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Conflict In Virtually Distributed Teams

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CONFLICT IN VIRTUALLY DISTRIBUTED TEAMS

by

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ABSTRACT

The purpose of this paper was two-fold. The first was to investigate the impact of conflict as a mediator in the relationship between distribution and team performance. The second was to examine how that relationship was affected by virtuality. Four-member teams of different distributions (partially distributed, fully distributed, and fully collocated) and different virtuality conditions (videoconferencing, teleconferencing, and chat) played a team-oriented game. Significant results were found only in the videoconferencing condition, in which both distribution and task conflict had a negative impact on team performance, but task conflict did not mediate the relationship between distribution and team performance. Further research investigating how virtuality impacts distributed teams in needed.

I dedicate this thesis to Dr. Toshio Murase.

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CHAPTER ONE: INTRODUCTION

As globalization spreads and companies face complex problems caused by globalization, they look for new ways to tackle these issues. One of these issues caused by globalization is the change in team structure. Due to globalization, many teams are no longer collocated and are now considered distributed. Much of the past research involving teams has been conducted with collocated teams to determine how to increase their effectiveness and overall performance. Following this, there has been an increase in research on distributed teams; this is because distributed teams face their own unique problems due to the distance between team members. This has lead to an increase in research to unpack the complexity of how these teams work; Researchers want to understand how to increase their performance and understand the overall impact of inputs and outputs associated with distributed teams.

However, with the ever-evolving use of technology that keeps distributed teams connected, there has been even less research examining the extent that virtuality impacts performance. Since the advent of e-mail, we have seen an increased use of many other forms of virtual tools. While e-mail is still widely used, we have seen a rise in much richer forms of communication being used by companies, such as instant messaging, teleconferencing, and video conferencing. Programs such as Skype are one of the prime examples of these new, widely used, technologies.

Little is understood on how these different modes of virtual communication may play a role in conflict within these teams. One thing is for certain, technology will continue to evolve, and in turn, shape the way people communicate. Technology has provided society with the

ability to access and share vast amounts of information easily, but it has also presented it with new challenges and issues. Thus, it is important to understand how these methods may impact conflict in teams present and in the future.

The area of conflict has received a monumental amount of research due to its abundance in our society. More importantly, and in line with the purpose of this paper, research on conflict and its effects on teams has also been bountiful, but is still lacking in the realm of virtual and distributed teams. For the purpose of this paper, relationship and task conflict will be the focal points. Prior research has shown that conflict can be a tricky topic to discuss. For example, some studies have shown that task conflict may be beneficial to a team (e.g., Jehn, 1994; Nemeth, 1995; Olson, Parayitam, & Bao, 2007), while others have shown it to be harmful (e.g., Amason, 1996; Carnevale & Probst, 1998; de Dreu, 2008). Thus, it is important to understand how conflict is affected not only by different levels of distribution, but also how it interacts with different virtual tools. This can greatly change the way businesses deal with conflict based on the conditions specific to the team. Current conflict resolution methods used in collocated teams may not be helpful in a distributed and virtual environment.

The purpose of this paper is two-fold. The first is to investigate the role of conflict on the relationship between distribution and team performance. The second is to examine the relationship between distribution and conflict, as well as the moderating effect of virtuality on this relationship.

This paper will demonstrate that while research in areas such as conflict and distributed teams has been conducted previously, results have shown there to be many situational factors

involved in how each of these effect teams. Overall, exploring these new avenues of research will help companies in many ways. Without an understanding of these situational influences on distributed virtual teams, companies may be training their employees with methods that are effective for collocated teams but ineffective for use in distributed virtual teams. Therefore, this research will add to the literature by providing specific breakdowns of various kinds of distributed teams while also investigating how the different modes of virtual communication may play a pivotal role in conflict and performance within said teams.

CHAPTER TWO: LITERATURE REVIEW

Team Conflict: An Overview

As defined by Wall and Callister (1995), "conflict is a process in which one party perceives that its interests are being opposed or negatively affected by another party (p. 517)." Although there are many definitions surrounding conflict, most agree that it represents relationship and task issues (Amason & Schweiger, 1997; Cosier & Rose, 1977; Guetzkow & Gyr, 1954; Jehn, 1997; Kabanoff, 1991) that result from perceived differences in a team creating tension(s) between members of a team (De Dreu, Harinck, & Van Vianen, 1999; Thomas, 1992). It is also suggested that conflict may inhibit team functioning (De Dreu, 2008) by members becoming emotional and distracted from the task, lowering team member satisfaction and commitment, increasing turnover, decreasing efficiency, and interfering with performance (De Dreu & Weingart, 2003; Evan, 1965; Greer, Saygi, Aaldering, & de Dreu, 2012; Hinds & Mortensen, 2005). Conflict has been broken up into three primary types: task conflict, relationship conflict, and process conflict (de Wit, Gree, & Jehn, 2012; Jehn & Bendersky, 2003); each of these has been highly debated in terms of whether these different facets have positive or negative outcomes on teamwork (Martinez-Moreno et al., 2012).Early stages of conflict research, though, did not distinguish between task and relationship conflict; these were both categorized as intragroup conflict. Intragroup conflict is broadly defined as perceived incompatibilities or differences between group or team members (De Dreu & Gelfand, 2008; De Dreu & Weingart, 2003; Thomas, 1992; Wall & Callister, 1995); these incompatibilities may

arise through differences in values such as, religion, politics, morality, resources, budgets, time, knowledge of the task at hand, or world views (De Dreu & Gelfand, 2008; Deutsch, 1973).

Much of the early research into conflict has been focused on the negative effects of team conflict (Wall & Callister, 1995). Past conflict research has corroborated the belief that there is in fact a negative impact on team productivity and satisfaction (Gladstein, 1984; Saavedra, Earley, & Van Dyne, 1993; Wall & Nolan, 1986). For instance, previous research has consistently demonstrated that task and relationship conflict negatively impact team member satisfaction (Amason & Schweiger, 1997; Jehn, 1995). The incompatibilities associated with conflict can also create a large number of negative emotions (Bell & Song, 2005; Lazarus, 1991; Roseman, Antoniou, & Jose, 1996). Such emotions can cause impairment in cognitive functioning (Brief & Weiss, 2002). These emotions may manifest themselves as anger, frustration, and resentment (Guetzkow & Gyr, 1954; Russell, 1978; Stearns, 1972). In a meta-analysis by De Dreu and Weingart (2003), the authors discovered that conflict had stronger negative relations with team performance in highly complex teams than those in less complex teams, and that intragroup conflict overall had an negative impact on team performance.

However, there has been some debate in the literature as to whether all types of conflict are bad. As claimed by McGrath (1984), conflict is inevitable in teams and is an important process to go through. Furthermore, Jehn (1994, 1995, & 1997) has proposed a differentiation between relationship conflict which generally decreases satisfaction and performance, and task conflict, which the author argues may be beneficial to task performance on non-routine tasks. Others believe that conflict can improve team performance by initiating debate and the trading of

other thought and viewpoints (Amason, 1996; Jehn, 1995; Van de Vliert & De Dreu, 1994). For example, a study conducted by Carnevale and Probst (1998) concluded that when comparing their control condition (no conflict) to an anticipated cooperative negotiation with another individual (low conflict), their low conflict condition exhibited more creative problem solving and more versatility in their thinking. The authors also had participants anticipate a competitive and hostile negotiation (high conflict) scenario which resulted in a substantial decreased in cognitive flexibility and creative thinking. This led them to conclude that a little conflict may stimulate information processing, but as the level of conflict increases, the more information processing is blocked, which can result in lower levels of team performance (Carnevale & Probst, 1998).

From the research in the conflict literature, it is easy to see there is still much debate surrounding the impact conflict has on teams. Some studies have concluded that conflict may have an negative impact on teams (see De Dreu & Weingart, 2003; Evan, 1965; Greer, Saygi, Aaldering, & de Dreu, 2012; Hinds & Mortensen, 2005; Gladstein, 1984; Saavedra, Earley, & Van Dyne, 1993; Wall & Nolan, 1986), yet others have argued that conflict may be beneficial for teams (see Amason, 1996; Jehn, 1995; Van de Vliert & De Dreu, 1994; Carnevale & Probst, 1998). Intragroup conflict has since been shown to be an integral team process (LeDoux, Gorman, Woehr, 2012); as such research began to parse out intragroup conflict into two distinguishable forms: relationship conflict and task conflict (Amason, 1996; Guetzkow & Gyr, 1954; Jehn, 1994; LeDoux, Gorman, Woehr, 2012).

Task Conflict

Task conflict addresses the disagreements of opinions about task content or outcomes (Greer et al., 2012; Hinds & Mortensen, 2005; Jehn, 1994; Jehn, 1995; Jehn, 1997; Jehn & Bendersky, 2003; Li, Chun, Ashkanasy, & Ahlstrom, 2012; Martinez-Moreno et al., 2012; Shaw, Zhu, Duff, Scott, Shih, & Susanto, 2011). Task conflict may also create heated debates, but it usually does not contain the same intense negative feelings seen in interpersonal conflict (Hinds & Mortensen, 2005), which helps to distinguish between the two. Task conflict can also pertain to distribution of resources, procedures and policies, and interpretation of facts (De Dreu & Weingart, 2003).

Task conflict has become one of the most debated topics today (Greer et al., 2012). This debate has been fueled by various research that finds task conflict to be either positive (e.g., Jehn, 1994; Nemeth, 1995; Olson, Parayitam, & Bao, 2007; Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, & Frey, 2006), negative (e.g., Amason, 1996; Carnevale & Probst, 1998; de Dreu, 2008; De Dreu & Weingart, 2003; Dijkstra, Dierendonck, & Evers, 2005; Greer, Jehn, & Mannix, 2008), have no impact (e.g., de Wit, Greer, & Jehn, 2012; Pelled, Eisenhardt, & Xin, 1999), or have varying degrees (e.g., de Dreu, 2006) of impact on team performance outcomes. As we can see, much of the research surrounding task conflict varies greatly. The next following sections will discuss the pros and cons of task conflict and the research behind both views.

Task Conflict: The Benefits

Some studies have shown that task conflict may in fact be beneficial for a team (see Jehn, 1994; Nemeth, 1995). Olson, Parayitam, and Bao (2007) surveyed top level management teams in the health care industry from 85 U.S. hospitals. Results suggested that task conflict positively influenced decision understanding, decision commitment, and decision quality. Furthermore, the results of the moderated mediation analysis indicated that cognitive diversity and task conflict had a strong, positive relationship, while conflict mediated the effects of cognitive diversity on decision outcomes. Similarly, Eisenhardt, Kahwajy, & Bourgeois (1997) concluded through a study of top level management that teams that those with high levels of task conflict outperformed their counterparts, which either had no conflict or high levels of relationship conflict. Eisenhardt and colleagues (1997) determined that these teams were successful because they managed interpersonal conflict through the use of six methods: (1) they debated facts and used more information, (2) considered several alternatives, (3) created common goals, (4) relieved stress with humor, (5) created a balanced power structure, and (6) forming a resolution without forcing consensus.

In 2008, Jehn, Greer, Levine, and Szulanski "examine[d] three types of conflict (task, relationship, and process) and four dimensions of conflict (emotions, norms, resolution efficacy, and importance) in decision making groups (p. 465)." Results indicated that task conflict was less associated to negative emotions than relationship and process conflict, and task conflict norms had a direct main effect on positive emergent states (e.g., trust, cohesion, & respect) (Jehn

et al., 2008). Findings by Thatcher, Jehn, and Chadwick (2007) indicate mixed results with regard to the relationship between conflict and morale; specifically, process and relationship conflict had a positive relationship with morale while task conflict produced a negative relationship (as cited in de Wit, Greer, & Jehn, 2012, p.363).

Results from a meta-analysis conducted by de Wit et al. (2012) suggested that out of all three forms of conflict, task conflict was the least disruptive. This was due to task conflicts generally relating to the specific task at hand. More importantly, the analysis showed that task conflict overall had neither positive nor negative relationship to team performance; however, in certain conditions, task conflict was shown to have a negative impact on performance (de Wit et al., 2012). Other studies have also found task conflict to positively affect teams in several different ways; it gives them an ability to overcome confirmation bias (Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, & Frey, 2006; Schweiger, Sandberg, & Rechner, 1989), create original solutions (De Dreu & West, 2001), provide critical evaluations of ideas related to the task at hand (Nemeth, 1995), and increase the acceptance of team decisions (Amason, 1996). Moderate levels of task conflict may energize the team by creating differences of opinion and increasing motivation (Shaw et al., 2011).

Alternatively, some studies have shown that only low levels of task conflict can be beneficial before it begins to have a negative impact on team performance (De Dreu, 2006; Jehn, 1994). It is believed that in order to take advantage of these beneficial levels of task conflict, the team must have the cognitive resources available in order to process the information from the

different perspectives of the group, consider other team members views, and review other possible courses of action (Shaw et al., 2011).

Task Conflict: The Negatives

On the other hand, other research over the years has shown that task conflict may be detrimental to team performance in several ways by impacting both distal and proximal group outcomes (Carnevale & Probst, 1998; De Dreu & Weingart, 2003; De Dreu & Weingart, 2003; Hinds & Mortensen, 2005; Lau & Murnighan, 2005; Raver & Gelfand, 2005). Team members may exhibit symptoms of increased stress and anxiety due to task conflict (Dijkstra, Dierendonck, & Evers, 2005) due to increased cognitive load (Carnevale & Probst, 1998). Task conflict can also hinder goal accomplishment and implementation (Amason, 1996; Vodosek, 2007).

While some believe task conflict to be less immediately detrimental to a team's performance, it may in fact reach an easy tipping point, resulting in higher levels of relationship and process conflicts, which results in negative impacts on performance over time (Greer, Jehn, & Mannix, 2008). Another problem faced by teams suffering from task conflict is a narrowing range of thought (De Dreu, 2008), which hinders team performance when they need to search for innovative or fresh ideas and/or make decisions (De Dreu, 2008). The onset of limited information processing and cognitive ability experienced by team members may create the avenue in which relationship conflict arises amongst team members due to conflict about the task being wrongfully interpreted as personal attacks (Simons & Peterson, 2000). It has also been

demonstrated that task conflicts are likely to disrupt routine tasks which have well-developed procedures guiding them (Amason, 1996; De Dreu, 1997; De Dreu & Weingart, 2003; Jehn, 1994, 1997; Turner & Pratkanis, 1997). De Dreu and Weingart conducted a study in 2003 in they predicted positive correlations between task conflict, performance, and satisfaction. The results actually showed a strong negative influence of task conflict on satisfaction. Referring back to the de Wit and colleagues (2012) meta-analysis, the authors discovered that the co-occurrence of task conflict and relationship conflict presented an interest finding; results confirmed that when groups have a higher relationship of task and relationship conflict, the more negative the relationship between task conflict and group performance. This replicates the findings by De Dreu and Weingart (2003), who also found a more negative impact on team performance when the relation between task conflict and relationship conflict was high. This is possibly due to the hostilities associated with relationship conflict counteracting any positive effects that may emerge from task conflict (de Wit et al., 2012).

Hypotheses 1a and 1b:

H1a) Teams high in distribution and high in richness will have increased levels of task conflict.

H1b) Teams low in distribution and low in richness will have decreased levels of task conflict.

In conclusion, the literature has demonstrated mixed results when addressing task conflict. Low levels of task conflict can be beneficial for team performance (De Dreu, 2006; Jehn, 1994), but task conflict may easily turn into high levels of relationship and process conflict,

that in turn have a negative impact on performance (Gree, Jehn, & Mannix, 2008). Task conflict may also increase stress and anxiety on team members (Dijkstra, Dierendonck, & Evers, 2005), which may be detrimental to team performance.

Relationship Conflict

Relationship conflict, also known as interpersonal conflicts, is defined by Jehn and Mannix (2001, p.238) as "an awareness of interpersonal incompatibilities, includes affective components such as feeling tension and friction," it is also defined as personal incompatibilities, disagreements, and personal issues (De Dreu, 2008; Hinds & Mortensen, 2005; Jehn, 1995; Jehn, 1997) that do not involve the task (Greer et al., 2012). Unlike task conflict, research and opinions surrounding relationship conflict have come to the consensus that relationship conflict negatively impacts team outcomes (Greer, Saygi, Aaldering, & de Dreu, 2012). Relationship conflict can stem from personality conflicts, differences of beliefs, values, political affiliations, norms, and habits (Greer et al., 2012; De Dreu, 2008; Jehn, 1995; Jehn, 1997; De Dreu & Weingart, 2003; de Wit, Greer, & Jehn, 2012). Interpersonal disagreements more than likely to result in group members becoming hostile and emotional (Greer, Saygi, Aaldering, & de Dreu, 2012), angry, frustrated, or distrustful (Hinds & Mortensen, 2005), and heighten member anxiety (Dijkstra, Van Dierendonck, & Evers, 2005); this may result in distractions that take group members away from the task, reduce collaborative problem solving (De Dreu & van Knippenberg, 2005), and waste time that could have been spent on the relevant task (Evan, 1965).

Relationship conflict consumes cognitive resources that could have been applied to task related conflicts in teams and for making satisfactory judgments, while also causing team members to misattribute others behaviors in situations with task conflict (Shaw, Zhu, Duff, Scott, Shih, & Susanto, 2011). Such misattributions can include members' criticisms to task based suggestions or differing views (Shaw et al., 2011). Janssen, Van De Vliert, and Veenstra (1999) also share a similar view and make the claim that "person-oriented dissent produces intolerance and antagonistic attributions concerning each other's intentions and behaviors" (p.122). de Wit and colleagues (2012) explain these conflicts are "ego threats" because of how closely they represent members' self-concept.

Relationship conflict has been found to negatively impact distal and proximal team outcomes (Amason, 1996; Brief & Weiss, 2002; Carnevale & Probst, 1998; De Dreu & Weingart, 2003; de Wit, Greer, & Jehn, 2012; Jehn, 1995) in areas such as group creativity (Farh, Lee, & Farh, 2010), team performance, and satisfaction (De Dreu & Weingart, 2003); thus, team performance is impacted by the reduction in collaborative problem solving from relationship conflict (De Dreu, 2006). Shaw and colleagues (2011) set out to look at the relationships of task conflict and relationship conflict with the dimensions of team performance and team member satisfaction with sampled work team in Indonesia and Taiwan. The authors hypothesized that relationship conflict would moderate the relationship between task conflict and both team performance and team member satisfaction. The results of study 1 revealed support for their first hypothesis; when relationship conflict is low, the relationship between task conflict and team performance followed an inverted U shape, but when relationship conflict was high, it

created a negative relationship. However, relationship conflict did not moderate team member satisfaction and task conflict; thus, not supporting their second hypothesis. Their second study supported their first hypothesis; when relationship conflict was low, there was a curvilinear relationship between task conflict and team performance. The authors' second hypothesis in study 2 was partially supported. The results concluded that when relationship conflict was high, the relationship between task conflict and team -member satisfaction was significant and negative; but, when relationship conflict was low, it failed to reach significance. Greer, Caruso, and Jehn (2011) conducted a field study of preexisting workgroups within a telecommunications sales unit. The authors hypothesized that high-power teams will have higher levels of task, process, and relationship conflict than their low-power counterparts, and that conflict would have a negative relationship to team performance. For their first hypothesis, results showed that relationship conflict and process conflict in high-power teams were significantly higher than low-power teams. In testing their second hypothesis, they concluded that all three forms of conflict were negatively related to team performance. More specifically, relationship conflict was related to leader-rated performance and member-rated performance.

Hypotheses 2a and 2b:

H2a) Teams high in distribution and high in richness will have increased levels of relationship conflict.

H2b) Teams low in distribution and low in richness will have decreased levels of relationship conflict.

In conclusion, research has shown that relationship conflict can impact team effectiveness and performance in several ways. It can stifle group creativity (see Farh, Lee, & Farh, 2010), lower team-member satisfaction (see De Dreu & Weingart, 2003), and create frustrations which result in misattributions of team members behaviors (see Shaw, Zhu, Duff, Scott, Shih, & Susanto, 2011).

Team Distribution of Members

People often use the terms "distributed teams" and "virtual teams" interchangeably due to the fact that distributed teams rely on technology to collaborate and solve the task at hand. However, in this paper, these terms have their own distinct definitions. Townsend, DeMarie, and Hendrickson (1998) provide a definition that distributed teams, "are groups of geographically and/or organizationally dispersed coworkers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task" (p.18). Virtuality is the method that is connecting said team members. Just like virtual teams, distributed teams are becoming more prevalent around the globe (such as the United States military) and becoming the ever increasing focal point of academic research across multiple disciplines (Connaughton, Shuffler, & Goodwin, 2011). Teams that are geographically separated have fewer chances to coordinate through monitoring behavior and must deal with increased levels of ambiguity (Espevik, Johnsen, & Eid, 2011). If leaders of distributed teams cannot convey information or ideas clearly to their team members, there will be a loss in leader effectiveness from their lost contributions (Connaughton, Shuffler, & Goodwin, 2011).

Scholars have long since taken the stance that conflict will have great impact on geographically-distributed teams compared to those that are collocated (Hinds & Bailey, 2003; Mannix, Griffith, and Neale, 2002). However, only a few empirical studies have been conducted to determine if conflict is indeed more severe for distributed teams and even less have been conducted to examine the conditions that are needed for conflict to arise under these conditions (Hinds & Mortensen, 2005). Mortensen and Hinds (2001) compared product development teams from five companies; Results indicated that there were no significant differences between collocated and distributed teams in terms of interpersonal or task conflict. A follow up study by Hinds and Mortensen (2005) was done with the intention to examine what moderating factors may or may not cause distribution to create conflict in distributed teams. In the study by Hinds and Mortensen (2005), the authors proposed that geographic distribution would lead to conflict, and that this relationship would be moderated by shared identify and shared context. They also proposed that spontaneous communication would reduce conflict in distributed teams. Hinds and Mortensen (2005) anticipated that there would be a negative conflict–to-performance relationship for both collocated and distributed teams, but that conflict would have a stronger impact on distributed teams. The authors collected field study data from a large multinational company. Results regarding the relationship between distribution and conflict discovered that task and interpersonal conflict were in fact greater in distributed teams than collocated teams. They also found that shared identity had a moderating effect on interpersonal conflict and distribution, while shared context had a moderating effect on task conflict and distribution. Lastly, spontaneous communication did in fact play a key part in reducing conflict (Hinds &

Mortensen, 2005). Results indicated: (a) spontaneous communication was associated with a stronger shared identity and shared context, and (b) spontaneous communication had a direct moderating effect on the relationship between conflict and distribution (Hinds & Mortensen, 2005). Lastly, research by Hinds and Bailey (2003) and Mannix, Griffith, and Neale (2002) have found conflict in distributed teams to be prevalent, hard to manage, and isolate. If the previous research is in fact true, then the ability for distributed teams to perform effectively may be in jeopardy (Hinds & Mortensen, 2005).

Hypotheses 3a and 3b:

H3a) Teams high in distribution and high in richness will have decreased levels of team performance.

H3b) Teams low in distribution and low in richness will have increased levels of team performance.

Other studies (Armstrong & Cole, 2002; Cramton, 2001) have also conducted experiments confirming that distributed teams experience high levels of conflict. Cramton (2001) observed that when there was missing information or miscommunications, conflict emerged, causing team members to make harsh comments about their distributed team members. Such conflict can arise within distributed teams from cultural misunderstandings or differences. Olson and Olson (2000) conducted a review of the past ten years of "field and laboratory investigations of collocated and noncollocated synchronous group collaborations" (p.139). According to the authors, the most shocking misunderstanding they witnessed was a video conference being held by workers from the United States, France, and Germany. The issues occurred when the "task

focused and money conscious" Americans ended the call immediately after their meeting finished, addressing the final item on the meeting's agenda. This was not unusual for the American workers; however, it was one of the French workers' last day on the job. The American workers did not express any condolences to the French worker or say any personal goodbyes, whereas the German workers stayed on the call for 15 minutes after the ending of the meeting to talk to the French worker and say farewells. This abrupt ending of the call by the Americans was taken as a great insult by the French and Germans (Olson & Olson, 2000). This story backs up initial theories that conflict in distributed teams is a result of weak interpersonal ties, poor information sharing, and lack of context (Hinds & Bailey, 2003).

In conclusion, the distribution literature has argued that conflict in distributed teams will be greater when compared to their collocated counterparts (Hinds & Bailey, 2003; Mannix, Griffith, and Neale, 2002). Hinds and Mortensen (2005) have backed up this belief by comparing distributed teams and collocated teams; results indicated that distributed teams had higher levels of both task and interpersonal conflict. Likewise, studies by Armstrong & Cole (2002) and Cramton (2001) concluded that distributed teams had higher levels of conflict.

Virtuality

It is important to be able to distinguish the difference between virtual teams and distributed teams. Unfortunately, the literature surrounding these two concepts tends to lead people to believe they are one and the same. So, what is a virtual team, and how does this disentangle itself from the distributed teams' literature? Similar to distributed teams literature, virtual teams are often defined as geographically dispersed, working remotely, or dependent on

electrical forms of communication (Gibson and Cohen, 2003; Martins, Gilson, and Maynard, 2004; Kirkman and Mathieu, 2005). As we can see, much of the literature focuses not only on the virtual communication aspect of these teams but also the geographical distribution, and herein lies the confusion which cause many to question how these teams are any different than distributed teams. Kirkman and Mathieu (2005), though, make it a point to show that geographic distribution is not essential for team virtuality; even though distribution of team members will likely lead to adopted forms of virtuality. Collocated team members are not automatically excluded from coordinating virtually or being highly virtual. Team members may elect to use virtual communication even though they are collocated (Kirkman & Mathieu, 2005). For example, most restaurants use computers to input orders which can be seen by cooks on the line; or air-traffic controllers who are seated next to one another will use virtual means to transfer different aircraft to each other (Kirkman & Mathieu, 2005). Therefore, Kirkman and Mathieu (2005) define virtual teams using three dimensions: (1) the extent to which team members use virtual tools to coordinate and achieve team processes, (2) the amount of quality information provided by these virtual tools, and (3) the synchronicity of the virtual interaction.

Why are these kinds of teams important? These virtual teams are becoming more important in organizations today (Gibson & Gibbs, 2006); organizations are relying on these teams to accomplish core tasks (Bell & Kozolowski, 2002; Gibson & Gibs, 2006; Hackman, 2011; Hinds & Kiesler, 2002). Even when virtual work teams are faced with geographic dispersion, they still maintain the ability to access expertise through their electronic modes of

communication (Kirkman, Rosen, Gibson, Tesluk, & McPherson, 2002), which is one of the major reasons as to why virtual work teams have caught on so fast in organizations.

Communication is key in teams; it has the ability to affect a team's leadership processes (Connaughton, Shufflers, & Goodwin, 2011), cohesiveness, and effectiveness (Cheshin, Kim, Bos Nathan, Ning, & Olson, 2013). Today, teams have several modes of communication at their disposals which vary in information richness that create several forms of virtual teams (Gibson & Gibbs, 2006). These types include face-to-face, email, video conferences, instant messaging, and teleconferencing. Traditionally, email has been the top choice for virtual teams due to it not requiring high levels of technology nor fast internet speeds (Martinez-Moreno, Zornoza, Gonzalez-Navarro, & Thompson, 2012). However, since faster internet has become more cost-effective and available, it has opened the door for virtual teams to utilize more advanced communication tools (e.g., Skype, webcams, voice chats, etc.). Virtual communication can be conceptualized on a richness (contextual cues) continuum, wherein email represents asynchronous communication or the poorest extreme. One step above asynchronous communication on the richness continuum is synchronous communication (e.g. instant messaging, or chat); this is because it allows for the transmission of immediate feedback. On the opposite end of the richness spectrum is face-to-face, providing the most amount of richness for a group; one step below this is videoconferencing, providing groups with voice and nonverbal cues (Daft & Lengel, 1986).

Overall, prior research has focused on analyzing the linkage between task and relationship conflict in face-to-face teams, but little has focused on these same links in virtual

teams (Martinez-Moreno et al., 2012). The research that has been conducted regarding virtual teams has focused on the antecedents of the different forms of intergroup conflict and the effects they have on virtual teamwork, while also comparing these effects to those seen in face-to-face teams (see Griffith, Mannix, & Neale, 2003). But, there is very little understanding concerning the relationship between virtual and face-to-face teams and the various kinds of conflict.

An issue faced by virtual teams is the lack of richness that is provided by working in a face-to-face setting; this is due to a decrease in social presence, contextual cues (i.e., verbal and nonverbal), personal feelings and emotions, and/or immediate feedback (Martinez-Moreno et al., 2012). Thus, the use of technology can have a negative impact on interpersonal and group processes in virtual teams (Culnan & Markus, 1987). There is some evidence to suggest intragroup conflict may have more opportunities to affect virtual teams than face-to-face teams (Hinds & Bailey, 2003). In the 2012 Martinez-Moreno et al. study, the authors explained how the disputeexacerbating model of e-mail (DEME, see Friedman & Currall, 2003) may help to explain how conflict arises in virtual teams. The DEME proposes that teams using email communications encounter understanding costs and asynchrony costs (Martinez-Moreno et al., 2012). These same authors define understanding costs as, "those based on the lack of contextual cues, produced by deficient contemporariness and sequentialness during the email communication" and asynchrony costs as, "those caused by the inability to carefully time actions and reactions, produced by the lack of copresence, visibility, audibility, and simultaneity in email communication" (p.162). Taking this into consideration, when emails are sent by team members, if the messages are not properly understood, conflict may occur (Jehn, 1997).

However, just like conflict, there are some who take a stance that virtuality offers many benefits. Griffith and colleagues (2003), for example, believe that virtual teams have a jumpstart on conflict management over their face-to-face counterparts; this is based on the idea that virtual teams are more aware that conflict may arise and therefore keep an eye out for it. And, despite their findings regarding email, Martinez-Moreno et al. (2012) recognize that the lack of verbal and nonverbal cues *may actually benefit* synchronous teams as they are not likely to detect genuine frustrations by their team members over a task related dispute, reducing the chances of them reacting to and escalating the situation; members of synchronous communication teams might also be less likely to wrongfully attribute task conflicts as personal attacks. There is clearly mixed reviews when it comes to whether or not nonverbal cues help to incite or help to hinder conflict.

There is also mixed research as to the benefits that richer forms of communication provide in terms of conflict. Richer forms of communication *do* have those nonverbal cues, which help to clarify and provide additional information that is lacking in less richer forms of virtual communication (Martinez-Moreno et al. 2012). But, as stated before, this could also be a downfall. For example, Martinez-Moreno and colleagues' (2012) study also concluded that there was a positive task-relationship conflict link in face-to-face teams. The authors found that task conflict is likely to grow into relationship conflict in a rich environment like videoconferencing, more so than in a synchronous CMC (computer-mediated communication) environment (e.g., chat). These authors also suggest that the differences of interest in virtual environments lie in the extreme conditions of the virtual richness continuum. Likewise, Griffith and colleagues (2003)

proposed that a potential downside to this increased richness of communication is that it may increase the likelihood of being embedded with tacit information, in turn, causing relationship conflicts.

Hypotheses 4a and 4b:

H4a) Teams high in distribution and high in richness will have decreased levels of team performance, mediated by task conflict.

H4b) Teams low in distribution and low in richness will have increased levels of team performance, mediated by task conflict.

H4c) Teams high in distribution and high in richness will have decreased levels of team performance, mediated by relationship conflict.

H4d) Teams low in distribution and low in richness will have increased levels of team performance, mediated by relationship conflict.

In conclusion, virtual communication should be conceptualized on a richness continuum. This continuum ranges from asynchronous communication (i.e., e-mail) to face-to-face communication (Daft & Lengel, 1986). Evidence has suggested that intragroup conflict may have a greater chance to impact virtual teams compared to face-to-face teams (Hinds & Bailey, 2003), leading to a negative impact on group and interpersonal processes (Culnan & Markus, 1987). Research has also demonstrated that task conflict is likely to grow into relationship conflict in a rich videoconferencing environment compared a synchronous chat based environment (Martinez-Moreno et al., 2012), and this this increase in tacit information may in turn cause relationship conflicts (Griffith et al., 2003).

CHAPTER THREE: METHODOLOGY

Participants

Archival data was used from large southeastern university. The sample consisted of 836 undergraduate students (broken into 209 four-person teams), with a mean age of 19.7 years. Participants engaged in a three hour long lab study. Each participant was compensated with 3.25 research credit ours for class credit or a monetary compensation of $24. Participants were eligible to choose whatever compensation they saw fit. All participants were recruited through an online signup system (SONA Systems) or through IRB-approved advertisements.

Design

This study was a 4x3 between-subjects design with an additional face-to-face condition. Participants were placed in teams of four and worked through a computed based video game called Democracy 2. Participants take on the role of prime ministers for a fake country, Libria. The main goal for the participants was to sway the voters (computer-generated) of the country to vote for their team's political party in the re-election and maintain their prime minster status, while also keeping a balanced budget. This was achieved by team members working together to make decisions for the country in order to please the constituents in order to gain their votes.

At the beginning of the performance phase, teams were presented with an initial report that described the state of the country. These reports were presented at the beginning of every

subsequent round by the game in order to provide teams with up-to-date information on how well they were swaying voters to their party, crises, constituents, etc. Team members could use this information in order to determine what policies they could/should change in order to increase the happiness of the constituents and reduce debt. Teams also needed to keep track of their changes to determine if they were in fact having the desired effect. For example, some policies were designed to make certain constituents happy while at the same time having the opposite effect on others. It was left up to the team to determine if these negative effects are worth it to achieve their overall goal. At the end of the final round, teams were presented with the final population vote, determining if they were going to be re-elected or not.

Each team member (prime minister) was provided with five constituents that she/he was in charge of; each prime minister was given unique information in their binders that was specific to their constituents (e.g., a description of each policy, how much capital it would cost to cancel, raise, or lower policies, etc.). Therefore, the best strategy for a team to implement in order to win is to work together by sharing information about these key constituents and make decisions that will help please them. Since some of the things that may please one constituent may anger another, teams had to discuss and overcome these conflicts of interest.

The control of the game was fairly straightforward; each team member shared the same game screen across all the computers depending on the distribution condition. All members of the team had access to the control of the game; however, only one team member could control the game at a time. All the information found in the prime minister's binders could be found in

the game on various screens, but this was not a preferred method due to the time allotment (60 minutes) they had. It was much more efficient for team members to share this information.

Democracy 2 was adapted from its original form (single player) to a multiplayer platform consisting of multiple roles. This study was specifically concerned with task independence, which is characterized by team members working as a whole to diagnose and solve problems in order to complete an overall team task (Saavedra, Earley, & Dyne, 1993). By providing each member of the group with unique information that they must share to help achieve an overall team goal (i.e., becoming re-elected), an environment of task interdependence and group goals was created. This process was also important to achieve a team performance outcome.

Lastly, the environment created was crucial to investigating team performance in a distributed and virtual team environment. Often, virtual teams maintain unique information that they must share with their distributed counterparts over various modes of communication in order to achieve a complex team goal. Democracy 2 helped mimic this by providing multiple constituents with differing information, distribution types (i.e., partially collocated, fully distributed, and collocated; see Appendix C for descriptions of distribution types), and different forms of virtual communication tools (i.e., videoconference, chat, teleconference, and face-to-face). All of these helped to create an environment that required team work, information sharing, and consensus amongst group members to reach an overall complex goal.

Distribution was a key control variable in this experiment and was manipulated to serve as different kinds of distributed teams. As previously mentioned, teams were placed into the following conditions: (1) full distributed (1-1-1-1), all team members were placed into separate

rooms, (2) partially distributed, wherein two members are collocated and the remaining members are separated or teams are split into pairs (2-1-1 and 2-2 respectively), (3) partially distributed (3-1), wherein 3 members were collocated and one member was separated, and (4) fully collocated.

Virtuality severed as a moderating variable between distribution and conflict. Much like distribution, virtuality was manipulated over the various forms of communication tools. These included videoconferencing, teleconferencing, and instant messaging.

Procedure

Prior to participating in the experiment, each participant completed an online survey that included demographic items, control items, and team leadership traits. Before the session began, teams were randomly assigned to one of the thirteen conditions, and each participant was randomly assigned to one of the four prime minister roles.

Throughout the experiment, there were two experimenters present, one who remained at the experimenter computer and guided the participants through the entire experiment and communicated with them virtually, and another that helped deliver materials to the rooms with participants, answered any technical problems that arose with the equipment, and escorted participants to the restrooms or vending machines during breaks.

Once the experiment began, experimenters remained in constant contact (visually and audibly) with each participant. However, participants were only able to communicate with one another using the virtual tools set for their condition (i.e., instant messaging/chat, teleconference, and videoconferencing). The main experimenter explained to the participants over virtual

communication software that they were taking part in a four person team, each of them taking on the role of a prime minster for the fictional country, Libria. The experimenter asked them to read over the informed consent and sign it if they wish to continue on with the experiment. The participants were made aware that if they did not wish to participate in the experiment they did not have to sign the informed consent form and that they may leave.

After all participants agreed to participate in the study, the experimenter guided them in launching the initial training video. All of the information regarding Democracy 2 is the same for all participants; it is only after the training video that they will begin receiving their unique information. If participants are a part of the collocated condition, they all watched the training video together. The experimenter also explained how they could communicate with one another and how they could contact the experimenter if needed. After the training video was completed, the experimenter guided the participants through a brief 10 minute practice round. In this round, the participants were asked to work together to complete a list of questions regarding tasks that cover the general layout of the game and their own personal information. After this 10 minute round, the experimenter went over the correct answers with the team and clarified any questions they may have about the game. Following this, the participants then engaged in a new 30 minute practice round in which they were in charge of a practice country. The purpose of this was to give them more time to familiarize themselves with the game and allow them to explore it more in depth. Once the teams completed this 30 minute practice round, they were asked to fill out a survey created to determine teamwork and emergent states. The team then started the full 60 minute performance round, consisting of 10 rounds in which to make decisions based on their

unique information in order to become re-elected in their real country, Libria. At this time, team members were not allowed to ask the experimenters any more questions regarding the game and had to complete the task on their own. Once the 60 minute performance round was completed, each participant was issued a final survey designed to capture the leadership behaviors of the team members. Once each participant completed the final survey, they were then debriefed and compensated accordingly.

Measures

Independent Variables

Conflict: Conflict will be assessed by an adapted Jehn's (1995) measurement of conflict. This measurement will include both task and relationship conflict. Task conflict and relationship conflict had reliabilities of .88 and .91 respectively. Task conflict was represented by four items, such as "how frequently are there conflicts about ideas in the team?" and "how often do people in the team disagree about opinions regarding the work being done?" Relationship conflict was assessed using six items; sample items include, "how much friction is there among members in the team?" and "to what extent do people take arguments in the team personally?"

Outcome Variables

Team Performance: Team performance was measured by the outcome of the Democracy 2 game. A weighted score was assigned to each team, which included popularity score (overall),

total debt, balanced budget, and popularity score for the four largest constituents. This was used as the measurement of performance because the overall goal was to be re-elected as prime ministers of their fictional country at the end of the team's performance round. As like any election, it was important to help maintain a balanced budget and debt to win over the voters. It was also important to maintain a high popularity score for the overall voters and for the four largest constituents, which was achieved by changing policies important to these groups. This helped secure a majority vote from the population, which in turn led to the likelihood of re-election.

CHAPTER FOUR: RESULTS

Within each level of virtuality, the Baron and Kenny method was used to test for the mediation effect of a) task conflict and b) relationship conflict on the relationship between distribution and team performance.

Videoconferencing condition (see APPENDIX C, tables 1 – 12):

Step one, a regression was used to establish the relationship between distribution and team performance. The overall model was significant ($F(3,61) = 4.87$, $p < .01$). The distribution level of 2-1-1 was significant ($\beta = -.39$, $p < .01$). Thus, hypothesis 3a was partially supported; 2-1-1 distributed videoconferencing conditions had as predicted lower team performance, however, there were no significant results for the teleconferencing condition. Step two, regressions were used to establish the relationship between distribution on task conflict and relationship conflict. The overall model for task conflict was significant ($F(3, 56) = 2.95$, $p < .05$), but no individual levels of distribution were found to be significant. Therefore, hypothesis 1a was not supported. Likewise, the overall model for relationship conflict was not significant ($F(3, 56) = 1.77$, $p = .16$), resulting in hypothesis 2a not being supported. Step three, regressions were used to establish the relationship between task conflict and relationship conflict on team performance. Task conflict was significant ($\beta = -.33$, $p < .05$), but relationship conflict was not significant ($\beta = .01$, $p = .92$). Step four, regressions were used to establish the relationship between distribution and task conflict on team performance and the relationship between distribution and relationship conflict on team performance. The overall model for distribution and task conflict on team performance was significant ($F(4, 55) = 4.40$, $p < .01$). The distribution level of 2-1-1 was

significant (β = -.37, p < .05), but task conflict was not significant (β = -.21, p = .11). Therefore, hypothesis 4a was not supported. Even though the overall model was significant, because task conflict, was not significant the requirement for mediation cannot be met. The overall model for distribution and relationship conflict on team performance was significant ($F(4, 55) = 4.04$, p < .01). The distribution level of 2-1-1 was significant (β = -.51, p < .01), but relationship conflict was not significant (β = .15, p = .22). Likewise, hypothesis 4c was not supported. Similar to hypothesis 4a, relationship conflict was not significant, and as such the requirement for mediation could not be met.

Teleconference condition (see APPENDIX C, tables 13 – 24):

Step one, a regression was used to establish the relationship between distribution and team performance. The overall model was not significant ($F(3,58) = .40$, p = .76). Due to the videoconferencing condition being significant, but no significance was found for teleconferencing, hypothesis 3a was partially supported. Step two, regressions were used to establish the relationship between distribution on task conflict and relationship conflict. Hypotheses 1a and 2a were not supported; the overall models of task conflict and relationship conflict were not significant ($F(3, 55) = 2.33$, p = .09) and ($F(3, 55) = .66$, p = .58) respectively. Step three, regressions were used to establish the relationship between task conflict and relationship conflict on team performance. Task conflict was not significant (β = -.17, p = .19), as well as relationship conflict (β = -.19, p = .15). Step four, regressions were used to establish the relationship between distribution and task conflict on team performance and the relationship between distribution and relationship conflict on team performance. The overall model for

distribution and task conflict on team performance was not significant ($F(4, 54) = 1.04$, $p = .40$). The overall model for distribution and relationship conflict on team performance was not significant ($F(4, 54) = 1.11$, $p = .36$). These results indicate that hypothesis 4a and 4c were not supported as the requirements for mediation could not be met.

Instant messaging condition (see APPENDIX C, tables 25 – 36):

Step one, a regression was used to establish the relationship between distribution and team performance. Hypothesis 3b was not supported, the overall model was not significant ($F(3,62) = 2.34$, $p = .08$); low distribution and low richness did not lead to increased team performance. Step two, regressions were used to establish the relationship between distribution on task conflict and relationship conflict. The overall model for task conflict was significant ($F(3, 52) = 3.34$, $p < .05$), but not in the expected direction. The distribution level of 2-2 was significant and showed increased task conflict ($\beta = .30$, $p < .05$); therefore, hypothesis 1b was not supported. The overall model for relationship conflict was not significant ($F(3, 52) = 1.25$, $p = .30$), resulting in hypothesis 2b being not supported. Step three, regressions were used to establish the relationship between task conflict and relationship conflict on team performance. Task conflict was not significant ($\beta = -.04$, $p = .79$), as well as relationship conflict ($\beta = .01$, $p = .96$). Step four, regressions were used to establish the relationship between distribution and task conflict on team performance and the relationship between distribution and relationship conflict on team performance. The overall model for distribution and task conflict on team performance was not significant ($F(4, 51) = .50$, $p = .74$) as well as the overall model for distribution and relationship conflict on team performance was not significant ($F(4, 51) = .40$, $p = .82$). These

results indicate that hypothesis 4b and 4d are not supported as the requirements for mediation could not be met.

CHAPTER FIVE: DISCUSSION

Hypothesis 1a: Teams high in distribution and high in richness will have increased levels of task conflict.

Hypothesis 1b: Teams low in distribution and low in richness will have decreased levels of task conflict.

Hypothesis 1a was not supported. For the videoconferencing condition, the overall model for distribution on task conflict was significant, but no individual level of distribution was significant on its own. Looking at the teleconferencing condition, the overall model of distribution on task conflict was not significant but there was a significant level of fully distributed teams on task conflict, which saw a decrease in task conflict. This finding is directly opposite as what was expected. It is a possibility that fully distributed teams saw a decrease in task conflict in the teleconferencing condition because the increased amount of richness was not enough to overload fully distributed teams and create conflict. Hypothesis 1b was not supported. For the instant messaging condition, the overall model for distribution on task conflict was significant and had a significant individual 2-2 level of distribution on task conflict. The 2-2 distribution level saw an increase in task conflict instead of a decrease which was unexpected. A possible explanation for this may be due to the fact that in the 2-2 distribution, the paired team members had to share a keyboard, only allowing one participant to type and send information at a time. This could have created a loss in task-relevant information resulting in higher task conflict between the pairs and amongst the entire team.

Hypothesis 2a: Teams high in distribution and high in richness will have increased levels of relationship conflict.

Hypothesis 2b: Teams low in distribution and low in richness will have decreased levels of relationship conflict.

Hypothesis 2a was not supported. For both the videoconferencing and teleconferencing conditions, there were no significant levels of distribution on relationship conflict. Hypothesis 2b was not supported. For the instant messaging condition, the overall model of distribution on relationship conflict was not significant, and there were no significant individual levels of distribution on relationship conflict. While these findings were not as predicted, it is not surprising when taken into account the findings of hypothesis 1a and 1b. It was believed that task conflict would easily flow over into relationship conflict, so finding that distribution to task conflict was not significantly related it, is not unexpected to find relationship conflict was not significantly related to distribution. Also, due to time constraints, relationship conflict may not have had enough time to develop between team members.

Hypothesis 3a: Teams high in distribution and high in richness will have decreased levels of team performance.

Hypothesis 3b: Teams low in distribution and low in richness will have increased levels of team performance.

Hypothesis 3a was partially supported. For the videoconferencing condition, there was a significant overall model on distribution and performance and at the individual distribution level. Specifically, the 2-1-1 distribution was significantly and negatively related to team performance.

However, the teleconferencing condition showed no significance. As previously stated, this mixed result might have been impacted by the amount of richness between the two virtuality conditions. Teams in the videoconferencing condition may have had been overloaded by the increased tacit information resulting in the negative impact on team performance; however, teams in the teleconferencing condition may have not received a high enough level of tacit information to negatively impact their performance. Hypothesis 3b was not supported. For the instant messaging condition, the overall model was not significant, but there was a significant 3-1 distribution on team performance. However, the 3-1 distribution was negatively related to team performance. A possible explanation for this finding in the 3-1 distribution for instant messaging is that the lone team member felt neglected by his/hers teammates, resulting in less motivation to communicate with the team, or that his/her teammates shunned the distributed member and did not take into account his/her information.

Hypothesis 4a: Teams high in distribution and high in richness will have decreased levels of team performance, mediated by task conflict.

Hypothesis 4b: Teams low in distribution and low in richness will have increased levels of team performance, mediated by task conflict.

Hypothesis 4c: Teams high in distribution and high in richness will have decreased levels of team performance, mediated by relationship conflict.

Hypothesis 4d: Teams low in distribution and low in richness will have increased levels of team performance, mediated by relationship conflict.

Hypotheses 4a-4d were not supported. For hypotheses 4a and 4c, even though the overall models were significant, neither task or relationship conflict were significant in either model. From these results, distribution is shown to have a strong relationship to team performance regardless of conflict. This is interesting regarding task conflict because task conflict was shown to have a significantly negative impact on team performance; but when distribution is added into the model task conflict is no longer significant. This result was not expected and further investigation is required.

Theoretical Implications

Research investigating teams and distributed teams are plentiful; however, research regarding distributed teams and how they are impacted by various modes of virtual communication and their conflict has been lacking. Such a void needs further investigation as virtual tools are in abundance in today's society. Although the experiment in this paper concluded with mostly non-significant findings, there are still theoretical implications to be addressed.

The main takeaway point (and what this study attempted to address) is how virtuality a) impacts teams and b) changes how we think of "distributed teams." This study has demonstrated that different virtual mediums do affect how distribution affects team performance. This is a newer idea in the literature, and one that needs to be investigated further as our workforce becomes more virtual.

Practical Implications

The current study demonstrated that task conflict had a negative impact on team performance, but only in the videoconferencing condition. Such findings build upon previous research that has found task conflict to negatively impact performance outcomes, but with an added scope of virtuality. The foremost implication this may have on industry is how we train personnel to deal with conflict in teams. Different training tools may need to be developed in order to properly train team members and managers on how to deal with conflict. Traditional training methods may not be appropriate in dealing with distributed teams who are connected virtually and could possibly exacerbate the onset or impact of task conflict on these teams.

Limitations and Future Research

One of the most important limitations was the sample population. As previously stated, the sample came from a southeastern university and comprised of undergraduate students. This sample is not one typically found in a general workforce population, therefore hindering these findings' generalizability. When considering how generalizable the experiment is, it must also be looked at in terms of age. The mean age of participants in the current study was 19.7 years, which could be seen as a lack of generational diversity compared to the current workforce. In today's society, companies consist of a wide range of generations, all exposed to different experiences. Younger generations have grown up with newer technologies such as Twitter, Skype, and so forth. This has allowed them to be more familiar at using and picking up on new technology that may be hard for older generations to use. Such frustrations with technology

experienced by older generations in the workforce may increase things such as relationship and task conflict, which might then affect a team's performance. Atmosphere and conditions were also a limitation. While the study tried to foster a serious environment for participants, it clearly could not mimic an environment faced by employees at a real job with career-defining implications. It must be admitted that no matter how true-to-life experiments are in a university setting, there is, to some degree, less seriousness by the part of the participants than if they were in a similar situations in their daily lives.

Another limitation of this study was time. The length of the experiment consisted of a total time of three hours. Of this time, only 60 minutes were actually spent by participants playing through the game in the performance round. Such a short amount of time may have not been long enough to properly capture key variables such as relationship conflict. Team members may not have had enough interaction with one another to properly gather personal information about one another, which would be needed to create the proper friction for relationship conflict to develop. Furthermore, the heavy volume of information required by participants to learn in such a short period of time may have also contributed to the lack of significance in relationship conflict. Participants may have been too focused on understanding the task, learning how to operate the game, and/or retaining several rounds worth of information to really focus on personal issues of their group members.

In terms of future research, there is plenty of room to investigate how distributed teams are impacted by both different modes of virtuality and conflict. First, a more in-depth look at how distributed teams are affected by virtuality is needed. Traditionally, teams were restricted to

very basic forms of virtual communication such as email. However, in the last several years, the amount of virtual communication software has grown rapidly. It is important to determine how these forms of communication may change the dynamic of teams and impact their bottom line. The current study covered some of the more popular virtual communication tools, but there is still an abundance of software to investigate. Therefore, more research should be conducted using some of the different major communication software used by companies in the field. An improvement upon the current study for future research would be a longer experimental study. One of the limitations of the current study was trying to measure relationship conflict in such a short amount of time. A longer study would be better suited to help foster interpersonal issues between participants. Lastly, it would be beneficial for future researchers to conduct a field study; the results would have high fidelity, and therefore be more generalizable.

APPENDIX A: CONFLICT MEASUREMENT

INSTRUCTIONS: Below are a number of statements regarding the team. ***Please select the most appropriate answer for each statement***		
Please answer the following questions about the extent to which differences in opinion and disagreements occur within the team.		1 = Not at All to 5 = Very Much
Task Conflict		
1	How frequently are there conflicts about ideas in the team?	① ② ③ ④ ⑤
2	How much conflict about the work you do is there in the team?	① ② ③ ④ ⑤
3	How often do people in the team disagree about opinions regarding the work being done?	① ② ③ ④ ⑤
4	To what extent are there differences of opinion in the team?	① ② ③ ④ ⑤
Interpersonal conflict		
6	How much friction is there among members in the team?	① ② ③ ④ ⑤
7	How much are personality conflicts evident in the team?	① ② ③ ④ ⑤
8	How much tension is there among members in the team?	① ② ③ ④ ⑤
9	How much emotional conflict is there among members in the team?	① ② ③ ④ ⑤

INSTRUCTIONS: Below are a number of statements regarding the team. ***Please select the most appropriate answer for each statement***		
Please answer the following questions about the extent to which differences in opinion and disagreements occur within the team.		1 = Not at All to 5 = Very Much
10	To what extent do people take the arguments in the team personally?	① ② ③ ④ ⑤
11	How much jealousy or rivalry is there among the members in the team?	① ② ③ ④ ⑤

Adapted from Jehn's (1995) measure of conflict

Task conflict ($\propto$ = 0.88)

Relationship conflict ($\propto$ = 0.91)

APPENDIX B: DISTRIBUTION CHART

DISTRIBUTION	DESCRIPTION	EXAMPLE
Fully distributed	All participants are separated	1-1-1-1
Partial distribution 1	3 participants are located within the same room while 1 participant is separated from the group	3-1
Partial distribution 2	2 participants are located within the same room while the remaining 2 participants are located together in a separate room	2-2
Partial distribution 3	2 participants are located within the same room while the remaining participants are placed in their own rooms	2-1-1
Collocated	All participants are located within the same room	

APPENDIX C: REGRESSION TABLES

Videoconferencing condition:

Table 1: Overall model of distribution on team performance (VC)

Overall model of distribution on team performance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.15	3	.05	4.87	.00
Residual	.63	61	.01		
Total	.78	64			

a. Dependent Variable: The mean of economy score and constituent score

b. Predictors: (Constant), Fully Distributed , 2-1-1 Distribution , 3-1 Distribution

c. Note: Levels of distribution were compared to fully collocated teams

Table 2: Individual levels of distribution on team performance (VC)

Individual levels of distribution regressed on team performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.53	.02		22.76	.00
3-1 Distribution	.02	.04	.07	.52	.60
2-1-1 Distribution	-.10	.04	-.39	-2.87	.01
Fully Distributed	.02	.04	.08	.59	.56

a. Dependent Variable: The mean of economy score and constituent score

b. Note: Levels of distribution were compared to fully collocated teams

Table 3: Overall model of distribution on task conflict (VC)

Overall model of distribution on task conflict

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	2.21	3	.74	2.95	.04
	Residual	13.94	56	.25		
	Total	16.15	59			

a. Dependent Variable: Task Conflict

b. Predictors: (Constant), Fully Distributed , 2-1-1 Distribution , 3-1 Distribution

c. Note: Levels of distribution were compared to fully collocated teams

Table 4: Individual levels of distribution on task conflict (VC)

Individual levels of distribution regressed on task conflict

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.07	.13		16.60	.00
3-1 Distribution	-.22	.18	-.18	-1.21	.23
2-1-1	.25	.18	.21	1.39	.17
Fully Distributed	-.22	.18	-.19	-1.25	.22

a. Dependent Variable: Task Conflict

b. Note: Levels of distribution were compared to fully collocated teams

Table 5: Overall model of distribution on relationship conflict (VC)

Overall model of distribution on relationship conflict

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.84	3	.28	1.77	.16
Residual	8.80	56	.16		
Total	9.64	59			

a. Dependent Variable: Relationship Conflict

b. Predictors: (Constant), Fully Distributed , 2-1-1 Distribution , 3-1 Distribution

c. Note: Levels of distribution were compared to fully collocated teams

Table 6: Individual levels of distribution on relationship conflict (VC)

Individual levels of distribution on relationship conflict

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.34	.10		13.48	.00
3-1 Distribution	-.10	.14	-.11	-.72	.47
2-1-1 Distribution	.20	.15	.21	1.37	.18
Fully Distributed	-.09	.14	-.10	-.63	.53

a. Dependent Variable: Relationship Conflict

b. Note: Levels of distribution were compared to fully collocated teams

Table 7: Task conflict on team performance (VC)

Task conflict regressed on team performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.66	.06		12.08	.00
	Task Conflict	-.07	.03	-.33	-2.62	.01

a. Dependent Variable: The mean of economy score and constituent score

Table 8: Relationship conflict on team performance (VC)

Relationship conflict regressed on team performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.52	.05		10.33	.00
	Relationship Conflict	.00	.04	.01	.10	.92

a. Dependent Variable: The mean of economy score and constituent score

Table 9: Overall model of distribution and task conflict on team performance (VC)

Overall model of distribution and task conflict on team performance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.18	4	.04	4.40	.00*
Residual	.55	55	.01		
Total	.73	59			

a. Dependent Variable: The mean of economy score and constituent score

b. Predictors: (Constant), Task Conflict, 2-2 Distribution, 3-1 Distribution, 2-1-1 Distribution

c. * $p < .01$

d. Note: Levels of distribution were compared to fully collocated teams

Table 10: Individual levels of distribution and task conflict on team performance (VC)

Individual levels of distribution and task conflict regressed on team performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.63	.06		11.33	.00
3-1 Distribution	.00	.04	.01	.03	.97
2-2 Distribution	.01	.04	.04	.24	.81
2-1-1 Distribution	-.10	.04	-.37	-2.48	.02*
Task Conflict	-.04	.03	-.21	-1.63	.11

a. Dependent Variable: The mean of economy score and constituent score

b. * $p < .05$

c. Note: Levels of distribution were compared to fully collocated teams

Table 11: Overall model of distribution and relationship conflict on team performance (VC)

Overall model of distribution and relationship conflict on team performance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.17	4	.04	4.04	.01*
Residual	.56	55	.01		
Total	.73	59			

a. Dependent Variable: The mean of economy score and constituent score
b. Predictors: (Constant), Relationship Conflict, 2-2 Distribution, Fully Distributed , 2-1-1 Distribution
c. * $p < .05$
d. Note: Levels of distribution were compared to fully collocated teams

Table 12: Individual levels of distribution and relationship conflict on team performance (VC)

Individual levels of distribution and relationship conflict regressed on team performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.50	.05		10.13	.00
2-2 Distribution	-.01	.04	-.03	-.18	.86
2-1-1 Distribution	-.13	.04	-.51	-3.38	.00*
Fully Distributed	-.00	.04	-.01	-.04	.97
Relationship Conflict	.04	.03	.15	1.23	.22

a. Dependent Variable: The mean of economy score and constituent score

b. * $p < .01$

c. Note: Levels of distribution were compared to fully collocated teams

Teleconferencing condition:

Table 13: Overall model of distribution on team performance (TC)

Overall model of distribution on team performance

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.02	3	.01	.40	.76
	Residual	.88	58	.02		
	Total	.90	61			

a. Dependent Variable: The mean of economy score and constituent score

b. Predictors: (Constant), Fully Distributed , 2-2 Distribution, 2-1-1 Distribution

c. Note: Levels of distribution were compared to fully collocated teams

Table 14: Individual levels of distribution on team performance (TC)

Individual levels of distribution on team performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.54	.03		17.66	.00
2-2 Distribution	-.04	.05	-.12	-.78	.44
2-1-1 Distribution	-.04	.04	-.13	-.82	.42
Fully Distributed	-.04	.04	-.16	-1.00	.32

a. Dependent Variable: The mean of economy score and constituent score

b. Note: Levels of distribution were compared to fully collocated teams

Table 15: Overall model of distribution on task conflict (TC)

Overall model of distribution on task conflict

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	1.46	3	.49	2.33	.09
	Residual	11.48	55	.21		
	Total	12.93	58			

a. Dependent Variable: Task Conflict

d. Predictors: (Constant), Fully Distributed , 2-2 Distribution, 3-1 Distribution

e. Note: Levels of distribution were compared to fully collocated teams

Table 16: Individual levels of distribution on task conflict (TC)

Individual levels of distribution on task conflict

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.18	.11		19.09	.00
3-1 Distribution	-.23	.16	-.21	-1.37	.18
2-2 Distribution	-.20	.17	-.17	-1.12	.27
Fully Distributed	-.43	.16	-.40	-2.64	.01*

a. Dependent Variable: Task Conflict

b. * $p < .05$

c. Note: Levels of distribution were compared to fully collocated teams

Table 17: Overall model of distribution on relationship conflict (TC)

Overall model of distribution on relationship conflict

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.27	3	.09	.66	.58
	Residual	7.47	55	.14		
	Total	7.74	58			

a. Dependent Variable: Relationship Conflict

b. Predictors: (Constant), Fully Distributed , 2-2 Distribution, 3-1 Distribution

c. Note: Levels of distribution were compared to fully collocated teams

Table 18: Individual levels of distribution on relationship conflict (TC)

Individual levels of distribution on relationship conflict

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.38	.09		15.01	.00
3-1 Distribution	-.08	.13	-.09	-.58	.56
2-2 Distribution	-.19	.14	-.21	-1.34	.19
Fully Distributed	-.13	.13	-.16	-.98	.33

a. Dependent Variable: Relationship Conflict

b. Note: Levels of distribution were compared to fully collocated teams

Table 19: Task conflict on team performance (TC)

Task conflict on team performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.60	.07		8.89	.00
	Task Conflict	-.04	.03	-.17	-1.32	.19

a. Dependent Variable: The mean of economy score and constituent score

Table 20: Relationship conflict on team performance (TC)

Relationship conflict on team performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.59	.06		10.29	.000
	Relationship Conflict	-.06	.04	-.19	-1.45	.15

a. Dependent Variable: The mean of economy score and constituent score

Table 21: Overall model of distribution and task conflict on team performance (TC)

Overall model of distribution and task conflict on team performance

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.06	4	.02	1.03	.40
	Residual	.78	54	.01		
	Total	.84	58			

a. Dependent Variable: The mean of economy score and constituent score
b. Predictors: (Constant), Task Conflict, 3-1 Distribution, 2-2 Distribution, 2-1-1 Distribution
c. Note: Levels of distribution were compared to fully collocated teams

Table 22: Individual levels of distribution and task conflict on team performance (TC)

Individual levels of distribution and task conflict on team performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.59	.07		8.51	.00
3-1 Distribution	.06	.04	.22	1.40	.17
2-2 Distribution	.01	.05	.02	.14	.89
2-1-1	.04	.05	.14	.81	.42
Task Conflict	-.05	.04	-.21	-1.49	.14

a. Dependent Variable: The mean of economy score and constituent score

b. Note: Levels of distribution were compared to fully collocated teams

Table 23: Overall model of distribution and relationship conflict on team performance (TC)

Overall model of distribution and relationship conflict on team performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.06	4	.02	1.11	.36
	Residual	.77	54	.01		
	Total	.84	58			

a. Dependent Variable: The mean of economy score and constituent score

c. Predictors: (Constant), Relationship Conflict, 3-1 Distribution, 2-2 Distribution, Fully Distributed

d. Note: Levels of distribution were compared to fully collocated teams

Table 24: Individual levels of distribution and relationship conflict on team performance (TC)

Individual levels of distribution and relationship conflict on team performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.61	.07		8.95	.00
3-1 Distribution	.03	.04	.11	.72	.47
2-2 Distribution	-.03	.05	-.11	-.71	.48
Fully Distributed	-.02	.04	-.09	-.54	.59
Relationship Conflict	-.07	.04	-.21	-1.59	.12

a. Dependent Variable: The mean of economy score and constituent score

b. Note: Levels of distribution were compared to fully collocated teams

Instant messaging condition:

Table 25: Overall model of distribution on team performance (IM)

Overall model of distribution on team performance

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.09	3	.03	2.34	.08
	Residual	.77	62	.01		
	Total	.86	65			

a. Dependent Variable: The mean of economy score and constituent score

c. Predictors: (Constant), Fully Distributed , 2-1-1 Distribution , 3-1 Distribution

d. Note: Levels of distribution were compared to fully collocated teams

Table 26: Individual levels of distribution on team performance (IM)

Individual levels of distribution on team performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.57	.03		21.60	.00
3-1 Distribution	-.09	.04	-.35	-2.40	.02*
2-1-1 Distribution	-.05	.04	-.20	-1.41	.14
Fully Distributed	-.01	.04	-.05	-.32	.75

a. Dependent Variable: The mean of economy score and constituent score

b. * $p < .05$

c. Note: Levels of distribution were compared to fully collocated teams

Table 27: Overall model of distribution on task conflict (IM)

Overall model of distribution on task conflict

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	2.56	3	.85	3.34	.03*
	Residual	13.30	52	.26		
	Total	15.86	55			

a. Dependent Variable: Task Conflict

c. Predictors: (Constant), Fully Distributed , 3-1 Distribution, 2-2 Distribution

d. * $p < .05$

e. Note: Levels of distribution were compared to fully collocated teams

Table 28: Individual levels of distribution on task conflict (IM)

Individual levels of distribution on task conflict

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.10	.13		16.59	.00
3-1 Distribution	-.25	.19	-.19	-1.28	.21
2-2 Distribution	.38	.19	.30	2.03	.05*
Fully Distributed	.01	.18	.01	.04	.97

a. Dependent Variable: Task Conflict

b. * $p < .05$

c. Note: Levels of distribution were compared to fully collocated teams

Table 29: Overall model of distribution on relationship conflict (IM)

Overall model of distribution on relationship conflict

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.89	3	.30	1.25	.30
	Residual	12.40	52	.24		
	Total	13.29	55			

a. Dependent Variable: Relationship Conflict

c. Predictors: (Constant), Fully Distributed , 3-1 Distribution, 2-2 Distribution

d. Note: Levels of distribution were compared to fully collocated teams

Table 30: Individual levels of distribution on relationship conflict (IM)

Individual levels of distribution on relationship conflict

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.48	.12		12.08	.00
3-1 Distribution	-.16	.19	-.13	-.83	.41
2-2 Distribution	.19	.18	.16	1.03	.31
Fully Distributed	-.10	.18	-.09	-.59	.56

a. Dependent Variable: Relationship Conflict

b. Note: Levels of distribution were compared to fully collocated teams

Table 31: Task conflict on team performance (IM)

Task conflict on team performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.55	.05		10.04	.00
	Task Conflict	-.01	.03	-.04	-.27	.79

a. Dependent Variable: The mean of economy score and constituent score

Table 32: Relationship conflict on team performance (IM)

Relationship conflict on team performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.53	.04		12.75	.00
	Relationship Conflict	.00	.03	.01	.06	.96

a. Dependent Variable: The mean of economy score and constituent score

Table 33: Overall model of distribution and task conflict on team performance (IM)

Overall model of distribution and task conflict on team performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.02	4	.01	.50	.74
	Residual	.50	51	.01		
	Total	.52	55			

a. Dependent Variable: The mean of economy score and constituent score

c. Predictors: (Constant), Task Conflict, Fully Distributed , 2-1-1 Distribution, 3-1 Distribution

d. Note: Levels of distribution were compared to fully collocated teams

Table 34: Individual levels of distribution and task conflict on team performance (IM)

Individual levels of distribution and task conflict on team performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.59	.07		8.11	.00
3-1 Distribution	-.04	.04	-.19	-1.03	.31
2-1-1 Distribution	-.04	.04	-.18	-1.02	.31
Fully Distributed	-.01	.04	-.03	-.16	.88
Task Conflict	-.02	.03	-.10	-.66	.51

a. Dependent Variable: The mean of economy score and constituent score

b. Note: Levels of distribution were compared to fully collocated teams

Table 35: Overall model of distribution and relationship conflict on team performance (IM)

Overall model of distribution and relationship conflict on team performance

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.02	4	.00	.39	.82
	Residual	.51	51	.01		
	Total	.52	55			

a. Dependent Variable: The mean of economy score and constituent score

c. Predictors: (Constant), Relationship Conflict, 2-1-1 Distribution , 3-1 Distribution, 2-2 Distribution

d. Note: Levels of distribution were compared to fully collocated teams

Table 36: Individual levels of distribution and relationship conflict on team performance (IM)

Individual levels of distribution and relationship conflict on team performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.55	.05		11.81	.00
3-1 Distribution	-.03	.04	-.14	-.88	.39
2-2 Distribution	.00	.04	-.00	-.00	.10
2-1-1 Distribution	-.03	.04	-.15	-.91	.37
Relationship Conflict	-.00	.03	-.01	-.07	.94

a. Dependent Variable: The mean of economy score and constituent score

b. Note: Levels of distribution were compared to fully collocated teams

APPENDIX D: CORRELATION MATRIX

Table 37: Correlations with means and standard deviations

Correlations with means and standard deviations

Variables	Mean	SD	1	2	3	4	5
1. Team Performance	.52	.11	1				
2. Distribution	2.68	1.27	.015	1			
3. Task conflict	2.03	.52	-.16*	-.02	1		
4. Relationship conflict	1.36	.41	-.03	.00	.68**	1	
5. Virtuality	2.16	.96	.07	.30**	.05	.08	1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

APPENDIX E: IRB HUMAN SUBJECTS PERMISSION LETTER

University of Central Florida Institutional Review Boa
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Shawn Burke** and Co-PIs: **Eduardo Salas, Stephen M. Fiore**

Date: **May 14, 2012**

Dear Researcher:

On 5/14/2012, the IRB approved the following human participant research until 5/13/2013 inclusive:

Type of Review:	IRB Continuing Review Application Form
Modification Type:	[Consent form revision, Add'n of co-inv's, Methodology Revisions, Add'n of Test Instruments, etc] (received on xx/xx/20xx) *<Delete this section if n/a>*
Project Title:	Shared Leadership: Moving Beyond Virtuality and Distribution to Build Capacity in Virtual Organizations
Investigator:	Shawn Burke
IRB Number:	SBE-10-07005
Funding Agency:	National Science Foundation
Grant Title:	
Research ID:	N/A

The Continuing Review Application must be submitted 30days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at https://iris.research.ucf.edu .

If continuing review approval is not granted before the expiration date of 5/13/2013, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., CF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 05/14/2012 03:29:53 PM EDT

Joanne Muratori

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