Association for Information Systems
AIS Electronic Library (AISeL)

ICIS 2008 Proceedings

International Conference on Information Systems (ICIS)

2008

Time Management and Temporal Dissonance in Global Virtual Teams

Christopher M. Conway
University of Arkansas, c.conway@ieseg.fr

Moez Limayem
University of Arkansas, mlimayem@walton.uark.edu

Follow this and additional works at: http://aisel.aisnet.org/icis2008

TIME MANAGEMENT AND TEMPORAL DISSONANCE IN GLOBAL VIRTUAL TEAMS

La gestion du temps et la dissonance temporelle dans les équipes virtuelles

Research-in-Progress

Christopher M. Conway
University of Arkansas
Department of Information Systems
Sam M. Walton College of Business
University of Arkansas
Fayetteville, AR 72701 USA
cconway@walton.uark.edu

Moez Limayem
University of Arkansas
Department of Information Systems
Sam M. Walton College of Business
University of Arkansas
Fayetteville, AR 72701 USA
mlimayem@walton.uark.edu

Abstract

Despite popular expectation that use of time management techniques will improve team performance, virtual teams still fail to perform well in practice. Past research has produced mixed results for the efficacy of time management on team performance. In this preliminary study, we investigate the effect of time management on virtual team performance. Using the punctuated equilibrium model of group development as a starting point, we show how a team's process conflict and affect conflict mediate the effect of time management on team performance. We define a new construct, Temporal Dissonance, which moderates the effect of time management on team conflict, explaining previous conflicting results. We then suggest scientific and practical implications of this research.

Keywords: Time Management, Virtual teams/geographically dispersed teams, Temporal Dissonance, Process Conflict, Time Urgency, Time Perspective, Circadian Rhythm

Résumé

Malgré que la plupart des gens pensent que l'utilisation des techniques de gestion de temps améliore la performance des groupes, les équipes virtuelles n'exécutent pas bien. Cependant, les recherches antérieures ne s'accordent pas sur le mérite de ces techniques. Nous définissons un nouveau construit appelé la dissonance temporelle, et nous avançons que ce construit modère le lien entre ces techniques et le conflit dans les équipes virtuelles.

Introduction

The only reason for time is so that everything doesn't happen at once.

—Albert Einstein

In their search for competitive advantage in an increasingly global marketplace, businesses have been turning ever more to global virtual teams to improve their efficiency, increase their productivity, and decrease their costs. These teams, made possible by advances in information technologies, literally span the globe, with team members potentially located on every continent, all working as a single group. Virtual teams allow a company to bring its "best and brightest" together without the expense of travel, local recruitment, or relocation of employees. In principle, the information technologies that make this possible—from simple email, through instant messaging, videoconferencing software, to the latest virtual worlds—enable a company to reduce costs associated with physical collocation of employees, and yet reap the benefits of their close coordination.

The Gartner Group has predicted that 60% of professional employees in Global 2000 companies would be working in virtual teams (Kanawattanachai and Yoo, 2002). However, they also predicted that "50% of virtual teams will fail to meet either strategic or operational objectives due to the inability to manage distributed workforce" (Biggs, 2000). Even when they do not fail, they are frequently less productive than their face-to-face counterparts (Furst *et al*. 2004). Understanding how to reduce the failure rate will obviously have significant implications for business.

In order to reduce the failure rate, we must understand how teams operate. One of the critical aspects of this operation is the process by which teams time their actions (Gersick 1988, Gersick 1989). When a team's sense of time is disrupted, their performance suffers (Labianca *et al*. 2005). These threads of research seem to suggest that disagreements about timing among team members could be important to the way that the team functions. This leads to the common practice of attempting to improve team performance through the use of time management methods (Claessens *et al*. 2007). Several studies have examined the impact of these techniques on performance. While some of these studies show that time management techniques improve team performance (*e.g.* Barling *et al*. 1996); others show no change in performance (*e.g.* Macan 1994). Mixed results like these suggest the presence of an unknown moderator. The important nature of time and its disruptive power when the team does not agree on time, coupled with its effect on a process that modifies temporal focus, leads us to believe that the moderator must be time-related. Further examination of the instances of poor performance due to failed team clocks leads us to the concept of Temporal Dissonance, which we define as the degree of failure of team members to come to a consensus on the group clock.

In a more basic sense, these disagreements about time are part of the process that the team is using to approach a task. Process conflict, along with task and affect conflict, has been suggested as one impediment to effective team functioning (Jehn 1997). Hinds and Bailey (2003) expanded on this, suggesting a role for time in creating process and affect conflict in teams. Supporting this, Montoya-Weiss *et al*. (2001) found that how time in the team is coordinated can change the performance of virtual teams.

These separate threads of research give us the clues needed to understand why time management techniques show mixed results. Our work will draw upon the work of Jehn (1997), Hinds and Bailey (2003), Hinds and Mortensen (2005), and Gersick (1988 and 1989) to examine our research question: Does Temporal Dissonance moderate the ability of time management to affect the performance of teams?

We will examine the prior work in the streams from which our theory draws in the next section, "Prior Work". The following section, "Theory Development", will describe our new theoretical model based upon that prior work, and propose testable hypotheses based upon that model. After that, the "Method" section will discuss the proposed research methodology to examine the validity of our theory. Since this is a research in progress, we will not have a

"Results" or "Discussion" section; the next following section will be "Expected Contribution", to discuss what implications we feel this research has, followed by "Future Work" with suggestions for possible extensions beyond this research. Again, since this is a research in progress, there will be no conclusions; we close the paper with a simple summary of the research progress.

Prior Work

Team performance has been a concern since the first primitive humans created teams in order to hunt more effectively. Modern study of team performance has been anchored in the model proposed by Tuckman (1965), consisting of four distinct phases: forming, storming, norming, and performing. Later, a fifth phase of adjourning was added (Tuckman and Jensen 1977). Later work found that teams do not move slowly through these phases; rather, they move quickly to a point in the process, stall, and then move rapidly to the next point (Gersick 1988, Gersick 1989). Gersick observed that teams made these transitions reliably at the halfway point of the time available for the task at hand. She dubbed this phenomenon "punctuated equilibrium," and showed empirically not only that the transitions existed, but also that disruption of those transitions could cause problems in team performance (Gersick 1988, Gersick 1989). Labianca *et al.* found a further intriguing fact: when teams operated at non-prototypical times (defined by Labianca *et al.* as 15-minute intervals, starting with the hour), they had trouble making transitions cleanly. Further observation showed that the teams did not come to a consensus on the amount of time for the task, and thus failed to agree as to when the halfway point for the transition would occur (Labianca *et al.* 2005). These are intriguing findings, suggesting that environmental or individual factors can disrupt the group's sense of time.

The failure to agree on transition points reflects a conflict within a team. In this case, the conflict is about the process that the team uses to approach the task; this is one of the types of conflict ("process conflict") proposed by Jehn (1997). Process conflict is defined as disagreement about the methods used to approach the group task on a meta-level. Rather than conflict about proposed solutions (which is "task conflict"), this is conflict about the method of choosing solutions or allocating group resources toward solutions. Process conflict is deleterious to the performance of teams (Jehn and Mannix 2001), and high levels of it can lead to affect conflict, further reducing team performance (Hinds and Bailey 2003, Hinds and Mortensen 2005). This problem may be worse in virtual teams, in which members may have different cultural backgrounds or be in different time zones (Hinds and Bailey 2003, Hinds and Mortensen 2005).

The other two types of conflict defined by Jehn (1997) are task conflict and affect conflict. Task conflict is defined as the interplay of ideas concerning the solution to a group task. Task conflict can be both beneficial and harmful. Low levels of task conflict may result in insufficient exploration of the solution space, leading to a poor choice by the group. High levels of task conflict may lead to "analysis paralysis", in which the group cannot choose between too many possible options. Moderate levels of task conflict, however, are advantageous, as they lead to sufficient exploration of the problem space to identify optimal solutions (Jehn and Mannix 2001).

Affect conflict is personality and mood based conflict among individuals on a team (Jehn 1997). Affect conflict occurs because of personal clashes on the team. Examples of affect conflict are disagreements due to bias (*e.g.* racial bias), perceived personality defects (*e.g.* laziness, stubbornness), or perceived instances of malicious behavior (*e.g.* backstabbing). Affect conflict is directly deleterious to group performance.

Since process conflicts caused by lack of a group clock are so detrimental, the obvious solution would be to implement some form of managerial time management to manage the group processes. These techniques include such activities as list making, prioritization, and scheduling (Macan 1994). However, studies examining this type of solution have yielded mixed results. While some studies have shown positive results (Barling *et al.* 1996), others have shown no effect (Macan 1994). We need to understand why these mixed results occur. Of the studies examined, only Macan offers a theory as to how time management techniques work, by proposing that time management techniques increased perceived control of time, which would then increase team performance. While Macan did find increased perceived control of time, she did not find that this, in turn, increased team performance. An aspect of time has, once again, intruded into the team process, underscoring its importance to team development.

Incorporating time into models can be very difficult to do in a consistent fashion. Ancona *et al.* (2001) suggest an excellent method for examining how time fits into a model. A critical part of their findings is that there are multiple aspects of time, and that theory must inform what aspect is to be used. They suggest that there are three categories of time: Conceptions of Time, Mapping Activities to Time, and Actors Relating to Time. We can see how this can be

used to categorize what is meant by "time" in the discussion we have had to this point. "Time management" usually speaks to Mapping Activities to Time. Individual traits and characteristics, such as morningness/eveningness (Horne *et al*. 1980) or time zone (O'Leary and Cummings. 2007) fall into the Conceptions of Time category. Finally, the emergent clock that groups develop, if and when they develop one, is in the Actors Relating to Time category. Also in that category are some more abstract individual traits such as time urgency (Landy *et al*. 1991) and time perspective (Zimbardo and Boyd 1999). Now we begin to see why these concepts have not lined up well in the previous literature-- they are investigating very different aspects of time, and care must be taken to bridge the categories properly.

Theory Development

The categories of time conceptualization (Ancona *et al*. 2001) give us the last keys we need to understand why, how, and when use of time management techniques will lead to improved team performance. The "Actors Relating to Time" category in particular underscores the socially constructed nature of a group clock. The group clock is formed as an emergent property of the team, created from the interactions of the individual team members, and is then used unconsciously by the team to guide the development of the team. Since the group clock is created from the interaction of the team members, understanding how the clock forms requires that we understand what aspects of the individual members are salient in this creation. The group clock is created from awareness of the passing of time, an ability to estimate its flow, the ability to schedule work against that time, and the ability to actually perform the work as scheduled. Thus, individual characteristics that relate to these aspects would be expected to be the most salient antecedents in the model we are constructing. While there are many ways of examining these characteristics, three in particular would seem to stand out: time urgency, time perspective, and morningness/eveningness. Additionally, in the context of virtual teams, the physical time zone will itself provide an input, as the time zone will modify the actual time for group members.

Time urgency is derived from the Type A personality literature stream (Landy *et al*. 1991). It is characterized as an individual's estimation of the importance of and awareness of the passage of time. Individuals with high time urgency are likelier to express concerns about time, to be more aware of the passage of time, and to engage in behaviors to attempt to maximize the value of their time use. Individuals with lower time urgency will be less concerned with the passage of time and will engage in fewer behaviors directed toward its economization. A disagreement among team members about time urgency will tend to decrease the likelihood of the emergence of the group clock.

Time perspective is a description of the locus of attention of an individual on time (Zimbardo and Boyd 1999). Individuals that are past-oriented will tend to focus on what has happened, and tend to be more concerned that things be done as they have always been done, following the traditions set forth. Present-focused individuals are more concerned with immediate situations, taking into account the current aspects and immediate goals. They are less concerned with distal outcomes and tradition than they are about achieving those immediate goals. Finally, future-oriented individuals are more concerned with the state of the situation to come. While they are aware of past solutions and current situations and goals, they are more concerned with how those will interplay to create future situations. Again, a disagreement among team members as to the temporal focus of the group will hinder the emergence of the group clock

Humans, like all animals, have a natural circadian rhythm (Horne *et al*. 1980). Individuals have a cycle of morningness/eveningness ("larks" and "owls") that characterizes their personal productivity. Larks tend to start the morning quickly and early, getting work done quickly and then relaxing as the day wears on. Owls start later, and have a broader peak of performance, which extends further into the day, and prefer doing more demanding tasks later in the day as a consequence. When one's cycle is disrupted (*e.g.*, by shift work or jet lag), the grasp of time is hurt, and performance also suffers. This morning/evening focus can even evidence itself in the nature of the tasks undertaken. People have the tendency to perform actions related to the start of tasks earlier in the day, and to the end of tasks later in the day. Once again, disagreement among team members as to circadian rhythm will hinder the emergence of the group clock.

Finally, related to the circadian rhythm, physical time differences (time zones) will shift the focus of individual members of a team (O'Leary and Cummings 2007). When team members all occupy one time zone, then they will agree on the physical time, and differences will be limited to the other time characteristics. When the team is scattered across several time zones, then those exacerbate the individual time characteristics previously mentioned,

especially the differences between larks and owls. The dispersion of a group across time zones will hinder the emergence of a group clock.

These four characteristics of each individual in the team explain the group sense of time. When the members of a team have very similar temporal characteristics, a group clock can emerge which reflects those characteristics very easily. Since no individual will have to shift their temporal views much, agreement is simple. However, wider differences in the team member temporal characteristics will tend to disrupt the group clock. When these differences are very large, the group clock may never emerge. This disharmony of group time, then, is defined by how different the individual team members' time perceptions are. We thus define temporal dissonance as the amount of disagreement among team members about the group clock.

From the previous discussion we then formulate our first four hypotheses:

H1A: An increase in the diversity of individual team member temporal urgency will increase temporal dissonance of the team.

H1B: An increase in the diversity of individual team member temporal perspective will increase temporal dissonance of the team.

H1C: An increase in the diversity of individual team member circadian rhythm will increase temporal dissonance of the team.

H1D: An increase in the diversity of individual team member time zones will increase temporal dissonance of the team.

In collocated teams, some of these time differences can be resolved through subtle cues. These cues may be visual, auditory, tactile, or even chemical. In virtual teams, these cues may be attenuated or completely eliminated. The degree of attenuation will be determined by the richness of the medium used for implementing the virtual team. Thus we expect:

H2A-D: Media richness will moderate the effects of each of the temporal characteristics on temporal dissonance. The effects of the temporal characteristic diversity will be strengthened as media richness decreases. Thus, we expect that virtual teams will experience greater temporal dissonance.

Managerial time management techniques work by promoting a more closely defined progression of group actions through time. They help to organize time, to create steps in processes, and to track the passage of time. Organization such as this will reduce the amount of process conflict on the team, as individuals will adjust their expressions of their internal time orientations to follow the pattern prescribed by the time management techniques. Further, the structure these techniques gives to a group depersonalizes any conflict about the group processes, reducing affect conflict. Thus:

H3A: Increased use of time management techniques reduces team process conflict.

H3B: Increased use of time management techniques reduces team affect conflict.

Teams that are high in temporal dissonance have difficulty doing these things; teams that are low in temporal dissonance have a strong group clock emerge that makes those techniques less salient. Thus, we see that temporal dissonance moderates the effects of time management techniques on process conflict.

H4A: Temporal dissonance moderates the effect of time management techniques on team process conflict, such that an increase in temporal dissonance strengthens the effect of time management techniques on team process conflict.

H4B: Temporal dissonance moderates the effect of time management techniques on team affect conflict, such that an increase in temporal dissonance strengthens the effect of time management techniques on team affect conflict.

Process conflict and affect conflict are known to reduce team performance (Hinds and Bailey 2003). Thus, as a check upon our work, and to show the results of temporal dissonance and time management upon their final dependent variable:

**H5A:** Team process conflict decreases team performance

H5B: Team affect conflict decreases team performance

Finally, it can be argued that time management might directly modify the team's experience of temporal dissonance.

We do not think this is the case, for time management has to have something to work on in order for it to be effective; and arguing that it directly impacts temporal dissonance would be arguing that, all else being equal, an increase in time management would lead to a reduction in temporal dissonance. The simplest case to consider that shows this to be problematic would be the case where the antecedents do not create any dissonance. In this case, a direct effects model would still indicate that an increase in time management would cause a decrease in temporal dissonance. Since this would seem illogical, we think that time management and temporal dissonance must interact, rather than time management having direct effects on temporal dissonance. To ensure that our theory is correct, we have the final hypothesis:

H6: Time management techniques do not directly affect temporal dissonance

Figure 1 provides a graphical summary of the research model. (For clarity, we did not include H6, since it hypothesizes that there is no direct effect of time management on temporal dissonance.)

Figure 1. Research Model
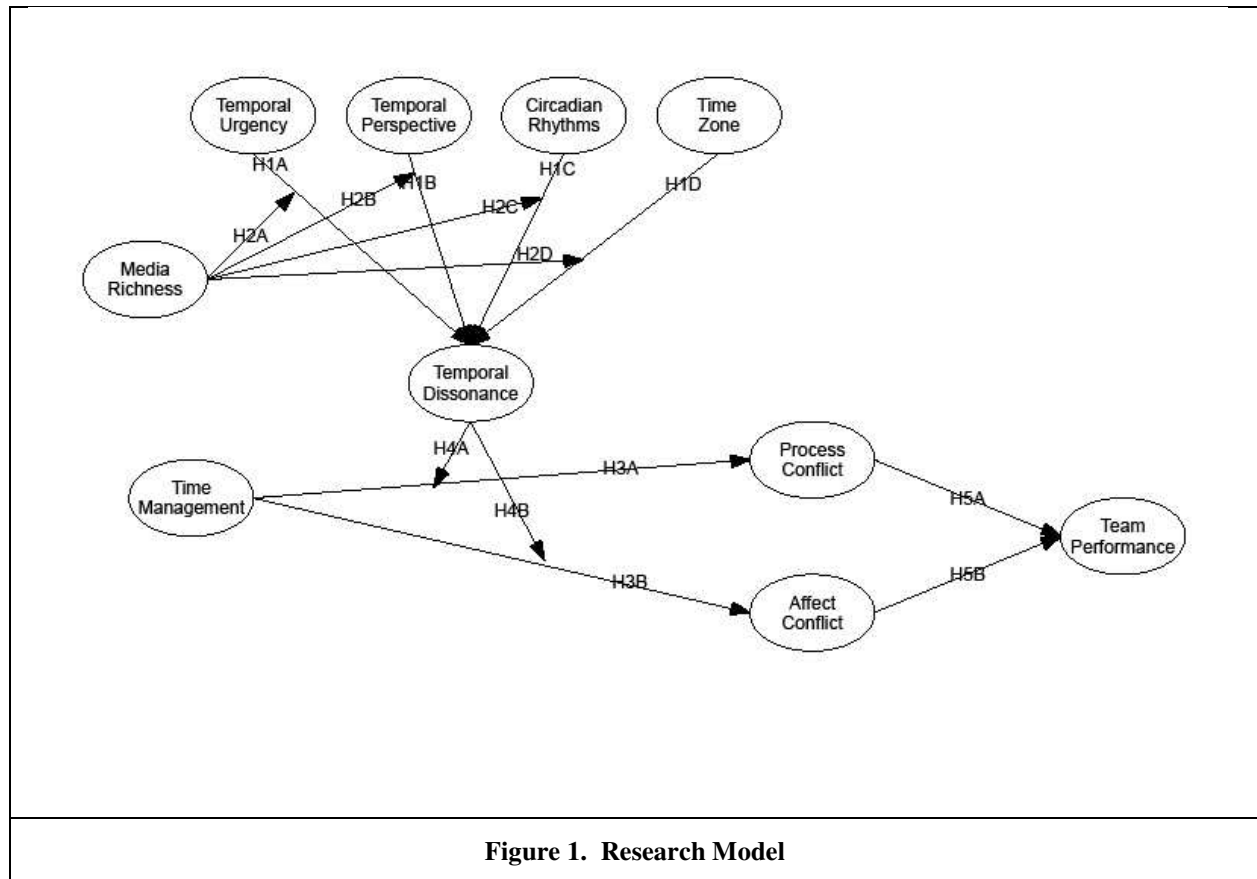
Method

We are currently undertaking a pilot exploratory laboratory study, using mixed methods: some quantitative measures, and some qualitative-style exploration of the experiences of the study respondents. This study consists of creating teams of four people, and operationalizing measurements for the constructs in our model. We will measure time urgency (Landy *et al.* 1991), time perspective (Zimbardo and Boyd 1999), morningness/eveningness (Horne and Östberg 1976), perceived team affect and process conflict (Hinds and Mortensen 2005), perceived team performance (Hinds and Mortensen 2005), and objective team performance. The team will be performing the hidden profiles task (Stasser and Stewart 1992); the objective measure of performance will be a binary value depending on whether they reached the correct conclusion on the task. The team will interact using a chat program, and time management will be manipulated by either allowing the team to function completely on their own, or by providing

suggestions as to scheduling, list making, and time awareness through the session via the chat program. At the end of the process, the participants will be interviewed to attempt to gain further insight into their experiences and perceptions of disjoint time perspectives. We expect completion of this pilot study in September 2008.

Upon completion of the pilot study, we plan to conduct a full quantitative study. Assuming that the pilot study confirms the validity of the task and the manipulation, and the potential existence of the effects we expect, we hope to begin the full study by November 2008. Due to the scale of a laboratory study of this nature, we do not expect to have final results before Spring of 2009.

Expected Contributions

Previous research has shown mixed results for the efficacy of time management on team performance. With this research, we show that the reason for the inconsistencies is the presence of a previously unidentified moderator, temporal dissonance. We have also shown how the strength of this moderator can depend upon individual characteristics of team members and the context of the virtual team. With this new moderator, we show then how time management works through reduction of process and affect conflict to result in improved team performance when temporal dissonance is present.

Our research also has practical implications. By identifying interaction between temporal dissonance and time management techniques, we identify those times when a practitioner can profitably use time management. . It further identifies when those techniques might be most effective, by way of the moderation of temporal dissonance. Also, understanding how the interaction works may make it possible to identify new managerial interventions which can improve team performance.

Future Work

The present work is supported by the results of an exploratory pilot study using mixed qualitative and quantitative methods. While such at study is useful for understanding theory (Lee and Baskerville 2003), further research, including full quantitative studies, will provide more support for the validity of the theory. Finding other temporal aspects which may contribute to, or ameliorate, temporal dissonance would also be useful. Finally, our study is only examining a limited subset of managerial time management techniques. Expanding the techniques studied to find which are more effective would provide better guidelines for practice, as well as potentially illuminating new areas of theory. Finally, integrating this with the stream of research on entrainment will provide further benefit.

Summary

In this study, we have examined the nature of the interaction of various elements of time with team development processes. In the course of this examination, we have identified a new construct, Temporal Dissonance, and identified how it moderates the effect of time management on process and affect conflict in virtual teams. We, in doing so, explained conflicting results as to the efficacy of time management in improving team performance, and identified the mediators (process and affect conflict) through which time management works.

Acknowledgments

References

Ancona, Deborah G., Okhuysen, Gerardo A., and Perlow, Leslie A., "Taking Time to Integrate Temporal Research", *Academy of Management Review* (26:4), 2001, pp. 512-529.
Barling, Julian, Kelloway, E. Kevin, and Cheung, Dominic, "Time Management and Achievement Striving Interact to Predict Car Sales Performance", *Journal of Applied Psychology* (81:6), 1996, pp. 821-826.
Biggs, M., "Assessing risks today will leave corporate leaders well-prepared for the future of work," *InfoWorld*,

September 2000, http://www.infoworld.com/articles/op/xml/00/09/25/000925opbiggs.html, accessed 24 November 2007.

Furst, Stacie A., Reeves, Martha, Rosen, Benson, and Blackburn, Richard S., "Managing the Life Cycle of Virtual Teams", *Academy of Management Executive* (18:2), May 2004, pp. 6-20.

Claessens, Brigitte J. C., van Eerde, Wendelien, Rutte, Christel G., and Roe, Robert A., "A Review of the Time Management Literature," *Personnel Review* (36:2), 2007, pp. 255-276.

Gersick, Connie J. G., "Time and Transition in Work Teams: Toward a New Model of Group Development," *Academy of management Journal* (31:1), 1988, pp. 9-41.

Gersick, Connie J.G., "Marking Time: Predictable Transitions in Task Groups," *Academy of Management Journal* (32:2), 1989, pp. 274-309.

Hinds, Pamela J., and Bailey, Diane E., "Out of Sight, Out of Sync: Understanding Conflict in Distributed Teams," *Organization Science* (14:6), November/December 2003, pp. 615-632.

Hinds, Pamela J., and Mortensen, Mark, "Understanding Conflict in Geographically Distributed Teams: The Moderating Effects of Shared Identity, Shared Context, and Spontaneous Communication", *Organization Science* (16:3), May-June 2005, pp. 290-307.

Horne, J.A., Brass, C.G., and Pettitt, A.N., " Circadian performance differences between morning and evening 'types'," *Ergonomics* (23), 1980, pp. 29-36.

Horne, J.A., and Östberg, O., "Self-assessment questionnaire to determine morningness-eveningness in human circadian rhythms," *International Journal of Chronbiology* (4), 1976, pp. 97-110.

Jehn, Karen A., "A Qualitative Analysis of Conflict Types and Dimensions in Organizational Groups," *Administrative Science Quarterly* (42), 1997, pp. 530-557.

Jehn, Karen A., and Mannix, Elizabeth A., "The Dynamic Nature of Group Conflict: A Longitudinal Study of Intragroup Conflict and Group Performance," *Academy of Management Journal* (44:2), 2001, pp. 248-251.

Kanawattanachai, Prasert, and Yoo, Youngjin, "Dynamic Nature of Trust in Virtual Teams," *Journal of Strategic Information Systems* (11), 2002, pp. 187-213.

Labianca, Giuseppe, Moon, Henry, and Watt, Ian, "When Is an Hour Not 60 Minutes? Deadlines, Temporal Schemata, and Individual and Task Group Performance," *Academy of Management Journal* (48:4), 2005, pp. 677-694.

Landy, Frank J., Rastegary, Haleh, Thayer, Julian, and Colvin, Caran, "Time Urgency: The Construct and Its Measurement," *Journal of Applied Psychology* (76:5), 1991, pp. 644-657.

Lee, Allen S. and Baskerville, Richard L., "Generalizing Generalizability in Information Systems Research", *Information Systems Research* (14:3), September 2003, pp. 221-243.

Macan, Therese Hoff, "Time Management: Test of a Process Model," *Journal of Applied Psychology* (79:3), 1994, pp. 381-391.

Montoya-Weiss, Mitzi M., Massey, Anne P., and Song, Michael, "Getting It Together: Temporal Coordination and Conflict Management in Global Virtual Teams", *Academy of Management Journal* (44:5), 2001, pp. 1251-1262.

O'Leary, Michael Boyer, and Cummings, Jonathon N., "The Spatial, Temporal, and Configurational Characteristics of Geographic Dispersion in Teams", *MIS Quarterly* (31:3), September 2007, pp. 433-452.

Stasser, Garold, and Stewart, Dennis, "Discovery of Hidden Profiles by Decision Making Groups: Solving a Problem Versus Making a Judgment", *Journal of Personality and Social Psychology* (63:3), 1992, pp. 426-434.

Tuckman, Bruce W., "Developmental Sequence in Small Groups," *Psychological Bulletin* (63:6), 1965, pp. 384-399.

Tuckman, Bruce W. and Jensen, M., "Stages of Small-Group Development," *Group and Organizational Studies* (2), 1977, pp. 419-427.

Waller, Mary J., Conte, Jeffrey M., Gibson, Christina B., and Carpenter, Mason A. "The Effect of Individual Perceptions of Deadlines on Team Performance," *Academy of Management Review* (26:4), October 2001, pp. 586-600.

Zimbardo, Philip G., and Boyd, John N., "Putting Time in Perspective: A Valid, Reliable Individual-Differences Metric," *Journal of Personality and Social Psychology* (77:6), 1999, pp. 1271-1288..