CYCLES AND SYNCHRONY:
THE TEMPORAL ROLE OF CONTEXT
IN TEAM BEHAVIOR

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ABSTRACT

The paper reports on the temporal role of context on team behavior. We will argue that variables having to do with time and timing—pace, cycles and rhythm—are key aspects of the environment that exert considerable influence on teams. The temporal lens represents a different orientation to the study of teams. Prior work has concentrated on *what* goes on within the team or between the team and its context. The temporal lens focuses on *when* behaviors arise, how quickly they take place, and the cycles with which they are aligned. By applying the concept of entrainment to teams and their environment, the paper will portray the team context as an external pacer, rhythm setter, creator of windows of opportunity, source of interrupts, and source of the meaning of time. The paper ends with new research directions as the external temporal lens is integrated with other aspects of group theory.

This paper reports on the temporal role of context on team behavior. We will argue that variables having to do with time and timing—pace, cycles, and rhythm—are key aspects of the environment that exert considerable influence on teams. The temporal lens represents a different orientation to the study of teams. Whereas prior work has concentrated on *what* goes on within the team or between the team and its context the temporal lens focuses on *when* behaviors arise, how quickly they take place and the cycles with which they are aligned. The temporal focus can be applied to activity within the team or between the team and its context. This chapter focuses on the latter stressing that the external context, particularly the external temporal context, plays a large role in determining the nature, speed and timing of team processes and events.

While there are a number of ways of thinking about temporal effects, we focus on entrainment. Entrainment illuminates the periodicity of events and the fact that they are occurring synchronously with other events across other levels of analysis. In other words, these events take place in bundles—many of them at once—that are predictably timed. The concept of entrainment (Ancona & Chong, 1996) helps to explain how the external temporal system influences team processes and how these processes may, in turn, be linked to larger temporal patterns in the organization and external environment.

This paper begins by locating the topic of the temporal context of teams in broader group theory. We then review the concept of entrainment and show how it highlights the role of the external temporal environment in shaping team behavior. In particular we will identify five key roles played by the external temporal environment and illustrate how they affect the team. The five roles include: external pacer, keeper of rhythms, source of windows of opportunity, source of interrupts and context for the meaning of time. Since research on timing is just beginning, the latter part of the paper discusses some new directions for team research and some ideas for integrating the temporal perspective with existing group theory and managerial practice.

THE TEMPORAL CONTEXT OF TEAMS

This paper attempts to make the case for the influence of the external temporal context on internal team behavior and performance. To understand how this perspective fits into existing group theory one can think of a two-by-two matrix (see Figure 1). In this matrix the rows are defined as: (1) what goes on within the team and (2) when and how quickly things happen in the team. The columns are defined as: (1) a focus on behavior within the team and (2) a focus on the interaction between team and context. This paper focuses our attention on the fourth cell; a temporal perspective applied between the team and its context.

In moving to this cell we see two shifts from the bulk of group theory. First, we move from an internal to an external perspective, from column 1 to column 2

Focus	Inside the Team	Interaction Between Team and Environment
What Goes On	1 Conflict Cohesiveness Decision making Identity	3 Boundary spanning Coaching Resource allocation Boundary holding
When and How Fast	2 Midpoint effects Forming, storming, norming, performing Exploration, exploitation, exportation	4 Decision making in high velocity environments Entrainment

Figure 1. Mapping of Existing Group Theory

(Ancona, 1993). Now rather than solely looking at what goes on inside the team, for example, conflict, cohesiveness, decision making, identity, we examine how the context influences and is influenced by the team. We include both internal behaviors and boundary management as indicators of process, and we look at the interaction of context, process, and performance over time. Second, the focus shifts from row 1 to row 2. Rather than looking solely at the activities and behaviors in the team, the focus shifts to when and how fast activities and change occur. Variables move from interdependencies, levels, amounts, and degrees to pace, cycles, synchrony and rhythm. The theoretical glue that allows us to tie together the timing and external viewpoints is entrainment.

When looking inside the team for temporal patterns we see the world of undisturbed pace, cycles, and rhythm. Here the internal team rhythms that come from the task, or team development, or midpoints are allowed to run free—much like individuals kept in isolation underground, away from the light/dark cycle of the earth. In this realm, much of Gersick's work (1988, 1989, 1994) on pacing would be placed. Here the team can set a strategy, set deadlines related to work, move in isolation until the midpoint, and then come up for air, check its progress with the outside world, recalibrate, and go back to an internal focus.

The case that will be made here is that in many organizations the external temporal influences are extremely strong, and they overwhelm that buffered world. Here external pacers push the team to move fast or slow, to speed up or slow

down. Here external rhythms pull the teams along causing members to set deadlines in accordance with external cycles and to structure their behavior to coincide with key external events. Entrainment to these rhythms can also be intentional such as the companies that select a rhythm that will pulse at a given interval and pull all activities into synchronization. Here the external environment is moving in cycles, with phases that offer windows of opportunity for team initiatives— determining whether a team members' influence attempts will be successful or not. Here the external context disturbs the team periodically, offering a chance to reflect and change productively or destroying routines that were working well. Here the actual meanings of speed, interval and flow are imposed from the outside, leaving the team members with little room to redefine those terms. The concept of entrainment helps to introduce and organize this external temporal perspective.

ENTRAINMENT

Entrainment is defined as the adjustment of the pace or cycle of an activity to match or synchronize with that of another activity. The adjustment could be in the phase, periodicity, magnitude, or some other temporal parameter of the activity. Pace refers to the speed at which an activity takes place. A cycle is a single complete execution of a periodically repeated phenomenon (Ancona & Chong, 1996; McGrath & Rothchford, 1983). Over time a rhythm develops based on the nature of the repetition of the cycle.

For example, entrainment of pace occurs when management speeds up product development to match the accelerated innovation cycle set by the competition. Entrainment of cycles occurs as multiple activities and processes shift predictably throughout the year in conjunction with the quarters laid out by the fiscal year. A rhythm develops as salespeople and customers act in unison and create sales figures that follow a flat pattern followed by high growth at the end of every quarter, with the fourth quarter always showing more dramatic rise at the end. Pace or tempo entrainment examines the alignment of speed, while phase entrainment examines the synchronization of cycles (Ancona & Chong, 1996).

The fundamental idea behind entrainment in teams and organizations is that endogenous cycles exist within individuals, groups, organizations and environments. These endogenous cycles are often influenced by other cycles within the system or outside the system so as to occur in synchrony; in entrainment language the cycles are "captured" by an external pacer so as to have the same phase, periodicity or magnitude. These external pacers are often signaled by cues in the environment called zeitgebers (Aschoff, 1979). The "captured" cycles establish an entrained rhythm that then "pulls" many other cycles in synchrony. The rhythm creates a dominant temporal ordering that serves as a powerful coordination mechanism for that entity. As more and more cycles entrain to this rhythm it

becomes inertial. The fiscal year in public firms and the semester in academic institutions are two examples of pacers that create entrained organizational rhythms which dominate and "capture" many organizational activities.

The History of Entrainment

The concept of entrainment dates back to the seventeenth century (Minorsky, 1962). As the story goes, a Dutch physicist named Huygens was home sick in bed when he noticed that two pendulum clocks on the wall were moving in synchrony. When he pushed one, within a half hour the two clocks moved together. He suspected that the two were influencing each other via tiny vibrations in their common support. Sure enough, when moved to opposite sides of the room, the clocks fell out of step. Such began the subbranch of mathematics known as the theory of coupled oscillations or entrainment (Strogatz & Stewart, 1993).

The term entrainment is most commonly used in biology, where researchers argue that most behavioral processes are rhythmic or cyclical in nature (Oatley & Goodwin, 1971). The most common biological example is the circadian (meaning about a day) rhythm, where most bodily cycles are entrained to the external light/ dark, 24-hour, cycle of the earth. In studies that isolate individuals away from natural light for several weeks, many bodily cycles (e.g., temperature and urinary cortisol excretion), free run and resume their "natural" periodicities that are usually more than 24 hours (Ashoff, 1979; McGrath et al., 1984). The new internal ordering or these free-running cycles is very different from that of a system entrained to a 24-hour cycle. Thus, entrainment of these bodily cycles to one another and together to the light-dark circadian rhythm shifts the timing of these cycles so that we follow the rhythm of the sun.

Entrainment has been used to explain phenomena in economics. The macro economy generates multiple cyclic modes such as the business cycle, construction cycle, and long wave, which may then entrain to one another such that they tend to peak simultaneously from time to time. The roughly 20-year construction cycle in the oil tanker industry seems to be entrained about a 4:1 ratio with the business cycle in oil demands, leading to periods of deep depression in shipbuilding. Similar dynamics exist in the real estate, mining, mining equipment, paper and pulp industries (Sterman & Mosekilde, 1993).

Organizations, with their multiple cycles, seem ripe for similar analyses. They are subject to multiple variant cycles, such as the quarterly and annual accounting cycles, the seasonal cycles of demand, and the roughly four-year business cycle, and contain processes with intrinsic response times that vary substantially (order fulfillment may take seconds while capacity expansion may take years). Organizations are filled with individuals going through various career and life cycles, and teams pace themselves to temporal milestones (Gersick, 1994). Organizations exist in environments with technological, market, and business cycles in which pace seems to be ever quickening; forcing organizations to reentrain to new

external pacers while having to maintain the coordination among internal cycles. These characteristics call for analysis through the entrainment lens. As teams reside in this organization they, too, must be part of the entrainment process.

McGrath and Rotchford (1983) were the first to use the term entrainment to explain processes in social and organizational behavior. They define social entrainment as the "capturing and modification of human activity cycles by various social customs, norms, and institutions" (1983, p. 78). They catalogued the existence of shared social cycles at various levels (e.g., weekly cycles such as workdays and weekends, and organizational cycles like slack periods and inventory times) and then provided evidence that individual activity entrains to these cycles. They presented a salient example of the shift worker whose behavior is primarily entrained to the work organization and how the family also becomes entrained by shifting eating and leisure activity to fit the particular shift. They further discuss various issues regarding the implications and consequences of social entrainment (e.g., the macro effect of daily rush hours and long lines in the cafeteria at lunch time).

We have built on, and elaborated, the work done by McGrath and Rotchford (1983). As stated earlier, we now define entrainment as the adjustment of the pace or cycle of an activity to match or synchronize with that of another activity. Under entrained conditions, endogenous paces and cycles that exist within individuals, groups, organizations and environments are somehow "captured" by (or capture) other paces and cycles within the system or outside the system so as to have the same pace, phase, or periodicity (Ancona & Chong, 1996). In this paper we apply the entrainment lens to the examination of the impact of context on team behavior and outcomes.

APPLYING THE ENTRAINMENT LENS TO TEAMS

Although the concept of entrainment is relatively new to the field of organizational behavior, there is already evidence of its existence in the team-context arena. Here we argue that the external environment—whether the organization itself or even beyond the organizational boundaries—influences teams in several ways. The context acts as an external pacer, rhythm setter, creator of windows of opportunity, source of interrupts, and context for the meaning of time.

Context as External Pacer

Any team that is put together has to make the decision about how quickly to work. While much of the literature on teams has assumed that team members and leaders set deadlines and pace based on the amount and type of work that needs to be done, evidence exists to show that teams are also influenced by their external

context. In entrainment language, the teams entrain their pace or tempo to match that of the external environment.

Several examples of context as external pacer exist. In a series of studies, Kelly and McGrath (1985) showed that individuals and groups who were given 5, 10, and 20 minutes, respectively, to solve anagrams learn to work at decreasing rates of speed. The shorter the time limit, the higher the rate at which anagrams are solved. McGrath, Kelly and Machatka (1984) argue that "individuals and groups 'attune' their rates of work to fit the temporal conditions of their work situations." When time frames were changed such that groups subsequently had 20, 10 and 5 minutes, respectively, to do their work, they continued to work at the pace set by their original time limit, illustrating entrainment to the original pacer.

Yet there is evidence of teams being able to change their pace as the external environment accelerates. In a study of five companies in "high velocity environments" Eisenhardt (1989) illustrates that some top management teams were able to match their pace of strategic decision making to the accelerated pace of technological and market change. These teams did not sacrifice thoroughness nor the number of alternatives considered, yet through frequent meetings, up-to-date operational data, mechanisms for conflict management, and simultaneous consideration of multiple alternatives, they were able to accelerate decision making to match the pace of the environment. Other top management teams were not able to speed up decision-making processes.

A study of five software development teams (Chong, 1995) found that team members had to shift their pace of work in response to changed external cycles. For example, one team switched from working on an organizational product to working on a customer's product. This change shifted the product development cycle, and the team members had to meet deadlines that were closer together than the original schedule. They quickly found ways to speed up their development activities.

Thus, there is some evidence that the external environment operates as an external pacer that works to set, and sometimes shift, the pace of the team. It is still not clear why some teams can reentrain to a new external pace and others cannot. Perhaps it is related to the degree of inertia and strength of routine in the team, or perhaps it is related to the strength, vividness, and saliency of the pacer or both. Future research is needed in this area.

Context as Rhythm Setter

Much of the literature on teams examines shifts in behavior as resulting from internal dynamics such as a midpoint effect (Gersick, 1988, 1989) or shifts due to movement across developmental stages such as forming, storming, norming, and performing (Tuckman, 1965). The entrainment lens offers the view of the team as shifting regularly to follow the rhythm of its external context. In an entrained

world the context plays the role of a music score sending signals about when to do what, at what level, to insure that coordination occurs.

Entrainment suggests that everyday life in organizations is rhythmic—shifting regularly from one beat to another, from one pace to another. In an entrained world, the team gets carried along. Consider the organizational realm in which there is movement from the "budgeting season" to the "summer lull." Nuclear power plants shift personnel and management as they regularly move from ongoing operations to the "shut-down phase" (Carroll & Perin, 1994). Political organizations move on a four-year cycle shifting from election time craze to post-election analysis and planning. Academic institutions move from September orientation and socialization of new students to graduation and summer research and executive program activity.

Whereas individuals match their internal biological processes to the light/dark cycle of the earth, organizational teams are pulled along by the rhythm set by the fiscal year or the product development process (which is, in turn, linked to innovation cycles). Entrainment basically organizes processes that would ordinarily follow their own cycles into an interwoven pattern with a common aggregate rhythm. To study this phenomenon requires examining ongoing cycles of activity, the periodicity and timing of those cycles, and their interaction over time. The key unit of analysis is the aggregate pattern that repeats itself over time and that consists of bundles of highly enmeshed cycles of activity.

Examples of teams that enmesh with external rhythms abound. Gersick (1994) writes about the top management team of a new venture:

> The midsummer occurrence of M-Tech's strategic planning meetings was chosen explicitly to bisect its fiscal and evaluation year, but mid-summer also placed M-Tech's planning conveniently before important annual industry meetings and poised it for the yearly Labor Day surge back to work in the U.S. culture at large. Such synchrony is probably not a coincidence, but the result of a nested complex of economic rhythms. M-Tech was entrained to its investor's schedule of evaluation, which, it could be hypothesized was entrained to annual national patterns, along with businesses all over the country (Gersick, 1994, p. 38).

While studying a hundred sales teams in a telecommunications company, Gladstein (1984), found that the differences between selling at the start of the quarter and the end of the quarter were dramatic. At the start of the quarter, sales activity was slow, customer visits were spread throughout the weeks, and a lot of time was spent finishing up the paper work from the last quarter and strategizing about the future. As the quarter progressed customer visits increased, the pace became frantic, and strategizing was replaced by actual selling and struggling to install the system "on time." As quarterly deadlines approached people worked harder and faster, especially in the fourth quarter so that salespeople could make their quarterly and yearly targets and bonuses. In addition, the company offered large discounts at the end of the quarter and the fiscal year that were not provided at other junctures. Customers "learned" that they could get better deals toward the end of

the quarter, so they waited until that period to buy. The result was a set of intertwined behaviors that created the well-known "ockey stick" pattern for the quarter, and an uneven saw pattern throughout the year (see Figure 1). The entrained cycles created a rhythm of behavior and change that repeats itself year in and year out and aligns the sales team with other parts of the organization as well as the customer.

Eisenhardt and Brown (1998), building on Gersick (1994), talk about *time pacing*, a practice whereby an organization sets up a rhythm such that change in product development teams is scheduled at predictable time intervals. "Time pacing is about running a business through regular deadlines to which managers synchronize the speed and intensity of their efforts. Like a metronome, time pacing creates a predictable rhythm for change in a company" (Eisenhardt & Brown, 1998, p. 60). New product teams in such companies find that they are "pulsed" to begin and end in accordance with these rhythms. For example, rather than have team members flounder when deciding when to start work on a product, when to launch, when to stop, and so on, new product team members in pulsed companies might work on a predictably timed nine-month schedule. The pulsing includes making sure that the next nine-month product iteration is underway even as the previous model is being finished.

Several other examples of organizations setting rhythms that permeate the organization are found in work by Tyre et al. (1996). When engineers working in product development teams had difficulty getting work done within reasonable hours due to too many interruptions, the organization reconfigured the work day by establishing "quiet time" during which engineers worked alone, and "interaction time" during which team members worked together. Microsoft is known to set work rhythms. For example, members of software development teams work independently until some hour in the afternoon when all work is brought together to insure that key interfaces work.

Teams are also very influenced by organizational initiatives that are linked to the fiscal rhythm. Ancona and Chong (1999) found that organizational initiatives such as layoffs, changes in product strategy, and total quality programs have profound effects on team structure, process, task and affect. These initiatives are not random in time, but map to the fiscal year and, thus, push teams into a change pattern that is firm-wide.

Context as Shifting Windows of Opportunity

In an entrained world the timing of a team intervention is as important as its content in determining whether or not it will be successful. It suggests that surrounding, ongoing paces and cycles will create windows of opportunity in which change will be more easily accomplished and other periods in which there will be more inertia and resistance. Here the key is to map existing entrained rhythms and cycles to see when intervention is optimal. Thus, this is not necessarily a case of

the team entraining to an external pace or cycle, it may simply mean taking advantage of a given window of opportunity that is created by existing cycles and their intersection.

Take, for example, a change process in a state department of education (Ancona, 1990). The educational consultants within the organization were to be reorganized into cross-functional teams that would provide educational services to specific geographic areas. Although teams were formed in the early fall, they did not really start work until January because that was when many organizational projects finished and personnel had the time and opportunity to begin team initiatives. Because the project send-off occurred in September with a big three-day, off-site meeting, but little actual work was actually done until late January, the project lost momentum and people on the teams wondered if it would succeed. The lull in January would have been the best window to start the change effort in terms of building commitment and excitement in the teams.

Work was further delayed because the school districts to which the teams were consulting had already been through the planning process for the academic year and were locked into programs until the following fall. Teams progressed with whatever initiatives they could get through at the time, but the real impact in the school districts was delayed causing frustration on the part of the consultants. Later the teams entrained to the cycles of the school districts, and planned their interventions so as to be able to have input into the schools' curricula. Ultimately the change effort was successful, despite the inability to take advantage of key windows of opportunity within the organization and within the client's schedule.

Starting the project when consultants were freed up from other commitments would have meant a faster start to the change effort and momentum might have built up more quickly. Also, planning early team assignments to better match client readiness for help might have lessened frustration.

Albert (1995) also argues that windows of opportunity in the external environment helped to determine the foreign policy decisions made by military teams in the Persian Gulf War. "Timing dictated policy rather than the reverse: the limited window for military action influenced whether action would be taken at all: 'when' helped decide 'whether.'" That is not to say that the decision to go to war was completely influenced by factors such as the weather, the date of pilgrimage to Mecca, the timetable for Congressional elections, and so on, but that it should be at all is difficult to accept" (p. 80).

Eisenhardt and Brown (1998) argue that teams that take advantage of windows of opportunity in the external environment can improve their performance. To the extent that these windows are repetitive due to ongoing cycles, entrainment to these cycles is useful. In one example, Thirstco, a company in the cold-beverage business, reformed their product development process to entrain to customer-buying patterns. Teams had to test market new flavors in the spring, finish in two months, and introduce new products in the summer—peak buying season—insuring them an advantage over their competitors who did not time their releases to

swings in customer demand. In another example, product development teams in a large household-goods manufacturing company were able to boost sales by taking advantage of the window of opportunity formed when key customers made decisions about shelf planning, which differed by category (such as school supplies, housewares, etc.). By matching product launch cycles to shelf-planning cycles the teams made available their products at the moment that the customer was open to making changes in product mix.

Context as Source of Interrupts

Teams that exist in an environment in which regular cycles create rhythms that direct, pulse, and time organizational activities can expect to be periodically "interrupted." A study of software development teams (Ancona & Chong, 1999) showed that the top management team of the firm often made strategic decisions that were communicated to the rest of the organization about a month before the end of the quarter. Team members that were affected by these decisions often had to make changes in response to varying threats and opportunities. These pulsed interruptions often disrupted internal team rhythms.

External interrupts have been shown to have a large impact on team behavior (Tyre & Orlikowski, 1994; Tyre, Perlow, Staudenmayer, & Wasson, 1996). Tyre and Orlikowski (1994) found that when new process technologies are introduced into project groups they respond with a short period of exploration and modification of behavior in response to the new technologies. Following this spurt of activity and adaptation "modification of new process technologies by users is limited by the increasing routinization that occurs with experience. Thus, the technology and its context of use tend to congeal, often embedding unresolved problems into organizational practice" (p. 98).

In a world of entrained paces, cycles and rhythms, external interrupts will be periodic, as well as random. Periodic interruptions have been shown to alter team rhythms (Ancona & Chong, 1996; Tyre, et al., 1996) and even cause a complete break in team activity as team members assess the situation and decide how to proceed. Tyre et al., show that these interrupts result in temporal shifts in the team that enable team change in four ways: (1) interrupts act as a trigger that breaks existing behavioral and attitudinal routines opening up the possibility of change, (2) interrupts act as a "time out" from regular work during which there is time for reflection and planning for change, (3) interrupts act as a coordinating mechanism freeing up all team members simultaneously thus allowing time for a collective focus on change, and (4) interrupts act as a signal of management's commitment to change. In an entrained pattern, interrupts occur periodically and across multiple teams and activities. Thus, change efforts can be coordinated across groups. All "clocks" (Keck & Tushman, 1993) within the organization can be set to zero at once facilitating change and allowing numerous parts of the organization to begin anew, together.

While Tyre et al. look at the positive side of interrupts, there may also be a "dark" side. Teams that are frequently interrupted often tend to have longer development times, feel frustrated about their progress, and wonder whether management really knows how to manage (Ancona & Chong, 1999). These macro rhythms may break into internal team rhythms requiring team members to take time out to figure out how to redirect their energies and how to respond to the external disturbance. The idea behind regular, pulsed product development (Eisenhardt & Brown, 1998) is to have change occur across, rather than within, project teams.

Context as Creator of the Meaning of Time

Time can be so accurately measured now that we assume it is an objective reality. After all, a second is a second anywhere in the world and a minute does not change from one moment to the next. Or, alternatively, one might assume that any team coming into existence would establish its own "temporal reference framework" (Zerubavel, 1979) that differentiates its member's understanding and experience of time from that of others. Here we argue that the external context of the team influences its temporal reference framework, thus, identifying a final influence on the team. The major point here is that a team that is entrained to a particular rate, cycle, or rhythm also takes on a set of meanings. The team does not simply adopt new temporal parameters but also a set of interpretive rules about those parameters.

Take, for example, the experience of an executive who moved from a high-technology company in a competitive market with short product life cycles to a monopolistic company with long product life cycles. The executive was brought in to help the company become more competitive as its monopoly stature was eroding. When meeting with one of his new product development teams the executive queried whether the product would be out on time. The answer was "yes." When the product turned out to be three months late the executive confronted a team member about why he had said that the product was going to be on time. The employee replied that it was on time. The issue here was not one of semantics, but rather the meaning of early and late. If your product cycles are eight years, then three months late is on time. If your cycle is nine months, then three months is very late. The meaning of many temporal terms, "early," "late," "fast," "slow," "long," "short," are related to task and technology, as well as historical experience. The point here is that those meanings are probably shared across aggregates that are larger than the team, and these meanings influence the ways in which each team determines its own way of defining time.

The meaning of time within the team might also change as context is changed. In a study of software development teams it was found that the two teams that shifted from internal organizational projects to external client projects shifted their understanding of deadlines and speed (Ancona & Chong, 1999). The one

team that was working for a Japanese client became obsessed with meeting deadlines and working quickly as this was what their client demanded. Whereas their U.S. parent company was a bit lax about being behind schedule, in the Japanese company, on time meant on time. So the notion that an hour is an hour is an hour does not hold. An hour when entrained to a tight deadline has a different meaning, a different feel, and a different sense of elapsed time than does an hour in an organization where creativity, not meeting schedule is paramount. Thus, entrainment shifts our notion of time as objective and measurable.

INTEGRATING THE TEMPORAL LENS WITH EXISTING GROUP THEORY

Having laid out the notion of entrainment and developed the fourth cell of the two-by-two matrix of group theory (see Figure 1), the next step is to see how to integrate the temporal context of teams with the other cells. In thinking through such an integration new research questions and directions arise. Below we suggest a few.

Take for example the relationship between cells 1 and 4. Here we are integrating internal team processes and temporal issues between the team and its external environment. A number of questions arise. What happens internally when a team entrains to a new external cycle that requires it to get work done in less time? Are the same processes actually done faster? Are certain processes left out, such as a concentration on task while eliminating all maintenance functions? Or is group process left alone while the group task or design is changed, for example, the product design is changed to eliminate all "extras" or new members are brought into the team. One could ask the same set of questions if the team needs to slow down its activities. What changes are made internal to the team, with what effect?

Sticking to the comparison of internal process to temporal issues between the team and its external environment but shifting the direction of causality creates another set of questions. Are teams that are very cohesive less likely to entrain to external pacers due to their internal focus? Does the nature of a team's identity have any bearing on its ability to entrain, or to detect windows of opportunity, or to deal effectively with interrupts? Does a team's identity influence its ability to internalize temporal meanings from the external environment?

In another vein, do our existing constructs need to change to incorporate the temporal perspective? For instance, conflict is currently conceptualized as being of three types: task, affective, or procedural conflict (Jehn, 1995). But perhaps there is a fourth type: temporal conflict. Here each group member may be entrained to a different set of external pacers and thus conflict over pace, deadlines, and timing of events may ensue.

A second area of integration is between temporal patterns within the team and those between the team and its external context—comparing cells 2 and 4 in

Figure 1. A key research question is how teams negotiate internal and external temporal demands? Do teams punctuate change using internal rhythms, for example, the midpoint or stage progressions, or are they overwhelmed by external rhythms? Or do some teams follow internal rhythms and others external rhythms? With what effect? Finally, is there some integration such that a team that changes in accordance with external rhythms has a more muted midpoint effect? Furthermore, are there different reactions to changes that stem from inside the team versus outside the team? Might there be more anger among members that are changing due to external interrupts rather than internal stage changes? Much research is needed here.

Continuing the integration between internal and external temporal patterns, one might ask whether entrainment is more likely during certain phases than others? According to the Gersick (1988) model, a team would probably be more likely to entrain to an external cycle or "notice" a window of opportunity at its very beginning and its midpoint, but less likely at other times. Interrupts would also probably be viewed more positively if they occurred during these junctures as well.

The third area of integration would be between what goes on across the team boundary and when things occur across the team boundary—comparing across cells 3 and 4 in Figure 1. Again, many research questions emerge. Does a team whose members engage in more boundary spanning have a higher level of entrainment to external pacers? Do certain types of boundary activity have a larger impact on entrainment than others? Does an organization that provides teams with high levels of coaching and resources do a better job at integrating internal and external rhythms?

On the other side, can the temporal lens expand our understanding of boundary variables? Perhaps boundary spanners would be more effective to the extent that they carried information about paces, cycles, and rhythms across the team boundary, in addition to technical and political information. Perhaps coaching needs to include help on when and how fast to carry out activities not just what activities to perform. Perhaps resource allocation would be more effective if it coincided with key stages of a group's development, rather than a certain point in the fiscal year.

CONCLUSION

Thus, the notion of team context as being temporal in nature causes us to rethink the very operationalization of classic group variables and to wonder about their interaction with temporal variables. Testing these new research ideas will require longitudinal studies that cross levels of analysis. There will have to be a mapping of individual, group, and organizational paces, cycles and rhythms. There will have to be a mapping of the windows of opportunity that arise within each level of analysis, and one of where they mesh and where they conflict. There will have to be a mapping of interrupts in all directions to determine whether influence flows from the individual to the team to the organization, or the other way around, or both. Finally, there will be a need to record the meanings of time across levels of analysis.

This theoretical orientation also calls upon us to play and experiment with alternative paces, cycles, and rhythms. It calls upon us to create teams that punctuate their changes in alternative ways so that we can test the impact on both performance and satisfaction. It calls upon us to experiment with alternative modes of speeding up and slowing down so as to learn how to do both more effectively. It calls upon us to state team and organizational priorities and to temporally structure around them.

Finally, this theoretical orientation calls for us to act differently, and action in this paced, cycled world requires a different mindset. A team needs to start with a temporal map, indicating key external paces, cycles, and rhythms as well as the team's synchrony with them. Members must ask themselves which pacers they currently match, and compare those with pacers that they may want to match. Members must map key windows of opportunity and see whether they can take advantage of these brief time horizons to sell a product, float an idea, or acquire resources. Members must be prepared for interrupts and manage their responses. Members must be prepared to exist in a world dominated by some vivid, strong rhythms that will carry them along and help construct their meaning of time and timing. This is not a linear, even world, but a pulsed, shifting one in which one moves from frenetic change at one moment to a completely different phase of activity and speed in the next. Choices must be made between going along for the ride, or making some system-wide interventions to gain control and modify the flow.

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REFERENCES

Albert, S. (1995). Towards a theory of timing: An archival study of timing decisions in the Persian gulf war. *Research in Organizational Behavior* (Vol. 17, pp. 1-70). Greenwich, CT: JAI Press.

Ancona, D.G. (1990). Outward bound: Strategies for team survival in the organization. *Academy of Management Journal, 33*, 334-365.

Ancona, D.G. (1993). The classics and the contemporary: A new blend of small group theory. In J. K. Murnighan (Ed.), *Social psychology in organizations: Advances in theory and research* (pp. 225-243). Englewood Cliffs, NJ: Prentice Hall.

Ancona, D.G., & Chong, C. (1996). Entrainment: Pace, cycle, and rhythm in organizational behavior. In L. L. Cummings & B. M. Staw (Eds.), *Research in Organizational Behavior* (vol. 18, pp. 251-284). Greenwich, CT: JAI Press.

Ancona, D.G., & Chong, C. (1999). Temporal patterns of change in software development teams. Working Paper, Sloan School of Management, MIT.

Aschoff, J. (1979). Circadian rhythms: General features and endocrinological aspects. In D. Krieger (Ed.), *Endocrine Rhythms* (pp. 1-61). New York: Raven Press.

Carroll, J., & Perin, C. (1994). *Organization and management of nuclear power plants for safe performance*. Annual Report. Cambridge, MA: MIT Sloan School.

Chong. C. (1995). *Temporal patterns of change in groups*. Unpublished Ph.D. dissertation. Sloan School of Management, MIT.

Eisenhardt, K. M. (1989). Making fast strategic decisions in high-velocity environments. *Academy of Management Journal, 32*, 543-576.

Eisenhardt, K.M., & Brown, S.L. (1998, March-April). Time pacing: Competing in markets that won't stand still. *Harvard Business Review*, 59-69.

Gersick, C. J. C. (1988). Time and transition in work teams: Towards a new model of group development. *Academy of Management Journal, 31*, 9-41.

Gersick, C. J. C. (1989). Marking time: Predictable transitions in task groups. *Academy of Management Journal, 32*, 274-309.

Gersick, C. J. C. (1994). Pacing strategic change: The case of a new venture. *Academy of Management Journal, 37*, 9-45.

Gladstein, D. (1984). Groups in context: A model of task group effectiveness. *Administrative Science Quarterly, 29*, 499-518.

Jehn, K. A. (1995). A multimethod examination of the benefits and detriments of intragroup conflict. *Administrative Science Quarterly, 40*, 256-282.

Keck, S.L., & Tushman, M.L. (1993). Environmental and organizational context and executive team structure. *Academy of Management Journal, 36*, 1314-1344.

Kelly, J.R., & McGrath, J.E. (1985). Effects of time limits and task types on task performance and interaction of four-person groups. *Journal of Personality and Social Psychology, 49*, 395-407.

McGrath, J.E., Kelly, J.R., & Machatka, D. E. (1984). The social psychology of time: Entrainment of behavior in social and organizational settings. In S. Oskamp (Ed.), *Applied Social Psychology Annual* (Vol. 5, pp. 21-44). Beverly Hills: Sage Publications.

McGrath, J. E., & Rotchford, N. L. (1983). Time and behavior in organizations. In L. L. Cummings & B. M. Staw (Eds.), *Research in Organizational Behavior* (Vol. 5, pp. 57-101). Greenwich, CT: JAI Press.

Minorsky, N. (1962). *Nonlinear oscillations*. Princeton, NJ: Van Nostrand.

Oatley, K., & Goodwin, B.C. (1971). Explanation and investigation of biological rhythms. In W. P. Colquhain (Ed.), *Biological rhythms and human performance*. New York: Academic Press.

Sterman, J.D., & Mosekilde, E. (1993). *Business cycles and long waves: A behavioral disequilibrium perspective*. Working Paper No. 3528-93-MSA, Sloan School of Management, MIT.

Strogatz, S.H., & Stewart, I. (1993). Coupled oscillators and biological synchronization. *Scientific American, 269*(4), 102-109.

Tuckman, B. (1965). Developmental sequence in small groups. *Psychological Bulletin, 63*, 384-399.

Tyre, M.J., & Orlikowski, W.J. (1994). Windows of opportunity: Temporal patterns of technological adaptation in organizations. *Organization Science, 5*, 98-118.

Tyre, M.J., Perlow, L., Staudenmayer, N., & Wasson, C. (1996). *Time as a trigger for organizational change*. Working Paper 157-197, Sloan School of Management, MIT.

Zerubavel, E. (1979). *Patterns of time in hospital life: A sociological perspective*. Chicago: University of Chicago Press.