address the problem.

Although we used the framework in Figure 1 to predict the effects of leadership and problem structure on group process and outcomes, we did not intend to test the framework per se. To be able to use the framework in Figure 1, we first examine the spirit of the Electronic Brainstorming (EBS) tool (Nunamaker et al., 1991) used in the current study. We followed DeSanctis and Poole's (1994) directions by triangulating among the following sources of evidence: (a) analysis of EBS' artifacts, (b) designer intent, and (c) user interpretations. Analysis of EBS' artifacts was based on an analysis of (a) the design metaphor underlying the EBS, (b) its name and presentation to users, (c) the nature of the user interface, and (d) the training provided to users (DeSanctis & Poole, 1994).

EBS reduces barriers to participation by enabling parallel and anonymous communication. It does not impose nor recommend any directions that participants should follow to perform their task. Rather, it frees participants from the social rules typically associated with face-to-face communication (e.g., waiting for someone to finish speaking before you speak), as well as cognitive constraints (e.g., thinking along narrow lines). Hence, we can summarize the spirit of the EBS tool as promoting participation and supporting an unrestricted approach to the task (DeSanctis & Poole, 1994).

#### *Hypotheses*

##### *Effect of Participative Versus Directive Leadership Style on Group Interaction*

*Participative leadership* is defined as sharing of problem solving by

a leader with followers by consulting them before making a decision, and *directive leadership* is defined as leader behaviors that seek followers' compliance with directions about how to accomplish a problem-solving task (Bass, 1990; Bass, Valenzi, Farrow, & Solomon, 1975). Based on the consideration of (a) consistency between leadership style and EMS' spirit and (b) participants' attitude toward the leader, we expected leadership style to influence group interaction.

#### *Consistency Between Leadership Styles and EMS' Spirit*

Path-goal theory suggests that participants under a participative leader are likely to strive for expression of solution proposals and opinions because they are likely to interpret (appropriate) that (a) the leader and their group members expect them to contribute to the task and (b) meeting those expectations is valuable (House & Mitchell, 1974; Mitchell, 1973). Opinions may be supportive (i.e., those expressing support for someone's solution), or critical (i.e., those expressing criticism for someone's solution). Attempts by participants to express solution proposals and opinions are likely to be successful because they are consistent with the EBS' spirit of promoting participation (DeSanctis & Poole, 1994).

Participants under a directive leader are likely to interpret that they have to conform to a set of directives during problem solving. Attempts by participants to conform to these directives are likely to create a conflict for participants because conforming to directives is inconsistent with the EBS' spirit of supporting an unrestricted approach to the task (e.g., a participant's comment displayed by the EBS may stimulate another participant to offer a new solution, whereas the leader may be directing the participants to focus on a certain set of solutions). Under a time limit imposed in the current study, this conflict is likely to distract participants from fully expressing solution proposals as well as supportive and critical opinions.

#### *Attitude Toward the Leader*

Participants are likely to have a favorable attitude toward a participative leader because participative problem solving provides a basis for satisfying participants' higher-order needs, such as self-expression, respect, and independence (Miller & Monge, 1986). We employed a moderately structured and a fairly structured problem in this study. Structured problems are characterized by a limited range of meanings that can be imposed on them (Sherif & Sherif, 1969; Weick, 1979). Participants are likely to have a favorable attitude toward a directive leader when solving structured problems because a directive leader helps them

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stay focused on a limited range of interpretations that can be imposed on the problem (Fiedler, 1968). Past leadership research, however, suggests that participative leadership generally promotes a more favorable attitude toward the leader than directive leadership (Bass, 1990). According to AST (DeSanctis & Poole, 1994), a more favorable attitude is likely to be associated with a greater expression of solutions and opinions.

In summary, the above analysis of (a) consistency between leadership styles and EBS' spirit and (b) attitude toward the leader suggests that groups are likely to express a greater number of problem solutions, supportive remarks, and critical remarks under a participative leader than a directive leader, leading to the following hypothesis.

*Hypothesis 1:* Participants working with a participative leader are likely to (a) propose more solutions, (b) make a greater number of supportive remarks, and (c) make a greater number of critical remarks than participants working with a directive leader.

#### *Effect of Problem Structure on Group Interaction*

A problem is defined as unstructured if it is ambiguous and difficult to solve (House & Dessler, 1974). Greater ambiguity and difficulty in solving a problem is likely to be associated with more thinking time to find solutions to the problem (Van de Ven & Delbecq, 1974). Under a time limit imposed in the current study, more thinking time to find solutions for the less structured problem is likely to lead to fewer solution proposals (i.e. fewer appropriations of the problem).

Participants are likely to generate more idiosyncratic solutions for the less structured problem (Sherif & Sherif, 1969). Consistent with AST's suggestion that prior group interaction affects subsequent group process, we expected the more idiosyncratic solutions to stimulate a greater number of critical and fewer supportive opinions in other participants' minds. Because the EBS' anonymity feature facilitates the expression of thoughts they might otherwise withhold (Jessup, Connolly, & Galegher, 1990), we expected participants to express a greater number of critical opinions and fewer supportive opinions while solving the less structured problem.

We summarize the above points in the following hypothesis.

*Hypothesis 2:* Participants solving the less structured problem are likely to (a) propose fewer solutions, (b) express fewer supportive remarks, and (c) express a greater number of critical remarks.

*Problem Structure's Moderating Effect on the Relationship Between Leadership Style and Group Interaction*

The expectation in Hypothesis 1 for greater expression of solution proposals and opinions under a participative versus a directive leader was partly based on path-goal theory. Participants under a participative leader are likely to strive for expression of solution proposals and opinions because they are likely to interpret (appropriate) that (a) the leader and their group members expect them to contribute to the task and (b) meeting those expectations is valuable (House & Mitchell, 1974; Mitchell, 1973). It is likely that for a less structured problem, which is more difficult to solve, meeting others' expectations presents a greater challenge and is perceived as more valuable, leading participants to strive for greater expression of solution proposals and opinions. We would, therefore, expect the effect of participative versus directive leadership on the expression of solution proposals and critical and supportive remarks to become more positive for a less structured problem.

The moderating effect of problem structure is also based on consideration of participants' attitude toward the leader. As argued below, the effect of participative versus directive leadership on participants' attitude is likely to be more positive for a less structured problem. We noted in Hypothesis 2 that participants' opinions are likely to be more idiosyncratic or nonoverlapping for a less structured problem (Sherif & Sherif, 1969). Due to a lack of overlap in views, participants solving a less structured problem are likely to experience a greater need for expressing their views. Because participative problem solving provides an opportunity for expression, participants' attitude toward a participative leader is likely to be more favorable for a less structured problem.

To the extent a problem is unstructured, the range of meanings that can be imposed on it increases (Sherif & Sherif, 1969; Weick, 1979). To register this variety adequately, a range of approaches for solving the problem are required (Weick, 1979). Because conforming to a leader's directives restricts the variety of approaches, participants are likely to have a less positive attitude toward a directive leader when discussing a less structured problem. In summary, the effect of participative versus directive leadership on participants' attitude will be more positive for a less structured problem. According to AST, a more positive attitude toward a leader is likely to lead to a greater expression of solutions and opinions.

Based on the above analysis, we hypothesize the following:

*Hypothesis 3:* For a less structured problem, the effect of participative versus directive leadership on the expression of (a) solutions, (b) supportive remarks, and (c) critical remarks will be more positive.

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### *Effect of Critical and Supportive Remarks on Solution Proposal*

Based on Connolly, Jessup, and Valacich's (1990) findings, we expected critical and supportive remarks to influence the proposal of solutions. This influence is consistent with AST's suggestion that prior interaction can affect subsequent group process.

Criticism motivates individuals to behave in a way that eliminates or invalidates criticism (Green, 1991). When communication is anonymous, participants may not withdraw from the interaction by taking criticism personally. Instead, they are likely to determine why someone has criticized their idea and invalidate the criticism by developing ideas further or by generating new ones (Connolly et al., 1990). An example mentioned by Jessup et al. (1990) involved a subject who mentioned that "when someone criticized her comment she felt they were focusing on the content of the comments, not on her personally" (p. 318). Because interaction was anonymous in the current study, we hypothesized the following:

*Hypothesis 4a:* Frequency of critical remarks will be positively related to the frequency of solution proposals.

Conversely, support for a participant's idea can slow down further development of the idea or generation of new ones by suggesting that the idea is adequate (Connolly et al., 1990). This leads us to the following hypothesis:

*Hypothesis 4b:* Frequency of supportive remarks will be negatively related to the frequency of solutions proposals.

### *Effect of Participant Interaction on Group Outcomes*

According to AST, a group's outcomes will improve only if the group's processes are suitable for the group's task. Participants were assigned a creativity task (McGrath, 1984), for which proposing as many solutions as possible, no matter how unconventional they are or how similar they are to previously expressed solutions is desirable (Osborn, 1963). Therefore, a greater frequency of solution proposals is likely to be associated with greater group productivity, defined as the number of unique solutions produced by a group (Diehl & Stroebe, 1987), and greater member satisfaction. This leads us to the following hypothesis:

*Hypothesis 5:* Greater frequency of solution proposals will be associated with (a) greater group productivity and (b) greater member satisfaction.

### *Method*

#### *Subjects*

Ninety-six undergraduate students, enrolled in an introductory organizational behavior course at a Northeastern public university participated in the study for course credit. The subjects, 49 of which were males, were randomly assigned to 24 groups consisting of four members each.

#### *The EMS*

Groups used the Electronic Brainstorming (EBS) tool in GroupSystems V (Nunamaker et al., 1991). The GroupSystems V setup used in this study requires a facilitator to operate and it consists of 20 user terminals facing the facilitator's terminal located in the front of the room. The EBS tool allows group members to simultaneously and anonymously type their ideas on a specific issue. At any point in time, the EBS tool displays a file containing a subset of the group's previously generated ideas on a group member's screen.

#### *Overview of Experimental Task*

Each group was assigned a 25 minute "creativity" or "idea-generation" task (McGrath, 1984), during which it had to generate (a) solutions to an assigned problem and (b) ideas to help the leader determine the group's most appropriate solutions. Group members communicated by typing their input into the EMS. Each group was led by a confederate as described below.

#### *Research Design*

The study employed a 2 (participative/directive leadership)  $\times$  2 (fairly/moderately structured problem) factorial design. The 24 experimental groups were assigned equally and randomly across conditions resulting in 6 groups per cell. Leadership was manipulated by introducing male confederates who led the task execution as either a *participative* or *directive* leader. Only male confederates were used to control for gender effects.

The leaders typed 16 scripted comments into the EMS. The leaders indicated the source of their comments by ending them with a "-L." The participative leader (a) shared the problem solving with participants by consulting them, (b) offered problem-solving directions to participants

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for their consideration but did not impose the directions, and (c) encouraged participants to contribute to solving the problem. The directive leader (a) asserted that he or she is in charge during problem solving and (b) provided problem-solving directions to participants without offering any latitude for further consideration of those directions or deviations from them.

In the fairly structured problem condition, participants described "the characteristics of a good professor," while those in the moderately structured problem condition described "ways to improve the prestige of the University." The university prestige problem was expected to be perceived as more unstructured than the professor problem by the student subjects because (a) they were likely to be more familiar with the professor problem than with the university prestige problem and (b) the issue of a university's prestige is broader in scope than the issue of a good professor, in that the quality of professors is only one of the elements contributing to the prestige of a university.

Manipulation checks, which are described below, supported the intended leadership and problem structure manipulations.

### *Procedure*

The experimental sessions were held in the "Decision Room," which houses GroupSystems V. Participants were introduced to other members of their group, including their leader. An experimental session consisted of three phases. Phase I was a 15 minute training session during which participants used the EBS tool without their leader to anonymously generate solutions to the university parking problem. During Phase II, participants performed the experimental task for 25 minutes using the EBS tool with the anonymity feature turned on. Subjects were informed that their leader was familiar with the task's requirements and would guide them through the task. During Phase III, subjects were administered a post-test questionnaire.

### *Control Variable*

Problem clarification by participants (e.g., prestige is associated with how your graduates perceive you) can influence the proposal of solutions. We included the relationship of problem clarification to solution proposals in our analysis to control for the effects of problem clarifications.



### *Coding and Operationalization of Variables in Hypothesized Model*

*Leadership style* and *problem structure* were coded as dummy variables. Measures for group interaction were obtained using EBS transcripts. Each group's transcript was parsed and coded independently by two raters blind to the experimental hypotheses. The coders used a standard coding scheme employed in prior EMS research (Connolly et al., 1990) with the following modification: It included a category for comments directed at the leader. The coders met to discuss and resolve their parsing and coding differences after independently completing the whole set of transcripts. The interrater agreement level was 89.5% for parsing and 92.5% for coding.

After the raters discussed and resolved their parsing and coding differences, the measures for group interaction were obtained as follows: (a) *frequency of solution proposals*—count of the number of instances when participants proposed solutions; (b) *frequency of supportive remarks*—count of the number of instances when participants supported a solution proposal; (c) *frequency of critical remarks*—count of the number of instances when participants criticized a solution proposal; and (d) *frequency of problem clarifications*—count of the number of instances when participants added details or new features to the problem statement.

*Group productivity* was operationalized as the number of unique solutions generated (Diehl & Stroebe, 1987). After identifying a solution proposal in a group's transcripts, the raters then coded it as unique or repeated (interrater agreement = 86.1%). Three questionnaire items measured *satisfaction* with process, discussion, and discussion's outcome. Cronbach's  $\alpha$  for a satisfaction scale formed by combining group level responses to satisfaction items was .90. Group level responses to satisfaction and other questionnaire items employed in this study were obtained by aggregating individual level responses within each group.

### *Manipulation Checks*

A scale representing perceptions of participative leadership was formed using three 5-point items that assessed how frequently the participants perceived the leader to (a) incorporate suggestions from the group members into the final decision, (b) treat group members as equal to himself, and (c) allow group members to have as much input as the leader. A scale representing perceptions of directive leadership was formed using two 5-point items that assessed how frequently participants perceived the leader (a) telling group members to follow specified rules and regulations and (b) telling group members how to accomplish the task without giving reasons. We found that (a) perceptions of leader

participativeness were significantly higher in the participative leadership condition than the directive leadership condition (3.76 vs. 3.15,  $t(22) = 3.06$ ,  $p < .01$ ) and (b) perceptions of leader directiveness were significantly higher in the directive leadership condition than the participative leadership condition (3.26 vs. 2.80,  $t(22) = 3.27$ ,  $p < .01$ ).

A perceived problem structure scale was formed by combining *standardized* values of group level responses to three items, which assessed (a) problem ambiguity (1–5 scale), (b) problem difficulty (1–5 scale), and (c) whether the problem could be categorized as one that was relatively well defined, easy to comprehend, and easy to go about solving or as one that was relatively ill-defined, confusing, and difficult to go about solving (1–2 scale). Using this perceived problem structure scale, we found that perceptions of lack of problem structure were significantly higher for the prestige problem than the professor problem (.53 vs.  $-.53$ ,  $t(22) = 4.04$ ,  $p < .01$ ).

Responses to problem structure items indicated that the prestige problem was viewed as moderately structured whereas the professor problem was viewed as fairly structured. The mean group level responses (standard deviations) for these items, in the order as listed above, were 2.79 (.6), 2.98 (.46), and 1.44 (.29) for the prestige problem and 2.48 (.29), 1.94 (.49), and 1.12 (.2) for the professor problem.

#### *Data Analysis Technique*

The study's research model was tested using two alternative statistical techniques. A more conservative test was first performed using multiple regression analysis. Next we employed a structural equation modeling technique called Partial Least Squares (PLS), which is highly suitable for early stages of theory building and testing as well as when sample sizes are small (Barclay, Higgins, & Thompson, 1995; Wold, 1985), conditions characterizing the present study. The lack of restrictive assumptions in PLS about (a) data distributions to estimate model parameters, (b) observation independence, or (c) variable metrics (Fornell & Larcker, 1981) makes PLS more suitable for the current study over LISREL, which requires multivariate normality, interval scaled data, and large sample sizes (Löhmoller, 1989).

Depending on how indicators of multi-indicator variables are defined, PLS optimally weighs and combines those indicators to increase a model's predictive power. Specifically, indicators are either defined as *reflective* or *formative* indicators (Fornell & Bookstein, 1982). Reflective indicators are those that are determined by a latent variable, while formative indicators are those that combine to create a latent variable. The

choice between reflective and formative indicators, which is not available in traditional statistical techniques, affects whether PLS emphasizes accounting for the variance of latent variables or of both latent variables and their indicators. PLS is insensitive to how single-indicator variables are modeled. In this study's hypothesized model, member satisfaction was the only multi-indicator variable. Because group members' feeling of satisfaction at the end of their task is likely to determine how they responded to post-test questionnaire satisfaction items, those items were considered as reflective.

PLS simultaneously assesses the structural component, representing the relationship among variables, and the measurement component, representing the relationship between variables and their indicators (Fornell & Bookstein, 1982). Simultaneous analysis of structural and measurement components is consistent with a contemporary view that psychometric properties of measures derive their meaning from the nomological network of relationships in which the measures are employed (see Bagozzi & Fornell, 1982).

PLS enables the assessment of measurement components by providing principal components factor loadings of indicators. The factor loadings provided by PLS analysis indicated adequate reliability of satisfaction measures. First, the *factor loadings* for the three satisfaction items exceeded .7 (.83 for satisfaction with process, .94 for satisfaction with discussion, and .95 for satisfaction with outcome), suggesting that less than half of an item's variance was due to error. Second, the *composite scale reliability*, an internal consistency estimate similar to Cronbach's  $\alpha$ , was .94, exceeding the recommended cut-off of .7 (Fornell & Larcker, 1981; Nunnally, 1978). Third, *average variance extracted* by the satisfaction variable from its items was .83, exceeding the recommended cut-off of .5 (Fornell & Larcker, 1981).

The satisfaction items demonstrated *convergent* and *discriminant validity* according to criteria similar to a multitrait/multimethod analysis (Carmines & Zeller, 1979). Specifically, the satisfaction variable shared more variance with its items (.83) than with other variables (range of .03 to .29). In addition, the magnitude of the factor loadings of satisfaction items on the satisfaction variable (ranging from .83 to .95), exceeded the magnitude of the loadings of these items on other variables (ranging from .13 to .60).

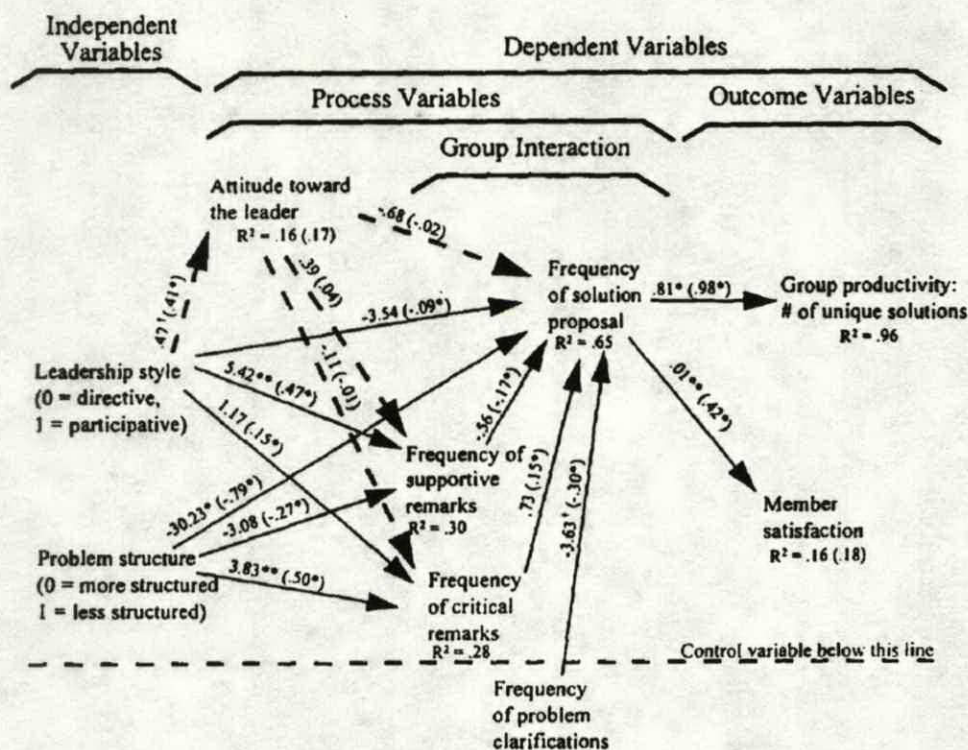
PLS generates estimates of *standardized regression coefficients* (i.e., beta coefficients) for the paths in a structural equation model. The significance of these beta coefficients was determined using a jackknifing procedure called blindfolding, with an omission distance of 10 (Sambamurthy & Chin, 1994; Wold, 1982). The blindfolding procedure omits a part of the data matrix for a particular variable and then estimates the

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TABLE 1  
Means, Standard Deviations, and Intercorrelations Among Model Variables (n = 24 Groups)

	Participative leader		Directive leader		A	B	C	D	E	F	G	H
	Fairly structured problem M (SD)	Moderately structured problem M (SD)	Fairly structured problem M (SD)	Moderately structured problem M (SD)								
A. Leadership style	-	-	-	-	1							
B. Problem type					.00	1						
C. Frequency of solution proposals	55.67 (15.53)	36.17 (7.84)	67.00 (14.28)	29.00 (12.65)	-.05	-.75	1					
D. Frequency of critical remarks	2.83 (3.06)	6.33 (4.41)	1.33 (1.03)	5.50 (4.55)	.15	.50	-.39	1				
E. Frequency of supportive remarks	12.17 (7.55)	8.17 (4.45)	5.83 (4.54)	3.66 (3.44)	.47	-.27	.08	.17	1			
F. Group productivity	44.83 (12.73)	31.67 (7.26)	57.00 (13.91)	26.33 (11.20)	-.11	-.69	.98	-.43	-.05	1		
G. Member satisfaction	3.33 (.53)	2.60 (.46)	2.97 (.52)	2.47 (.55)	.21	-.53	.40	-.40	.17	.38	1	
H. Frequency of problem clarification	.33 (.82)	.83 (1.33)	1.00 (1.67)	2.17 (2.14)	-.32	.26	-.40	.32	-.17	-.38	-.44	1

Note: Correlations with absolute values > = .40 are significant (p < = .05).

**Notes**

1. Regression coefficients are provided without parentheses over the links. Standardized regression coefficients (beta coefficients) generated by PLS are provided within parentheses.
2. \* $p < .01$ , \*\* $p < .05$ , † $p < .10$
3. Attitude toward the leader and the dashed links relating it to other variables represent a modification to the hypothesized model. This modification caused minor or no changes to the magnitudes of other links or the explained variance of dependent variables.
4.  $R^2$  value generated by PLS is given in parentheses if it is different from the value generated by regression analysis.

**Figure 2: Results of testing the hypothesized model**

model parameters (e.g., path coefficients) associated with that variable. This process is repeated as often as the omission distance, which refers to how many data points in the data matrix are skipped before omitting the next data point. PLS also computes  $R^2$ , (i.e., the proportion of explained variance, for dependent variables). The PLS analysis reported in this study was performed using PLS-Graph (version 2.91.02.08).

### Results

Table 1 shows means, standard deviations, and intercorrelations for variables in the study's research model. Results in Figure 2 are based on both multiple regression and PLS analysis and correspond to the main effects posed in all of our hypotheses, other than Hypothesis 3.

TABLE 2  
Difference in Path Coefficients Across Problems

Path	Regression coefficients		Standardized regression coefficients from PLS analysis		Significance of B - A	Significance of D - C
	Fairly structured problem A	Moderately structured problem B	Fairly structured problem C	Moderately structured problem D		
Leadership style	-22.13 <sup>c</sup>	8.54	-.75 <sup>a</sup>	.42 <sup>a</sup>	p < .05	p < .01
Leadership style	6.33	4.50 <sup>c</sup>	.49 <sup>a</sup>	.53 <sup>a</sup>	p > .10	p > .10
Leadership style	1.50	0.83	.34 <sup>a</sup>	.10 <sup>b</sup>	p > .10	p < .01
Frequency of supportive remarks	0.16	-1.50	.07	-.63 <sup>a</sup>	p > .10	p < .01
Frequency of critical remarks	2.97	0.85	.45 <sup>a</sup>	.34 <sup>a</sup>	p > .10	p > .10
Frequency of solution proposals	0.89 <sup>a</sup>	0.86 <sup>a</sup>	.96 <sup>a</sup>	.97 <sup>a</sup>	p > .10	p < .01
Frequency of Group productivity	-0.01	0.02	-.27 <sup>a</sup>	.61 <sup>a</sup>	p > .10	p < .01
Frequency of Member satisfaction						

<sup>a</sup> p < .01; <sup>b</sup> p < .05; <sup>c</sup> p < .10

Table 2 shows the regression coefficients and path coefficients obtained using PLS for subsamples corresponding to the two problem structure conditions ( $n = 12$ ). Results for Hypothesis 3 were obtained by examining the difference between relevant regression or path coefficients presented in Table 2. Our approach for detecting the moderating effect of problem structure parallels the more traditional subgroup analysis approach, which is considered to be more powerful than moderated regression when dichotomous moderator variables are involved (Alexander & DeShon, 1994).

### *Multiple Regression Analysis Results*

Results partially supported Hypothesis 1, which predicted that groups working with a participative leader were likely to propose more solutions and make a greater number of supportive and critical remarks than groups working under a directive leader. Participative leadership was associated with a greater frequency of supportive remarks than directive leadership (Hypothesis 1b;  $b = 5.42, p = .02$ ). Leadership style did not influence the frequency of solution proposals (Hypothesis 1a;  $b = -3.54, p = .59$ ), nor the frequency of critical remarks (Hypothesis 1c;  $b = 1.17, p = .42$ ). Results partially supported Hypothesis 2. Participants solving the less structured problem proposed fewer solutions (Hypothesis 2a;  $b = -30.23, p < .01$ ) and made a greater number of critical remarks (Hypothesis 2c;  $b = 3.83, p = .01$ ). However, the frequency of supportive remarks was not related to problem structure (Hypothesis 2b;  $b = -3.08, p = .16$ ).

Results presented in Table 2 partially supported Hypothesis 3, which predicted that the effect of participative versus directive leadership on the expression of solution proposals, supportive remarks, and critical remarks will be more positive for a less structured problem. Compared to the fairly structured problem condition, the effect of participative versus directive leadership in the moderately structured problem condition on (a) the expression of solution proposals was more positive (8.54 vs. -22.13,  $p < .05$ ), and (b) the expression of supportive remarks and critical remarks was unchanged (4.50 vs. 6.33 and .83 vs. 1.50,  $p > .10$ ).

Results did not support Hypotheses 4a and 4b. Neither the frequency of supportive remarks nor the frequency of critical remarks were associated with the frequency of solution proposals ( $b = -.56$  and  $.73, p = .36$  and  $.44$ ). Group productivity increased with the frequency of solution proposals ( $b = .81, p < .01$ ), as did member satisfaction ( $b = .01, p = .05$ ), thereby supporting Hypothesis 5.

### *PLS Analysis Results*

Results pertaining to the study's research model based on PLS analysis differed somewhat from the regression analysis results. This is due to a difference in how standard errors of regression and PLS path coefficients are estimated. Unlike regression analysis, which relies on analytic estimation of the standard errors, PLS utilizes a nonanalytic blindfolding procedure, which was described earlier. The blindfolding procedure often yields lower standard error estimates than the procedure for estimating standard errors in regression analysis, thereby providing a less conservative test of our hypotheses.

Results of PLS analysis countered Hypothesis 1a. Compared to the directive leadership condition, participants in the participative leadership condition proposed fewer solutions (Hypothesis 1a;  $\beta = -.09, p < .01$ ). PLS results also confirmed several hypotheses that were not supported by the regression analysis. Specifically, participants in the participative leadership condition were more critical of others (Hypothesis 1c;  $\beta = .15, p < .01$ ). The effect of participative versus directive leadership on the expression of critical remarks was less positive in the moderately structured problem condition than in the fairly structured problem condition (Hypothesis 2c: .10 vs. .34,  $p < .01$ ).

Results of PLS analysis supported Hypotheses 4a and 4b. Frequency of critical remarks was positively associated with frequency of solution proposals ( $\beta = .15, p < .01$ ), while frequency of supportive remarks was negatively associated with frequency of solution proposals ( $\beta = -.17, p < .01$ ). Support for other hypotheses paralleled the support provided by multiple regression analysis.

### *Discussion*

We will base our discussion of the results and the study's implications and conclusions on the more conservative results of multiple regression analysis. Our intent in performing the PLS analysis was to explore patterns in the data that should be examined in future research. Using PLS in the early stages of theory building and testing helps uncover effects that may not be detected using traditional analysis techniques and are likely to be ignored in future research. Future research may potentially confirm the PLS results, using traditional statistical techniques and a larger number of groups.

We expected participative leadership to be associated with greater expression of solution proposals, supportive remarks, and critical remarks than directive leadership. This expected main effect was not obtained using multiple regression analysis of solution proposals and



critical remarks. Our expectation for a greater level of input under a participative leader relative to a directive leader was based on consideration of: (a) consistency between the leadership style and the spirit of the EMS, and (b) participants' attitude toward the leader.

In order to examine the extent to which attitude toward the leader accounted for the observed pattern of results, we modified the model in Figure 2. We included attitude toward the leader, a link from leadership style to this variable, and links from this variable to frequency of solution proposals, supportive remarks, and critical remarks. This variable was created using three 5-point, post-test questionnaire-based items that measured (a) satisfaction with leader's management style, (b) satisfaction with the leader's ability to lead, and (c) general satisfaction with the leader (Cronbach's  $\alpha = .94$ ). Results of analyzing this model, shown in Figure 2, suggest that participants had a more positive attitude toward the participative leader than the directive leader although this effect was marginal ( $p = .06$ ). Attitude toward the leader was not associated with group interaction and, therefore, did not mediate the association between leadership styles and group interaction. A similar analysis of the subsamples corresponding to the two problems that were employed showed that attitude toward the leader did not account for the pattern of results presented in Table 2.

A potential explanation for our results comes from Cognitive Evaluation Theory (CET; Deci & Ryan, 1985). According to CET, structures external to an individual (e.g., leader directiveness) can have both a *controlling* and an *informational* aspect. The controlling aspect brings an individual's behavior into compliance with an external structure, while the informational aspect provides information concerning one's competence. We had proposed that participants working under a directive leader were likely to interpret that they have to conform to a set of directives during problem solving. It is possible that participants interpreted that the directive leader was not interested in controlling them because control is not feasible in the presence of anonymity. This may have led participants to focus instead on the informational aspect of the leader's directives, and to interpret them as suggesting that they were capable of providing the input the leader was directing them to provide. Such an interpretation, which is likely to have motivated participants to provide more input, would be consistent with the EMS' spirit of encouraging participation, potentially explaining why the frequency of solution proposals and critical remarks were not lower in the directive leadership condition relative to the participative leadership condition. An exploratory analysis reported below, provides indirect support for this explanation.

Though subjects in the study were more likely to report that they perceived their communication to be more anonymous than nonanonymous,

there was substantial variance in their impressions. A perceived anonymity scale was formed using group level responses to three 5-point, post-test questionnaire items, which assessed how anonymous participants felt relative to other members in their group, the leader, and the experimenter (Cronbach's  $\alpha = .71$ ). A participation scale was also formed by combining standardized values of the number of comment blocks and parsed comments (Cronbach's  $\alpha = .91$ ). A comment block is defined as a block of text (a maximum of five lines) entered by a participant during each occasion of providing input (Valacich, Dennis, & Nunamaker, 1992). A parsed comment is defined as contiguous text pertaining to a single point or thought being expressed by a participant (Connolly et al., 1990).

Correlational analysis of subsamples ( $n = 12$ ), created using perceived anonymity scores to perform a median split, indicated that the partial correlation between perceptions of leader directiveness and participation, after controlling for perceptions of leader participativeness, perceived problem structure, and perceived anonymity, was stronger for higher versus lower levels of perceived anonymity (.31 vs. .05). This finding is consistent with our explanation that anonymity may have led participants to believe that control by the leader was more difficult. This belief may have made the control aspect of leader directiveness less salient to subjects than the informational aspect, perhaps motivating them to participate as much in the directive leadership condition as in the participative condition.

The moderating effects of problem structure on the relationship between leadership style and the number of solutions proposed in the different leadership and problem structure conditions (Table 1) indicates, that while participative leadership was more conducive than directive leadership to solution proposals in the moderately structured problem condition, directive leadership was more conducive than participative leadership in the fairly structured problem condition. In combination with the idea that, in the presence of anonymity, directive leadership may be consistent with the EBS' spirit of promoting participation, this pattern of results may suggest that perhaps (a) consistency between participative leadership and the EBS' spirit is qualitatively different from that between directive leadership and the EBS' spirit and (b) how each of these consistencies influence group process may depend on problem structure.

The relationship between (a) problem structure and supportive remarks, (b) supportive remarks and solution proposals, and (c) critical remarks and solution proposals were in the expected direction, but were not significant in the regression analysis. This lack of significance may have been due to insufficient power in the current study to detect these

effects. It is also possible that the frequencies of supportive and critical remarks were below certain thresholds required to influence solution proposals. In the Connolly et al. (1990) study, on which the relationships between supportive or critical remarks and solution proposals were based, frequencies of supportive or critical remarks were likely above these thresholds because Connolly et al. employed confederates who provided supportive or critical comments throughout the duration of the group meeting.

### *Implications and Conclusions*

EMSs are becoming increasingly available in organizations and personnel practitioners are likely to use them to enhance group processes and outcomes. A personnel manager seeking to use an EMS for generating ideas for problems such as re-engineering of organizational processes, defining selection criteria and creating job descriptions or for collaborative learning among personnel (Alavi, 1994), may confront a choice among alternative leadership styles to display. Our results (see Table 2) suggest the need to match leadership style with problem type and provide insights for choosing between a consultative form of participative and directive leadership styles for fairly structured and moderately structured problems in an electronic brainstorming context.

To increase productivity and satisfaction in an electronic brainstorming context during anonymous generation of ideas for a moderately structured problem, such as developing broad job band classifications, the results suggest a participative leadership style where a manager or a facilitator (a) shares the problem solving with group members by consulting them during problem solving, (b) offers directions for problem solving to participants for their consideration but does not impose the directions, and (c) encourages input for solving the problem.

To increase productivity and satisfaction in an electronic brainstorming context during anonymous generation of ideas for a fairly structured problem, such as identifying specific selection criteria for an administrative staff position, the preferred leadership style should be a directive style where a manager or a facilitator (a) asserts that he/she is in charge during problem solving, and (b) provides directions for problem solving to participants without offering any latitude for further consideration of those directions or deviations from them.

Our recommendations above complement Dickson et al.'s (1993) suggestion that for unstructured problems, EMS facilitation should be flexible if EMS benefits are to be maximized. Yet, they differ from the "universalistic" suggestion that EMS facilitators should create an open

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and participative environment (Clawson et al., 1993), regardless of the type of problem.

In addition to providing the above recommendations, our study also demonstrated the potential for investigating issues relevant to personnel psychologists using PLS analysis. Personnel researchers often have to deal with complex research models that include multiple variables with multiple items. Such models can be readily analyzed using PLS, which makes less restrictive assumptions than traditional regression analysis techniques or LISREL. PLS may highlight modest effects that may be overlooked by other techniques in the early stages of theory building.

Our study's contribution also includes a general framework based on AST to predict the effects of leadership style and problem structure on group process and outcomes. While some of the framework's elements were supported, results also indicated the need to re-examine issues such as whether EMS' features (e.g., anonymity) influence the interpretation of leadership styles or whether attitude toward a leader mediates the leader's influence on a group's process. To extend the results of our study, future research should also examine how contextual factors such as communication modes available (e.g., electronic vs. electronic and verbal), use of different EMS features and tools, time pressure, ad-hoc versus intact nature of groups, dispersion of group members, and rewards structure, influence the effects of participative and directive leadership styles on the group process and outcomes.

A number of limitations characterize this study. First, groups involved in this study did not have any "history" of prior interaction. Thus, the pattern of results observed here may not generalize to "intact" groups. Second, since participants in this study interacted over an EMS for a relatively short period of time, it is unclear whether additional EMS experience would have altered the pattern of results. Third, the present study's participants were relatively young with little or no full-time work experience. Consequently, their reaction to either directive or participative leadership may have been different from that of more experienced workers. Fourth, we employed two different problems to manipulate problem structure. Therefore, aspects of the problems other than their structure (e.g., the topics they pertained to) could have also influenced the pattern of results.

Nonetheless, the current study's conditions could be related to the conditions of work groups in organizations. Like work groups in organizations, student groups interacted on issues that were relevant to them. The groups' tasks could also be related to the tasks of work groups in organizations. The "university prestige" task is a specific case of a more general task of determining ways to improve an organization's image. The "good professor" task is similar to the task of defining performance

criteria for a particular position in an organization. The temporary nature of the groups in this study and the short duration of the group's task correspond to conditions often observed in focus group meetings. In addition, temporary groups that meet for a short duration of time, like those employed here, are becoming a more common fixture as organizations restructure in response to environmental turbulence (Cascio, 1995).

In conclusion, as organizations increasingly employ work groups and computer technology to support them, the need to understand the behavior of work groups in computer-mediated environments becomes more critical. This study examined leadership effects in the context of computer-mediated interaction. Given that work groups typically require some form of leadership, to the extent we understand how leadership affects computer-mediated interaction, the better able we will be to improve the performance of work groups in organizations.

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