

A Script for Group Development: Punctuated Equilibrium and the Stages Model

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Abstract

The punctuated equilibrium model and the stages model of group development present very different explanations for how a group develops. The goal of this paper is to explain how and why some groups follow the punctuated equilibrium model while others follow the stages model. We studied six medical groups that worked on similar projects over a seven week period. Three groups worked “normally,” while three groups used a new technology that disrupted their traditional work processes. The behavior of the three “normal” groups whose members shared common scripts and understandings of the group’s work processes followed the punctuated equilibrium model: they quickly enacted their shared scripts and began working on the task. The behavior of the three “disrupted” groups whose members did not share a common script of how to integrate the new technology into their work processes followed the stages model: they first formed, stormed, and normed, before performing the task. We conclude that the punctuated equilibrium model best fits groups whose members have shared scripts for working together (e.g., established groups, newly formed groups in organizations with well established norms), while the stages model best fits groups whose members lack shared scripts for work processes (e.g., newly formed groups, disrupted groups).

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Group development, the process that groups move through from the inception of a project to its conclusion (Gersick, 1988), has been studied for decades (Arrow, 1997; McGrath, Arrow, and Berdahl, 2000). While many models of group development have been proposed, most models fall into one of two categories (Chang, Bordia, and Duck 2003): stage models, often exemplified by Tuckman, (1965); and the punctuated equilibrium model of Gersick (1988). In other words, groups either progress through somewhat distinct stages such as forming, storming, norming and performing (Tuckman, 1965) or they jump immediately into working on the task at hand, until a midpoint transition, when they re-evaluate their work and often decide to take a new direction (Gersick, 1988). Both the punctuated equilibrium model and the stage models have been empirically validated (Chang, et al., 2003; Fisher, 1970; Romanelli and Tushman, 1994). Chang, et al., (2003) conclude that groups simultaneously follow both models as a result researchers can use either model to explain group behavior depending the unit of analysis and the dimension of observation the researcher employs (e.g., time awareness, task activities, group processes), while other researchers argue that there are fundamental differences between the two models that make them quite distinct (Arrow, 1997; Seers and Woodruff, 1997).

We believe there are fundamental differences between the two models and thus the goal of this paper is to explain how and why some groups follow the punctuated equilibrium model while others follow the stages model. We believe that the key to understanding the different developmental paths taken by groups lies in the procedural scripts for working in groups that individual group members bring with them (Arrow, 1997; Bettenhausen and Murnighan, 1985; Mathieu, Goodwin, Heffner, Salas, and Cannon-Bowers, 2000). Such scripts are behavioral templates that guide a person in thinking about how a group should work together and provide

mental models of how certain types of group interaction should proceed. When individuals first meet as a group, they search for ways to organize and make sense of the current situation, which often entails drawing on past experiences and importing the scripts from past work into the current situation (Weick and Meader, 1993). When group members share common scripts it leads to a common understanding of the situation, and the group can quickly proceed with the project (Bettenhausen and Murnighan, 1985). We argue that this situation leads to the punctuated equilibrium model of group development. In contrast, when group members do not share common scripts, then the group needs to spend time and effort to form a common script that they can use before they can begin to work on the project (Bettenhausen and Murnighan, 1985). We argue that this situation leads to the stages model of group development.

In this paper, we first contrast the two group development models and then hypothesize how and why differences in scripts can affect the nature of group development. We then present the method by which we tested our hypotheses and describe the experiences of the six groups we studied. Finally, we present the results of our analyses and discuss the implications for research and practice.

PREVIOUS RESEARCH

The Stages Model

The stages model of group development was first proposed by Tuckman (1965) as a synthesis of the literature on group formation (see Table 1 for a summary). Tuckman proposed that groups go through four stages: forming, storming, norming and performing (this was updated by Tuckman and Jensen (1977) to include adjourning). In the forming stage of the development cycle, the group is in the process of getting to know one another and familiarizing themselves with the task at hand. Group members explore the goals and the boundaries of the

task. They often look to preexisting standards (though not always shared by the group) to guide their interactions and discuss the work processes to be used in performing the task. This stage is typically characterized by the questioning of authority within the group and the emergence of a group leader.

In the storming stage, the group is sorting out the processes that will be used by the group. This is seen in an increase in the level of interpersonal conflict between the group members, as individuals question the controls that are in place to guide the group. There are often emotional and even hostile reactions to task oriented requests.

After this stage, the group moves into the norming stage, when the group settles into a set of mutually accepted work processes and norms for the project. Conflict typically subsides as the group has come to agreement on the nature of the task and the way members of the group will work together on the task. At this stage of group development, the group typically begins to show a concern for the development of interpersonal relationships and also exhibits behaviors associated with building group cohesiveness.

Finally, in the performing stage, the group sets about performing the task they have been assigned, showing an intense focus on attaining their goals, and the group members tend to be less destructive towards one another. There is increased task activity and the group focuses both on the task and individuals roles within the group.

This model was developed by synthesizing the literature in therapy groups, t-group studies and natural and laboratory groups. Despite the varied backgrounds and settings in these streams of research, Tuckman noted that all of these groups tended to follow similar patterns of development in their formation. It is interesting to note that most of these groups in the research synthesized to produce the model lacked familiarity with the task setting and were newly formed,

rather than existing groups that had previous experience working together. The enduring value of this model can be seen in the extensive research stream that has used and adapted this model (e.g., see Wheelan, 1994; Wheelan, and Tilin, 1999).

The Punctuated Equilibrium Model

Gersick (1988) proposed the second primary model of group development: the punctuated equilibrium model (see Table 1 for a summary). Gersick noted that the groups in her study did not follow the stages model, which led her to search for a new model that would explain her observations. She observed that groups formed rapidly, determining the method by which they would proceed within the first few moments of their meeting. There was rapid agreement on the task goals and on how the group should work together to accomplish them. The task goal and the way in which group members worked remained essentially unchanged until reaching a temporal milestone. However, work was unfocused and unproductive.

At a temporal milestone, most often the project's temporal midpoint, each group underwent a series of radical changes (a "midpoint transition"). Group members became acutely aware that time was passing and this triggered them to rethink the project. They began questioning the project goals and the way in which they worked on the project. This questioning typically led to a shift in goals and/or the way they worked together. This second phase was also characterized by an increased focus on the task and increased task performance. Subsequent research has shown that although group members stop and evaluate their progress and processes, not all groups experience a transition; the midpoint pause presents an *opportunity* for change, but does not *guarantee* that a change will take place (Okhuysen and Eisenhardt, 2002; Okhuysen and Waller, 2002). It is this evaluation, not a transition, that is the marker of the punctuated equilibrium model.

The Relationship Between the Two Models

It is possible that these two models are complementary and co-exist by functioning at two different levels of analysis. Chang et al. (2003) put forth the argument that the punctuated equilibrium model focuses on how a group works on a specific task, whereas the stage models focus on the overall development of the group. Therefore, it is possible to code a group's interaction processes using two separate schemas (one tied to each group development model) and find support for both models¹. Chang et al concluded, based on a 40-minute laboratory experiment with 25 newly formed groups, that these two group formation models focus on different levels of group development and thus they co-exist simultaneously within the same group, but operate on different levels of analysis. Phases 1 and 2 of the stage model can roughly match to pre-mid point transition in the punctuated equilibrium model and phases 3 and 4 of the stage model can map to the post-mid point transition in the punctuated equilibrium model (Chang et al, 2003). It is the temporal granularity of the analysis that plays a major force in which model is observed; the stage model is at the more micro level and the punctuated equilibrium model is at the more macro level. Therefore, researchers should feel free to choose which model to use, based on the level of analyses they conduct. Support for either or both models in the empirical studies can thus be found.

We concur with Chang et al. that there are some similarities between these two conceptions of group development (see Table 1). However, we also believe that there are some striking differences that may only become apparent in well-established groups working on projects of longer duration (Arrow, 1997). Both models argue that groups perform most of the

¹ Chang et al. chose to use the integrative model (Wheelan, 1994) to represent the stage models, while we decided to use the classic stage model by Tuckman (1965).

task-oriented work in the later part of the project but they differ in how group members behave in the first part of the project. With the stages model, the first part of a group's life is devoted to forming, storming and norming over the project's goal and the processes by which the group will work together. With the punctuated equilibrium model, the first part of a group's life is relatively unfocused, a result of the quick adoption of a goal and work processes. We do not believe that the differences in group development can be fully explained by the temporal granularity of analysis nor by the fact that the punctuated equilibrium model is more task oriented than the stages model (Seers and Woodruff, 1997).

What influences the very different behaviors in the early part of a group's life? Why do some groups form, storm, and norm over the task and work processes before beginning work on the task, while others quickly adopt a goal and work processes, only to rethink them at a midpoint transition?

We believe that the answer lies in the procedural scripts for working in groups that individuals bring with them to the group (Bettenhausen and Murnighan, 1985; 1991; Lord and Kernan, 1987; Mathieu, et al., 2000). When individuals first meet as a group, they search for ways to organize and make sense of the task and the other individuals in the group. This sensemaking often entails drawing on past experiences and importing knowledge from past work into the current situation (Bettenhausen and Murnighan, 1985; Gersick, 1988; Weick and Meader, 1993). Scripts are knowledge templates that describe appropriate roles, responsibilities, procedures, and communication patterns for how the group should work together (Bettenhausen and Murnighan, 1985; 1991; Lord and Kernan, 1987; Mathieu, et al., 2000). Group work scripts are used to both understand the behavior of others and to guide one's own behavior (Lord and Kernan, 1987).

When group members share common scripts and these scripts lead to a common understanding of the situation, then the group can quickly proceed with the project (Bettenhausen and Murnighan, 1985). This occurs because individuals can invoke their commonly-held scripts for working groups, they can agree on the goal and work processes, and work can begin immediately (Edmondson, Bohmer, and Pisano, 2001; Fulk, Steinfield, Schmitz, and Power, 1987; Gersick and Hackman 1990; McGrath, 1991). In this situation, the initial behavior should follow the predictions of the punctuated equilibrium model.

In contrast, if group members do not share common scripts that for the task they have been assigned, then the group cannot proceed until a common script is created and agreed to (Bettenhausen and Murnighan, 1985, 1991; Mathieu, et al., 2000). To do this, group members must discuss the project goal and/or the way in which group members will work together before they can begin to perform the task (Hollingshead, McGrath, and O'Connor, 1993). Because group members may disagree over the goal and/or work processes, conflict is probable (Jehn, 1997; O'Connor, Gruenfeld and McGrath, 1993) and problem solving and conflict resolution will likely occur (McGrath, 1991). In this situation, the initial behavior of a group should follow the predictions of the stages model.

Thus, the key factor influencing the nature of the group development process (stages or punctuated equilibrium) is the extent to which group members share a common understanding of how to work on the task at hand and the scripts that guide how the individual group members expect to work together. These are likely to differ depending upon the familiarity that the individual group members have with each other and with the task the group has been asked to perform (McGrath, 1991).

Members of well-established groups working on tasks typical to those they have

performed in the past are most likely to share a common set of scripts for group work processes that have been well honed through prior interactions (Feldman, 1984; Lord and Kernan, 1987; Mathieu, et al., 2000; Okhuysen, 2001). Due to the existence of these well-established scripts little discussion will be needed about how to perform the task and the group will be able to quickly begin work on a task. These groups will not need to form, storm and norm about work process scripts. Instead, the group is likely to quickly adopt work processes and immediately begin work on the project.

If a group is newly formed or is faced with a task different from what they are familiar with its members may not have share a common understanding of the appropriate scripts to be used for group work. However, if the individuals are drawn from the same organization, it is likely that they will share a somewhat similar set of group work scripts – these scripts will be the norms and habitual routines for the setting in which they find themselves (Gersick and Hackman 1990). So if a group is not well established, but it contains individuals who share a common environment (organization), it is possible that a common organizational culture(s) will lead them to develop similar scripts for group work, and thus they will behave in ways similar to that of an established group when it comes to adopting work processes.

It is also possible that members of newly formed groups will be drawn from different cultures that have different understandings about the appropriate scripts to use for group work. In this case, the lack of these shared scripts means that the group cannot immediately enact shared work processes. Group members will then need to engage in the discussion and negotiation of the appropriate scripts to be used – that is, getting to know each other (forming), experiencing conflict over norms and directions (storming), coming to agreements over norms and directions (norming) – before they can perform the task using a common script.

Summary and Hypotheses

We argued above that well-established groups working on familiar tasks (or groups whose members are drawn from similar work cultures) will follow the pattern of behavior explained by the punctuated equilibrium model: a quick adoption of shared scripts followed by a midpoint transition. In absence of any compelling reason to the contrary, group members simply enact and re-enact these shared scripts; the patterns become habitual (Gersick and Hackman, 1990; Orlikowski and Yates, 1994). While there is no direct empirical evidence for our arguments, Okhuysen and Waller (2002) observed that familiarity among group members increased the likelihood of midpoint transitions compared to groups of relative strangers. We hypothesized that:

H1: The punctuated equilibrium model will better explain the behavior of groups whose members share common scripts than will the stages model.

In contrast, groups who are unable to invoke a shared script for work processes will need to discuss and negotiate the scripts to use before they can begin working on the task. They will form, storm, and norm, before performing, as explained by the stage models. A group may not be able to invoke a set of shared scripts when the members are drawn from different organizations (or organizations lacking shared scripts) or when the scripts they do share do not apply to the task the group is faced with. Rather than studying newly formed groups of strangers working on different tasks in different environments whose members likely do not have shared scripts, we choose instead to study a set of six groups whose members had prior experience working together in the same departments of the same organizations. These six groups were assigned a similar task to work on over the same time period. Three groups worked as they normally would on a new project, while the other three groups faced a major change to their

work processes that disrupted the use of their common scripts.

A change in work processes can disrupt group members' abilities to smoothly enact their established scripts (Edmonson, Bohmer, and Pisano, 2001; Okhuysen, 2001). Group members must discuss the change and negotiate how the disruptions it brings affect the scripts they use. We expected that when a group is faced with something that changes the way in which they have worked in the past, the groups will re-evaluate their scripts and create new ones (Okhuysen, 2001). The disruption to their common scripts would require the groups to revert to forming, storming, and norming behavior about how to revise their scripts (O'Connor, Gruenfeld and McGrath, 1993). In other words, a disruption would induce group behavior to follow the pattern explained by the stages model.

There are many types of changes that may introduce disruptions to group work that would provoke group members to rethink the use of their scripts (Bettenhausen and Murnighan, 1991). One common source of disruptions is the introduction of new technologies, because new technologies often inhibit the use of existing scripts and enable the use of new scripts that have the potential to challenge existing scripts (Arrow, 1997; Barley, 1986; Bettenhausen and Murnighan, 1991; Edmondson, et al., 2001; Majchrzak, Rice, Malhotra, and King, 2000; Tyre and Orlikowski, 1994). In this study, three groups used a technology new to them called a Group Support System (GSS) that we theorized would disrupt the use of their habitual scripts. This technology is described in the method section. We hypothesized that:

H2: The stages model will better explain the behavior of groups that experience an intervention into their work processes that disrupts the use of existing scripts than will the stages model.

METHOD

Research Design

We used a multiple case study design to investigate our hypotheses. Our unit of analysis is the group. We followed six groups drawn from the same organization as they worked on similar projects over the same 7-week time period. Three groups used their “normal” work processes (i.e., undisrupted), while three groups (randomly selected via a coin toss) used a GSS technology that was new to them and had the potential to disrupt their habitual scripts.

Participants

The six groups were from the Department of Nursing at American Medical Center (AMC, all names are pseudonyms). The project was undertaken jointly with American Physicians Corporation (APC), its sister organization of physicians working in the hospital. The Department of Nursing was divided into five principal directorates (e.g., Pediatrics) and three supporting directorates (e.g., Research) that reported to the Vice President of Nursing (“the VP”). Six groups were formed from the directors and managers in these directorates, plus their counterparts from APC. The six groups were organized around the five principal directorates with the exception of the Critical Care/Trauma directorate, which, due to its size, was divided into two groups, one for Critical Care, one for Trauma.

Groups ranged from six to eight members (mean 6.7) and were predominantly female, with an average of one male per group. Each group was comprised of one AMC director and members of the next management level below director and their counterparts from APC. All participants knew all the other members of their group and had worked together on other projects with them in the past, although no individual had worked together with the exact set of individuals in his or her group on a prior project. We believed that members of these

organizations drawn from the same departments and specialties with extensive prior history of working together would share common scripts for group work, especially given the strong culture that typically exists in hospitals (Jones, DeBaca, and Yarbrough, 1997; Sweet, and Norman, 1995) and thus would provide an appropriate test of our arguments that the presence or absence of common scripts induce behavior to follow either the stages model or the punctuated equilibrium model.

The Project

The project (and our involvement in it) was proposed by the VP. The groups' objective, as repeatedly defined by the VP, was to write a proposal to improve the satisfaction of four customer groups: patients, families, physicians, and nurses. The project began with a kickoff meeting in which the VP introduced the project and its goals, and explained the role of the researchers and the GSS. To help organize, analyze, and report the project plans, groups were given the 15-page *Baxter Planning Worksheet* used by AMC to develop organizational change proposals. This worksheet covered items such as project overview, project definition, key success factors, required investment, experience with similar projects, project competitors, other alternatives considered, and potential impacts. The groups were asked to draft a project plan using the worksheets and to give a short presentation seven weeks later at the final meeting. The groups were introduced to the concept of a GSS and told whether or not they had been randomly assigned to use the GSS. In the kick-off meeting, the groups were given 45 minutes to organize their plans; no GSS support was provided.

The GSS Technology

With the form of GSS used in this study, group members worked together in a specially designed meeting room that provided each person with a computer and special purpose GSS

software that enabled them to conduct electronic discussions, electronic outlining, group writing, and voting. Group members worked together using both computer-mediated communication as well as traditional verbal communication. For descriptions of GSS and reviews of prior research on it, see Fjermestad and Hiltz (1998, 2000) and Dennis, Wixom, and Vandenberg (2001).

The GSS meeting room was located in a building adjacent to AMC's main building and provided 16 networked microcomputers with a large screen video projection system. The GSS software was GroupSystems (for a description of the software, see Nunamaker, et al., 1991 and Valacich, Dennis, and Nunamaker, 1991). A GSS facilitator often plays an active role in designing meetings and chairing groups' verbal discussions (e.g., Tyran, et al., 1992), but the group leaders in this study immediately rejected this idea and chose to run the meetings themselves (this was true in the non-GSS groups as well – in each case the group leader ran the meetings). The facilitator assisted in the technical operation of the GSS and acted as a scribe when asked, but most of the time, the facilitator sat in a chair observing the group interact.

Data Sources and Analyses

We chose to focus on qualitative, rather than quantitative data, in an effort to gain a richer perspective on what was happening within these groups as they went about their projects in their natural setting. We collected qualitative data from multiple sources (observation, transcripts of electronic discussions, and interviews). Qualitative observational data were collected to build a chain of evidence to describe the groups' work processes (Lee, 1989; Yin, 1994). First, all meetings except one were observed by the first author with about one-third of meetings also being observed by a doctoral student (who observed the one meeting missed by the first author). Based on the agreement of both observers on meetings that were attended by both, we do not expect that this missed meeting had any impact on the data collection. Detailed notes were taken

and case reports completed within 24 hours of each meeting; minor differences in notes were resolved between observers. We would have preferred to audio or video tape meetings, but this was not permitted by the organization. Second, transcripts of all electronic comments during GSS meetings were made. Third, each group leader was interviewed between each meeting.

Our analyses are first within-group over time to determine the extent to which each model fits each group. We then conduct a between-groups analysis to determine if there are patterns in the fit of each model due to disruptions. The qualitative data was analyzed using a coding schema based on the descriptions of the stages in Tuckman (1965) and of the activities within the punctuated equilibrium model (Gersick 1988, 1989). The purpose of the coding scheme was to identify actions that would fall within the various stages in the stages model, or that represented actions that would be expected based on the punctuated equilibrium model. An initial coding scheme for the stages model and an initial coding scheme for the punctuated equilibrium model were developed based on the theoretical constructs defined for each model.

The first and third authors independently examined the case reports and transcripts from one group and coded them using the initial coding scheme. The authors then discussed the codings, and revised the coding scheme by consolidating two categories based on insights from this analysis. Next, the second and third authors used the revised coding scheme to independently code the remaining groups. The authors then met again and discussed the codings. There were few disagreements between the coders. Four categories were merged (“examination of goals” and “defining boundaries of task” were merged into one category; and “questioning of authority” and “emergence of a leader” into another).

The final coding scheme is presented in Table 1. For the stages model, we identified 12 behaviors keyed to the four time-based stages. For example, in the first or second meeting, the

group should examine goals and task boundaries. For the punctuated equilibrium model, we identified 8 behaviors keyed to the two time-based phases. For example, in the first meeting the group should quickly adopt a project goal. Behaviors were coded only if they occurred in the theorized stage or phase period. For example, for hostility to be coded as “storming” under the stages model, it had to occur in the first two meetings; if a group had experienced hostility later in the project when it was not predicted by the stages model, it would not have been coded as “storming.” In some cases, it was not clear if a behavior was observed; there was some evidence that the behavior occurred but the evidence was not beyond a reasonable doubt. In these cases, we coded the behavior as a “maybe” because it we did not believe it was appropriate to definitively code the behavior as occurring or not occurring.

Once we had coded behaviors within each group using the two coding schemes, we produced a summary table of the data showing how many of the coded behaviors were observed in each group and then converted this to a percentage for the relative fit of each model. For example, if we observed 9 of the 12 behaviors coded for the stages model in a particular group, then the fit of the stages model for that group would be recorded as 75%. Likewise, if that same group exhibited 6 of the 8 behaviors coded for the punctuated equilibrium model, the percentage fit would also be 75%. For the percentage calculations, “maybes” were scored as .5, so that a group with 9 out of 12 stages behaviors plus one “maybe” would receive a $9.5 \div 12 = 79\%$.

As we noted above, the later time periods of development are somewhat similar between the two models, so some of the coded behaviors are similar between the two models. For example, the stages model predicts increased task activity in the final “performing” stage, while the punctuated equilibrium model predicts increased task performance after the midpoint transition. Thus if increased task activity were observed in the later time periods, then the

behavior would be coded as matching both models and the resulting percentage fits would show both models fitting the data to some extent.

EXPERIENCES OF THE SIX GROUPS

In this section, we describe the six cases used in this study – the experiences of the groups that used the GSS (groups D1, D2, D3) and the three that did not (groups N1, N2, N3).

Group N1

Kickoff. At the kickoff meeting, the group leader suggested that the group attempt to solve the problems faced by patients' families caused by the lack of a waiting room and a consultation room in which to talk with the doctors. This problem had been previously identified by an AMC strategic task force and ranked eighth in priority. The group quickly accepted this idea and focused on one solution proposed by the AMC task force: the provision of old, unused pagers to families so that they could wait anywhere in the hospital and still be contacted immediately. *Meeting 1.* (Week 2) The notes from the kick-off meeting had been lost, so the group began by recalling the issues, and then walked around the department looking for suitable locations for the consultation room and the pager station. They returned to the Director's office and generated ideas on how to sell their project to the administration; the Director tasked two group members with developing and administering a questionnaire to doctors and families that would be used to support the group's claim that the lack of consultation and waiting rooms was hurting satisfaction. Members were very excited about the project, noting that they were "over-achievers" able to accomplish much with few resources.

Meeting 2. (week 5) The group first discussed the results of the doctor questionnaires, which provided support as expected; the family questionnaires had not yet been done. Most of the meeting was then spent working on the worksheets. The Director read each item to the group,

and wrote down responses. At first, many members talked at once, but gradually the discussion waned and the group appeared bored, with much yawning and comments of "let's finish this."

During this meeting, members were surprised by three significant problems. First, the volunteers managing the pager system would need to provide coverage for 16 hours, although most volunteer services only provided 12 hour coverage. Second, some families did not speak English, and bilingual volunteers were scarce. Third, it was unclear whether the pagers would actually work, or whether they would have to be repaired, increasing project cost. Members were uneasy about these issues, but decided to stick to the original plan.

Meeting 3. (week 7) This meeting lacked the interest of the first meeting. The group quickly reviewed the results of the family questionnaires (which met their expectations) and spent the rest of the meeting reviewing the presentation the Director had developed. A major new concern was raised: getting the 30-40 volunteers needed to manage the pager station would prove difficult, and who would manage them? It became apparent that a full time employee might be needed, so one member phoned the administrative offices to determine the salary required.

Group N2

Kickoff. The discussion quickly focused on the relationship between the doctors and the nurses in the department: how nurses sometimes treated residents poorly, and how private physicians were not always accorded the respect they received at other hospitals. After deciding that their project goal would be to improve physician satisfaction, the group began to brainstorm ways to accomplish it. The group began working through the first items on the worksheet, defining how to improve physician satisfaction.

Meeting 1. (week 2) The Director led the meeting, first reviewing the results of the previous meeting and then moving through the remaining items on the worksheets and jotting

down the group's responses. The Director was clearly in charge, but the discussion was lively and friendly. The Director assigned “homework” tasks for herself and two group members.

Meeting 2. (week 4) The Director reviewed the group's homework assignments and then turned discussion to generating ways of making doctors feel more welcome. Many ideas were discussed, including a physician day, a newsletter, a resident welcoming program, and a physician and resident of the month program.

Meeting 3. (week 6) The Director opened the meeting by stating "I've learned some things that will make our job easier." She had talked with the leader of Group N3, and learned that N3 and the Planning Department were going to do a survey of the doctors. She had agreed to have her group join the effort, beginning with an initial focus group meeting in two weeks time.

The Director then led the group through the completed worksheet recording changes suggested by group members. None of the specific ideas from the second meeting were listed on the worksheet. One member expressed a general concern: "Is this all we said?" The Director pointed to one sentence that said "some physician recognition activities" would be initiated, and showed the new resident welcoming material the Planning Department was preparing and a 4-page list of questions for the Planning Department's focus group session. After reviewing the materials, the member commented to the Director: "I'm glad you're on our committee."

Discussion shifted to the presentation and overheads. One member mentioned an earlier meeting where a group did a skit to illustrate a point. After much joking, the group decided to do a skit as the introduction to the presentation, and spent the rest of the meeting planning it.

Group N3

Kickoff. Several weeks prior to the kickoff meeting, the Director had proposed to AMC administration that she survey physicians to see how her department could be improved but was

told to wait. When she suggested the same idea to the group, no one opposed it. An AMC manager noted: "We didn't have time to think of our own [ideas] and this seemed like a project we could buy into." The Director then led the group through the first items on the worksheet.

Meeting 1. (week 4) The Director was unavailable, so the Director's deputy led the group through what had been done at the previous meeting, and recorded additional points suggested by members. Several challenges to doing the questionnaire were raised by APC managers (e.g., "What does this have to do with me? I'm not ... [AMC]. I might as well go."), but the deputy continued to work through the forms. Few new points were raised. One AMC member attempted to joke, but all she got was yawns, and pointed criticisms of AMC staff from the APC managers.

Meeting 2. (week 5) The Director ran the meeting, and began by quickly reviewing the worksheets and soliciting improvements. A few suggestions were made, but the Director did not record any of them. The Director then had the group generate ideas for questions to be included on the doctor questionnaire. She noted that the group did not have to design the questionnaire, just identify issues to be covered. At the end of the meeting, the APC managers left immediately, while the others lingered to share chocolates brought by the Director.

Group D1

Kickoff. Some members presumed that the Director would be the leader, but she declined; another member was assigned to be "coordinator." There was no quick focus on a project. The group discussed conducting questionnaires of patients and doctors to identify problems. By the end of the meeting, the group had reached consensus that the two major issues that they could attempt to improve were the lack of support for the family and the flow of patients through the ICU, but they had not yet settled on the nature of the project they were going to develop.

Meeting 1. (week 2) After a brief introduction to the GSS, the group used a tool to

brainstorm solutions to the two key problems (family support and patient flow). They then used a different tool to organize their ideas into a set of proposed solutions and discussed them both electronically and verbally to produce a short list of two viable alternatives: a family liaison and a case manager. The group looked to the Director for leadership, but she was reluctant to provide it. At the end of the meeting, the group started proposing criteria to evaluate the alternatives, but the Director said that evaluation was premature; they first needed to understand the alternatives.

Meeting 2. (week 3) The Director did not attend the second meeting, and a different member (not the “coordinator”) began to emerge as the group's leader. The group started by using solely communication-mediated communication via the GSS to describe the two alternatives. One member (call him “John”) voiced opposition to using the GSS rather than talking, but the others convinced him to use it. After 35 minutes of using the GSS, the emergent leader said "We're spinning our wheels" and got the group to verbally discuss what had been entered into the GSS while the facilitator used an editor to take notes for the group. During the verbal discussion, the group referred to specific comments in the GSS. This discussion began with the emergent leader observing that the two alternatives were essentially the same and after some discussion the others agreed. The group then worked on the details of the proposal and agreed that "family liaison" was the better title. One member volunteered to do a literature search to find support.

Meeting 3. (week 4) The group started with communication-mediated communication, and John again suggested that the group talk and only one person record items using the GSS; this time the group agreed. The emergent leader was appointed recorder and typed notes as the group discussed the items verbally. The emergent leader took great care with the wording of each point, and chose not to record all the points the others made. Gradually group members became

frustrated. After awhile, a different group member took over the typing. However, John still felt frustrated and began to type on another part of the worksheet noting that the others "didn't need ... [his] mind." At this point, another group member arrived and began typing on a separate worksheet item from the others. Shortly after this, the room fell silent as everyone began typing by themselves. For the rest of the meeting, there was only occasional verbal conversation to coordinate activities (e.g., "I'll do Case Manager under 'Other Approaches Considered.' You do Clinical Nurse.") or for clarification (e.g., "What does 'patient volume' mean?").

Meeting 4. (week 5) Only two members attended the fourth meeting (the others were on vacation or at a conference). They worked together on one computer (alternating typing responsibilities) to edit, refine and improve the document from the previous meeting.

Meeting 5. (week 6) After reviewing what the two had done previously, group members broke into 2-member sub-groups and further refined the proposal. Once again, verbal communication was used solely for coordination and clarification. By the end of the meeting they felt that they had accomplished a lot. It was agreed that the emergent leader would give a short presentation at the closing meeting that closely followed the group's report.

Group D2

Kickoff. Members of group D2 expressed many different viewpoints expressed at the kickoff meeting. It was not uncommon for two (or even three) members to talk at once, although two APC members made very few comments. Several months prior to the meeting, the Director and her deputy had proposed that AMC establish a nurse-run clinic similar to an x-ray clinic for outpatient procedures (e.g., IVs). The project was turned down. The Director proposed the same idea to the group, and by the end of the meeting, she stated that everyone had agreed to pursue the clinic plan, although this was not clear to the researchers. The Director was openly hostile to

the GSS, claiming that everyone had "the same ideas," that no discussion was needed, and that computers couldn't help them. Nonetheless, she agreed to "try" the GSS for one meeting.

Meeting 1. (week 1) During the initial verbal discussion on what the group was going to do, only the three AMC managers and one APC manager spoke; the other two APC managers were silent. The situation reversed when the group used the GSS. All the APC managers and one of the AMC managers (the deputy) began to actively type ideas and challenge ideas of others. The Director was flippant and tried to distract the group, made sarcastic remarks, complained that the GSS could not automatically link related ideas, and engaged in side conversations with two other members. After 40 minutes the group stopped and reviewed the results; two APC managers led a verbal discussion of the issues, with the facilitator recording key points. By the end of the meeting, all members had accepted the basic premise, an outpatient procedures clinic.

Prior to the next meeting, one researcher met with the Director to determine if the group would use GSS again. The Director started the meeting by saying that the previous meeting "was very successful" agreed to continue in the study.

Meeting 2. (week 4) This meeting was spent refining project details. The group verbally discussed the issues with the facilitator recording points. The group also referred to the notes from the first meeting, both on paper in the GSS. At the end of the meeting, the group felt that it had accomplished a great deal and "deserved lunch out." Each member except the Director was assigned tasks for the next meeting.

Meeting 3. (week 6) After some discussion of how the meeting would be run, the deputy convinced everyone to type their "homework" into the GSS. The Director and one other member appeared frustrated at this, but agreed. After 30 minutes the group began to verbally discuss the issues on the worksheet not yet covered, and the nature of their presentation; the deputy kept

typing. By the end of the meeting, everyone agreed that their project was looking good and that all that remained was to have the report formally typed and the overheads prepared.

Meeting 4. (week 7) The Director described the overheads she was planning to use for the presentation, amidst much good natured joking.

Group D3

Kickoff. The Director of Group D3 was an enthusiastic champion both for the use of GSS and for the development of a plan to improve customer satisfaction. She and two other members of the group excitedly spoke of bringing in outside parties to "brainstorm" and of using their department (perceived as leading edge department within AMC) as a model for new strategies to improve customer satisfaction within AMC as a whole. The project focus was "empowering employees, fostering team building, and promoting self-esteem, thereby improving satisfaction." The next meeting was scheduled two days later because the Director wanted to move quickly.

Meeting 1. (week 1) The Director did not attend the meeting, and the group did not feel that it could proceed without her. The group seemed to be upset and one person expressed her frustration when she wrote "The only reason we were there [at the kickoff meeting]... was to get the message BE NICE TO THE DOCS OR ELSE!!!" [original emphasis]. The issue of empowerment was discussed using a brainstorming tool, but members felt frustrated by the lack of progress. One was vehemently opposed to letting the non-attending members see the output as she felt that the Director would think it was a waste of time. They argued about this as they left.

Over the next six weeks, the research group repeatedly contacted the Director to schedule another meeting; she never responded. We speculate that this radical change from the excitement of the kickoff meeting was due to the Director becoming aware of the VP's unstated agenda of

satisfying the doctors² and choosing not to commit her time and energy to the project.

Meeting 2. (week 7) A rushed meeting was scheduled two days before the closing meeting. Two members showed up on time and began using computer-mediated communication; other members arrived late. The project focus shifted immediately from empowerment to ways of improving communication among staff members. One member suggested installing a computer bulletin board and the group adopted that idea as their plan. The Director arrived 45 minutes late and twenty minutes after she arrived, stated: "I think we are wasting our time." The Director focused a verbal discussion on the presentation. She declined to give the presentation and the group argued over who would give it. Discussion then turned to completing the worksheet with group members verbally discussing the questions while the facilitator typed comments. One member said she thought the project was "stupid" and that it reminded her of "being in graduate school." As the meeting closed, the group took the printouts and a disk and went out to dinner to finalize the remaining issues. The group never did complete the worksheet.

ANALYSIS

Non-Disrupted Groups

The development processes used in the three groups that received no external disruptions are shown in Tables 2a and 2b. Table 2a shows the codings reflecting the punctuated equilibrium model while Table 2b codings reflect the stages model. Cells shaded in gray

² This group leader never did explain her behavior. However, interviews with other group leaders showed that they believed that the VP wanted to improve doctor satisfaction, not the satisfaction of all four stakeholder groups, despite repeated comments by the VP that all four stakeholders were to be the focus of the projects.

indicate those cells for which the codings match the model.

Insert Tables 2a and 2b about here

In Table 2a, we see a fairly consistent pattern across the three groups for the initial meetings up to the midpoint. All three groups quickly enacted previously existing group scripts with no discussion, and the project goal was quickly proposed by the leader and immediately accepted by the group. The groups experienced a long period of stable interaction up to the midpoint meeting. For two groups (N1 and N2), little was accomplished prior to the midpoint, but the leader of the third group (N3) began writing the project report in the very first meeting. In the meeting nearest to the midpoint, members of all three groups questioned the goals of the project and the amount of work accomplished. The leader of one group (N2) completely changed the direction of the group at this meeting, while the leaders of the other two groups overruled their group and refused to change the project direction.

In Table 2b, we again see a fairly consistent pattern across the three groups. There is no evidence that the groups engaged in any initial forming activities in their first meeting. One group (N3) experienced some hostility and emotion which could be categorized as the storming stage, but the other two groups did not. Activities associated with the norming stage for the three groups did not occur after the first two stages, but rather from the very first minute of the first meeting. Activities associated with the performing stage increased after the midpoint groups N1 and N2, but started with the first meeting for group N3.

It is interesting to note that the only group that did not fit the punctuated equilibrium pattern well, N3, was also a group that failed to deliver on its objectives. They never settled into a good pattern of interaction and failed to deliver in the end because of it.

Disrupted Groups

Table 3a shows the codings reflecting the punctuated equilibrium model while Table 3b codings reflect the stages model. Cells shaded in gray indicate those cells for which the codings match the model.

Insert Tables 3a and 3b about here

We see a fairly consistent pattern in Table 3a. In none of these three groups was there a quick adoption of meeting scripts or the project goal, although the leader of one group (D3) was quickly accepted. There was no long period of interaction matching the original pattern, as groups experimented with the GSS. The initial work prior to the midpoint was unfocused for one group (D3) which never did succeed in accomplishing the task; they did not write a project plan as directed by the VP. The initial work in D2 was unfocused until the leadership issues were resolved in meeting 2. None of the three groups experienced a midpoint transition, although task performance increased as the groups worked on the projects.

We also see a fairly consistent pattern in Table 3b. All three disrupted groups performed activities associated with the forming stage in the first meeting or two: examination of goals and task boundaries, questioning of methods, and questioning of leadership. All three also experienced the problems of control, emotions, and hostility associated with the storming stage in the first or second meetings. For group D3, the problems and hostility continued into their third and final meeting, so one might conclude they never made it past the storming stage. In the other two groups, the storming was followed by the development of norms which were used for the remainder of the project and an emphasis on building cohesiveness. The intensity of task focus and performance increased in the later meetings.

Once again, the only group that failed to fit the expected pattern of interaction also failed to create their deliverables. As with N3, this group did not settle into a pattern of interacting and did not produce their deliverables on time. In both cases, the groups that failed to follow the expected patterns were failed groups.

Comparison of Disrupted and Non-Disrupted Groups

A summary of the codings in Tables 2 and 3 are presented in Table 4. This table shows both the raw counts of behaviors fitting each model as well as the percentage fit.

Table 4 shows a clear picture of the differences in behavior between the disrupted and the non-disrupted groups. The punctuated equilibrium model better fit the behavior of groups N1 and N2 (88% to 17%) who were not disrupted. The difference in fit is less for group N3 (56% to 17%), but we believe it is still conclusive. Therefore, based on the pattern of behaviors across these three groups, we conclude that the punctuated equilibrium model was a better fit than the stages model for groups who experienced no disruptions. H1 is supported.

Two groups who used the GSS (D1 and D2), whose patterns of interaction were disrupted, showed strong evidence that the stages model better fit their behavior (92% to 25% and 100% to 19%, respectively). For group D3, the evidence is less clear (67% to 44%). Group D3 spent far less time on the project than did the other groups and never did finish the assigned project, so it is perhaps not surprising that its behavior is hard to classify. Therefore, based on the pattern of behaviors across two groups (D1 and D2) and the more equivocal results from group D3, we conclude that the stages model was a better fit than the punctuated equilibrium model for groups who experienced an initial disruption. H2 is supported.

DISCUSSION

We argued that groups whose members shared common group work scripts would

quickly enact those shared scripts when undertaking a new project, and thus their pattern of group development would be best explained by the punctuated equilibrium model. In contrast, groups whose habitual group work scripts were disrupted would lack such shared scripts and would be unable to quickly enact them; their group development would be best explained by the stages model as they first worked to create and negotiate new shared scripts.

Our data supported these arguments. All three groups without disruptions quickly adopted existing scripts and the project goal proposed by the leader, before running into problems at the project midpoint. One of these groups (N2) experienced a midpoint transition when the leader unilaterally changed the group's direction. In the other two groups, the leader overrode group members' midpoint concerns to prevent a transition. The pattern of behavior in these groups does not perfectly fit the punctuated equilibrium archetype because not all groups experienced a transition at midpoint, but we agree with Okhuysen and Eisenhardt (2002) and Okhuysen and Waller (2002) that it is the conflict and the discussion of a transition at the midpoint, not the actual transition itself, which is a marker of the punctuated equilibrium model.

In contrast, all three groups whose habitual scripts were disrupted began by forming and storming (examining goals and task boundaries, challenging the work methods and leader, and displaying hostility), with two of these groups (D1, D2) moving on to norming and performing in later meetings (establishing norms, building relationships and developing cohesiveness, and then focusing on the task). Group D3 had a perfunctory initial meeting without the leader that did not advance the goals of the project nor enable them to develop shared scripts. The group's second and final meeting two days before the due date started with the leader absent. This group and its leader were not as conscientious about the project as the other groups and their leaders, and, ultimately, they failed to complete the project. Thus it is not surprising that their behavior does

not fit either the stages model or punctuated equilibrium model very well.

We believe that these results support our theoretical explanation as to why some groups follow the stages model of group development and others follow the punctuated equilibrium model. Our disrupted groups lacked commonly shared scripts for working with the new GSS technology and thus the group could not start in an equilibrium state. The processes the group used to create commonly shared scripts – that is, to reach equilibrium – were those of the stages model: forming, storming, and norming. Once the scripts were in place, these groups began performing the task. In contrast, the nondisrupted groups were able to very quickly come to consensus on the scripts to use; despite the fact that the specific set of individuals in each group had never worked together before as an intact group, their past experience with each other from prior projects and the strong culture shared by the two organizations meant that the group work scripts brought by the individual group members were so similar that the groups were able to quickly recognize and enact these commonly shared scripts and immediately begin work on the project. These shared scripts represented an equilibrium state for the group despite the fact that the group as a whole had never before worked together.

In some organizations, group work scripts are widely shared. Such common scripts evolve and differ only slightly from one part of an organization to another (DeSanctis and Poole, 1994; Orlikowski, 1992; 2000), and form a powerful set of “habitual routines” (Gersick and Hackman, 1990) that define how individuals in that organization *expect* to work together in a group, even if they have never been part of the same group (Majchrzak, et al., 2000). Newly formed groups in such organizations should more closely follow the punctuated equilibrium model because even though the group and its members may have never met before, the shared scripts are powerful enough that they pervade these organizations and create an equilibrium

before the group forms.

When the habitual norms are challenged, as for the three groups in our study that received the GSS, the group is knocked out of its equilibrium state. The group must develop new scripts or modify old ones, typically by following the forming, storming and norming processes seen in the stages model. Once new scripts are developed, agreed to, and reinforced, the group again returns to equilibrium and can reach the performing stage.

A potential rival hypothesis for our findings is that the GSS facilitator and/or the GSS itself could have imposed more “rationality” on the groups’ processes causing them to better match the stages model. However, the facilitator played a very small role in the group meetings, as the leaders and group members preferred to make their own decisions about how the meetings should be run. The processes by which the GSS was used were experimental, driven by novel uses of the GSS and unanticipated outcomes. Despite the best intentions of the participants and facilitator, it felt more like “ongoing improvisation enacted by organizational actors trying to make sense of and act coherently in the world” (Orlikowski, 1996, p. 65). The processes evolved like those in other small group settings (e.g., Majchrzak, et al., 2000) rather than the more “rational” highly structured processes seen in larger groups uses of GSS (e.g., Tyran, et al., 1992). Thus we do not see “increased rationality” as a plausible explanation for our results.

We were surprised by the amount of disruption that occurred from the introduction of the GSS in our study. The underlying spirit of many multi-user GSS, including the one used in this study, is to promote a meeting process that encourages more participative decision making (Ackermann and Eden, 1994; DeSanctis, et al., 1993; de Vreede and de Bruijn, 1999), akin to what Habermas terms *ideal speech* (Habermas and Nielsen, 1990). We do not know how strong these groups’ habitual scripts were, but given the general desire for more participative decision

making in the nursing discipline (Moss and Rowles, 1997; Warner, 1998), it may be that the members of these groups saw their chance to use the GSS to challenge the existing leader-centric scripts (i.e., the work processes used by the three non-disrupted groups).

One unanswered question is how the nondisrupted groups were able to not only come to quick consensus on the work processes, but also come to quick consensus on specific the topic or goal for the project. For all groups in our study, the task assigned to the group was known prior to the group's first formal meeting, as is common for many groups in organizations. The group leader and group members arrived at the first official meeting having had the opportunity to give some thought to the project. For the nondisrupted groups in our study, the strongly shared, habitually enacted, group work scripts reinforced the power of the leader so, when the leader proposed a specific goal for the project, it was quickly accepted by the group. Interestingly, the idea proposed by the leaders of two disrupted groups (D2 and D3) was not quickly adopted by the groups. We speculate that the more participative spirit of the GSS spilled over and not only disrupted the commonly used scripts but also acted to undermine the power habitually granted to the leader by those scripts; participants felt empowered not to immediately acquiesce to the leader's proposal but to consider alternatives.

This study suffers from the usual limitations of field research. We studied only a limited number of groups (six, in this case), in only one organization, a hospital, so it is possible that factors idiosyncratic to that organization or to the medical environment as a whole had significant influence on our observations. Another limitation is our use of disruptions. We used a technology specifically designed to introduce new scripts into the group process to disrupt these groups. Other, less intrusive, technologies or other sources of disruptions might have lesser impacts on the use of habitual scripts, and ultimately a lesser effect on the group

development process. We believe that introducing disruptions into the groups whose members are well known to each other (even if all members have not worked together previously in a group) produces conditions similar to those encountered by newly formed groups whose members do not share common scripts, but we could not demonstrate this empirically. This remains a major limitation of this study.

Nonetheless, we believe that these results have several implications for future research. First, to address the limitations, more research is needed over a larger number of groups in a variety of different settings to replicate and extend these results, and to investigate the boundary conditions over their generalizability. Second, we need more research on newly formed groups, especially those in organizations that have and do not have well established and widely shared scripts for group work.

We concluded that the stages model provides a useful model of the processes by which groups create or adapt existing potential group scripts into mutually accepted group interaction patterns. We need more research over a wider set of groups to better understand exactly how groups move through these stages to develop an equilibrium set of commonly shared scripts. It would also be of interest to understand the cyclicity of the group formation phases in understanding how change impacts the formation and re-formation of shared scripts and group norms (cf. Okhuysen and Waller, 2002). Furthermore, future work that utilizes various perspectives of time and the multi-tasking of groups would aid in our understanding of group processes over the duration of more than one project (cf. Marks, Mathieu, and Zaccaro, 2001).

In conclusion, we believe that the punctuated equilibrium model and the stages model of group development are complimentary models that explain behavior under different conditions. Although the two models share some common aspects, we do not believe they operate

simultaneously. The stages model provides an explanation of the ways in which groups behave when they need to create, negotiate, and select the group work scripts that will be used, while the punctuated equilibrium model explains how groups behave when they enact commonly held, shared, group work scripts. Thus the punctuated equilibrium model best applies to established groups or groups in organizations with widely shared scripts for group work. The stages model best applies to newly formed groups whose members that lack such shared scripts, or to groups faced with a disruption that induces them to rethink their habitually used scripts.

Table 1 Characteristics of the Two Models

Characteristics of the Stages Model	
Forming Stage (First meeting)	Examination of goals and task boundaries
	Questioning of work processes
	Questioning of authority; leader emerges
Storming Stage (After Forming)	Problems of control
	Emotional responses
	Hostility
Norming Stage (After Storming)	Establishment of norms
	Emphasis on building relationships
	Development of group cohesiveness
Performing Stage (After Norming)	Increased attention to task
	Increased task activity
	Increased attention to role in group
Characteristics of the Punctuated Equilibrium Model	
First Meeting to Midpoint	Quick formation and use of existing scripts
	Quick adoption of project goal
	Long period of interaction matching original pattern
	Task performance unfocused prior to midpoint
Midpoint Transition to the End of the Project	Focus on time at the midpoint
	Questioning of work processes and/or goals at the midpoint
	Shift in work processes and/or goals at the midpoint
	Increased task performance after the midpoint

Table 2a NonDisrupted Groups: Punctuated Equilibrium Model

Characteristics		Group N1	Group N2	Group N3
First Meeting to Midpoint	Quick formation and use of existing scripts	Yes. Highest ranking person assumed role of group leader. Immediately began directing the meetings.	Yes. Highest ranking person assumed role of group leader. Immediately began directing the meetings.	Yes. Highest ranking person assumed role of group leader. Immediately began directing the meetings. Leader's deputy took over in her absence for one meeting
	Quick adoption of project goal	Yes. Highest ranking person proposed the project idea within 5 minutes of the start of the first meeting which was immediately adopted by the group.	Yes. Highest ranking person proposed the project idea within 5 minutes of the start of the first meeting which was immediately adopted by the group.	Yes. Highest ranking person proposed the project idea within 5 minutes of the start of the first meeting which was immediately adopted by the group.
	Long period of interaction matching original pattern	Yes. The meetings before the midpoint followed the same pattern: the leader directed the discussion and recorded the meeting notes.	Yes. The meetings before the midpoint followed the same pattern: the leader directed the discussion and recorded the meeting notes.	Yes. The meetings before the midpoint followed the same pattern: leader guided discussion by reading each item on the worksheet to the group, and by writing down the responses.
	Task performance unfocused prior to midpoint	Yes. No formal meeting agendas were done. The group discussed ideas in the first meeting, but no actions were taken. The notes from the first meeting were lost. No deliverables were identified. The actions during the meetings prior to the midpoint (locating office space and discussing how to sell the idea to the VP) were quite general.	Yes. No formal meeting agendas were done. The group brainstormed and discussed a wide range of general ideas.	Maybe. No formal meeting agendas were done. The group discussed ideas and the leader began writing the report immediately. All meetings prior to and after the midpoint began with some confusion over what had happened in the previous meeting.
Midpoint Transition to End of Project	Focus on time	Yes. Groups commented on the need to "get it done" and "finish it up."	No. No discussion of time.	No. No discussion of time.
	Questioning of work processes and/or goals	Yes. In the midpoint meeting, group members pointed out problems with the project and questioned the project goals.	Yes. In the midpoint meeting, one group member commented that they had accomplished little. Group leader expressed dissatisfaction with the work to date.	Yes. In the meeting prior to the exact midpoint, two group members challenged the project goals and the meeting was spent rehashing prior discussions.
	Shift in work processes and/or scripts	No. Group leader overrode the concerns of group members to prevent changes to the project. Some members became less involved in the project after this.	Yes. At the start of the midpoint meeting, the leader changed the project to something new. All work prior to midpoint meeting was reduced to one phrase.	No. Group leader overrode the concerns of group members to prevent changes to the project. Some members became less involved in the project.
	Increased task performance	Yes. Project deliverables were created and the report was written.	Yes. Meetings became more action oriented and focused on tasks required to produce the report.	No. The report was close to being finished by the midpoint meeting and the final meetings were spent discussing implementation ideas.

Table 2b NonDisrupted Groups: Stages Model

Characteristics		Group N1	Group N2	Group N3
Forming (first meeting)	Examination of goals and task boundaries	No. Immediate adoption of leader's proposal for project	No. Immediate adoption of leader's proposal for project	No. Immediate adoption of leader's proposal for project
	Questioning of work processes	No. Immediate adoption of prior work scripts with no discussion.	No. Immediate adoption of prior work scripts with no discussion.	No. Immediate adoption of prior work scripts with no discussion.
	Questioning of authority; leader emerges	No. Highest ranking person assumed role of group leader without question.	No. Highest ranking person assumed role of group leader without question.	No. Highest ranking person assumed role of group leader without question.
Storming (first or second meeting)	Problems of control	No. Leader maintained control with no challenges to authority.	No. Leader maintained control with no challenges to authority.	No. Leader maintained control with no challenges to authority.
	Emotional responses	No. No emotional exchanges.	No. No emotional exchanges.	Yes. Some participants did not agree with the project idea.
	Hostility	No. No overt or covert hostility.	No. No overt or covert hostility.	Yes. Some participants disagreed with the project idea and said so.
Norming (second meeting or later)	Establishment of norms	No. Norms established at first meeting not after forming and storming.	No. Norms established at first meeting not after forming and storming.	No. Norms established at first meeting not after forming and storming.
	Emphasis on building relationships	No evidence of attempts to build relationships.	No evidence of attempts to build relationships.	No evidence of attempts to build relationships.
	Development of group cohesiveness	No. Group started as a very cohesive group and cohesiveness did not change.	No. Group started as a very cohesive group and cohesiveness did not change.	No. Group started as a set of two cohesive sub-groups and cohesiveness did not change.
Performing (second meeting or later)	Increased attention to task	Yes. Groups commented on the need to "get it done" and "finish it up."	Yes. Meetings became more action oriented and focused on tasks required to produce the report.	No. The leader began writing the report in the first meeting.
	Increased task activity	Yes. Project deliverables were created and the report was written at later stages in the project.	Yes. More tasks assigned and completed.	No. The report was close to being finished by the midpoint meeting and the final meetings were spent discussing implementation ideas.
	Increased attention to role in group	No. Specific roles develop in first meeting; some participants are introduced to group as designated as experts in specific areas at first meeting.	No. Specific roles develop in first meeting.	No. Specific roles develop in first meeting.

Table 3a. Disrupted Groups: Punctuated Equilibrium Model

Characteristics		Group D1	Group D2	Group D3
First Meeting to Midpoint	Quick formation and use of existing scripts	No. The highest ranking person did not want to be leader so a “coordinator” was appointed instead. During meeting 2, a different member emerged as the leader. Group experiments with GSS.	No. Highest ranking person became the leader after a series of challenges in the first two meetings. Group accepted her as the leader in meeting 2. Group experiments with GSS.	Maybe. Highest ranking person assumed role of group leader. Group experiments with GSS.
	Quick adoption of project goal	No. During the first meeting, the group discussed a wide range of project ideas and narrowed it down to two alternatives. These two alternatives were refined in subsequent meetings, until the groups chose to integrate the two ideas into plan at the end of the midpoint meeting.	No. The leader proposed the idea in the first meeting, but the group did not accept it. Only after group members discussed ideas in meeting 2 did they accept it.	No. The initial ideas for the project came from a verbal discussion (dominated by the leader and two others), but is never adopted by the group. The final idea for the project was proposed by a group member at the final group meeting.
	Long period of interaction matching original pattern	No. The group tried new meeting processes in all meetings before the midpoint as they tried to integrate the GSS scripts into their existing scripts.	No. The group tried new meeting processes in all meetings before the midpoint as they tried to integrate the GSS scripts into their existing scripts.	No. The group leader fails to attend the second meeting and the group flounders. Group challenges unclear goals. New work processes are tried using the GSS.
	Task performance unfocused prior to midpoint	No. Each meeting started with a review of prior work and a discussion of that meeting's objectives. Members volunteered for and completed “homework” assignments to move the project forward.	Maybe. Much discussion of project but little accomplished until group agrees to the ideas suggested by the leader in meeting 2.	Yes. The group leader fails to attend the second meeting and the group flounders. No work is accomplished. No further meetings held until the final week before the project is due
Midpoint Transition to End of Project	Focus on time	Yes. Some discussion of time at midpoint meeting.	No. No discussion of time.	Yes. Last meeting is held in the final week of the project and members are focused on time remaining.
	Questioning of work processes and/or goals	No questioning of goals at midpoint. Questioning of scripts reduced in the midpoint and later meetings.	No. These occurred at the start of the project, not at the midpoint.	No. The group had not selected a project goal or developed work scripts so questioning is not possible.
	Shift in work processes and/or scripts	No. No shift in goals. Changes to the scripts by which the GSS is used reduced by the midpoint and later meetings; a routine develops.	No. No shift in goals. Changes to the scripts by which the GSS is used reduced by the midpoint and later meetings.	No. The group had not selected a project goal or developed work scripts so changes are not possible.
	Increased task performance	Yes. After the decision on the project goal, group members turned to writing the report.	Yes. The report is written after the midpoint, with the last meeting used to review the report.	Yes. The presentation is written the night before it is due. The report is never completed.

Table 3b Disrupted Groups: Stages Model

Characteristics		Group D1	Group D2	Group D3
Forming (first or second meeting)	Examination of goals and task boundaries	Yes. Groups discussed goals, current problems, and task boundaries.	Yes. The leader attempted to constrain the group to her ideas but the group insisted on discussing the ideas and the task boundaries.	Yes. Open discussion of possible ideas and task boundaries.
	Questioning of work processes	Yes. The way in which the GSS was to be used was discussed in the first two meetings with different approaches used at different times	Yes. Open revolt over work methods. Leader refused to use GSS in second meeting, while rest of group used it in spite of her. Group then uses GSS in different ways in subsequent meetings.	Yes. The way in which the GSS was to be used was discussed in the first two meetings with different approaches used at different times
	Questioning of authority; leader emerges	Yes. When the leader declined, a “coordinator” was appointed instead. During meeting 2, a different member emerged as the leader.	Yes. Open revolt over leadership. Leader accepted by group only after her idea is accepted in meeting 2.	No. Highest ranking person assumed role of group leader. Chaos ensued when she missed a meeting.
Storming (first or second meeting)	Problems of control	Yes. The group wanted the highest ranking person to be the leader, but she declined. At one point the group went in a direction the leader did not like, so she redirected the group.	Yes. Group did not accept leader until late in the second meeting so the leader could not control group.	Yes. Leader missed second meeting and group is chaos. No one wanted to assume responsibility.
	Emotional responses	Maybe. There were a few emotional displays around the use of the GSS and disagreements about how it should be used.	Yes. Emotions ran very high around the leader’s lack of control.	Yes. There were strong positive emotions in meeting one and strong negative emotions in meetings 2 and 3.
	Hostility	Maybe. Some disagreements over how to use the GSS but not “hostile”; several members choose not to participate in the verbal discussions but to work as individuals on sections.	Yes. Group members openly revolt against leader. Leader openly hostile to use of GSS and sarcastic to revolting group members.	Yes. Group could not agree on what to do in meeting 2 and left the meeting arguing over whether the meeting notes should be destroyed. In meeting 3, the leader says she will not be the “mommy” and argues with group members over who will give the presentation.
Norming (second)	Establishment of norms	Yes. Norms for use of GSS and roles of group members emerge in meeting 3 and remain constant for rest of project.	Yes. Norms for use of GSS and roles of group members emerge in meeting 3 and remain constant for rest of project.	No evidence that norms developed.
	Emphasis on building relationships	Yes. Group members try to accommodate the requests of group members for changes in the way in which the group worked.	Yes. All group members decided to go to lunch together after meeting 3.	No evidence of attempts to build relationships. Last meeting ended with hostility.

meeting or later)	Development of group cohesiveness	Yes. Group becomes more cohesive. Members miss meetings due to scheduled vacations but comment that they trust others to continue to work on project.	Yes. Group becomes more cohesive in meeting 3 and cohesiveness gradually builds until the end of the project.	No. Group was not cohesive in meetings 2 and 3. Last meeting ended with hostility.
Performing (second meeting or later)	Increased attention to task	Yes. Last two meetings are highly focused on preparing report.	Yes. Last two meetings are highly focused on preparing report.	Yes. Last meeting is held in the final week of the project and members are focused on time remaining.
	Increased task activity	Yes. After the decision on the project goal, group members turned to writing the report.	Yes. The report is written after the midpoint of the project, with the last meeting used to review the report.	Yes. The presentation is written the night before it is due.
	Increased attention to role in group	Yes. Certain group members take responsibility for certain parts of the report.	Yes. Certain group members take responsibility for certain parts of the report.	Yes. The group argues over who will write what sections and give the presentation. The report is never completed.

Group	Number of Group Characteristics Fitting Model						Percentage of Group Characteristics Fitting Model***	
	Stages Model				Punctuated Equilibrium Model		Stages Model	Punctuated Equilibrium Model
	Forming	Storming	Norming	Performing	Pre Midpoint	Post Midpoint		
NonDisrupted Groups								
Group N1	0/3	0/3	0/3	2/3	4/4	3/4	17%	88%
Group N2	0/3	0/3	0/3	2/3	4/4	3/4	17%	88%
Group N3	0/3	2/3	0/3	0/3	3/4**	1/4	17%	56%
Disrupted Groups								
Group D1	3/3	1/3*	3/3	3/3	0/4	2/4	92%	25%
Group D2	3/3	3/3	3/3	3/3	0/4**	1/4	100%	19%
Group D3	2/3	3/3	0/3	3/3	1/4**	2/4	67%	44%

* In this group, two of the behaviors were possibly observed, but were not clear.

** In these groups, one of the behaviors may have been observed, but was not clear.

*** For percentage fit, behaviors that were possibly, but not clearly, observed were counted as ½.

Table 4 Extent to which the Models fit the Groups

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