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The Academy of Management Journal, Vol. 32, No. 2. (Jun., 1989), pp. 274-309.

Stable URL:
http://links.jstor.org/sici?sici=0001-4273%28198906%2932%3A2%3C274%3AMTPTIT%3E2.0.CO%3B2-M

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1989, Vol. 32, No. 2, 274–309.

MARKING TIME: PREDICTABLE TRANSITIONS IN TASK GROUPS

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A new model of group development suggests that groups' attention to time and pacing is an important catalyst of their progress through creative projects. In this laboratory study, groups were videotaped as they produced creative products and then interviewed about replays of selected portions of the tapes. Participants' efforts to pace themselves were explored in depth, with special focus on a key feature of the model, a major transition in groups' approach toward their work at the midpoint of their allotted time. The appropriateness of laboratory simulation for studying midpoint transitions was also assessed. The laboratory results mirrored and extended the field-based model; they showed how groups make deliberate attentional shifts at their temporal midpoints, what differences exist between pacing patterns in the first and second halves of groups' life spans, and what happens when transitions fail. Implications are drawn for theory, practice, and research.

Organizations often rely on small groups when they need an innovation by a deadline. Managers appoint time-limited task forces and committees to deal with novel problems. Businesses designate time-limited project groups to invent new products. Consultants set up time-limited retreats for top-executive teams to design new strategies. How do such groups manage—or fail—to produce unpredictable outcomes within preset schedules? Answering that question requires understanding (1) how groups progress through creative tasks and (2) how groups pace themselves, or fit work into time.

Although there are important literatures bearing on each of those two points separately, almost no research has considered the integrative question of how groups pace themselves through creative work. However, my recent field study of the complete life cycles of special project groups (Gersick, 1988) did explore how teams finished creative products by their deadlines. The study proposed a new model of group development—the path a group takes over its life span toward the accomplishment of its main tasks—that includes the mechanisms and timing of change. It suggested, furthermore, that there are strong, heretofore unrecognized connections between groups'

I am grateful to Kelin Gersick, Richard Hackman, Barbara Lawrence, Daniel Levinson, Leslie Ray, and two anonymous reviewers for their helpful comments on earlier drafts of this paper and to Michael Patton, Leslie Ray, and several M.B.A. student participants for their assistance in carrying out the research. This project was supported by a grant from the Research Committee of the University of California, Los Angeles, Academic Senate.

pacing efforts and their creative work progress: specifically, that the former can catalyze the latter.

This article discusses a study conducted to follow up on my original research by exploring the cognitive and behavioral links between pacing and development. A laboratory simulation was designed to permit both close observation of groups working and close questioning of participants on how they thought about their work. Using this previously untried design with the field-based model dictated a second purpose for the study: to assess the suitability of laboratory simulation as a research tool for the phenomena of interest.

PREVIOUS RESEARCH

For groups with creative assignments and the responsibility to invent their own work processes, pace is a complex manifestation of group members' speed in managing their own interaction and their interaction with outside stakeholders, solving problems, and discovering and developing new ideas. Understanding what such groups do to accomplish those ends by a deadline overlaps importantly with understanding what they do to create a product at all.

One source of information about these issues is the nascent body of empirical research on the effects of time limits on problem-solving groups. Studies have shown that groups adjust both their rate of work (McGrath & Kelly, 1986) and their style of interaction (Frye & Stritch, 1964; Hermann, 1972; Hoffman & O'Day, 1979; Isenberg, 1981; Pruitt & Drews, 1969) in response to time constraints. For example, McGrath and Kelly found that "the shorter the time limit on [an initial] work period, the higher the *rate*" at which groups studied in a laboratory solved anagrams (1986: 98). Groups given more time in their first trials not only worked more slowly but showed more attention to interpersonal matters in their interaction patterns (McGrath, forthcoming). Isenberg (1981) found similarly that groups solving a set of memory-related problems both communicated at a faster rate and used more autocratic decision-making processes under high time pressure than they did when time pressure was low. Those findings were based on laboratory groups with sets of similar problems to do in time periods of 3 to 20 minutes. Do the findings extend to groups working through larger, more complex projects?

The literature on group problem solving, or decision development in small groups, should help answer that question. However, although such research has done much to identify the activities groups use to solve problems, it has not attended to pacing. Based on a paradigm of development as an unvarying sequence of stages or activities (Poole, 1983a),[1] it has tradi-

[1] Poole (1983a,b) showed that groups in fact develop in multiple sequences; however, single-sequence models continue to be presented in management texts as factual representations of group development (e.g., Hellriegel, Slocum, & Woodman, 1986; Szilagy & Wallace, 1987; Tosi, Rizzo, & Carroll, 1986).

tionally concentrated on discovering the content and order of those stages. Bales and Strodtbeck's (1951) model, "orientation, evaluation, control," is both classic and indicative. It is implicit in the sequential paradigm that a group advances to a given stage only, and whenever, it completes the prior stage. Perhaps naturally, then, researchers working in this tradition have not investigated the timing or mechanics of how a group moves from one stage to the next, as several previous authors have noted (Hare, 1976; McGrath, 1986; Poole, 1983b; Tuckman, 1965), or how groups fit stages into time limits.

Background: The Field Study

The point of departure for this research was a field study of how task forces—naturally occurring teams brought together specifically to do special projects in limited time periods—actually got work done. I observed eight groups from six different organizations from the start to the finish of their projects. The organizations included a bank, a hospital, a community fund-raising group, a psychiatric treatment center, and two universities. Complete transcripts of groups' meetings and interviews with the members of four groups were analyzed inductively to derive a model of group development.

The findings (Gersick, 1988) showed that teams did not develop in a universal sequence of activities or stages, as traditional models have predicted. Groups' histories varied considerably. However, even though groups' projects ranged from several days to several months in duration, there were striking similarities in the *times* that groups formed, maintained, and changed their approaches toward their work. Every group exhibited a distinctive approach to its task as soon as it commenced and stayed with that approach through a period of inertia,[2] which I called *phase 1*, that lasted until precisely halfway through the group's allotted duration. Every group then underwent what I called a *transition*. In a concentrated burst of activity, groups dropped old patterns, reengaged with their outside supervisors, adopted new perspectives on their work, and made dramatic progress. The events that occurred during those transitions shaped, for every group, a new approach to its task. Those new approaches carried groups through a second major phase of inertial activity, called *phase 2*, as they executed plans created at their transition. Groups made one last shift in their behavior patterns just before their deadlines, when they launched into a final burst of activity to finish their work. I called this last phase *completion*.

The findings of the field study seemed to call for a different paradigm of development, not simply a different stage model. The difference between the temporally defined phases that emerged and the traditional activity-defined stages is somewhat analogous to the difference between seeing the structure of football as a set of time-based quarters (phases) with wide variation in the

[2] This article uses the dictionary definition of inertia as the tendency of a body to remain in a condition: if standing still, to remain so; if moving, to keep moving on the same course.

sequence of plays across games and seeing it as a sequence of different styles of play (stages) that are the same for every game.

Moreover, the linear, additive, building block model of traditional group-development theory was not a good description of the data. The data from my field study suggested that groups' progress was less a succession of stages than a *punctuated equilibrium* (Eldrege & Gould, 1972), or an alternation of inertial movement and radical change. Groups established perceptual and behavior patterns suddenly and worked within those patterns for relatively long periods. They moved ahead by virtue of concentrated bursts of revolutionary change in those patterns. Groups' histories were so varied that progress could not be interpreted as the accomplishment of enough results in one stage to proceed to the next. Instead, the consistent timing of the transition and members' comments in meetings and interviews suggested that major progress occurred when and because members felt particularly strongly that it was time to move ahead.

The most striking single feature of the proposed model, and possibly the most critical for understanding the developmental dynamics of creative invention in groups, is the midpoint transition. In each group, the transition was the moment when group members made fundamental changes in their conceptualization of their own work. They pulled in new ideas and reframed their accrued experience in ways that enabled them to jump forward. Groups did not make such basic changes in their overall direction either before or after these key moments. To the extent that invention means seeing things in a new way, transitions may be at the heart of the invention process.

The Current Study

The punctuated equilibrium model describes some specific earmarks of the transition from phase 1 to phase 2 and specifically proposes that group members' attention to time is the trigger for that transition. The premise of this study was that if group projects could be effectively simulated in a laboratory setting, those earmark events should be as identifiable as they were in the field. By videotaping meetings and replaying those key events (among others) for the groups, participants could be asked to observe their own specific behaviors and to discuss their own understanding of what those behaviors meant, independent of researcher conjecture. Data from meetings and interviews could then be combined to refine and enrich the model of group development and to explore some questions about it through grounded theory (Glaser & Strauss, 1967).

The laboratory process, in which interviews immediately followed brief, videotaped group meetings, was expected to allow participants to recall substantially more about their perceptions and intentions than they could in the field, where projects lasted much longer and interviews were postponed until after meeting observations were complete, to minimize intrusiveness. However, it was not clear whether patterns observed in naturally occurring teams could also arise under artificial conditions and dras-

tically shorter time limits. As McGrath (1987) pointed out, we currently have no theory of how laboratory time translates to real-world time. An important issue for the study, then, was to see if the field-observed patterns appeared at all or appeared in distorted form.

The current study addressed three research questions. The first was if transitions occurred, and if they did, how they worked. Transcript excerpts of meeting behavior itself, alongside members' interpretations of their own actions, are used both to show the extent to which transitions occurred in these laboratory groups and to illustrate precisely why and how groups made transitional changes.

The second question addressed how groups paced themselves throughout their lifespans and what was special about their temporal midpoints. Given the proposed critical role of time in transitions, it is important to understand the temporal context in which groups place their midpoint. Is the special energy associated with it a localized effect, like a reaction to an alarm clock, that can be evoked any time someone inside or outside a group sets off a similar alarm? Or is a midpoint's effect more context-dependent, part of a larger pattern of groups' feelings about how they will use their entire time span?

The third research question was what happened when the midpoint of a group's allotted time passed without the team's completing a minimally successful transition by closing its phase 1 agenda and agreeing on a new basis for phase 2 work. The proposed model suggests that a transition provides a chance for teams to take fresh approaches to their projects by interrupting the inertial movement of phase 1. However, if a group's reaction to time, not the completion of a certain amount of work, triggers transition, the moment will arrive whether or not members are ready to make good use of it. The transition period is an opportunity for change, not a change in and of itself. A team may experience the transition period without being able to change itself successfully or well.

In the field study, none of the teams altered their fundamental approaches after the midpoint transition, and problems left unresolved (or resolved in a dysfunctional way) at transitions persisted throughout phase 2. The midpoint opportunity appears to be fleeting. It is important to explore what happens in teams that do not progress at their midpoints, since the concept of a temporally determined, time-limited chance for major change is so different from the traditional idea that teams progress gradually as they finish the work of each stage.

METHODS

Data Sources

This study was initiated not simply to see whether certain phenomena occurred but also to investigate why and how they occurred. Thorough, in-depth analysis of a small number of teams was therefore chosen over a

large-sample approach. I studied eight groups of M.B.A. students (six groups of three and two groups of four) between December 1985 and May 1986. Subjects were solicited through classroom visits, where the research was explained as a study of how groups get work done. Session dates were set in advance, and a research assistant composed the groups by telephoning volunteers until he found enough who could come for each session. This process yielded groups of people with varying degrees of acquaintanceship with one another, as might normally occur in a work organization. Volunteers knew they would be paid five dollars per hour for participating.

The Simulation

The laboratory sessions were set in a small conference room, with a clock in the middle of one end wall. The clock was already there, so it was not a conspicuous addition to the room. A video camera was set up against the wall opposite the clock and linked to a remote television monitor in the adjoining room. Subjects were requested to arrive on the hour. Once all had arrived, they were given a set of materials about their task and told they would have 15 or 20 minutes to peruse the materials, after which I would convene them for a one-hour meeting to do the task. They were asked not to converse until their meeting was convened.

The materials the subjects received were designed to simulate a real organizational project group in the following respects: The open-ended, creative task required them to construct a concrete product. The subjects had an external client for their product and some information about the client's preferences. They had internal organizational supervisors with whom they could initiate communication. They had a finite but negotiable pool of resources to use and some requirements to meet.

A written task assignment informed them that they were to assume the role of professional advertising writers at a major urban radio station and that their assignment was to come up with the pilot commercial for a prospective client, a well-known airline company. They would have one hour to meet and create a 60-second commercial; no written product was required, but at the end of the hour, a technician would tape them acting out their ad. They were told that several groups would be doing commercials and that the group whose product was judged to be the best according to the client's criteria would receive a bonus of ten dollars per member. The performance and competition were intended to help motivate the students to finish on time and to attend to the requirements and evaluation criteria, given the artificiality of the situation.

Each team's materials included a folder of information about the client, a description of requirements and resources, a list of the costs of a recording session, a statement about how much the ad could cost, and the client's criteria for evaluating the ad. Each group received an audio tape player, four different music tapes, and two sound effects tapes. The budget allowed a group to use only one of the music tapes. Finally, each group had a telephone

and the numbers of two "vice presidents." They could call one if they wanted to argue for a budget increase; they could call the other for advice about the client's probable response to their ideas. A research assistant played the role of the vice presidents.

After subjects had reviewed the material, I repeated their instructions and gave them a chance to ask questions. They were asked to sit at the end of the table facing the camera; they had to turn if they wanted to see the wall clock. Groups were timed so that meetings could start on a half hour.

Meetings were videotaped while I watched on the remote monitor. As each meeting progressed, I made a handwritten transcript and marked the elapsed time and the videotape counter-number in the margin. As I went along, I starred segments I might want to replay for a group. Segments to be replayed were not chosen mechanically or randomly but were selected for their potential to illuminate times, group members' thought processes, and events of theoretical importance.

The model identifies the very beginning and the midpoint of groups' lives as times when groups respectively form and change basic patterns, so I starred those moments. The model postulates that groups' attention to time catalyzes transitions, so moments when members remarked on the time were starred. Since the model proposes that groups make their most significant progress in a concentrated, midpoint burst, I starred moments when the group members strongly urged each other to get moving or appeared to take an especially significant step forward. Finally, the model suggests that groups are particularly receptive to contact with external supervisors at the midpoint and that such contact importantly influences their transitions. Therefore, I starred moments when teams telephoned, or discussed telephoning, a vice president.

When one hour had elapsed, a research assistant entered the conference room and recorded the group's ad on audio tape. He then rewound the videotape. During that time, I selected the starred portions of the written transcripts that appeared most informative or most relevant to the group's progress in light of my overview of the whole meeting. To avoid attributing unwarranted importance to the midpoint, I always selected segments from within the first and second halves of each group's life span, in addition to segments from the beginning and middle of each hour. The number of segments that could be played for each group varied somewhat because of variation in how much group members had to say.

After selecting segments, I entered the room and explained to group members that I was interested in knowing what they were thinking at different times during their meeting, noting that there were no right or wrong answers. I began by asking them what they were thinking immediately before the meeting started. No videotape was played at that time. Next, I played five or six one-to-two minute segments of videotape and asked open-ended questions after each segment, following Ericsson and Simon's (1984) suggestions for protocol analysis. The first question for every segment was

"What were you thinking then?" The last was "Can you recall anything else from that segment?" Somewhat more specific questions were also asked, to clarify and probe what participants said (e.g., "Why did you say [X]?").

Group members were interviewed together. Doing so undoubtedly prevented some participants from speaking freely about some issues, but it elicited a wider range of comments than individual interviews would have, as people reacted to their teammates' views. It also meant that people did not have to wait to be interviewed, thereby insuring immediacy and providing more time to view and discuss the tape.[3] Interviews were audio taped.

Written transcripts were made of each group's videotape and interview tape. Although I generally did not record nonverbal behavior, transcripts included notations to show when team members looked at the clock and when they took physical actions related to work, such as taking out paper and pen, picking up or using the music tapes and tape player, using the telephone, or taking out their folders of informational materials.

Analysis

Data reduction. As Miles and Huberman (1984: 21) pointed out, the first step in qualitative analysis is reducing the data into a manageable form. Data reduction aimed (1) to produce a literal condensation of each group's meeting both compact and informative enough to work with and (2) to require a very thorough reading of transcripts, so information inconsistent with the original model could not easily be overlooked.

In reducing the data, I did not follow the approach, taken in many quantitative studies, of placing every statement group members made into a category and then deriving frequencies. Instead, my strategy was to construct a concise, qualitative map of each meeting. The map consisted of a detailed synopsis of a group's discussion on the right half of each page, with code letters on the left half of the page denoting every spot in the meeting where certain types of statements occurred. The codes could be used, for example, to locate every comment a team made about time and pacing, and then the synopsis could be used to see exactly what was said, in what context, and how teammates responded.

Condensation of groups' discussions. For every team, two initial meeting maps were created independently, one by me and one by a research assistant. The research assistant knew the general outline and purpose of the study but had not observed any of the group meetings or interviews or read the interview transcripts. Every turn each group member took to speak was numbered, for cross-referencing of maps and transcripts. Members' exchanges were then abstracted, a few statements at a time, into detailed summaries of each topic of the meeting. For example "22–65: Z and T report ideas they had while reading information materials" indicates that in state-

[3] On an initial trial run, both individual and group interviews were conducted; the group interviews were more productive.

ments 22 to 65, members Zoe and Teri[4] sustained a conversation on the topic described before moving to a new topic. Each summary headed a qualitative segment of a meeting map.

A category system was developed to identify several types of statements to select from the transcript and record—either verbatim or condensed—under the summary headings. The code letters placed in the left margin of the map showed the location of each such statement. Categories were not exhaustive or mutually exclusive. People often tried to accomplish several purposes in the same speaking turn, so many statements were multiply coded.

Since groups' deliberate efforts to move ahead correspond imperfectly with the actual creation of their products, I used two broad classes of categories. The first showed actions group members took to manage the work process. *Action statements* indicated members' attempts to shape their group's progress on its work. There were three types of action statements: In process comments, members made suggestions about how their group should proceed with the work. Process comments were coded with a *P*.

In time-pacing comments, members might mention time directly, by noting what time it was, or how much time had elapsed or was left, or members might try to pace their group by saying when something should be done in reference to the group's allotted time (e.g., "toward the end; before too long"), to how long an action would take, or to finishing on time. Such statements contrast to references to when something should be done according to a logical sequence of subtasks. Time-pacing comments were coded *T*.

In resources-requirements comments, group members drew attention to their group's resources, requirements, or criteria for the task or explicitly tried to shape the product in accordance with the group's resources or requirements. Resources-requirements comments were coded *R*.

There were two types of query comments. The first, coded *Q*, represented a participant's telephone call to one of the vice presidents. The second, coded *q*, coded mentions of telephoning with no call made.

The second class of categories traced *contributions to the final product*. Using a transcript of the recording of each commercial as a guide, we coded the first appearance of ideas found in the finished product. We could then tell when groups were producing usable materials, whether or not they knew they were doing so, when groups' efforts were directly fruitful, when groups created basic formats to organize ideas, as opposed to scattered details, and when groups were working on different aspects of their products. Coding for statements that contributed to the final product was as follows.

In content statements, group members mentioned selling points to be pushed in the ad or gave ideas for content themes or story lines, the content of dialogue, or information to be presented. Content statements were coded *#c*. Detail statements, coded *#d*, concerned small modifications or fine

[4] All names that appear in this article are pseudonyms.

points of ad content. Format statements, coded #*f*, expressed ideas for the basic format of the ad, the vehicle through which the information would be conveyed. Procedure statements, coded #*p*, gave ideas about the process of acting out the ad and about who would do what for the recording session.

Table 1 shows examples of the coded statements and excerpts from meeting maps.

After creating the initial maps, the research assistant and I met to compare results. We discussed discrepancies until agreement could be reached, referring to the original videotapes if necessary. Cases of unresolved disagreement were noted. This process produced a final map of each meeting.

As a measure of interrater agreement on the initial, uncorrected meeting maps, reliabilities were calculated for each type of action statement coded. On the basis of Rosenthal's (1987) suggestion for handling dummy variables, phi was calculated for each pair of maps and the results averaged. The mean interrater reliability for time-pacing comments was .85 for the eight groups (range = .70–1.00).[5]

Data display and further analysis. The next steps of qualitative analysis are to select and display parts of the reduced data so research questions can be answered (Miles & Huberman, 1984). Again working independently, the research assistant and I used the corrected meeting maps to assess pacing and transition processes.

To gain an overview of team pacing, the interview transcripts were searched for all members' comments about their awareness of time and pacing. Time comments from the meeting transcripts were isolated and all available interview comments about them were displayed below the meeting excerpts.

The last task of the data analysis was to gauge the extent to which each group experienced a transition and to display any interview comments that illuminated the transition process. The first step in this task was to see if meetings broke into major segments, or periods within which activities were similar.[6] We then determined whether transitions occurred by searching each team's data to see if the following configuration of events, identified as indicating transitions in the field study, occurred within a single ten min-

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[5] Mean interrater reliabilities for other statements coded were .83 for *Q* and *q* comments (.95 if one group with only one *q* comment and zero reliability is excluded); .73 for *P* comments; and .70 for *R* comments.

[6] We used several kinds of data to see if meetings broke into segments. The qualitative summaries of members' exchanges were isolated and scanned to see if a group's miniconversations could be grouped into larger chunks, such as "generating raw materials to present in the ad" or "writing and developing a script." Coded contributions to the final product were similarly isolated and, if possible, grouped; we might note, for instance, that all main elements of ad content (items coded #*c*) were mentioned by X minutes elapsed time, and only minor details and procedures (items coded #*d* and #p) were added after X minutes. Next, the process statements (items coded *P*) were used, along with the meeting segments, to pinpoint any moments when groups made major steps forward in their work, such as consolidating agreement on main selling points or beginning work on the concept for the ad's script.

TABLE 1
Examples of Coded Statements and Meeting Maps[a]

a) Coded Statements

Type of Statement	Letter Code	Type of Comment	Examples
Action statements	*P*	Process	Why don't we just toss out some ideas that we could get into the commercial.
			Well, do you want to play a tape and see what kind of mood we come up with?
	T	Time-pacing	It seems to me that in the limited time we have (looks at clock), what we might want to do is . . .
			We still have 32 minutes.
			I was thinking, kind of shoot for 8:00 and sort of get—get the concept.
	R	Resources-requirements	That's $200 per thing, so we basically have the choice of one.
			Let's take one more look over these three (reads client criteria; all check folders).
Contributions to the final product	#c	Content	A rich movie star get[s] into a car . . . chauffeur says "What terminal, sir?"
			You want to push both [budget and first class].
	#d	Detail	Should the brakes slam or not? . . . They should.
			Say "Including Europe, Hawaii—"
	#f	Format	What if we had a conversation between two people . . . / You can have two different points of view, the budget point of view and the—
	#p	Procedure	I'll do the second person.
			Can anyone do that noise? "eerrrrr?" / You're hired.

b) Excerpts from Two Meeting Maps[b]

61–91: Discussion of using music and sound effects
R 61 D: We have to tailor it toward the L.A. market, so I was thinking it should be
#c Beach Boys type music, as opposed to Mozart.
62–64: C & K agree it shouldn't be Mozart; you use music to make a point.
#c 67 D: It's nice to have classy music to . . . establish an image, but that's not really the point. The point is they're setting up a hub and they want you to fly it.
530–549: Getting ready and assigning tasks for trial run
P 530 M: Why don't you set up the music?
#p 532–548: Who and when to do "swoosh"; J will swoosh and will time it.
R 541 J: It's 50 bucks there (for sound effect).

[a] Slashes divide sequential statements by different team members. Dashes indicate pauses or breaks in speech.

[b] Numbers indicate the sequence of statements.

utes of meeting time: (1) a time-pacing comment, (2) a clear effort to conclude or drop phase 1 activity, and (3) a clear effort to take a major step ahead with the work. We also checked the timing of such configurations of events to see if transitions occurred at the midpoint or at some other time in each meeting. Since contact between teams and external stakeholders, usually supervisors, played important roles in the field teams' transitions, we checked the maps to see if members moved to telephone a vice president or referred to the group's requirements or resources during a transition. Finally, the data were consulted to see whether, in fact, there was a jump ahead in task progress during transitions; however, achieved progress was considered a measure of the success of a transition, not an indicator of whether or not one occurred.

Relevant excerpts from meeting transcripts, interview transcripts, and data displays were used to document the results of every search. After the research assistant and I had analyzed each group independently, we discussed and reconciled discrepancies.

RESULTS

The results of the study will be presented in three parts corresponding to the research questions identified in the introductory section. The entire data set was used for all the research questions; however, in order to report every group's transition with both depth and economy, I have divided the transcript data among the three parts.[7]

The first part of this section examines meeting and interview transcripts from four groups to illustrate the extent to which laboratory transitions can mimic those observed in the field. At the same time, these data are analyzed to suggest how the transitional jump in progress works. The second part examines the overall patterns of time-pacing comments from all eight groups' meetings, to explore how groups pace themselves. It then presents data from a different subset of four groups in which off-schedule attempts to spark transitions occurred, to probe the special role of the temporal midpoint. In the third part, the one group in the study that experienced serious problems with its work is examined for the lessons it offers about what happens when the midpoint passes without a team's completing a successful transition.

Transitions in the Laboratory

Did midpoint transitions occur in this laboratory setting? If they did, how did they work? A key hypothesis generated by the field study was that groups take the major steps in their work suddenly, when and because mem-

[7] The one group that did not finish its task provides unique data about a problematic transition and is therefore presented in the third part of the Results section. Four groups that included members who made off-schedule attempts to precipitate transitions are presented in the second part, since they offer some unique data about the timing of transitions. I chose the three remaining groups, along with one from the second part, to present in the first part.

bers feel it is time to do so, not gradually, as they complete a prerequisite amount of work. All eight groups studied exhibited such time-linked transitions, displaying explicit attention to time, accompanied by efforts to conclude an initial phase of the work and efforts to shift ahead. In six of the groups, transitions occurred at the midpoint of the groups' allotted time. In group 5, where one member's watch was slow and another overestimated the time limit, the transition was slightly late, and in group 8, it was early. Groups' behavior with regard to outside requirements and resources was less similar to the field results than was behavior regarding transitions. The four teams whose meeting and interview transcripts are excerpted in this subsection provide succinct, representative illustrations of the mechanics of midpoint transitions and show some important variation in how the eight lab teams worked.

Attention to time. In all eight groups, members made time-related comments at their midpoints, varying from a brief remark to a careful evaluation of the group's time use (see Table 3). Table 2 shows details of those comments. The video dialogues in this table are from portions of group meetings that were played back for participants. The interview excerpts below them are members' comments on the video segments. In group 3, for example, one member simply noted "we only have a half hour more," whereas group 2's members interrupted their work on the product to assess how they were "doing for time" and to plan how to pace their work over the remaining half hour. In groups 1 and 4, members voiced more overt concerns about finishing on time: "Once it passes the halfway point, that's when the panic sets in" (1v: 322).[8] "You know, if we had three or four hours . . . that's one of the things we've got to think about here" (4v: 255).

This midpoint attention to time is interesting per se, but the important theoretical question is whether or not it affected the development of groups' work. Table 2 documents members' explicit midpoint decisions that they should shift gears because of the time. When asked "[Is there] anything you can remember about that part of the tape?" Pat, in group 1 (1i: 135–139), described thinking that because it was "the halfway point . . . we did . . . have to get down to business now." In group 2, Dan and Nick stated point-blank that "it was time to move on with the task" (2i: 99; 100) and Karl explained how he judged that it was "important to start writing" so the group would have time to make changes later.

Other comments offer similar evidence and suggest further that time overrides considerations about the amount of work that's been done as a stimulus to move ahead. In group 3 (3i: 92), Rob noted that even though, in *task* terms, he felt they didn't "have enough written down" yet to move forward, he still thought "we better get something done on this thing, and go with it." Finally, Ben's statement (4i: 106) in group 4 shows his assessment

[8] In the notation "1v: 322," 1 identifies the group, "v" indicates the quote is from the video transcript, and 322 is the statement's number in the original transcript; in other notations, "i" means a quote is from an interview transcript.

TABLE 2
Time-linked Efforts to Move Ahead at the Midpoint in Four Groups

Group	Description of Excerpt	Statements[a]
1	Meeting videotape, 30 minutes elapsed	316 May: Do we care that they carry Columbian coffee instead of instant? 319 May: Alright, I think we're running out of time. 320 Jon: (looks at clock) We have 28 minutes. 322 Pat: Uh oh. Once it passes the halfway point, that's when the panic sets in. 326 May: OK so we've got this music playing and we're going to open with the business scenario of high pressure, fast pace. 327 May: So what's our opening line? 328 Pat: Something like (suggests line). 333 Jon: I don't know . . . This is supposed to be creative . . . and probably we're not doing it. (Talks at length; outlines whole ad, including format, music, sound effects.)
1	Group interview	135–139 Pat: I remember thinking . . . it was now, indeed, the halfway point. . . . There was no question in my mind that we were going to get it done. But I was recognizing your concern . . . that you were—watching the clock and that . . . we did . . . have to get down to business now. 140 May: When I [mentioned the coffee] I was trying to raise issues so we could say "no, that *isn't* important, let's get on with more important issues"—like trying to stimulate some kind of—coming to a conclusion. . . . 144 May: I was anxious to get something down on paper in the form of a script. And I liked the fact that he had an idea and we were going with it. 147 Pat: Jon was wrapping up and providing a condensed version, basically, of our last 20 minutes and what we wanted to do, *with* some of his own viewpoints and interpretations.
2	Meeting videotape, 30 minutes elapsed	321 Nick: How are we doing for time? (All look at clock; it is exactly half past.) 323 Karl: We're doing OK. We have till what—9:00? 325 Karl: I'm just watching the time, we're doing OK. 326 Nick: I think we should keep a 10-minute margin. But we should be through by [8:50]. There'll be lots of copy and we'll have a— 327 Clark: Practice. Yeah. We've got to hit (summarizes 3 issues to cover).
	31 minutes elapsed	357 Dan: We can start putting this all together. We have (describes how commercial would be).
2	Group interview	97 Clark: I thought we should start writing then. We knew the points we were going to put in, so let's start . . . At that point, it seemed like we had a lot of time— 99 Dan: . . . It was time to move on with the task. . . . And Clark was—sort of summarizing and re-focusing us to continue to move ahead, and no longer formulate ideas, but transform it into the ad. 100 Nick: I thought it was time to get moving and just get it written. Whether we get it right or not, we want to get it written. 102 Karl: I was obviously concerned about the time. . . . I knew

TABLE 2 (continued)

Group	Description of Excerpt	Statements[a]
		we could make a . . . change or leave something and then come back. So it seemed important to start writing. Starting thinking more about a script rather than just ideas. . . .
3	Meeting videotape, 28 minutes elapsed	256 Ann: OK, should we listen to some of this [music] or just—? 257 Rob: (Suggests playing Beethoven tape.) 258 Ann: Well, maybe that would class up the image. I mean we only have a half hour more (R looks at clock) but let's class up the image! 264 Deb: How 'bout this?! As it goes "ba ba ba bum," say "Brussels!"
	30 minutes elapsed	280–292 Ann: (Plays rock tape, ad libs to music, as in final product.) 288 Deb: Oh! That was perfect! Right like you said that!
3	Group interview	78 Ann: We were really disjointed. And that gave us something real concrete . . . if we can't agree on the concepts, can't agree on the text, if we don't have a niche marketplace, let's at least listen to the music. 81 Deb: . . . it was the first time we started to put on thinking caps as about not *what* we wanted to say, but *how* we wanted to say it, and it changed the direction of the conversation. From then on—from that point on, I started to get a clearer and clearer idea what I wanted this commercial to be. 92 Rob: I started having a lot of fun as soon as P started playing the music . . . I also remember thinking . . . it's too soon to do that because we don't have enough written down about what the message would be . . . [but I thought] we better get something done on this thing, and go with it.
4	Meeting videotape, 30 minutes elapsed	206 Ben: We still have 32 minutes. [Want to] play one [tape] and see what kind of mood we come up with? 207 Ian: (Suggests idea using Beethoven tape.) 224 Ian: We're going to have to script this. . . . 225 Ben: . . . alright, let's go. You know, if we had three or four hours, we [could try other things]—that's one of the things we've got to think about here. I *like* the Beethoven idea and being on a time constraint, I feel like, let's go with that idea and build from there.
	31 minutes elapsed	236 Ian: Or you know how we can do it? We can have a dialogue between two people? And have one guy say "Joe, I'd love to fly—" 237 Ben: (joining in) "It's just so expensive." 238 Ian: And he goes "Guess what? Da, da, da, da. *People Express!*" 239 Ben: Oh, that could be great!
4	Group interview	61 Ian: (earlier in interview) I was . . . wondering who was going to come up with the big concept of the commercial. . . . Like my roommate . . . comes up with the big idea and I throw all the jokes inside. . . . And I could feel the shift at one point, where . . . our ideas were a lot more creative, whereas before they were just really analytical. 100 Ben: This was . . . the beginning stage of coming up with the

TABLE 2 (continued)

Group	Description of Excerpt	Statements[a]
		final product more so than the facts. We got the facts . . . and we were in the state now where we were throwing out ideas. . . . It was a real give and take . . . the meat of the creative process.
		105 Fred: Well, I was watching my watch, that's why—
		106 Ben: That's what pulled it together is time. . . . You always could make it a little bit better. . . . But time pulls you in a sense of "well, that's one limitation we can't get around here." And so whatever you got, quit talking about it, just get it on there.

[a] Initial numbers indicate the sequence of statements.

that the group could have continued their current activity indefinitely but that they simply had to move forward, "Time pulls you . . . that's one limitation we can't get around here. And so whatever you got, quit talking about it, just get it on there."

Efforts to conclude an initial phase of the work and shift ahead. The hypothesized model proposes that at the transition, groups are poised for a major turning point in their development. The field study suggested that, at the midpoint, groups stop the activity that has dominated the first half of their time and, if their transitions are successful, quickly move into a new, qualitatively different phase of work activity.

Table 2 documents group members' discussion of their efforts to do that. In groups 1 and 2, members' remarks suggest that they brought an initial phase of activity to an abrupt close by summarizing it and then shifted their attention ahead to the next step in a deliberate fashion. In group 1's meeting, May made two consecutive statements, first summarizing the group's general idea of what the product would be like (1v: 326) and then immediately prodding the group to move on from there: "So what's our opening line?" May's interview mirrors this pattern when she says she was trying to stimulate the group's "coming to a conclusion" (1i: 140), then adds that she was "anxious to get . . . a script." Pat describes Jon's long statement in the meeting as a "wrapping up . . . of our last 20 minutes and what we wanted to do" (1i: 147).

In group 2, Clark summarized the issues the product should cover (2v: 327) and, in the interview, Dan said Clark was "summarizing and refocusing us to continue to move ahead—and no longer formulate ideas, but transform it into the ad." Dan's statement that "we can start putting this all together" (2v: 357) launched group 2 into the work of transforming "ideas into the ad" just 60 seconds after the group's midpoint.

The transcripts for groups 3 and 4 also indicate that group members saw this part of the meeting as a turning point between two major work segments: ". . . it was the first time we started to [think] about not *what* we wanted to say but *how* we wanted to say it, and it changed the direction of the

conversation" (3i: 81). In group 4, Ben described the midpoint as "the beginning stage of coming up with the final product more so than the facts . . . the meat of the creative process" (4i: 100); Ian said he "could feel the shift at one point, where our ideas were a lot more creative, whereas before they were just really analytical" (4i: 61).

Groups 3 and 4 were not as far along in their work as groups 1 and 2 when they reached the midpoint, and the way they accomplished the jump ahead was somewhat different. For groups 1 and 2, the transition was a little like stamping "complete" on one subtask and turning to the in-basket for the next subtask. Groups 3 and 4 made the shift less tidily, but equally deliberately, by reaching out for a new source of inspiration—something to catalyze their progress. In these teams, the catalyst was the music tapes they had been given to work with: ". . . if we can't agree on the concepts, can't agree on the text, if we don't have a niche marketplace, let's at least listen to the music" (3i: 78). "[Do you want to] play one and see what kind of mood we come up with?" (4v: 206). Groups 3 and 4 each came up with "the big concept of the commercial" (4i: 61) within two minutes of their midpoints (see 3v: 280–288 and 4v: 236–239).

Agreement on a basis for the work. In the field study, the transition was a moment when successful groups agreed on some concrete plan or goal that formed the basis for moving forward with their projects. In doing so, they eliminated competing possibilities and gave themselves a platform from which to construct further work. There was evidence that the laboratory groups also did this.

In groups 1 and 2, members' summary statements do more than bring an end to an initial phase of activity: they close off options ("and no longer formulate ideas" [2i: 99]) and provide a point of focus for the next step ("So . . . we're going to open with the business scenario . . ." [1v: 326]). Comments from groups 3 and 4, who did not begin their transitions with summaries of the work they had done, show that they also wanted to zero in on a focused plan. Ann's comment (3i: 78) in group 3 indicated that she pulled out the music tapes specifically because she was looking for something "concrete" on which a "disjointed" group could agree. Group 4 essentially pounced on one idea as soon as members came up with something appealing: "I *like* the Beethoven idea and being on a time constraint, I feel like, let's go with that idea and build from there" (4v: 225).

Attention to outside stakeholders. The field study identified the midpoint as a time when teams were especially influenceable by and interested in contact with outside stakeholders. In some cases, midpoint contact helped teams make choices and move ahead, and often teams' midpoint matching of their product with outside requirements and resources was critical to project success. Four of the eight field teams had special midpoint meetings with outside stakeholders,[9] two initiated by the team, one by the supervisor, and one mutually initiated by the team and outside stakeholders.

[9] One of the field team's meetings with an outside supervisor was announced at the midpoint and carried out just afterward.

In the laboratory study, several teams did check requirements and resources at the time of their transition, but requirements were more likely to enter teams' discussions throughout their first half hours. Of the seven teams whose members raised the idea of calling their vice president, four teams made calls, about the same proportion that initiated direct contact in the field study. No calls were made during transitions, however. Almost all telephone activity occurred during the first 27 minutes of teams' hours, in which seven of the eight calls and 12 of the 14 comments about calling occurred. Half of that activity occurred between 22 and 27 minutes elasped time (5 calls, 4 comments).

The sharp drop in calls after the 27-minute point and the clustering of calls slightly before the midpoint are interesting indexes of differences in teams' activities between phases 1 and 2. The calls made between the 22nd and 27th minutes may reflect teams' running low on patience with phase 1 materials. Furthermore, comments made after 21 minutes had passed dealt mainly with participants' desire for information to help them make choices, whereas earlier phone calls and comments about phone calls more often dealt with the clarification of facts.[10] The laboratory teams were therefore somewhat similar to the field teams that regarded supervisors as potential sources of fresh input to catalyze their decision making. But the lab groups showed virtually no concern about their supervisors' evaluation of them and few expectations that they would get help over the telephone, beyond such simple assistance as a description of the radio audience. In those respects, the lab groups were very different from the field groups.

In summary, the evidence from these experimental groups suggests that it is possible to observe the central features of a transition in a laboratory. Groups did make sudden, time-linked shifts in their work at the midpoint of their lifespans. Members' comments suggest that they chose halfway as a point when they *ought* to move forward with their work, whatever the amount of material they had generated so far or could potentially generate. Members' deliberate shifts in attention appeared to be central to the mechanics of the laboratory transitions. Members either declared their first phase of activity complete and turned to the next phase, or they sought out a fresh source of ideas. In each team, members moved to narrow down their work by trying to select a concrete base on which to construct their product. The one area that did not match the field results was teams' contact with outside supervisors.

Pacing and the Midpoint

How do groups pace themselves through time, and how is the midpoint special? An overview of all the time-pacing comments from all eight groups shows when and how often group members voiced concern with pacing. It shows the special status of the midpoint and suggests there may be differ-

[10] A summary of Q and q comments is available from the author.

ences between pacing activities in the first and second halves of groups' time. Excerpts from groups in which members made "early" attempts to move teammates ahead show how groups responded to off-schedule, non-midpoint pacing efforts.

Overall patterns of attention to time and pacing. Figure 1a shows when every time comment was made, with each group's pacing pattern isolated by row. (Cases in which several statements about time were made in one continuous exchange were counted as one.) Figure 1b is simplified to give a sharper overall picture of when, in the hour, time comments occurred in all eight groups combined. Table 3 shows the abbreviated content of all time comments.

The most significant aspect of the distribution of comments is that there

FIGURE 1A
Patterns of Time Comments in Eight Groups

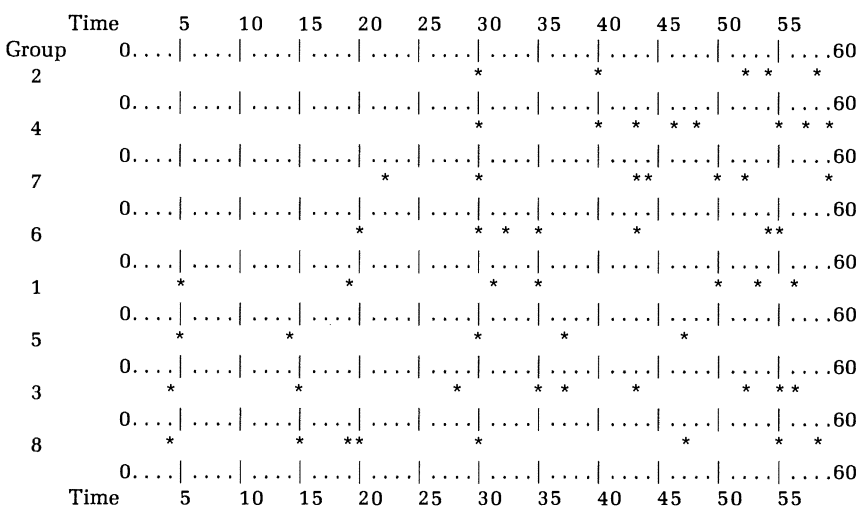
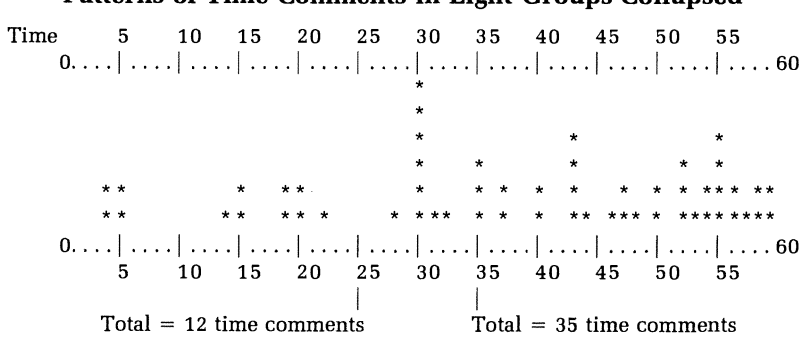


FIGURE 1B
Patterns of Time Comments in Eight Groups Collapsed



was one segment, from 28 to 31 minutes elapsed time, during which a time comment occurred in *every* group. Comments were made at precisely 30 minutes in six groups; in the remaining two groups, one member commented on the "halfway point" at 31 minutes elapsed time, and one remarked that there was "a half hour" left at 28 minutes elapsed time. There was no other 3-minute segment when more than four groups made time comments until the last 8 minutes. There was no other segment when more than five groups made time comments. Halfway emerges as the most likely moment at which at least one group member will call attention to time or pacing.

It is also evident from Figure 1 and Table 3 that members made several comments about time and pacing in every group and that those comments were not evenly distributed across the hour. Clearly, groups do not universally wait for the midpoint to begin pacing themselves; at least in some cases, they start talking about how fast to work from the start. As Table 3 shows, the first four time comments, made at 4 and 5 minutes elapsed time, all call attention to the total time limit, as if to set the group's initial pace at a fast enough rate: "Come on, we only have an hour!" Two of the other pre-midpoint time comments simply check the time, without calling for any action.

A third pattern evident in Figure 1 is the difference in the frequency of comments in the first and last 25 minutes of the groups' meetings. The midpoint appeared to divide groups' hours into two parts during which members turned their attention to time at different rates. Two groups did not mention time at all until the midpoint. Across groups, a total of 12 time comments were made in the first 25 minutes. During the last 25 minutes, 35 comments—almost three times as many—were made. This skewed distribution occurred in six of the groups. Evidently, the less time a group has left, the more frequently pacing activity occurs, with a jump in the rate at the midpoint.

Along with differences in frequency, there is a difference in the placement of comments made during the first and second halves of the meetings. Comments in the first 25 minutes cluster near 5 minutes, 15 minutes, and 20 minutes, whereas comments in the last half occur at less orderly intervals. The neat clusters of time comments suggest the possibility that for the first half of their time, these students were mechanically pacing themselves against temporal milestones that were relatively independent of the amount of work they had done—the midpoint being by far the most important. In this portion of the groups' life spans, time limits were much clearer than the amount of work they had to do, given a novel task and great latitude to vary the ambitiousness of their plans. In contrast, the varied spacing of time comments in the second half of groups' meetings may indicate increased clarity about work plans. Not only were groups hurrying themselves more as the deadline approached, but their struggles to fit work into time may have become more particularistic as they dealt with more concrete demands from the specific plans they had generated.

The importance of the midpoint. All but one group (group 8, whose

TABLE 3
An Overview of Time and Pacing Comments in the Eight Groups

Time Period	Minutes Elapsed	Group	Statements
0–28 minutes[a]	4	3	Maybe we should just start making some basics because actually I have a feeling an hour is going to go really fast.
	4	8	It seems to me that in the limited time we have (looks at clock) what we might want to do is start by thinking what type of ad do we want to do.
	5	5	Maybe what we should do, considering the time constraint, is make a list. . . .
	5	1	(teammates are joking) Come on, we only have one hour!
	14	5	How are we doing on time? OK (looks at watch).
	15	3	We should get a concept down real fast, because we need to—see if it's . . . too boring, whatever.
	15	8	We should really start writing this (looks at clock and watch). We have 45 minutes.
	19	1	How much more time do we have? / Plenty of time. / 40 minutes. We can rattle off 40 commercials. / When did we start? / 9:30 / OK.
	19	8	OK, I think we ought to start writing some dialogue (looks at clock). You know . . . as far as the other end, I'm thinking about the production end of it.
	20	8	I think all we have to do just *right* now (looks at watch) is pick one or the other.
	20	6	(looks at clock) You know, I think we should stop at—like—I don't wanna say stop, but we should get our ideas down. It's gonna take a while to write it out. That scares me, 'cause that *takes* a long time. / Yeah—I was thinking, kind of shoot for 8:00 and sort of—Get the concept [first].
	22	7	(one, then all look at clock) We have 20 minutes gone. / Should we brainstorm, just ideas for the ad—?
28–32 minutes—the midpoint	28	3	We only have a half hour more—but let's class up the image!
	30	2	How are we doing for time? / (all look at clock) / We're doing OK. / I think we should keep a ten minute margin. But we should be through by [8:50]. There'll be lots of copy and we'll have a— / Practice.
	30	4	Do you want to play one again? (looks at clock) We still have 32 minutes. Play one and see what kind of mood we come up with?
	30	5	Maybe we should start on the script pretty soon.
	30	6	The real time is going to be spent writing up (looks at clock) and maybe we should do this separately.
	32	6	[Would anyone] feel good about writing the other section or should we all work on it together? I'm just thinking about time (looks at clock).
	30	7	Alright. (looks at clock) It's 8:00. We've got half an hour to put this together. . . . Are we ready to move on to concepts for the one-minute spot?

TABLE 3 (continued)

Time Period	Minutes Elapsed	Group	Statements
	30	8	We have to decide right now . . . either do something . . . realistic or make it funny . . . and we don't have an hour to make up a whole jingle.
	31	1	Alright, we're running out of time. / We have 28 minutes. / Uh oh. Once it passes the halfway point, that's when the panic sets in.
35–48 minutes	35	1	Let's run through the whole idea . . . and if we don't like it, we [could] can it and we still have 20 minutes to—
	35	3	We have 25 minutes! / OK let's start writing some script. Let's *try* this music. If it doesn't work, we only have 25 more minutes.
	35	6	I guess that [point's] nothing we should worry about too long. We don't have the time.
	37	5	We better start writing the script, since we only have 20 minutes left. / We've got a half hour! / Really? (looks at watch) I have 20 minutes . . . less than 20 minutes (looks at clock). / Really? When did we start? / 25 after.
	37	3	Ready for some script? We have to time it. We have . . . 20 minutes to write a whole script!
	40	2	We better get some words down. We've got—ten minutes to get some words!
	40	4	OK, we've got to nail it down (looks at watch) or we're not going to be ready. / (looks at watch) We've got 20 minutes. / We've got to get a script. OK, what do we have the first guy say?
	43	3	We have about 10 minutes to finish this.
	43	4	We're down to 15 minutes! . . . but we don't have all week to do this. We just need to get something down now.
	43	6	We need to write this down—fast, too (looks at clock).
	43	7	I think we need to (looks at clock) get down and write something.
	44	7	What would be the jingle? We really have to decide on things now, otherwise—
	46	4	We've got 15 minutes here. We'll just go with it. It's not to perfection.
	47	5	I think we have to can quality control because we've only got 10 minutes left and we've only got about 3 lines written (suggests they divide the labor).
	47	8	(looks at clock) I think we're in good shape.
	48	4	Eleven minutes. Maybe we ought to go back to the thing on vacation. / Start working on it because we're running out of time. Just have a 15-second dialogue that gets the facts out, OK?
50–60 minutes	50	1	We like anything at *this* point in time.
	50	7	(responding to suggestion) Well we don't have time (looks at clock) I think we really have got to get it together.

TABLE 3 (continued)

Time Period	Minutes Elapsed	Group	Statements
50–60 minutes (continued)	52	7	We've got to get it done in 5 minutes. And we've got to have time to practice once, at least.
	52	3	I'm at the point I don't care what we do. We only have like 3 minutes to finish this and practice once. / We have 7 minutes. / But it'll take 5 to [practice & revise]. / Well, we better do something.
	52	2	We're closing in on the last 10 minutes. / I know, we've got to get going here.
	53	1	I think we should try a dry run in about 2 minutes.
	54	2	It doesn't matter. Not right now (re refining product).
	54	6	We need to run through this . . . the time is really a problem.
	55	6	Is that enough help? / Gotta be, cause . . . we have about three minutes.
	55	4	We've only got a minute here . . . OK we've got three . . . four minutes here (looks at clock). OK we've got (summarizes script). Now we've got to . . . / Alright, we have to think about (X). We're looking at 2½ minutes!
	55	8	OK, now run through it one more time, and then pick out the music, because we've got 3 minutes!
	55	3	How are we doing on time? / We have 4 minutes left.
	56	3	We . . . have time to go through it one time. Let's go through it once. Who wants to do what?
	56	1	Why don't we play through it once. / It's not long enough yet. / Well, put it this way. We have 3½ minutes to go.
	57	4	Let's give it one try. We've got a minute and a half.
	58	8	Final rehearsal! We have—2 minutes left! (looks at clock)
	58	2	There's no time to talk about price! (as topic in ad)
	59	4	It's great! We still have not quite figured out the music here. We've got 30 more seconds! (laughs)
	59	7	Call . . . the marketing manager. . . . Tell him we need a 15-minute extension.

[a] There were no time comments during the following: 6–13 minutes, 16–18 minutes, and 23–27 minutes.

transition is explained below) waited until the midpoint to make a major transition in their work, even though members of six groups began commenting about time before then. It appears that early efforts to pace a group don't usually push it into a transition. For the most part, teammates appeared to regard pre-midpoint times as early, and post-midpoint times as late, for making the transitional shifts into a qualitatively different type of work activity.

Table 4 provides evidence of this awareness with excerpts from three teams who talked about pre-midpoint pacing in their interviews. The first

TABLE 4
"Off-Schedule" Pacing Comments in Three Groups

Group	Description of Excerpt	Statements
1	Meeting videotape, 19 minutes elapsed	185 May: How much time do we have? 186 Pat: (not looking up) Plenty of time. 187 Jon: (looks at clock) 40 minutes. We can rattle off 40 commercials. 188 May: When did we start? (looks at clock)
1	Group interview	86 May: I got a little bit impatient. . . . And I really needed to be more aware of time. . . . That's when Pat said "Oh, we have forty more minutes! Plenty of time!" And I think later on, we referred to time . . . she's like "OK, now we've reached the halfway point. Now we're *really* in trouble!"
5	Meeting videotape, 30 minutes elapsed	251 Meg: (interrupts talk about number of flight departures) Well, you'd have to add them up. Maybe we should start on the script pretty soon.
5	Group interview	112 Meg: Feeling time pressure . . . I could envision how much work we had left to do. And even though we had about 25 minutes left, I really felt we had to start then. 113 Cora: I felt . . . it would be a pretty good idea to start. We could also wait for a little. I wasn't feeling it was mandatory to start right then. 114 Sam: It turns out I had thought we actually had a few more minutes than we did at that point. So I could see the value of starting early but I didn't probably feel as pressured as Meg did, mistakenly so. It turns out, when I finally got on the right time schedule, I started to get a little desperate.
6	Meeting video, 20 minutes elapsed	200 Teri: (looks at clock) You know, I think we should stop at like—I don't wanna say stop, but we should get our ideas down. It's gonna take a while to write it out. That scares me, cause that *takes* a long time. 201 Sid: Yeah—I was thinking, kind of shoot for 8:00 and sort of—get the concept [first].
6	Group interview	80 Zoe: I had been thinking that we should set up a time table. And then Teri said it. And then—I was also thinking—if I had to write the ad by myself, I could probably do it but I wasn't sure we could get it all together by the time limit. 82 Sid: I had an image that we would *form* the idea completely and then—execute. . . . At that point, I was hoping to stall a move to start working on it too soon and thereby sort of freeze where we were because I felt we were really just . . . spinning off a lot of ideas . . . I felt as we got a really good idea [we] could have time to work on it. We would be able to do it really fast. Q: You mentioned 8:00. How did that figure in? 88 Sid: That was halfway between 7:30 and 8:30. (They laugh) No, and I thought if we waited until 8:00, that would still give us half an hour, which ought to be enough to execute it. And that way, we sort of set a number . . . we could work toward it and then at that moment, we would shift gears and go into the execution.

excerpt shows one participant's observation that one of her teammates went from an assessment that the group had "plenty of time" to the statement "OK, now we've reached the halfway point. Now we're *really* in trouble!" in just 10 minutes.

Group 5 illustrates the importance as a catalyst of group members' perception that they are at the midpoint of their time—as opposed to the absolute number of minutes they've spent—and it indicates the need for team agreement that it is time to move. In group 5, Meg was clearly "feeling time pressure" at the midpoint, but Sam, whose watch was wrong, thought it was "[too] early . . . mistakenly so." Cora, who said in the interview she had thought they had an hour and a half to work, was also feeling no need "to start right then." Seven minutes later, Meg mentioned the time explicitly, and the group clarified its schedule. The following is an excerpt from group 5's video transcript, at 37 minutes elapsed time.

> 302 Meg: Well, we better start writing the script, since we only have 20 minutes left.
> 303 Sam: (jerks up head, picks up watch from table) We've got a half hour.
> 304 Meg: Really? (leans forward, looks at watch on table) I have 20 minutes . . . (looks at wall clock).

At this point, Sam apparently thought it was "late" to be moving into script writing, judging from his comment that "When I finally got on the right time schedule, I started to get a little desperate."

Group 6 provides a final illustration of a team's reluctance to make a transition before its midpoint. The following interview excerpts show the reaction of members of group 6 to a video segment from 15 minutes into the meeting, when the group was discussing story ideas.

> 56 Teri: . . . we came back and forth to that same concept a couple of times. . . . there was a long period when my thoughts were pretty much the same. It fit in there.
> 66 Sid: I actually remember at that point . . . I wondered whether I was sort of stirring the pot about the idea in order not to have to cope with—
> 67 Teri: The work of it.
> 68 Sid: (agreeing)—who had to do it, because I was really fearful of that—having to actually execute this. So I . . . may have been hoping that we can . . . *extend* the concept of talking about the idea so as to not have to do it.

At the 15-minute mark, group 6 was circling around the same ideas without doing much to move on. Progress was not simply a matter of striding ahead as soon as a group had enough raw material.

Table 4 shows the group 5 minutes later, more restless about time—and it shows Sid's conscious plan to "shoot for" a transition at the midpoint. When Teri asked the group to plan its time use, Sid "stall[ed] a move to start working on it *too soon*" (my emphasis), this time because he felt the group

was working well and he didn't want to forgo the possibility of coming up with "a really good idea" (6i: 82). He planned waiting until 8:00, because that "was halfway between 7:30 and 8:30." He explained his plan as setting a number to work toward, "and then at that moment, we would shift gears and go into the execution."

Group 8 was the only one that made a major shift before the midpoint. One of the group's members started the meeting with a clear structure for pacing the group's work. He said at the very beginning of the interview that he "wanted to start right into it" and that he was "trying . . . to formulate things in a time structure." He added, "You know, for the hour, I was thinking, OK, we can spend *the first half hour* deciding what we want, the next 15 minutes writing, the next 15 minutes refining it" (my emphasis).

His teammates did use this three-part structure, except they started into their second segment 7 minutes early. They took only 23 minutes to outline all the elements for their ad, then created a complete first-draft script between 23 and 42 minutes elapsed time. They spent the last third of their time rehearsing and revising the ad. The video transcripts clearly indicate that group 8's move ahead was time-linked, like the other groups' transitions. The following statements are from 15 and 20 minutes elapsed time, respectively.

> 216 Ned: So, we should really start writing this. We have 45 minutes. (Group does not write, but develops two alternative story lines.)
> 266 Ned: I think all we have to do just *right* now (looks at watch) is pick one [story line] or the other. (3 minutes later, the group settles on one choice and starts writing.)

The major difference between this team and the others was that one member prodded the group to start ahead of schedule, and his teammates went along.

There seem to have been several contributors to group 8's early progress: expertise, agreement, and a clear work schedule. One group member with entertainment experience was ready immediately with script scenarios. Members agreed quickly on content for the ad. Perhaps most important, Ned's teammates agreed to let him pace their work. In their interview, Joan said: "[Kathy] and I pretty much acquiesced to all of—everything [Ned] said about budget and time." Since Ned had explicitly structured both the time and the work into segments as the meeting began, and Joan had had experience with the task, they may have been more likely than other teams to declare or recognize a part of the work as done and move to the next step.

In summary, the overall distribution of time comments and transcript evidence about off-schedule pacing attempts suggest the following: (1) Pacing occurs in every team, but individuals vary in their patterns of attention to time. At least some team members begin consciously pacing themselves from the start of work. (2) Some teammate convergence, or agreement that

"the time is right," is necessary to precipitate a transition. (3) Under some circumstances, team members may agree that it is time for a transition before they are halfway through, but in most cases, (4) the midpoint is the most likely time at which team members will feel both ready and willing to declare that it is time to move ahead with the work.

Unsuccessful Transitions

What happens when a midpoint passes without a successful transition? The serendipitous difficulties of one of the laboratory teams, group 7, allow the exploration of this question. Table 5 begins with excerpts from both the midpoint and later in group 7's meeting.

Table 5 (7v: 268 and 272) shows that this group started its transition the same way as the other groups in the study. Pete noted the time, stressing that there was half an hour left. He asked the group to turn to its next subtask: "Are we ready to move on to concepts for the spot?" Getting no strong response, he backtracked and summarized what he thought the group had agreed on so far (7v: 274).

The interview indicates that his teammates felt the same time pressure and also felt that it was time to move on. However, members said they did not advance to the next step because they were unable to stop "discussion mode" (7i: 157–175 and 191). The team could not close debate and agree on a basis for phase 2 work, as statements 303 and 375 in the video transcript indicate. One member expressly described the group's trouble as a faulty transition: "Our problem was going from an idea phase to a paper phase . . . that transition was really bad. We should have said 'OK, [this is it]' . . . We had no framework to fit the ideas into."

Video transcript lines 374–376 show how group 7 finally did start on a script. With only 10 minutes left, Pete simply stopped further discussion and started dictating. Until then, the team still had not agreed on a common basis for production. Andy, commenting in his interview on video excerpt 374, said, "Just before this, basically we had nothing. We each had ideas, but . . . our ideas were different." At that point, however, the team acquiesced: "As soon as [Pete] got that paper out there, I knew that was going to be it, because those guys wanted something so badly" (Josh's interview comment on video segments 372–374).

Although there were certainly multiple reasons for group 7's problems, the transcripts suggest that resistance to Pete's leadership was one contributor. However, it seems doubtful that it was working through that problem that finally got the team moving: Pete ultimately dictated the product to the group. Instead, it seems it was the additional temporal jolt of being 10 minutes from the deadline that made the difference, as video segments 372–374 suggest. But if teams feel they must progress at halftime or be unable to finish, why would a team try again at the last minute? Group 7 seemed to reduce the impossibility by collapsing its standards. As Pete said, "We've got to start generating garbage."

TABLE 5
Group 7: An Unsuccessful Transition

Description of Excerpt	Statements
Meeting videotape, 30 minutes elapsed	268 Pete: Alright. (looks at clock) It's 8:00. We've got half an hour to put this thing together. Are we ready to move on to concepts for the spot?
	272 Pete: Do we have any disagreement on what we're going to sell?
	273 (all): No.
	274 Pete: We're selling the convenience and the public splash.
37 minutes elapsed	303 Fred: . . . but we really have to decide . . . what thing are you going to sell?
50 minutes elapsed	372 Fred: We don't have time—I think we really got to get it together.
	374 Pete: We've got to get it done in 5 minutes . . . What kind of music fits?
	375 Fred: Before we pick the music—what kind of thing are we going to write?
	376 Pete: OK, let me give you—what I envisioned . . . (starts "talking" the script, and writes as he talks)
Group interview on midpoint segment	156 Pete: I thought . . . we took *ten* minutes to *decide* that but nobody really *knew* we had decided it so—make a point of saying "thirty minutes. Halfway through. We *decided* on what we wanted to try and do. Let's work for a concept. . . ." And I felt we were pretty much on schedule. Something was going to come out of it.
	157 Andy: That's where I felt . . . it's at that point that you *write* something. And I couldn't figure out how. . . . It's such a different kind of process. But we were still in the discussion mode instead of whatever mode you get into—
	173 Fred: I felt we were wandering . . . I just wanted to make that thing *stop* so we could then define exactly what we were going to be doing.
	174 Pete: It was really important to you to get something down on paper?
	175 Fred: No. To *stop* something. We were discussing things we already talked about.
Later in the interview	191 Josh: There was a point . . . it was kind of fleeting . . . where I really felt I needed a break . . . but I wasn't able to bring it up because I continued to participate in the discussion. Where I almost wanted to say "OK everybody stop, sit down and *write* your one minute commercial. . . ." (Andy agrees) Right at that same point, we had about half an hour left and I *wanted* that time to think, and form an idea. And we didn't get it again.
	235 Andy: Our problem was going from an idea phase to a paper phase. . . . That transition was really bad. . . . We should have said OK [this is it]. Then we could have—it's in production that the idea's going to fit in. But we had no framework to fit the ideas into.
	236 Pete: I didn't feel it was acceptable at [that] time, to bring out paper.
	237 Fred: Yeah, we had been trying to *extend* the time.
	264 Pete: I didn't feel like I was leading it . . . I never got the feeling that I could structure their time.
	265 Andy: Right. We never gave you that.

Group 7 was the only team that did not complete a script. After 59 minutes, members tried unsuccessfully to telephone their vice president to ask for a 15-minute extension. In the end, they had to ad-lib half of their commercial.

The evidence suggests it was not the case that group 7 simply had no transition. Team members felt it was time for a major shift and exhibited much of the same transitional behavior as other teams. However, they did not manage the opportunity successfully enough to launch a productive second half of the group's life span. Josh's interview comments directly support the hypothesis of the midpoint as a temporary (and in this case, missed) opportunity: "There was a point . . . it was kind of fleeting . . . where I really felt I needed a break . . . we had about half an hour left and I *wanted* that time to . . . form an idea. And we didn't *get* it again" (i: 191).

DISCUSSION

The results of this study suggest there is much to learn about group pacing and transitions from laboratory study. Not only did these laboratory group meetings follow patterns originally seen in naturally occurring teams of much longer duration; in their interviews, laboratory participants described their own development specifically in terms of time-based transitions and halfway-through shifts in work activities. There are several facets of the results to discuss: the substantive findings about transition and pacing processes gained from the transcript analyses, the degree to which the laboratory groups mirrored the findings from the field study, and implications for research and practice.

Transition Processes

The starting point for this study was a punctuated equilibrium model of development, according to which groups persevere with the same cognitive approaches to their projects until their midpoint, when they reinitiate a search for ideas and adopt new perspectives on their work (Gersick, 1988). The results of the current study support and extend the field-generated comparison between midpoint pacing efforts and problemistic search, March and Simon's (1958) concept that boundedly rational humans seldom change their basic strategies unless interrupted by a problem. In this case, the problem is the midpoint reminder of the deadline. The findings show a deliberate, abrupt attentional shift at the heart of groups' midpoint efforts to progress. This shift occurs in two related but separate parts: the closing of a group's initial phase of work and the pursuit of a next step that is specific to the group.

These results also seem related to findings from individual problem-solving research on the Einstellung effect, the tendency of subjects to persist with the same approach to a problem or series of problems whether or not that approach is productive (Luchins, 1940). Commenting on Jensen's (1960) findings, Ericsson and Simon reported that "the effect is not the result of inadvertent mechanization, but results from subjects' deliberate choices of strategy. A number of experiments have reduced the Einstellung effect by marking the test problems as separate problems rather than a continuation of the sequence of problems presented before" (1984: 129). Possibly, then,

groups' deliberate decisions to close one phase and open a new phase of their work involve a redefinition of their situation or of the task at hand. Such redefinition would be similar to "marking test problems" as starting a separate sequence and therefore calling for a new choice of strategy. Such redefinition may be critical to a team's ability to take new approaches.

Two ways of making this shift were observed. One way consisted of summarizing previous work, declaring it complete, and picking up a next subtask. A second way was observed in groups whose phase 1 agendas appeared to be floundering. These groups just dropped stalled phase 1 approaches and reached out for a fresh source of inspiration, something around which to crystallize further efforts. The special significance of the second way is that it confers special influence on whatever inspiration source the group happens to choose.

In the field study, several groups looked outward—most importantly, to outside stakeholders or requirements—to provide some of this inspiration. The laboratory groups used simpler resources: their music tapes. It is premature to interpret the laboratory findings as a negation of the field results. The lab teams' connections to their vice presidents did not compare to the powerful team-context relationships operating in real life, and team-supervisor communication was not two-way, as in the field. However, this study does suggest that teams searching for ideas at transition will turn to sources from which they expect some relevant help, not necessarily to external supervisors or contexts.

Pacing Processes

Because the model presented in this research links groups' transitions to time, it raises questions about pacing. What are the connections between groups' pacing efforts and their work progress? Why are temporal midpoints special, and how do groups pace themselves throughout their life spans? Why would groups' opportunity to make a quantum leap be best at—and possibly limited to—a particular slice of their time?

The field research that preceded this study suggests that bounded rationality, a cognitive barrier, limits a group's ability to take fresh approaches to its task before the midpoint of its life span. The current results suggest that group time-structuring regulates some motivational barriers as well. Group members discussed several sources of reluctance to move from one part of their task to the next in the first half of their time. One source was a fear that the next step might be too difficult. Another described source of inertia was a reluctance to narrow choices prematurely and forgo the chance to think of something better. A third source was a reluctance to compromise with teammates or bow to someone's leadership attempts and agree on one plan. In the face of such forces, group members seem to make a pact with themselves. They use time as a heuristic for deciding how long they will remain on the same track and when they must forge ahead. Such a heuristic is particularly

understandable for time-limited tasks that are novel and open-ended, in which temporal milestones are much more accessible than purely task-based signals for moving ahead. As one participant noted, "You always could make it a little bit better," but a deadline imposes limits.

Individual group members vary somewhat in how early and how consciously they start to structure their time and in the temporal milestones they choose. But transitions are unlikely to occur until there is some team agreement on the appropriate moment to shift ahead. The special power of the midpoint appears to be that it is the most likely time that members will select, consciously or unconsciously, as a key milestone. Groups are more likely to have a quorum of members simultaneously ready to make changes at that point than either earlier or later, and members are less likely to feel it is the wrong time to make changes than at any other point.

If a shared, precise temporal milestone, not a gradually mounting urgency, sets off a transition, the collective feeling that "now is the right time to move" must be temporally limited. Beyond a certain time, it will be clear that the midpoint (or other milestone) has passed. The current evidence suggests that if a milestone passes without the occurrence of enough perceived progress, a team will experience the passing as a failure, and their shared sense of opportunity will probably be lost until the next temporal milestone. The one field group whose transition failed was disbanded on the spot. The one laboratory group whose transition failed did not begin producing until the deadline was imminent. These results must be interpreted cautiously because of the small numbers of groups studied, but they do argue for further research on the consequences of, and remedies for, flawed transitions.

Groups' pacing patterns were more idiosyncratic after the transition than during phase 1. It is possible that pacing was more often driven by both temporal and task milestones during phase 2, as members worked on specific pieces of product designs made more concrete at the transition. Such an interpretation is consistent with Norden's finding about project managers' handling of schedule delays in two- and three-year-long R&D projects:

> The reduction of maneuvering room [to recover lost time] is not an absolute function of the time remaining, but depends on the relative reduction in the "degrees of freedom" inherent in tactical choices made from the start . . . [As one respondent indicated]: "When you're half-way through a project, you're locked-in a lot deeper than when you're just getting under way" (1965: 306).

A Field-Laboratory Comparison

There were some differences between the dynamics observed in this laboratory study and the dynamics observed in the naturally occurring groups. In the field, groups met on several occasions. They prepared home-

work and communicated with independently acting outside stakeholders between meetings, and they often extended their midpoint meetings beyond their usual time limits in order to complete a key piece of work. Because of the laboratory design, the groups described in this study lacked the flexibility to extend their time spans, so it was not possible to see comparable changes in groups' routines or external interaction. It was not possible to identify a clearly bounded "transition meeting" with a set of transition accomplishments. Because of these restrictions, too, laboratory transitions were more temporally compact and less complex than some of the transitions observed in the field. More important, the laboratory setting did not simulate team-supervisor relations very well, thus restricting the generalizability of results dealing with that facet of team development.

A final difference has to do with the shortness of the time span for the laboratory teams' work. The fact that the lab groups made many more time comments overall than the field groups and the increased frequency of all the lab groups' time comments toward the end of their meeting hour suggest that the sharper a group's time constraints, the more frequently participants will pay explicit attention to time and pacing. The intensity of teams' attention to time was probably exaggerated in the one-hour laboratory sessions. To an extent, that exaggeration was a great advantage because it heightened the very phenomenon I wanted to study. Since the midpoint effect was first discovered in the field and then observed in the lab, that particular finding appears to be robust. However, it is important to be cautious about generalizing laboratory pacing patterns back to the field wholesale.

Notwithstanding these differences, the central features of the midpoint transition did emerge strongly in the laboratory: groups paid special attention to time at the midpoint of their time spans, made abrupt shifts in the focus of their work activities, and depended on midpoint agreements to provide a basis for work in the second half of their time. If laboratory task groups can display a punctuated equilibrium pattern with a midpoint transition, we can use laboratories to see how various interventions cause groups to depart from that baseline. Such settings appear to be promising sites for further research.

Implications for Research and Practice

The current findings have several implications for practice that in turn suggest questions for research. Uncertain or shifting deadlines are a fact of life in many organizations. Interdependent organizational units and groups may keep each other waiting, may suddenly move deadlines forward or back, or may create deadlines that are known to be earlier than is necessary in efforts to control erratic workflows. The current research suggests that the consequences of such uncertainty may involve more than stress, wasted time, overtime work, and intergroup conflicts. Synchrony in group members' expectations about deadlines may be critical to groups' abilities to

accomplish successful transitions in their work. The laboratory could be a good place to examine groups' reactions to uncertain or shifting deadlines and to try out ameliorating interventions.

A second area is the appropriate timing for interventions designed to assist or influence groups' work. The field study suggested that interventions or environmental events that called for dramatic changes would be especially powerful at the very beginning or midpoint of groups' life spans but might be resisted at other times. The laboratory groups examined here provided consistent evidence that members were quite receptive to teammates' efforts to redirect the team's attention at the midpoint and much less receptive before or after that. The laboratory could be a good place to test the effects of environmental changes or interventions at different points in groups' life spans.

A third area concerns effective ways to pace and manage groups through their life spans. The subjects in this research had no exposure to the hypotheses of this study, yet they described their own transition processes with great clarity and managed their time relatively deliberately. Those findings suggest that people learn substantial aspects of group pacing and might be able to improve upon that learned behavior. For example, without conscious, alternative planning, the midpoint appears to be the most likely temporal stimulus for groups' primary jump ahead, but the case of group 8, with its 20-minute transition and three-segment meeting, suggests the possibility of more planful tailoring of groups' pacing to their tasks and time.

Similarly, groups might be taught to anticipate characteristic challenges of the transition and helped to develop various ways of handling those challenges. It should be noted that managing the interaction process is not the only challenge to address. The transition may well be an acid test of whether or not a team's design, including its membership composition, task structure, and contextual supports, is workable. If the boost of the transition cannot galvanize a team, it may be suffering from especially serious design flaws.[11] Overall, the laboratory might be a good place to see whether group members, leaders, and external supervisors can be trained in how to manage different periods of groups' life spans most effectively. Specific suggestions for such training appear in Hackman and Walton (1986) and Gersick (1988).

A final implication applies more broadly to research on temporal issues and the correspondence between laboratory time and field time. The findings show that groups, at least in the research domain of this study, regarded time differently as the laboratory hour progressed[12] and, perhaps, as their

[11] Hackman (1986) contrasted design and process determinants of group effectiveness.

[12] McGrath and Kelly (1986) found that groups solving anagrams, given relatively short (or long) time limits on the first of two trials, persisted in working at a faster (or slower) pace on the second trial, even when the amount of time they had was lengthened (or shortened). A finding of such persistence in pace clearly differs from the current findings. It is, however, consistent with the findings of research on Einstellung effects that McGrath and Kelly's groups, (continued)

work became more concrete. This attitudinal shift suggests the importance of attending to task type and to the whole temporal context in which any segment of activity occurs.

Limitations of this Study

As pointed out in the above section on field-laboratory differences, there are many respects in which this laboratory simulation departed from natural settings. In addition, this study included only a small number of groups, from one population, doing one kind of task, under one set of conditions. People less experienced in group work or more experienced at a task might use their time differently in a laboratory or might describe their own work differently in interviews. Finally, research to date has been limited to a particular domain: groups with some discretion over their own work processes, with open-ended tasks and deadlines to meet. Further research is required before the current results can be generalized beyond that domain.

CONCLUSIONS

The results of this study suggest that the mechanisms groups use to pace their work may have critical effects on members' collective motivation to move ahead and on attentional and perceptual shifts that allow progress to occur. The reliable appearance of a midpoint transition, participants' articulate description of their transition dynamics and pacing behavior, and the deliberate quality of groups' efforts to advance at the midpoint of their allotted time have two important implications. First, pacing and transition dynamics may be facets of creative group work that are both consequential for group effectiveness and amenable to improvement through learning. Second, laboratory study holds much promise for enriching understanding of pacing behavior and punctuated equilibrium patterns in group development.

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with 10 or 20 minutes per trial and anagrams to do throughout, perceived themselves as having essentially the same task across trials, but groups in the current study perceived the nature of their task as *changing* at the midpoint.

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