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Examining the Relationship Between Time-related Diversity Variables and Team Conflict

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**Examining the Relationship Between Time-related Diversity Variables
and Team Conflict**

(Spine title: Time-related Diversity and Team Conflict)

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by

Erin C. Marcotte

Graduate Program in Psychology

**A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science**

**School of Graduate and Postdoctoral Studies
The University of Western Ontario
London, Ontario, Canada**

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THE UNIVERSITY OF WESTERN ONTARIO
SCHOOL OF GRADUATE AND POSTDOCTORAL STUDIES

CERTIFICATE OF EXAMINATION

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**Examining the Relationship Between Time-related Diversity Variables
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Abstract

This research sought to extend the team diversity literature to examine the relationships between three time-related individual difference variables and team conflict. This study answers the call for team research that incorporates time and outcome variables other than performance or deadline adherence. The present longitudinal study of engineering project teams (N=72), explored how diversity in regards to polychronicity, time urgency and pacing styles affect task and relationship conflict in teams over time. Based on results, polychronicity diversity was positively related to task conflict at Time 1 and relationship conflict at Time 3, while time urgency diversity was negatively related to both task and relationship conflict at Time 2. These results call into question the assumption that the effect of deep-level traits increases over time (Harrison, Price, & Bell, 1998). Strengths, limitations and directions for future research are discussed.

KEYWORDS: Diversity, Teamwork, Conflict, Polychronicity, Time Urgency, Pacing

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Examining the Relationship Between Time-related Diversity Variables and Team Conflict

Given the increased prevalence of work teams in organizations, much attention has been drawn to the composition of these teams. This research sought to determine which combinations of people work best together. There are many ways to examine the compositions of teams. One strategy, which focuses on a particular variable, involves examining the aggregate or mean amount of that trait across the individuals on the team. Alternatively, team composition has been conceptualized as the minimum or maximum variable score of a member of that group. Another way of studying composition is by looking at the diversity, or variety, of that variable for all team members. This deviation of scores represents how much the individuals in the group differ on a given variable. It is this type of team composition that was under investigation in the current study.

Diversity of team members has been studied with respect to different types of variables, which have been labeled "deep" and "surface". Within teams, when diversity on surface, or demographic, variables exists, it means there is heterogeneity in terms of age, gender, ethnicity, organizational tenure, or other similar characteristics that are readily apparent. Diversity on deep, or attitudinal, variables is the extent to which the members of the team differ in their attitudes, values, beliefs, and personalities (Barrick, Stewart, Neubert, & Mount, 1998; Harrison, Price, & Bell, 1998). Harrison and colleagues studied two separate samples of work teams and established that while the effects of some surface variables decreased over time, the effects of some deep variables increased over time. In other words, if a team was highly heterogeneous on surface variables, they experienced more negative consequences (such as decreased cohesion) at

the beginning of their interactions, but after spending more time together the effects were neutralized. The opposite is the case for deep variables, which became more apparent and had more harmful consequences over time. Although this research considered time as a variable, the authors explain that it may actually be information that affects these relationships. It is simply over time (or rather, through rich interactions) that information regarding deep psychological variables is exchanged or learned about other team members. It is this new information that could affect how individuals perceive their fellow team members and reveals deep variables (Harrison et al., 1998).

As one could imagine, there are numerous deep and surface variables that are present and that can be important to groups at the same time. Studies that examine the effects of diversity within teams often consider many different variables, both deep and surface in nature. For the purpose of the present study, what were primarily of interest were certain types of deep variables that have recently received some attention in the team diversity literature: time-related variables (e.g Mohammed & Angell, 2004). Time-related variables are deep variables because they are not readily viewed or easily identified right away, but become evident over time or with increased interaction. This kind of individual difference characteristic often has to do with the perception, use and salience of time for individual team members. The current research study, focused on three time-related individual difference variables: polychronicity, time urgency, and pacing styles. Some previous research has shown that individuals' preferences for different ways of using time can have important implications for outcomes and effective behaviour in the workplace, such as organizational commitment and perceived performance (Slocombe & Bluedorn, 1999). Time usage variables have similarly been

related to team processes, such as conflict (Mohammed & Angell, 2004). In what follows, I begin by reviewing team conflict and then proceed to look at how diversity with respect to the three time-related individual difference variables of interest (polychronicity, time urgency and pacing styles) could affect the amount of conflict experienced by teams.

Team Conflict

The research on intragroup conflict has demonstrated that it can generally be separated into two dimensions, the socio-affective and the cognitive task-oriented types of conflict (Amason, 1996; Jehn, 1995; Pelled, Eisenhardt, & Xin, 1999). In this research, relationship conflict is used to refer to the first type, and task conflict to refer to the second type, as is conceptualized by Jehn. These two types of conflict have received a fair amount of attention in recent teams research, however they have not both been examined in relation to time-related diversity variables, as in the current research. Additionally, conflict is often assessed as if it is a static event, but this research will examine it as a dynamic process that changes over time within a group (Jehn & Mannix, 2001). Another trend in the research on team conflict is that it is often the outcomes rather than the antecedents of conflict that are studied (e.g. Amason, 1996; DeDreu & Weingart, 2003; Jehn, 1995). The present research considered diversity on time-related individual difference characteristics as antecedents of conflict.

Relationship conflict. Research has demonstrated that socio-affective, or relationship, conflict typically has negative effects on group outcomes (De Dreu & Weingart, 2003). Some suggestions as to why relationship conflict hinders group performance are that it reduces mutual understanding and goodwill between members,

and that it diverts members' attention away from the task at hand (Vodeseck, 2007).

Researchers have also proposed that group functioning is impaired due to the negative emotions, such as suspicion and resentfulness, which are caused by relationship conflict. For example, research has demonstrated that relationship conflict is negatively associated with group members' satisfaction with their group (Jehn, 1995, 1997), group members' intent to stay with the group (Jehn, 1995); and positively associated with members' perceptions of inequity (Wall & Nolan, 1986). In terms of outcome, relationship conflict has also been demonstrated to be negatively related to group productivity (Pelled, 1996), and performance as indicated by a variety of measures (Jehn, 1997).

Task conflict. Task conflict, unlike relationship conflict, has sometimes been found to have positive effects on group outcomes, though this is not consistently the case. Previously, researchers have hypothesized that while relationship conflict creates friction in social interactions, conflict that focuses on the task can be beneficial because it forces team members to see contrasting perspectives of an issue, think innovatively and creatively, and question assumptions (Amason & Schweiger, 1994). Some research supports this notion, and has demonstrated that task conflict is positively associated with instructor ratings of group performance in student teams (Jehn, 1994), decision quality in management teams (Amason, 1996), as well as satisfaction with the group decision and a desire to stay in the group (Amason, 1996). However, similar to relationship conflict, task conflict can negatively affect member satisfaction and commitment to the group (Amason, 1996). Task conflict may affect a group differently based on the type of task the group has to complete – that is – whether it is a routine or non-routine task. Jehn (1995) found that in teams performing a routine job, task conflict had a negative effect on

performance, whereas in teams with non-routine tasks, task conflict had a curvilinear effect. In this case, either low or high task conflict was detrimental to the team, but medium levels of task conflict were beneficial to the team's functioning. Despite Jehn's findings about task conflict's positive effect on teams in certain situations, a recent meta-analysis by De Dreu and Weingart (2003) concluded that generally, task conflict is negatively correlated with both member satisfaction with the group and the group's performance.

Diversity and conflict. Research has demonstrated that diversity on both deep and surface variables can lead to conflict, and that conflict is a robust mediator between diversity and performance (Jehn, Northcraft, & Neale, 1999; Pelled et al., 1999). Social identity theory and self-categorization can help to explain why diversity affects conflict in this way (Harrison, Price, Gavin, & Florey, 2002). Research has shown that although in some cases diversity on surface variables is more relevant in the initial stages of a team's interactions, diversity on deep variables becomes more relevant over time (Mohammed & Angell, 2004). Heterogeneity on the deep variables such as Big Five personality traits, cognitive ability, values, and work attitudes have been the main focal point of the team diversity literature (e.g. Jehn, Chadwick, & Thatcher, 1997; Harrison et al., 2002). Among the other types of variables that could be examined are time-related variables, which is the primary focus of the present research.

Time-related variables

Time and temporal variables have been largely neglected in the organizational science literature, though some researchers acknowledge these as important variables and call for more research to include them (Slocombe & Bluedorn, 1999). While research on

individual-level time variables is quite mature, research about how time orientation affects groups is in the earlier stages. The examination of how individual-level time orientations and perceptions affect group processes is important because it integrates the two levels of analysis (Waller, Giambatista & Zellmer-Bruhn, 1998). The dimension of time in teams has not received adequate attention, and some authors (e.g. Marks, Mathieu, & Zaccaro, 2001) have called for a greater examination of this topic. There is some research to support that both group performance and group process may be influenced by time-related individual differences (e.g., Blount & Janicik, 2002; Mohammed & Angell, 2004). There are a number of different ways that researchers have conceptualized time usage. The proposed study focuses on three of these time conceptualizations: Polychronicity, time-urgency and pacing styles.

Polychronicity and monochronicity. The concept of polychronic time use was first developed by Hall (1983), who saw time use as a cultural phenomenon. He distinguished between cultures that conceptualized time in a tangible and “machine-paced” way (monochronic), and those that conceptualized time as being intangible and “nature-paced” (polychronic). Within cultures, individuals also have time use preferences; polychronic and monochronic time orientations account for one such type of preference. Polychronicity is conceptualized as a continuum with polychronic behaviour on one end and monochronic behaviour on the opposite end. On the monochronic end, there is the desire to engage in one activity at a time until it is complete, and at the other end of the polychronicity continuum is the preference to engage in multiple activities simultaneously. Since it is a continuum, there are also other types of intermediate

behaviour, such as engaging in single activities intermittently until they are all complete (Bluedorn, 2002).

True polychronicity does not simply mean using time by switching back and forth between several tasks with each task being focused on monochronically. Rather, polychronic behaviour involves the interspersing and overlapping of tasks as the transition is being made back and forth between them (Bluedorn, 2002). People who tend towards polychronicity (termed "polychrons") are typically not bothered by interruptions and can manage switching between multiple activities at once. Additionally, they perceive this way of doing things as efficient for completing their daily tasks. If someone prefers to do things in a monochronic way (called, "monochrons"), they try to complete their tasks by prioritizing activities, allocating time towards their completion, and strictly planning their course of action (Kaufman-Scarborough & Lindquist, 1999). Beliefs about time have an important place in human cultures (Hall, 1983), and therefore people are socialized about these values from an early age. This likely contributes to the fact that, as research indicates, polychronicity is a relatively stable personality trait (Kaufman-Scarborough & Lindquist). Since individuals in teams and in organizations are likely to differ on this trait, the contrasting approaches to time management may be a source of conflict (Kaufman-Scarborough & Lindquist, 1999).

The idea of polychronicity has been applied at the group level as well as the individual level. Similar to individuals, groups can perform tasks sequentially, finishing one before moving on to the next. If the group acts more polychronically, then it might work on multiple tasks simultaneously, with all group members working on different tasks (Waller et al., 1998). Both individual and group level outcomes may be affected by

the time use preference at either level of analysis (Waller et al., 1998). Research on individuals' preferred polychronicity and the perceived polychronicity of the work group indicates that there are positive individual-level outcomes when there is congruence between the polychronic time styles of both. Slocombe and Bluedorn (1999) surveyed a sample of employed business school graduates about the extent that each individual preferred to act polychronically and that person's perception of the polychronicity of the group (i.e. supervisor and co-workers). They found that congruence between the individual's preferred polychronicity and the perception of group polychronicity was positively related to aspects of the individuals' organizational commitment, perceived level of performance evaluation by the supervisor and by the co-workers, and the perception of fairness in performance evaluations. Researchers have also hypothesized that it is beneficial for team members to share cognitions on time so that they can better accommodate each other's work styles, and that not doing so can cause problems for group processes (Gevers, Rutte, & van Eerde, 2004).

H1a: Team diversity with respect to polychronicity will be positively correlated with task and relationship conflict.

In accordance with work by Harrison and colleagues (1998) that determined that, over time, deep variables such as polychronicity become more apparent and more important to team members, it was hypothesized that the effect time-related variables on conflict would increase over time.

H1b: The polychronicity and conflict relations will strengthen over time

Time urgency. Another type of time-related individual difference variable that is considered to be a relatively stable attribute is that of time urgency (Conte, Landy, &

Mathieu, 1995). An individual's sense of time urgency is that person's awareness and concern about the passage of time, perception of deadlines, how that individual prioritizes tasks, and the rate at which he or she feels it is necessary to work on tasks (e.g. Conte et al., 1995; Landy, Rastegary, Thayer, & Colvin, 1991; Waller et al., 2001). Typically, time-urgent individuals try to fit more activities in their schedule that they will likely be able to complete and therefore often feel rushed and preoccupied with deadlines and time-limits (Waller, Giambatista, & Zellmer-Bruhn, 1998). A sense of high time urgency is the only characteristic that is evident in all people with Type A behaviour and is thus considered the single most significant trait of Type A behaviour pattern (Conte et al., 1995; Landy et al., 1991). In addition to Type A behaviour, time urgency has also been linked to other individual-level outcomes such as task performance (Bingham & Hailey, 1989).

Different types of attention to time by team members can have differing effects on the group as a whole. Since individuals with a high sense of time urgency are more attentive to deadlines, they are more likely to voice concerns about time and timing when in groups or teams (Bingham & Hailey, 1989). A high time-urgent person in a team or group may try to keep the rest of the members focused on timely completion of tasks by imposing strict schedules and issuing warnings about approaching deadlines (Waller, Conte, Gibson, & Carpenter, 2001). Less time-urgent individuals are less concerned with how much time has passed or how much remains, and are more likely to wait until the last minute to begin work on a task (Waller et al., 2001). In this case, it could be beneficial to have a time-urgent team member who acts as a pacer to the group. As Waller and colleagues (1998) suggested, however, there could come a point when having

a team member who is higher on time-urgency could become a distraction or annoyance to team members rather than a catalyst to productivity. Because of the different perception of deadlines that time-urgent and non-time-urgent people have, as well as the different pace at which they work, misunderstandings and conflict may result when there exists heterogeneity on this trait within a team (Waller et al., 2001).

Most research thus far, however, has examined how time urgency affects deadline adherence, which led Waller and colleagues (2001) to call for research to investigate the effects on other group outcomes. The present research addressed this call by focusing on the relationship between diversity on time urgency and both task conflict and relationship conflict within teams. Although various compositions of time-urgent individuals in groups can be examined (e.g. maximum, minimum), diversity is an important aspect to study because individual time urgency becomes relative to that of other members of the group (Waller et al., 1998). Therefore, someone with a high sense of time urgency may have a significant impact in a team of less time-urgent individuals, but not in a group composed of other time-urgent members.

In a related vein, Jansen and Kristof-Brown (2005) found that when an individual's hurriedness matched that of his or her co-workers that person was more satisfied with their work environment and were more likely to engage in helping behaviour. It is a logical extension from this that heterogeneity on time-urgency will disrupt team processes, thereby creating conflict. Since time-urgency affects the way and pace at which individuals' approach a task, it was hypothesized that task conflict would result from diversity on time urgency. It was also hypothesized that relationship conflict would be positively related to heterogeneity on the trait of time urgency because the

incompatibility of perspectives in would create misunderstandings and hostility among team members.

H2a: Team diversity with respect to time urgency will be positively correlated with task and relationship conflict.

H2b: The time urgency and conflict relationships will strengthen over time.

Pacing styles. The third time variable of interest in this research is an individual's pacing preference. One type of pacing style is to work on a task consistently and spread the work out evenly over time. A second type of pacing style exists because some people are more comfortable doing the majority of the work as soon as possible and then having less to do immediately prior to the deadline. Others may prefer to wait until very close to the deadline before completing the majority of work on a task because they would rather work under pressure (Gevers, Rutte, & van Eerde, 2006). Gevers and colleagues (2006) conceptualize these different pacing styles as relatively stable individual characteristics. Since team members are likely to have different pacing styles, they will have differing opinions about how to allocate time and work towards deadlines.

Some past research points toward the proposition that team members' pacing styles can have an impact on group conflict. For example, in their study in which pairs of participants engaged in negotiations, Blount and Janicik (2002) found that partners who had similar preferences for the pace of the negotiations were more content with and effective in their negotiations.

H3a: Team diversity with respect to pacing styles will be positively correlated with task and relationship conflict.

H3b: The pacing style and conflict relationships will strengthen over time.

Method

Participants

Participants in this study were undergraduate students enrolled in a first-year Engineering Design class at the University of Western Ontario. Data for the project were collected through the completion of online questionnaires for which students received a nominal amount of course credit. The Engineering Design class is mandatory for all first-year engineering students and includes a weekly 2-hour design studio component in addition to lecture hours. Students were placed in teams of 3 to 5 people at the beginning of the school year and these teams remained the same across both semesters. During their time in the design studios, students engaged in teamwork activities including solving small design problems, and working on a larger design projects, including a creativity vignette due at the end of the first semester and a major design project due at the end of the second semester.

Surveys were administered at four separate time points throughout the school year. Participation in the surveys fluctuated from 281 to 301 students. At the time of the first data collection, when participation was the highest, the gender breakdown in the sample was 79.1% male and 20.9% female. The sample was predominantly Caucasian (70.1%), and the remaining participants identified themselves as Asian (10.6%), Arabic/East Indian (9.3%), other (6.6%), Southeast Asian (1.3%), Black (1.0%), or Native American (.3%). Detailed demographic information about the sample can be found in Table 1. Originally there were 78 teams, but 6 were deleted from the present sample because team membership changed throughout the year. The sample used in this study therefore consisted of 72 teams of three to five students each.

Table 1

Descriptive Statistics (N = 301)

Variable	Number	Percent
1. Gender		
a. Male	238	79.1%
b. Female	63	20.9%
2. Ethnicity		
a. Arabic/East Indian	28	9.3%
b. Asian	32	10.6%
c. Black	3	1.0%
d. Native American	1	.3%
e. Southeast Asian	4	1.3%
f. Caucasian	211	70.1%
g. Other	20	6.6%

Within each design studio, teams were formed quasi-randomly, based on guidelines set out by the engineering faculty, in an attempt to give all groups the best chance of succeeding. Specifically, students rated their own perceived competency on four skills (analytical, communication, computer, and hands-on), and the researchers then formed groups by distributing the skills among groups as equally as possible (See Appendix B for a copy of the skills questionnaire).

This sample was chosen because of some of the characteristics of the teams and the tasks they completed. First, the student teams worked together for the duration of the school year, allowing them to be examined over time. In addition to two studio hours a week dedicated to teamwork on group learning exercises and larger projects, teams usually met outside of studio hours to work on the projects. The first major task the teams worked on was a Creativity Vignette that was submitted towards the end of the first semester. This project was worth 17.5% of the final course grade and consisted of a seven- to nine-page written report about how the group would design and build a new invention, or how they would improve an existing device.

The primary task that the groups had to complete by the end of the second semester was the design and construction of an apparatus that would improve the student lifestyle. This task necessitated that the group agree on what device they would build and work together to design it, build it and write a report as well as a users' manual. Although they could have worked independently on some aspects of the project, all members of the group had to coordinate themselves in order to complete their projects.

Second, the task was relevant and meaningful for the team members because completion of the project was necessary in order to pass the course and the outcome of

the task, the grade that the project was awarded, affected their overall course grade. The task was therefore interdependent, as was the reward since grades were assigned to the team as a whole. The groups of students that comprised our study sample were thus real teams who worked interdependently towards a common goal.

Procedure

Data were collected at four separate times over the course of the school year. Initial data collection took place at the beginning of the first semester (the second week of September). During the studio sessions when the first set of data was collected, researchers also conducted teambuilding sessions with the newly formed teams. After the skills questionnaires were completed and teams were formed, researchers discussed some helpful hints for teamwork with the students, followed by an exercise that initiated team interaction. The online questionnaire that students completed during this session included demographic information, the Polychronicity-Monochronicity Tendency Scale (Lindquist & Kaufman-Scarborough, 2007), a time urgency measure (adapted from Landy et al., 1991), and a pacing style item (Gevers et al., 2006).

The second data collection time took place towards the end of the first semester (the second week of November). At this point the first group project had been submitted but teams had not yet received performance feedback. Similar to the initial data collection, questionnaires were completed online by students during their studio session. However, at this and the following two data collection time points, students who were not in class also had the opportunity to complete the online questionnaire. To facilitate this, all of the students enrolled in the course received an email with a link directing them to the survey, which could be completed within the week after the in-class data collection.

The relevant measures included in this questionnaire were Jehn's (1995) scales of task and relationship conflict. Contact time for the teams was also collected by having team members indicate how many meetings they had held as well as the average length of meetings. Although this was the second data collection, it will henceforth be referred to as Time 1, as this was the first of three times we collected data on the outcome measure, team conflict.

The third data collection time point, Time 2, data were collected near the beginning of the second semester (the first week of February), while work on the final major project was under way. Conflict measures and contact time data were again collected.

The final questionnaire, providing Time 3 data, was administered to the students near the end of the second semester (the fourth week of March), after the major project was submitted but marks for it were not yet received. In order to allow a longitudinal perspective, conflict measures and contact time were again collected at this time point.

Measures

Polychronicity-Monochronicity Tendency Scale. The Polychronicity-Monochronicity Tendency Scale (Lindquist & Kaufman-Scarborough, 2007) was used to assess the construct of Polychronicity. This is a 5-item scale with self-report Likert-format responses ranging from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). Examples of items on this scale are: "I prefer to do two or more activities at the same time", "Doing two or more activities at the same time is the most efficient way to use my time", and "I am comfortable doing more than one activity at the same time" (See Appendix C for complete list of items). This particular scale is thought to capture five separate tendencies

of polychronicity: reported behaviour, preference for that type of behaviour, comfort with the behaviour, liking of juggle simultaneous activities, and the belief that this type of behaviour is the most efficient way to use time (Lindquist & Kaufman-Scarborough). In contrast to other scales attempting to measure the same construct, the Polychronicity/Monochronicity Tendency Scale is thought to be more general, and measure individual tendencies rather than situation-specific behaviours (for alternative scales, see Kaufman, Lane, & Lindquist, 1991 and Bluedorn, Kaufman, & Lane, 1992). Cronbach's alpha for this scale was .90.

Time Urgency Scale. The time urgency measure (Landy et al., 1991) used in this study was adapted from a version that has 33 items and measures 5 separate dimensions: competitiveness, eating behaviour, general hurry, task-related hurry and speech pattern. The eating behaviour dimension was not considered to be an important dimension in the present research, and therefore items related to that dimension were excluded from questionnaires. This left 28 items which participants responded to by indicating their agreement with the statements on a 5-point Likert scale ranging from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Examples of items included in this measure are: "I often feel pressured for time", "I am more restless and fidgety than most people", "I am a slow, deliberate talker" (See Appendix D for list of items). Cronbach's alpha for the time urgency measure was .79.

Pacing Styles Scale. The measure used to assess Pacing style is a single-item measure that asks respondents to indicate their pacing style by choosing from five graphs illustrating the acceleration or deceleration of task activities over time (Gevers et al., 2006). The options range from *early action pacing style* to *deadline action pacing style*.

The third option, in the middle, is a *constant action pacing style*, and options 2 and 4 are considered *moderate tendencies* (See Appendix E).

Conflict. Jehn's (1995) Conflict scales were used to assess task and relationship conflict within teams. These 4-item scales both require respondents to rate the extent to which they experience certain feelings about their group using a Likert scale with responses ranging from 1 (*none*) to 5 (*a great deal*). Examples of items that assess relationship conflict are: "How much friction is there among members in your team?" and "How much are personality conflicts evident in your team?". Some of the items that assess task conflict are: "How frequently are there conflicts about ideas in your team?", and "To what extent are there differences of opinion in your team?" (See Appendix F for a list of all items). At Time 1, Cronbach's alpha was .84 for task conflict and .79 for relationship conflict.

Time. Given the longitudinal nature of the current study, the time construct was very important. Time was construed in two distinct ways: in terms of the chronological passage of time and in terms of contact time. Time was construed chronologically in the sense that outcomes measures were administered at three different time points over the eight months of the school year. This allowed us to take a snapshot of groups at distinct points in time as the task deadline approaches.

Contact Time. Contact time was assessed by having participants report at Time 1, 2 and 3 about the number of meetings held outside of the scheduled studio time, and the average meeting length. At Time 1, individuals' responses about the number of meetings and meeting length were multiplied and then averaged per group to get an idea of how much time they had spent together. At subsequent time points, the product of individuals'

responses were summed with those of the prior time point(s) and then averaged per groups. Despite the fact that a certain amount of time was allocated for meetings in studios, teams differed in the amount of time they actually spent together because groups met outside of the classroom to differing extents. It was thought to be important to capture Contact Time because this conceptualization of the time construct may tell us more about the richness of interaction and the exchange of information among group members than simply the chronological passage of time.

Results

Means, standard deviations and intercorrelations of all study variables are presented in Table 2.

Confirmatory factor analysis

Given that the task and relationship conflict constructs were so highly correlated at all time points, it seemed possible that the eight conflict items on Jehn's (1995) scales represented a general conflict construct, rather than two separate and distinct types of conflict. Confirmatory factor analyses for each time point were conducted using EQS 6.1 to determine how well a one-factor model as well as the proposed two-factor model fit the data. The statistical criteria used to decide which model best fit the data were the chi-square, the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). Results for the CFI¹ and RMSEA², two statistics that are generally well

¹ The CFI (Bentler, 1990) ranges from zero to one with higher values indicated a better fit. Although cutoffs have been proposed further research has indicated that these should not be rigidly adhered to (see Goffin, 2007). Nonetheless, values in the range of .90 are typically indicative of a reasonably well-fitting model.

² Lower values on the RMSEA (MacCallum et al., 1996) indicate a better fit with the proposed model. Proposed cutoffs specify that values less than .10 may indicate a minimally acceptable fit, values less than .08 may indicate a fair fit, and values less than .05 may indicate a close fit (MacCallum et al., 1996).

Table 2

Means, Standard Deviations and Intercorrelations of IVs and DVs

	Mean	SD	1	2	3	4	5	6	7
<i>Independent Variables</i>									
1. Polychronicity SD	1.22	.46							
2. Polychronicity Mean	4.12	.67	-.11						
3. Time Urgency SD	.32	.14	.02	.05					
4. Time Urgency Mean	3.22	.19	-.05	.04	.04				
5. Pacing Style SD	.94	.49	-.02	.02	.15	.22			
6. Pacing Styles Mean	3.66	.45	.05	.05	-.04	-.21	-.57**		
7. Pacing Style (Blau)	.49	.20	-.03	-.07	.21	.00	.77**	-.43**	
<i>Conflict</i>									
8. Time 1 Task Conflict	2.21	.45	.23	-.06	-.13	.09	.02	-.01	-.06
9. Time 1 Rel. Conflict	1.72	.52	.07	-.11	-.16	.13	.08	-.05	-.03
10. Time 2 Task Conflict	2.25	.45	.02	.04	-.28*	.21	.10	-.11	.01
11. Time 2 Rel. Conflict	1.69	.52	.00	-.01	-.32**	.42**	.13	-.08	-.08
12. Time 3 Task Conflict	2.32	.52	.17	.09	-.15	.22	.03	-.02	-.09
13. Time 3 Rel. Conflict	1.89	.53	.23*	-.03	-.13	.29*	.10	-.05	-.05
<i>Time</i>									
14. Time 1 Contact Time	572.38	341.78	-.13	-.34**	.13	.03	.13	-.14	.09
15. Time 2 Contact Time	1176.61	758.19	-.20	-.26*	.03	.09	-.01	-.05	-.01
16. Time 3 Contact Time	1884.81	1184.76	-.20	-.24	-.01	.09	.06	-.11	.02

Table 2 (continued)

	8	9	10	11	12	13	14	15	16
<i>Independent Variables</i>									
1. Polychronicity SD									
2. Polychronicity Mean									
3. Time Urgency SD									
4. Time Urgency Mean									
5. Pacing Style SD									
6. Pacing Styles Mean									
7. Pacing Style (Blau)									
<i>Conflict</i>									
8. Time 1 Task Conflict									
9. Time 1 Rel. Conflict	.70**								
10. Time 2 Task Conflict	.46**	.36**							
11. Time 2 Rel. Conflict	.43**	.61**	.67**						
12. Time 3 Task Conflict	.47**	.34**	.65**	.53**					
13. Time 3 Rel. Conflict	.39**	.48**	.52**	.71**	.78**				
<i>Time</i>									
14. Time 1 Contact Time	-.03	-.05	-.03	-.03	.07	.08			
15. Time 2 Contact Time	-.08	-.01	-.09	.02	.02	.05	.86**		
16. Time 3 Contact Time	-.08	-.03	-.08	.03	-.04	.00	.84**	.97**	
<i>Note. N = 72.</i>									
* $p < .05$ (two-tailed); ** $p < .01$ (two-tailed)									
(Rel.) Relationship									

accepted in the literature, indicate that the two-factor model was a better fit at all three time points. Consideration of the chi-square statistic indicates the same result.

Subtracting the smaller chi-square (from the two-factor model) from the larger chi-square (from the one-factor model) provides the chi-square difference between the models. If the difference is larger than 6.63 (the cut-off at the .01 level with 1 degree of freedom), then this indicates that the two-factor model is the superior fitting model. Examination of the data (Appendix G), shows that this is clearly the case.

Since the two-factor model was supported, regression analyses were conducted using task and relationship conflict as separate constructs, as originally proposed.

Team diversity measures

The three time usage and perception variables in this study were measured at the individual level, but were analyzed at the group level. Particularly of interest was the diversity, or heterogeneity, of these traits within groups. Harrison and Klein (2007) recommend using the simple standard deviation (SD) when heterogeneity is construed as separation, as in the current study. Therefore, the simple SD for polychronicity, time urgency and pacing style was computed for each team in order for group-level analyses to be conducted.

Given how it is measured, pacing style can be thought of as a categorical variable. For this reason, Blau's index of heterogeneity (1977) was used to compute groups' diversity on this variable. Categorical diversity scores are computed using the following equation: $(1 - \sum p_i^2)$, where p is the proportion of group members in the i th category. In this case i represents the five types of pacing style participants identified themselves as having. For example, imagine a four-person team with three people who identified

themselves as having a constant action pacing style and one who identified himself as having a deadline action pacing style. In this case 75% of the group has one style and 25% has another. The equation for this group would be $1 - \Sigma (.75^2) + (.25^2)$, or $1 - \Sigma (.56) + (.06)$, and the overall diversity score is .38. Diversity scores obtained using Blau's index can vary from 0 (indicating that the group is homogenous on the trait in question) to 1 (indicating complete heterogeneity).

Aggregation

Team members provided ratings of conflict based on their individual perceptions. It is assumed that these perceptions should be shared among all team members, since they provided ratings about the same group-level construct. In order to obtain a conflict score for the team as a whole, the individual ratings were aggregated. It is recommended that this aggregation be justified (Klein & Kozlowski, 2000). One way to justify the aggregation of team conflict is by demonstrating within-group agreement (r_{wg}) (James, Demaree, & Wolf, 1993). The r_{wg} statistic is typically used to indicate the extent to which raters are interchangeable. When the r_{wg} value is .70 and above, the team member ratings converge enough that the construct is considered to be meaningful at the group level. Values below .70 are not considered acceptable levels of agreement, and therefore aggregation would not be justified (Klein & Kozlowski).

The mean r_{wg} of the 72 teams was calculated for task and relationship conflict at all three time points. These ranged from .83 to .90, indicating adequate within-group agreement in all cases (see Appendix H for mean r_{wg} statistics).

In addition to within-group agreement on group-level constructs, some authors have suggested that between-group heterogeneity also be demonstrated (e.g., Ployhart &

Schneider, 2005; Yammarino & Markham, 1992). Within-group variability compared to between-group variability can be assessed by the intraclass correlation coefficient (ICC1). It is interpreted as the percentage of variance in individual-level ratings that are explained by the group-level construct (Ployhart & Schneider, 2005). The range of values for ICC(1) is typically from zero to .5, with a median of .12 (James, 1982; Ostroff, 1992). ICC(2) provides an estimate of the reliability of group means and is also recommended when justifying aggregation. ICC(2) values of .70 and higher are considered to be reliable (Ployhart & Schneider). The ICC(1) and ICC(2) values were calculated for task and relationship conflict at all three time points. At Time 1, ICC(1) and ICC(2) for task conflict were .28 and .60, respectively, and for relationship conflict were .41 and .74. At Time 2, ICC(1) and ICC(2) for task conflict were .27 and .59, and were .37 and .71 for relationship conflict. ICC(1) and ICC(2) values for task conflict at Time 3 were .23 and .54, and for relationship conflict were .23 and .54. Taken together, the r_{wg} , ICC(1) and ICC(2) values support the aggregation of the task and relationship conflict constructs to the team level.

Control variables

As recommended by Becker (2005), control variables that were uncorrelated with the dependent variable, either task or relationship conflict, were excluded from regression equations so as not to reduce power. Thus, the only control variable used was the mean level of the diversity trait in question when it was correlated with the dependent variable. This was only the case for mean time urgency, which was correlated with task and relationship conflict at Time 2. Otherwise, no additional control variables were entered into regression equations.

Regression analyses

All main and interaction effects were tested using a series of a hierarchical moderated multiple regression analyses for each separate independent variable with each conflict variable at all three time points. This method is in line with arguments made by Lees and Neufeld (1994).

Control variables as well as the mean level of either task or relationship conflict from the prior time point were entered into the regression at the first step. The prior mean conflict level was entered in order to account for the conflict that already existed within the group. Regression equations for Time 2 thus included mean conflict score from Time 1, and regression equations for Time 3 included the mean conflict score from Time 2. There was no such control variable for Time 1. The second step tested the main effects, and therefore the polychronicity, time urgency or pacing style diversity score was entered alone at this point. In the final step, the contact time variable and the interaction term (diversity x contact time) were entered. Before being multiplied together to create the interaction terms, the continuous independent variables were centered by subtracting the scale mean.

Hypothesis Tests

For ease of interpretation, the main effects and interaction effects will be presented together for each of the three time-related individual difference variables.

The tests of interaction effects are conducted to determine if the relations between the deep-level variables are amplified over time. As previously mentioned, time was construed in two different ways in the current study. The regression method examines the relations between the time-related individual difference variables and conflict when time

is construed as the number of minutes a team spent together. In order to compare the interaction effects using chronological time (across data points), rather than contact time the results from Time 1, Time 2 and Time 3 were compared.

Polychronicity: Time 1. Hypothesis 1a postulated that diversity on the trait of polychronicity would predict both task and relationship conflict in teams. This variable did not predict relationship conflict at Time 1 but did significantly predict task conflict at Time 1 ($\beta = .24, p < .05$), such that a greater level of diversity on this trait were related to higher levels of task conflict in the team (see Table 3).

Polychronicity: Time 2. Neither of the regression equations that included polychronicity, along with the mean conflict score from the prior time point, as predictors of task or relationship conflict at Time 2 were significant (see Table 4).

Polychronicity: Time 3. At Time 3, polychronicity was a significant predictor of relationship conflict ($\beta = .22, p < .05$), but not of task conflict (see Table 5). Diversity on the trait of polychronicity was only a significant predictor of task conflict at Time 1 and of relationship conflict at Time 3. Thus, this hypothesis was only partially supported.

Polychronicity over time. Based on the results of the main effects for polychronicity at all three time points, it seems that the effect of this variable on task and relationship conflict does change as time progresses. Hypothesis 1b predicts that the relationship would strengthen over time, and the results of the main effects indicated that while this seems to be true of relationship conflict, it might be the opposite for task conflict as that effect is strongest at Time 1.

Polychronicity and contact time. Since time in this study has also been construed as the amount of time teams actually spent together, Hypothesis 1b was also tested by

Table 3

Regression Analysis of Polychronicity Diversity x Contact Time on Task and Relationship Conflict at Time 1

Variable	Time 1	
	Task Conflict β	Relationship Conflict β
<i>Main effects</i>		
Polychronicity Diversity	.24*	.06
ΔR^2	.06*	.00
R^2	.06	.00
<i>Interaction</i>		
Polychronicity SD x Contact Time	.03	.14
ΔR^2	.00	.02
Total R^2	.06	.02
Overall F	1.37	.46

Note. $N = 72$.

** $p < .01$; * $p < .05$

Table 4

Regression Analysis of Polychronicity Diversity x Contact Time on Task and Relationship Conflict at Time 2

Variable	Time 2	
	Task Conflict β	Relationship Conflict β
<i>Control</i>		
Conflict Time 1	.47**	.59**
ΔR^2	.22**	.35**
<i>Main effects</i>		
Polychronicity Diversity	-.10	-.04
ΔR^2	.01	.00
R^2	.23	.35
<i>Interaction</i>		
Polychronicity SD x Contact Time	-.14	-.13
ΔR^2	.22	.01
Total R^2	.26	.37
Overall F	5.29**	8.96**

Note. $N = 72$.

** $p < .01$; * $p < .05$

Table 5

*Regression Analysis of Polychronicity Diversity x Contact Time on Task and Relationship**Conflict at Time 3*

Variable	Time 3	
	Task Conflict β	Relationship Conflict β
<i>Control</i>		
Conflict Time 2	.67**	.70**
ΔR^2	.45**	.49**
<i>Main effects</i>		
Polychronicity Diversity	.13	.22*
ΔR^2	.02	.05*
R^2	.47	.54
<i>Interaction</i>		
Polychronicity SD x Contact Time	-.06	-.04
ΔR^2	.00	.00
Total R^2	.47	.54
Overall F	13.17**	17.12**

Note. $N = 72$.

** $p < .01$; * $p < .05$

means of a moderated multiple regression using the contact time and polychronicity interaction as a predictor (see Tables 3, 4 & 5). None of the results of the tests of the interaction reached significance.

Time Urgency: Time 1. Hypothesis 2a predicted that task and relationship conflict in teams would be predicted by diversity in terms of time urgency. A significant regression model was not obtained for either type of conflict at Time 1 (see Table 6).

Time Urgency: Time 2. Time urgency diversity did significantly predict both task ($\beta = -.25, p < .05$), and relationship conflict ($\beta = -.25, p < .01$) at Time 2, though it was not in the predicted direction (see Table 7). That is, Time 2 regression results indicate that as time urgency diversity increases, task and relationship conflict decreases. Hypothesis 2a was therefore not supported based on Time 2 results.

Time Urgency: Time 3. Similar to results for the relationship between time-urgency diversity and conflict at Time 1, neither of the regression equations for task nor relationship conflict was significant at Time 3 (see Table 8). Again at this time point, there was no support for Hypothesis 2a.

Time Urgency over time. Regarding the relationship between time urgency and conflict, Hypothesis 2b suggested that this relationship would strengthen across time points. Although, based on the results of the main effects, the relationship between time urgency and conflict does change from Time 1 to Time 2, the trend does not continue, nor is it in the predicted direction.

Time Urgency and contact time. The tests of the interaction effects using the contact time and time urgency interaction as a moderator also do not support Hypothesis 2b as all of the tests failed to reach significant (see Tables 6, 7 & 8).

Table 6

Regression Analysis of Time Urgency Diversity x Contact Time on Task and Relationship Conflict at Time 1

Variable	Time 1	
	Task Conflict β	Relationship Conflict β
<i>Main effects</i>		
Time Urgency Diversity	-.09	-.12
ΔR^2	.01	.01
R^2	.01	.01
<i>Interaction</i>		
Time Urgency SD x Contact Time	.00	.07
ΔR^2	.00	.01
Total R^2	.01	.02
Overall F	.20	.40

Note. $N = 72$.

** $p < .01$; * $p < .05$

Table 7

*Regression Analysis of Time Urgency Diversity x Contact Time on Task and Relationship**Conflict at Time 2*

Variable	Time 2	
	Task Conflict β	Relationship Conflict β
<i>Control</i>		
Conflict Time 1	.47	.54**
Time Urgency Mean		.36**
ΔR^2	.22**	.48**
<i>Main effects</i>		
Time Urgency Diversity	-.25*	-.25**
ΔR^2	.06*	.06**
R^2	.53	.54
<i>Interaction</i>		
Time Urgency SD x Contact Time	-.02	-.06
ΔR^2	.00	.00
Total R^2	.53	.54
Overall F	6.16**	14.48**

Note. $N = 72$.

** $p < .01$; * $p < .05$

Table 8

*Regression Analysis of Time Urgency Diversity x Contact Time on Task and Relationship**Conflict at Time 3*

Variable	Time 3	
	Task Conflict β	Relationship Conflict β
<i>Control</i>		
Conflict Time 2	.67**	.71**
Time Urgency Mean		-.02
ΔR^2	.45**	.49**
<i>Main effects</i>		
Time Urgency Diversity	.02	.10
ΔR^2	.00	.01
R^2	.45	.50
<i>Interaction</i>		
Time Urgency SD x Contact Time	-.09	-.12
ΔR^2	.01	.01
Total R^2	.46	.51
Overall F	12.41**	12.00**

Note. $N = 72$.

** $p < .01$; * $p < .05$

Pacing Style: Times 1, 2 and 3. Hypothesis 3a posited that diversity of individuals' pacing styles in teams would be a predictor of task and relationship conflict. This hypothesis was tested in two ways. In one set of regression equations the simple standard deviation was used to represent pacing styles diversity (see Tables 9, 10 & 11). In a separate set of regression equations the score obtained using Blau's (1977) index of heterogeneity for categorical variables was used (see Tables 12, 13 & 14). The data did not support the hypothesis since none of the regression models were significant.

Pacing style over time. Hypothesis 3b proposed that pacing style diversity in teams would become a stronger predictor of task and relationship conflict over time. Examined as chronological time, this does not seem to be the case as none of the main effects were significant at any time point.

Pacing style and contact time. This hypothesis was also tested using contact time as a moderating variable in regression analyses, and none of these were significant (see Tables 9 - 14). Thus, there was no support for Hypothesis 3b.

Discussion

This research was designed to examine the relations between heterogeneity in terms of time-related variables and group conflict. In line with much of the previous literature about the effects of diversity in teams, results were inconsistent (e.g Horwitz & Horwitz, 2007; van Knippenberg & Schippers, 2007). In the following paragraphs, some possible explanations for these results are examined.

Main Effects

The main effects of diversity with respect to polychronicity, time urgency and pacing styles on team conflict were varied and seemed to follow different patterns.

Table 9

*Regression Analysis of Pacing Styles Diversity x Contact Time on Task and Relationship**Conflict at Time 1*

Variable	Time 1	
	Task Conflict β	Relationship Conflict β
<i>Main effects</i>		
Pacing Styles Diversity	-.07	-.02
ΔR^2	.01	.00
R^2	.01	.00
<i>Interaction</i>		
Pacing Styles SD x Contact Time	-1.27	-.18
ΔR^2	.03	.03
Total R^2	.03	.03
Overall F	.66	.65

Note. $N = 72$.

** $p < .01$; * $p < .05$

Table 10

Regression Analysis of Pacing Styles Diversity x Contact Time on Task and Relationship Conflict at Time 2

Variable	Time 2	
	Task Conflict β	Relationship Conflict β
<i>Control</i>		
Conflict Time 1	.47**	.59**
ΔR^2	.22**	.35**
<i>Main effects</i>		
Pacing Styles Diversity	.12	.10
ΔR^2	.02	.01
R^2	.24	.36
<i>Interaction</i>		
Pacing Styles SD x Contact Time	-.07	-.06
ΔR^2	.01	.00
Total R^2	.24	.36
Overall F	5.01**	8.84**

Note. $N = 72$.

** $p < .01$; * $p < .05$

Table 11

Regression Analysis of Pacing Styles Diversity x Contact Time on Task and Relationship Conflict at Time 3

Variable	Time 3	
	Task Conflict β	Relationship Conflict β
<i>Control</i>		
Conflict Time 2	.67**	.70**
ΔR^2	.45**	.49**
<i>Main effects</i>		
Pacing Styles Diversity	-.05	-.02
ΔR^2	.00	.00
R^2	.45	.49
<i>Interaction</i>		
Pacing Styles SD x Contact Time	.01	-.09
ΔR^2	.00	.01
Total R^2	.45	.50
Overall F	12.23**	14.58**

Note. $N = 72$.

** $p < .01$; * $p < .05$

Table 12

Regression Analysis of Categorical (Blau) Pacing Styles Diversity x Contact Time on Task and Relationship Conflict at Time 1

Variable	Time 1	
	Task Conflict β	Relationship Conflict β
<i>Main effects</i>		
Categorical Pacing Styles Diversity	-.11	-.06
ΔR^2	.01	.00
R^2	.01	.00
<i>Interaction</i>		
Categorical Pacing Styles SD x Contact Time	-.51	-.57
ΔR^2	.02	.03
Total R^2	.03	.03
Overall F	.74	.67

Note. $N = 72$.

** $p < .01$; * $p < .05$

Table 13

Regression Analysis of Categorical (Blau) Pacing Styles Diversity x Contact Time on Task and Relationship Conflict at Time 2

Variable	Time 2	
	Task Conflict β	Relationship Conflict β
<i>Control</i>		
Conflict Time 1	.47**	.59**
ΔR^2	.22**	.35**
<i>Main effects</i>		
Categorical Pacing Styles Diversity	.06	-.07
ΔR^2	.00	.01
R^2	.23	.36
<i>Interaction</i>		
Categorical Pacing Styles SD x Contact Time	-.07	-.13
ΔR^2	.00	.00
Total R^2	.23	.36
Overall F	4.62**	8.65**

Note. $N = 72$.

** $p < .01$; * $p < .05$

Table 14

Regression Analysis of Categorical (Blau) Pacing Styles Diversity x Contact Time on Task and Relationship Conflict at Time 3

Variable	Time 3	
	Task Conflict β	Relationship Conflict β
<i>Control</i>		
Conflict Time 2	.67**	.70**
ΔR^2	.45**	.49**
<i>Main effects</i>		
Categorical Pacing Styles Diversity	-.10	-.03
ΔR^2	.01	.00
R^2	.46	.49
<i>Interaction</i>		
Categorical Pacing Styles SD x Contact Time	.13	-.27
ΔR^2	.00	.01
Total R^2	.46	.50
Overall F	12.67**	14.65**

Note. $N = 72$.

** $p < .01$; * $p < .05$

Although some significant effects were observed, diversity on these traits most often did not significantly predict conflict. The fact that each of the three variables predicted conflict in distinctive ways and to differing extents warrants further analysis. We will begin with a discussion of the main effects of diversity on the trait of polychronicity, followed by time urgency and lastly, pacing styles.

Polychronicity. The results of the current study indicate that diversity on the trait of polychronicity was positively related to task conflict at Time 1, but was not significantly related to task conflict at either of the other two time points. There is a viable explanation for the existence of the relation at the first but none of the subsequent time points. However, this explanation relies on the belief that the team members were able to perceive this deep level difference early on. Although this seems contrary to what was hypothesized, it is possible that the timing was off and that conflict data were collected after the team members had gotten to know each other well enough to notice this type of difference. Conflict data were first collected approximately three months after the formation of the teams, and it is therefore possible that this is a long enough period of time for deep-level traits to emerge. If this is the case, then at this earlier stage of the team's existence, perhaps members have noticed that others in their team manage their time either more or less polychronically than themselves, but they have not yet learned how to deal with these differences. Additionally, it may be at this point that differences in time management style emerge, because groups must decide how to allocate time and divide tasks. Should team members have different notions of the most efficient way to use time, they may disagree about how to proceed with the projects, thus creating task conflict. Once a plan is made and work is divided, individuals may be able to work

somewhat more independently and in their own preferred way. For this reason, diversity in terms of polychronicity may predict task conflict at Time 1, but as progress on tasks increases, the strength of the relation will lessen.

Relationship conflict was also significantly positively predicted by polychronicity diversity at Time 3. This pattern of results may make sense when we take into consideration the significant prediction of task conflict at Time 1. While different styles of time management may lead to task conflict initially, these differences within the group may not cause tension between member relations so early on. Though diversity on polychronicity may cause disagreements about the task that will be worked out, differences on this trait may begin to cause friction between members on a more personal level over time. In other words, team members may learn how to deal with the task conflict that results from diversity in regards to polychronicity early on, but may still be irritated by these differences on a more personal level, allowing relationship conflict to develop.

Time urgency. In contrast to polychronicity, diversity on time urgency *negatively* predicted task, relationship as well as general team conflict at one of three time points. Though the prediction at Time 2 was significant for both types of conflict, the results were in the opposite direction to that hypothesized. These results are not in line with those obtained by Mohammed and Angell (2004), who found no significant effects when they examined the effect of time urgency diversity on relationship conflict.

Time 2 in the current study is when teams would likely have been working on their final major project, but not quite approaching the deadline. At both Time 1 and Time 3 groups had handed in their projects (either the creativity vignette or the final

design project) but had not yet received performance feedback. Perhaps the fact that Time 2 is when groups are in the middle of working on a task is important when we consider the effect that diversity on time urgency has on the group. Specifically, perhaps at this point team members acknowledge that it is beneficial to have people with different degrees of time urgency. Diversity on this trait could be favourable because, while it is important to have at least one person who is high on time urgency to act as a pacer to the group (Waller et al., 2001), it is not advantageous to have a group of all one type or another. A team with members who are all high on time urgency may be too stressed out and focused on the passage of time, whereas a group of members all low on this trait may experience conflict because no one is pressed to get the work done.

Pacing styles. Heterogeneity of pacing styles among team members was unrelated to both task and relationship conflict at all three time points studied. Given the fact that previous research has indicated that pacing styles have important effects on team processes Blount and Janicik (2002), and outcomes (Gevers, Classens, Van Eerde, & Rutte, 2008), this is surprising.

Perhaps the measure used did not adequately capture the different types of pacing styles that existed within this sample. A later version of this measure developed by Gevers and colleagues (2008) is a similar one-item scale, but two of the five response options were different. Rather than option 2 and 4 being moderate tendencies of the scale extremes (early action and deadline pacing styles), the newer version of the measure replaces these response choices with U-shape and inverted U-shape graphs. The U-shape curve would indicate a preference for intense periods of work towards both the very beginning and very end of the project timeline, without much work being done between

these two time points. In contrast, the inverted U-shape would indicate that most of the work for the task is completed approximately halfway towards the deadline. It is possible that this version of the measure is a better representation of the pacing styles preferences that exist in the population and therefore may have obtained different results. Previous studies that have used this newer version of the item found that 44% of one sample and 34.2% of another sample endorsed either the U-shape or inverse U-shape graph as their preferred pacing style (Gevers et al.). In one of these studies, the U-shape pacing preference was significantly correlated with job performance and effectiveness. Given the significant relationship to team outcomes, it is possible that this pacing style may also be important to team processes, such as conflict.

Over time effects. The hypotheses regarding the over time effects were based on the argument that effects of deep psychological traits increases over time as team members get to know each other better (Harrison et al., 1998). In past research (e.g. Chatman & Flynn, 2001; Harrison et al., 2002), significant relationships with contact time were found, but this was not the case in the current study. The lack of significant interaction effects is puzzling.

One possible explanation as to why the contact time results were not as predicted is that it is unclear when is best to measure the passage of time. It is difficult to decipher when a group may have spent enough time together to notice differences on deep level traits. Furthermore, it is unclear how long it will take conflict to develop, and perhaps be resolved, based on these differences. In this study, conflict was measured for the first time at approximately three-months after the group's inception. Depending on the variable in question, this may already be too late to capture contact time effects. Perhaps

most participants would have already acknowledged individual differences and determined ways to work around them. Alternatively, the eight-month time period in which this study took place may not be long enough to assess over-time effects. This issue of when is best to measure outcome variables in order to evaluate the effects over time likely differs across variables, groups, and contexts.

The time-related variables under investigation in the present research have rarely been examined longitudinally. Perhaps the effect of this type of trait over time follows a different trajectory than other deep-level variables specifically because these variables are *about* time. Polychronicity, time urgency and pacing styles all concern the perception and usage of time. Thus, the passage of time and approach of deadlines may affect the intensity or pattern of relationships between these traits and outcome variables differently than it would affect other deep level traits. In other words, as time passes and group members get to know each other better, the deadline also approaches. The proximity to the deadline may be particularly relevant to how these traits affect the group. Groups tend to act differently as a deadline approaches. Specifically, Waller, Zellmer-Bruhn, and Giambatista (2002) found that attention to time increases as a deadline nears. When team members begin paying more attention to timing, time-related diversity variables may be of greater importance. Instead of becoming increasingly salient over time, as is the case with certain deep level variables such as satisfaction (Harrison et al., 1998), these variables may be salient right before a deadline, but not be as important to group members at other times. For example, heterogeneity on time urgency may not have as strong of an effect on conflict after a deadline is reached, but could be quite salient to the group members when nearing a deadline.

There is no single explanation for all of the results that were obtained. Each deep level variable, including these three time-related variables, might be quite different in terms of how their effects strengthen or weaken over time.

Interaction Effects

Another surprising finding was that none of the interaction hypotheses involving contact time proved to be significant. This could be due to the reliability challenge inherent with the contact time measure. As the reader will recall, contact time was measured by asking participants at Time 1, 2 and 3 how many meetings their group had, as well as the approximate length of these meetings. This information may be difficult to accurately recall, evidenced by the large standard deviations on within-group contact time estimates. For example, the within-group standard deviations of contact time estimates were often between 500 and 1000 minutes. The fact that members of the same team often differed in their responses seems to indicate that people had difficulty correctly remembering this information.

Strengths, Limitations and Future Research

This study has some strengths and limitations that are worth highlighting. One strength is that the groups of participants were real teams that worked together on meaningful tasks. Grades were assigned to the team as a whole, which implies interdependence of reward. While interdependence among team members was inferred based on the nature of the task and the reward, it was not directly measured. Interdependence is a necessary component of true teamwork (Sundstrom, De Muse, & Futrell, 1990), but it is not entirely clear to what extent teams worked interpedently. Although the importance of teamwork emphasized in the task can be considered a

strength of the present study, it may be beneficial to assess the interdependence of the groups in a more precise way in future research, in order to bring additional clarity to the results.

A potential limitation also related to the design of the study is that student teams were used, and results may therefore not be generalizable to a normal work teams. However, the student teams did embody many of the characteristics of traditional work teams. For example, teams received performance-based rewards (grades), had a limited budget with which to work, had specific rules to abide by in terms of time and resource allocation, and both the assigned task and nature of the project team were similar to what is typically found in the field of engineering. Nevertheless, given that the sample used was composed of engineering students who were mostly male (79.1%), the generalizability of these results to different types of groups, such as groups consisting of mostly female members, is unclear.

Another possible limitation of this study is that the sample size was not especially large. Given the difficulty of obtaining large sample sizes in teams research (Porter, 2005), however, this was well within the norm of typical sample sizes for teams. A recent meta-analysis (Peeters, Van Tuijl, Rutte, & Reymen, 2006) about teams included studies with samples ranging from 24 to 88 teams, with an average of 53. The sample size in this study is therefore consistent with the current literature.

A particular advantage of this study, as compared to laboratory-based research, is that the teams spent more time together and the task was more complex and more meaningful for all participants. The longitudinal nature of this study is therefore one of its strengths, since other types of research may not be able to capture the element of time in the same

way. Nevertheless, given that the independent variables were related to the perception and usage of time, it may have been useful to conceptualize time in another way. The current study examined the relationships of heterogeneity of time-related variables over time, operationalized as simple chronological time and as contact time. Another way that this could be assessed is in terms of "project time", that is, the beginning, midpoint, and before the deadline of each of the two projects. Conceptualizing the passage of time in this way may be particularly apt when examining how groups with different time usage styles get along over the duration of the project. Gersick (1989) found that there is something unique about how groups of individuals focus on a task at the midpoint of time allotted before the deadline. In particular, high-performing groups experienced a shift at the midpoint of time allotted before a deadline, such that they developed a new perspective and increased activity levels (Gersick, 1989). In future research, especially dealing with time-related variables, group process measures could be administered at key points before the completion of a specific task.

Conclusion

While the topics of time orientation and management styles have been studied in past literature, there is a dearth of research that merges these constructs with the team composition research. This is especially true when the outcome variable of interest is conflict, or another group process variable, rather than deadline adherence and performance. The goal of this research was to broaden the team diversity literature to include the examination of three time-related individual difference variables and how these affect task and relationship conflict over time.

Overall, findings suggest that we cannot assume that the effect of these deep level variables strengthens over time. In fact, polychronicity, time urgency and pacing styles all had very distinct relationships with both types of conflict across time points. These results seem to imply that deep level traits, even ones that are conceptually related, are likely to have different relationships with outcome variables depending on when they are assessed. Furthermore, heterogeneity on these traits, taken altogether, did not have a consistently positive or negative effect on interactions between team members. Diversity in some cases seemed to be a hindrance, while in others it proved to be generally advantageous. Since it is practically impossible to avoid heterogeneity in groups in today's workplace, it is important to understand how individual differences, such as those examined in the present study, affect the group's functioning.

Another possible conclusion that could be drawn from this research is that the over-time effect of deep-level variables, as stated by Harrison and colleagues (1998), simply does not exist. Perhaps the effect of these traits does not typically increase over time, despite this having been the case for overall job satisfaction, one of the deep-level variables examined by Harrison and colleagues. Admittedly, there are numerous deep-level variables that one could choose to study, and the relevance of each one may depend on the situation or context (Harrison et al., 1998). It does not seem likely, however, that the time-related variables examined in this study would not be relevant variables in this case, given the literature supporting the importance of this type of variable in group work (e.g., Blount & Janicik, 2002; Mohammed & Angell, 2004; Slocombe & Bluedorn, 1999). A further examination of the effects of various deep-level variables over time is

warranted before concluding that this type of variable does in fact follow the specified pattern of interaction over time.

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Appendix A

Demographics

Below you will find four short questions about your personal characteristics. Please answer the questions by filling in the appropriate information.

1. Gender: Male Female

2. Age: _____ years

3. Your ethnicity (choose the one that best describe you):

- Arabic/East Indian
- Asian
- Black
- Native American
- Southeast Asian
- White/Caucasian
- Other (please specify) _____

4. Is English your first language? Yes No

5. What city, province/state, and country are you from?

City: _____ Province/State: _____ Country: _____

Appendix B**Team Composition Questions**

Consider the four "skills" listed below. Rank order them, from 1 to 4, where:

1 = the skill you consider yourself most proficient in

4 = the skill you consider yourself least proficient in

Ranking	"Skill"
	Analytical skills
	Communication skills
	Computer skills
	"Hands-on" skills

Appendix C

Polychronic-Monochronic Tendency Scale (Lindquist & Kaufman-Scarborough, 2007)

Please answer the following questions honestly based on how you typically use your time.

		1	2	3	4	5	6	7
1.	I prefer to do two or more activities at the same time.							
2.	I typically do two or more activities at the same time.							
3.	Doing two or more activities at the same time is the most efficient way to use my time.							
4.	I am comfortable doing more than one activity at the same time.							
5.	I like to juggle two or more activities at the same time.							

Appendix D

Time Urgency scale (adapted from Landy, Rastegary, Thayer, & Colvin, 1991)

Use the scale below to decide how well each statement describes your behaviour.

1 = Strongly disagree

4 = Agree

2 = Disagree

5 = Strongly agree

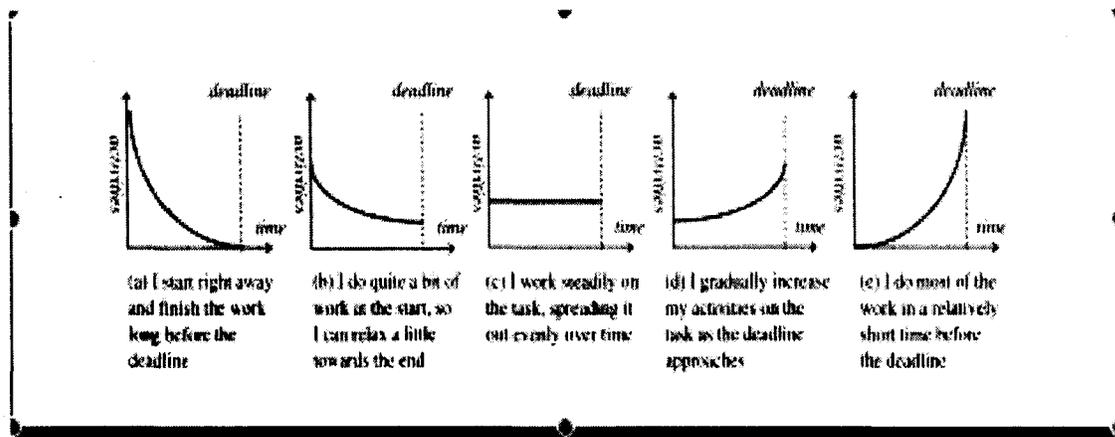
3 = Neutral

	1	2	3	4	5
I am slow at doing things.					
I often feel pressured for time.					
I like work that is slow and deliberate.					
I go "all out".					
I have a strong need to excel in not things.					
Compared to the average student, I am much less responsible.					
I talk more rapidly than most people.					
I am bossy or dominating.					
When I listen to someone talking and this person takes too long to come to the point, I actually "put words in his/her mouth".					
I am usually pressed for time.					
I am more restless and fidgety than most people.					
I never feel in a rush, even under pressure.					
I am hard driving.					
I find myself hurrying to get places even when there is plenty of time.					
I usually speak louder than most people.					
I often work slowly and leisurely.					
I set deadlines or quotas for myself at work and other things.					
I am hard driving and competitive.					
People that know me well agree that I tend to do most things in a hurry.					
I only care about satisfying myself, no matter what others think.					
I am ambitious.					
A close friend would rate me as definitely relaxed and easy going.					
I usually work fast.					
I am a slow, deliberate talker.					
Nowadays, I consider myself to be definitely relaxed and easy going.					
I often try to persuade others to my point of view.					
I am often in a hurry.					
I ordinarily work quickly and energetically.					

Appendix E

Pacing Style scale (Gevers, Rutte, & van Eerde, 2006)

Which of the following models best represents the way you generally organize your time when performing a task of project?



Appendix F

Task Conflict and Relationship Conflict Scales (Jehn, 1995)

		None	A limited amount	Some	A considerable amount	A great deal
1.	How much friction is there among members in your team?	1	2	3	4	5
2.	How much are personality conflicts evident in your team? (R)	1	2	3	4	5
3.	How much tension is there among members in your team?	1	2	3	4	5
4.	How much emotional conflict is there among members in your team? (R)	1	2	3	4	5
5.	How often do people in your team disagree about opinions regarding the work being done?	1	2	3	4	5
6.	How frequently are there conflicts about ideas in your team?	1	2	3	4	5
7.	How much conflict about the work you do is there in your team?	1	2	3	4	5
8.	To what extent are there differences of opinion in your team?	1	2	3	4	5

Appendix G

Supplemental Analyses

Table 1

Results of the Confirmatory Factor Analysis of the Team Conflict Scale

Model Tested	N	df	Chi-square	CFI	RMSEA	Estimated factor-factor correlation
1-factor Time 1	290	20	127.04**	.85	.11	
2-factor Time 1	290	19	36.28**	.98	.04	.74*
1-factor Time 2	290	20	183.58**	.80	.13	
2-factor Time 2	290	19	60.76**	.95	.07	.71*
1-factor Time 1	281	20	206.41**	.80	.14	
2-factor Time 2	281	19	46.26**	.98	.05	.75*

Note. CFI = Comparative fit index; RMSEA = Root mean square error of approximation.

* $p < .05$

** $p < .01$

$\chi^2_{.01} = 6.63$ at 1 df

Appendix H

Conflict	r_{wg}
Relationship conflict Time 1	.89
Task conflict Time1	.88
Relationship conflict Time 2	.90
Task conflict Time 2	.89
Relationship conflict Time 3	.83
Task conflict Time 3	.83

Appendix I

Letter of Information**Principal Investigator:**

Dr. Natalie Allen
Department of Psychology
The University of Western Ontario

As part of your ongoing participation in the present study, you will be asked to complete a series of questions regarding your ES1050 Project Team. The data collected will be confidential and accessed only by the principal investigator (Dr. Natalie Allen) and members of The TeamWork Lab in the Psychology Department at Western. As per an agreement between the TeamWork Lab and the Engineering Sciences 1050 professors, your participation in this study is worth a small percentage of your final course grade (please see your course outline for further details). However, your course instructor and teaching assistants WILL NOT be aware of your decision to participate, as surveys are sent directly to the TeamWork Lab, and your participation is recorded solely by the ES 1050 marks manager, not any individual professor. This is the second survey. At 2 other times during the academic year, you will be given the opportunity to complete other questionnaires relevant to this study.

No known psychological or physical discomforts are associated with participating in this study. If at any time you feel that you do not want to continue your participation, you have the right to stop. Even after viewing this questionnaire, or any of the subsequent surveys, if you feel nervous or uncomfortable at any point, you may withdraw your participation. If you choose not to participate, please sit quietly while those that do participate complete their questionnaire. In the meantime, you can complete some course reading.

In addition to the preliminary debriefing letter that you were given at the end of the first survey session, a presentation of the study's results will be given during one of the end-of-year studio classes in the winter term. Furthermore, if you have any questions or concerns about the research, you are encouraged to contact Natalie Allen, the principal investigator (Social Science Centre, Room#

Thank you in advance for your participation!

Consent to Participate. By logging in and submitting the questionnaires you are indicating you have read the above information and consent to take part in this study.

Appendix J

Debriefing Letter

Thank you for completing the questionnaire.

Executives around the globe are incorporating teamwork into their corporate processes, and the widespread use of teams in organizations is apparent. Teamwork presents an opportunity for groups of individuals to share knowledge and perspectives when confronting organizational problems. Despite this increased use of teams in organizations, gaps still exist in the literature regarding the links between composition (or "people makeup") of a team, team performance, and team members' reactions to the team.

A major goal of the present study is to investigate whether the ways that team members differ on certain characteristics (e.g., personality, work styles) affects their experience of conflict within the group. Some people believe that teamwork is made easier by having a group in which members are very different from one another. Others have suggested that individual differences on particular characteristics can hinder effective teamwork. Understanding these compositional effects will improve our ability to design better teams and possibly reduce the amount of conflict experienced by members.

We are grateful for your participation in this study because a student sample, such as the one you belong to, is often difficult to find. Due to the fact that some studies rely on very short-term team participation (45 minutes), results from those studies are suspect. Longer standing project teams, such as the one in which you are participating, offer a special opportunity for the expression of personality traits. Therefore, we could not conduct this study without your help, and **we thank you for your participation.**

We hope your participation in this study will be a valuable educational experience. As teamwork is common in organizations, increasing your understanding of effective teamwork will most certainly be useful for your career. In addition, we hope you will be able to learn about the current status of the research in teamwork, and what the implications of this research may have for you in the future. Feel free to contact the principal investigator (Natalie Allen, Ph.D.) if you have any questions, concerns, or discussion items you would like to share.

Thank you very much for taking the time to participate in this study. Your participation makes an important contribution to this research. If you are further interested in this topic, you might consider reading the following articles:

Barry, B., & Stewart, G. L. (1997). Composition, process, and performance in self-managed groups: the role of personality. *Journal of Applied Psychology*, 82, 62-78.

Harrison, D. A., Price, K. H., & Bell, M. P (1998). Beyond relational demography: Time and the effects of surface- and deep-level diversity of work group cohesion. *Academy of Management Journal*, 41, 95-107.

Mohammed, S., & Angell, L. C. (2004). Surface- and deep-level diversity in workgroups: Examining the moderating effects of team orientation and team process on relationship conflict. *Journal of Organizational Behavior*, 25, 1015-1039.

If you have questions about your rights as a research subject, you should contact the Director of the Office of Research Ethics at ethics@uwo.ca or 519-661-3036.



Appendix K
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Use of Human Subjects - Ethics Approval Notice

Review Number	08 10 22	Approval Date	08 10 24
Principal Investigator	Natalie Allen/Erin Marcotte	End Date	09 04 30
Protocol Title	Towards an understanding of composition effects in teams		
Sponsor	n/a		

This is to notify you that The University of Western Ontario Department of Psychology Research Ethics Board (PREB) has granted expedited ethics approval to the above named research study on the date noted above.

The PREB is a sub-REB of The University of Western Ontario's Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement and the applicable laws and regulations of Ontario. (See Office of Research Ethics web site: <http://www.uwo.ca/research/ethics/>)

This approval shall remain valid until end date noted above assuming timely and acceptable responses to the University's periodic requests for surveillance and monitoring information.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the PREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of research assistant, telephone number etc). Subjects must receive a copy of the information/consent documentation.

Investigators must promptly also report to the PREB:

- a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) all adverse and unexpected experiences or events that are both serious and unexpected;
- c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to the PREB for approval.

Members of the PREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the PREB.

Clive Seligman Ph.D.

Chair, Psychology Expedited Research Ethics Board (PREB)

The other members of the 2087-2009 PREB are: David Dozois, Bill Fisher, Riley Hinson and Steve Lupker

CC: UWO Office of Research Ethics

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