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TRUST TRAJECTORIES AS A FUNCTION OF VIOLATION TYPE AND REPAIR
EFFORTS

by

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B.A. University of North Carolina at Wilmington, 2005

A dissertation submitted in partial fulfillment of the requirements
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in the College of Sciences
at the University of Central Florida
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ABSTRACT

Across domains, organizations and society are facing a trust deficit (Twenge, Campbell, & Carter, 2014). This is problematic, as trust is important to a variety of critical organizational outcomes, such as perceived task performance, team satisfaction, relationship commitment, and stress mitigation (Costa, Roe, & Taillieu, 2001), and has been cited as a motivator for cooperation and knowledge transfer due to its capacity to reduce fear and risk of exploitation (Chen et al., 1998; Fleig-Palmer & Schoorman, 2011; Irwin & Berigan, 2013; Yamagishi & Sato, 1986), and a key component of collaboration. As organizations increasingly rely upon collaboration for achieving important outcomes, it is of critical importance that organizations understand how to not only develop interpersonal trust in collaborative partnerships to facilitate these positive outcomes, but also the way in which interpersonal trust is broken and can be repaired when problems inevitably arise. Though research has begun to investigate trust violation and trust repair, relatively little is known about trust development, violation, and repair as a process that unfolds over time. This is problematic, as cross-sectional studies fail to capture *change*, both in terms of how trust itself changes as well as how the effect of a violation or the utility of a repair strategy may be weaker or stronger in the long-term than the short-term. Thus, findings from a single point in time may result in different conclusions and recommendations than those that would result from long-term investigation.

Therefore, this study examines how interpersonal trust patterns unfold within individuals, and how these patterns differ between individuals depending on the type of violation and the repair strategy employed. An experimental study using discontinuous growth modeling to examine intraindividual and interindividual differences in trust processes found that generally,

trust was negatively impacted more after an intentional (“will do”) violation as compared to a competence (“can do”) violation, such that it had a greater impact on character assessments than a competence violation and also damaged perceptions of ability as much as a competence violation. These negative impacts carried over into trust restoration, which was significantly slower after an intentional violation than a competence violation. Furthermore, study findings suggest that after an intentional violation, trust restored more quickly when surveillance was implemented than when compensation was offered. Though the opposite did not hold true for a competence violation, the findings did approach significance. Drawing from these findings, implications and future research recommendations are discussed.

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CHAPTER ONE: INTRODUCTION

Statement of the Problem

Across domains, organizations and society are facing a trust deficit. A recent 30-year study investigating trust and social capital from 1972 to 2012 found that in the United States, interpersonal trust and trust in institutions such as the media, government, and health organizations has reached historic lows (Twenge et al., 2014). Other polls have reflected similar themes; in terms of the economy, business leaders were trusted less than politicians (CNN/Opinion Research Corporation, 2009) and only 39% of employees trust senior leaders (Watson Wyatt, 2007). These trends are highly problematic for organizations. Trust is important to a variety of critical organizational outcomes, such as perceived task performance, team satisfaction, relationship commitment, stress mitigation (Costa et al., 2001), knowledge transfer in mentoring relationships (Fleig-Palmer & Schoorman, 2011), and cooperation, due to its capacity to reduce fear and risk of exploitation (Chen et al., 1998; Irwin & Berigan, 2013; Yamagishi & Sato, 1986).

Indeed, in their theoretical framework, Bedwell and colleagues (2012) cited interpersonal trust as a key collaborative process that affects overall collaborative performance. Collaboration, defined as “an *evolving process* whereby two or more social entities actively and *reciprocally* engage in *joint* activities aimed at achieving at least one *shared goal*” (note: emphasis added; Bedwell et al., 2012), is influenced by not only characteristics of the entities themselves but also external forces such as environmental characteristics (e.g., level of risk and uncertainty; stressors, such as performance failure or ethical issues) and temporal characteristics (e.g., relationship tenure or phase). As organizations increasingly rely upon collaboration

(Tannenbaum, Mathieu, Salas, & Cohen, 2012), it is thus of critical importance that organizations understand not only how to develop interpersonal trust in interpersonal collaborative partnerships in order to facilitate these positive outcomes, but also the way in which interpersonal trust is broken and can be repaired when problems inevitably arise.

Trust deficits can exist for a variety of reasons, including dispositional tendencies to trust (or distrust), the social environment in which individuals operate, and as a response to violations (i.e., events that damage trust; Fulmer & Gelfand, 2013). For instance, Robinson and Rousseau (1994) found that 55% of employees reported that their employers had violated their psychological contract (i.e., failed to adequately fulfill the promises made), which reduced trust. This is troubling, as trust violations (i.e., events that damage trust) can have a substantial impact on relationships and outcomes (Tomlinson & Mayer, 2009), leading to relationship withdrawal or revenge (Aquino, Tripp, & Bies, 2006), reduced affective commitment, and higher turnover intentions (Dulac, Coyle-Shapiro, Henderson, & Wayne, 2008), among other negative outcomes. However, there are different ways that trust can be broken, including through accidental (due to a lack of competence, or ability) versus intentional acts, and it is certainly reasonable to consider that the type, or characteristics, of a violation may make it more or less damaging to collaborative relationships. Indeed, studies have found that the severity (large versus small), frequency (single versus multiple), and timing (early versus late in the relationship) are important factors (Kramer & Lewicki, 2010), but to my knowledge the relative immediate and long-term effects of different types of violations has not been empirically examined. This is problematic, as expectations for repair cannot be fully understood without understanding the way in which trust was broken and the extent of the damage done.

Fortunately, there is hope for avoiding negative outcomes of trust deficits, namely through efforts to restore trust after a violation. Encouragingly, research suggests that a variety of strategies are useful for restoring broken trust, and several of these studies have gone a step further to investigate the utility of different strategies in repairing trust after particular types of violation events. For instance, research findings suggest that it is better to apologize and accept blame when the damaging event was a mistake, but to deny responsibility if it was intentional (Kim, Ferrin, Cooper, & Dirks, 2004). Much of the literature to date has focused on verbal strategies that repair perceptions of the trustee's trustworthiness (i.e., a perceived trait that makes one worthy of taking a risk on), such as the effects of apology (i.e., expressive vocal acts indicating empathy or acceptance of responsibility), accounts (i.e., explanations of the violation and why it occurred; Beugré, 2011), and denial of accountability for a violation (e.g., Kim, Ferrin, Cooper, & Dirks, 2004; Kim, Dirks, Cooper, & Ferrin, 2006; Struthers, Eaton, Santelli, Uchiyama, & Shirvani, 2008). These strategies are particularly useful in shaping attributions of blame, trustworthiness, and guilt.

Other potentially useful non-verbal repair strategies that draw from alternative theoretical perspectives (Dirks, Lewicki, & Zaheer, 2009) have been proposed but not yet fully examined to determine their effectiveness (Schoorman, Mayer, & Davis, 2007). In particular, Dirks and colleagues (2009) suggest that social equilibrium (i.e., efforts to restore stability and reinforce norms in relationships) and structural (i.e., the use of regulations or measures that provide assurance of positive exchange) strategies are also particularly useful in repairing relationships beyond just changing perceptions of the offender. Indeed, verbal strategies may not always be practical or possible depending on the situation, and the use of non-verbal tactics such as

compensation (i.e., tangible amends to make up for harm done) or surveillance (i.e., monitoring systems that provide assurance of positive exchange and prevent future transgressions) may be more appropriate. However, there is much to learn in order to provide scientifically-based recommendations to organizations regarding the use of these non-verbal methods.

As a key component of collaboration, trust is a reciprocal process that evolves over time. Despite this, work to date has not examined trust as a temporal process, meaning there is much to learn about the short- and long-term impact of the different ways that trust is broken and repaired and how trust changes, or unfolds (Fulmer & Gelfand, 2013; Schoorman et al., 2007). Studies on trust violation and repair have overwhelmingly utilized cross-sectional designs, meaning they only compare people at a single point in time (Dirks et al., 2009; Lewicki, Tomlinson, & Gillespie, 2006). This is problematic, as it fails to capture *change*, both in terms of how trust itself changes as well as how useful a repair strategy is in the immediate versus long-term. Thus, findings from a single point in time may result in different conclusions and recommendations than those that would result from long-term investigation. Though the findings from previous studies have been enlightening in terms of beginning to understand trust repair, there is much that can be gained from examining the *process* of trust as well as how time factors into the effects of violation and repair efforts on trust. To my knowledge, only one empirical study has investigated trust trajectories, or patterns over time (i.e., Fulmer, 2010), but this study did not investigate the immediate or long-term relative impact of different types of violations.

Purpose of the Current Study

The current study's purpose is to serve as an initial step toward addressing these gaps, by investigating trust as a key collaborative process that is influenced jointly by the parties

involved, evolves over time, and is influenced by trust violations and repair strategies. Simply stated, this study makes three important contributions toward understanding how trust changes over time, how trust repairs depending on what broke the relationship, and how quickly trust can be repaired. The specific aims are threefold.

First, this study takes a process approach to investigate interpersonal trust in collaborative relationships as a phenomenon that unfolds over time. Historically, research on interpersonal trust violation and repair has examined trust at a single point in time using between-subjects designs, leaving much to be explored in terms of how it grows, is damaged, and restores. Therefore, this study examines trust both within- and between-subjects to investigate interpersonal trust patterns that unfold within individuals in collaborative relationships as they progress through the phases of initial trust development, trust dissolution (i.e., trust decreasing after a violation), and trust restoration (i.e., trust growing again after it has been damaged). In particular, this study examines (1) how trust is developed, (2) the degree to which trust is broken after different types of violations as well as their long-term impact on trust, and (3) the utility of two different trust repair efforts in restoring trust.

Second, this study leverages the process approach to understand the relative effects of competence (i.e., accidental, suggesting lack of ability) and intentional (i.e., deliberate or purposeful, suggesting lack of integrity) violations on the dissolution (i.e., reduction) in interpersonal trust. More specifically, this study examines (1) relative differences in the immediate impact of a competence versus intentional trust violation, as well as (2) the relative long-term effects of these violations on the rate at which trust can be restored.

Third, this study builds upon the extant work on trust violation and trust repair to go beyond attributional perspectives and the use of verbal tactics to also draw from alternative theories (i.e., social equilibrium and structural) and focus on two non-verbal strategies, compensation and surveillance. Though commonly used in collaborative relationships, these non-verbal strategies are relatively under-studied in terms of their actual effectiveness in restoring trust after a transgression, more specifically after competence- versus intentional violations have occurred.

Overall, this research is designed to make several important contributions. First, this study takes a process rather than a cross-sectional approach to provide a foundation for understanding trust as a process of trust development, dissolution, and restoration that occurs within individuals. This approach is an important step toward understanding not just how *much* trust one has at a given time, but the *speed*, or rate, at which it changes, thereby allowing for projections of future trust as well. Second, this research examines both the immediate and long-term impact of competence and intentional violations as distinct types of events. Though violations are assumed to have a detrimental impact on trust overall, it's also important to know what causes trust to break down the most and whether these events have a lasting effect or if the relationship is able to quickly rebound. Finally, this research provides empirical evidence for the utility of two under-studied methods of repairing trust over time. This is an important next step in moving beyond verbal tactics (e.g., apology, accounts, denial) to understand if there are non-verbal behavioral or environmental methods that can be used if one is unable or unwilling to engage in conversation or would prefer to repair the relationship through less personal means.

Taken together, this study has important implications for how trust development, dissolution, and repair are approached in interpersonal collaborative contexts.

CHAPTER TWO: LITERATURE REVIEW

Interpersonal Trust

Trust, defined as the confident, positive expectations about the words, actions, and decisions of another in situations entailing risk (Lewicki & Bunker, 1995; McAllister, 1995), has been conceptualized in many different ways. However, there are clearly similarities across definitions, as many have theorized that it consists of two distinct facets. First, Barber (1983) and Sitkin and Roth (1993) identified trust in *competence*, or ability, and trust in *motives or values* as the two components of trust. Similarly, McAllister (1995) argued the two primary trust facets include *cognition-based* and *affect-based* trust. Cognition-based trust is defined as a confidence in a one's history of behavior and reputation for dependability, reliability, or predictability. In other words, trust is developed as a result of cognitive reasoning. In contrast, affect-based trust is defined as a confidence based on emotional investments and reciprocal care and concern for the other party's well-being. Thus, emotional ties link individuals and this serves as the foundation of trusting expectations. From the trust violation literature, Elangovan, Auer-Rizzi, and Szabo (2007) suggested that violations can be classified into two distinct types: "couldn't" and "didn't want to," or *competence* and *integrity*, respectively (Janowicz-Panjaitan & Noorderhaven, 2009; Kim et al., 2004). Competence violations are situations in which the trustee unintentionally engages in an act that reflects a lack of ability (e.g., a mistake), whereas integrity violations occur when the trustee intentionally engages in an act that violates expectations to engage in an ethical and fair manner. In the context of interpersonal relationships within organizations, the distinction between competence (predictability of performance) and intent (purposeful behavior based on motives/values) essentially represents the task-focused and person-focused components

of a working relationship, a distinction that has been made for other interpersonally-grounded constructs such as cohesion (i.e., task cohesion, social cohesion; Carless & de Paola, 2000), interpersonal citizenship behaviors (i.e., task-focused, person-focused; Settoon & Mossholder, 2002), conflict (i.e., task conflict, relationship conflict; Jehn, 1995, 1997), team performance (i.e., taskwork, teamwork; Morgan, Glickman, Woodward, Blaiwes, & Salas, 1986), and psychological contracts (i.e., relational, transactional; (Robinson & Rousseau, 1994; Rousseau, 1995).

Trust as a Process: Development, Dissolution, and Repair

Beyond understanding the meaning and structure, or types, of trust, it is also important to consider that like other attitudinal constructs, trust is inherently dynamic. Within-person fluctuations are expected as trust changes over time – as the relationship between the trustor and trustee develops and evolves, and as events occur that shock the underlying affect (Judge, Hulin, & Dalal, 2010). Indeed, Affective Events Theory (AET; Weiss & Cropanzano, 1996) suggests that work events evoke an emotional reaction, which in turn shapes immediate responses as well as long-term thoughts and actions. In other words, events may be short-lived but may have a long-term influence on attitudes and behaviors.

Prior research has identified three trust phases: trust development (or formation), trust dissolution, and trust restoration (e.g., Kim, Dirks, & Cooper, 2009; Rousseau, Sitkin, Burt, & Camerer, 1998). As suggested in Figure 1, trust is generally assumed to increase or grow during trust development, to decrease or dissolve after a violation, and to begin growing or restoring again at some point after the violation (e.g., after effort has been made to repair the damage done). Drawing from a framework offered by Dirks, Lewicki, and Zaheer (2009) for

understanding relationship repair as a process, several questions about how trust unfolds arise, including the factors that influence trust; the evolution of trust as it moves through processes of development, dissolution, and restoration; and outcomes of trust processes. More specifically, what factors of the person or situation influence how trust unfolds over time? What is the state of trust and is it growing? What caused trust to decrease, and to what extent and how quickly is it damaged? What actions were taken to repair trust, and to what extent and how quickly is it restored? And what factors are impacted by trust as it unfolds over time?

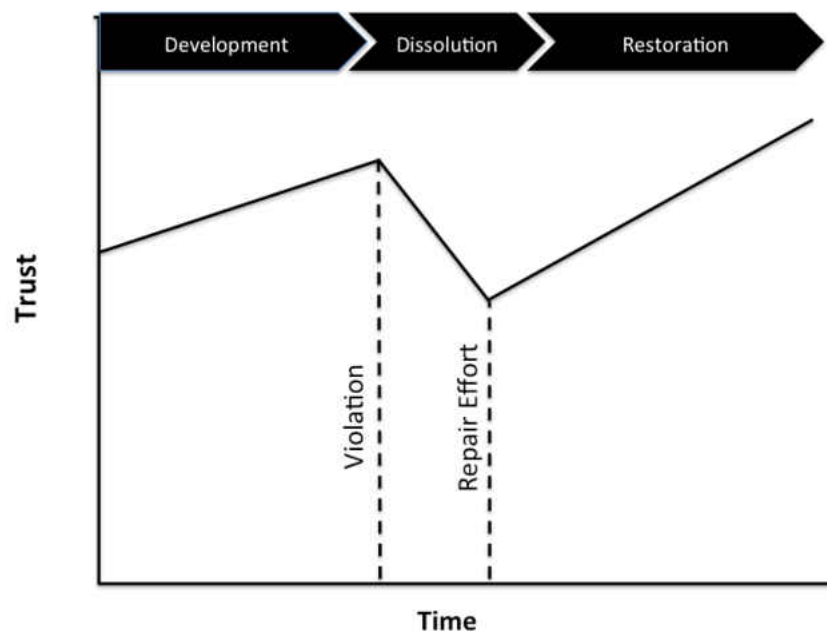


Figure 1. Trust development, dissolution, and restoration over time.

Several factors come into play to facilitate changes in trust, including characteristics of the trustor and the trustee, the past relationship between the parties (e.g., patterns of successful cooperation), communication processes (e.g., threats, promises), relationship form (e.g., friend, authority, partner), and structural parameters governing the relationship (Lewicki et al., 2006). Characteristics of the trustor (i.e., the person doing the trusting) include individual differences

such as propensity to trust (i.e., a general willingness to trust others; Mayer, Davis, & Schoorman, 1995), whereas characteristics of the trustee (i.e., the one being trusted) determine trustworthiness. Trust is related yet conceptually distinct from trustworthiness. Whereas trust represents an internal cognition or feeling, trustworthiness is a perceived attribute of another party. In one of the most well-known models of trust development, Mayer and colleagues (1995) suggested that trustworthiness is based on expectations of one's ability, benevolence (i.e., perception that the other party is well-intentioned and motivated to act in a way that is beneficial to the trustor, due to an attachment or loyalty based on care and concern), or integrity (i.e., perception that the trustee adheres to a set of norms or values that the trustor finds acceptable). Though the trustor may trust *because* they perceive the trustee to be trustworthy, one can also trust for various external reasons, such as situational norms or other structural parameters that reduce uncertainty and risk regardless of the innate characteristics of the other individuals involved (Chen et al., 1998).

Trust Development

Trust development, or formation, describes the way in which individuals come to trust one another and how that trust increases over time as the relationship develops. In an examination of the trust development literature, two dominant theories of trust development emerged, namely transformational models and swift trust.

First, early transformational models of trust development assumed that at the beginning of a relationship, trust was low or even nonexistent (Lewicki et al., 2006). For instance, Shapiro, Sheppard, and Cheraskin (1992) and Lewicki and Bunker (1995) posited that trust develops through three phases: deterrence-based or calculus-based trust (respectively; i.e., short-term

advantages of acting in a distrustful way are outweighed by the cost of retribution or severing the relationship), knowledge-based trust (i.e., knowing one sufficiently well enough to be able to predict one's behavior), and finally, identification-based trust (i.e., identifying with the other's desires such that partners can act on each other's behalf). Similarly, Rousseau and colleagues (1998) suggested that early trust is derived from the existence of deterrence mechanisms coupled with knowledge about one's partner (i.e., calculus-based trust) and over time and through repeated interactions, emotion enters the relationship and relational trust develops. These theories suggest that time and multiple interactions are required for trust to grow and develop in order to reach full relationship potential.

On the other hand, the concept of *swift trust* has also received some attention, particularly in explaining how temporary groups or temporary systems appear to be tied together by trust, despite the fact that traditional sources of trust (e.g., familiarity, threats and deterrents, prior interactions) are not present. Swift trust refers to a unique form of perception and relating that relies upon categorization of the trustee into a group from which the trustor can infer information (about trustworthiness) in order to manage risk, uncertainty, expectations, and vulnerability (Meyerson, Weick, & Kramer, 1996). Swift trust is assumed to be role-based and derived from knowledge of professional standards such as training and development; recruitment from a small labor pool with good reputation; and moderate levels of interdependence. For instance, medical teams are often quick to form to address the needs of a patient and in many cases have never worked together before. However, the physicians involved may have a high level of trust in one another despite not having personally interacted in the past. According to Wildman and colleagues (2012), as trustors in these swift starting teams make trust-related evaluations of the

trustee, they draw primarily from (1) their own propensity to trust, (2) surface level cues, and (3) information imported from past experience or third parties. Thus, theories of swift trust suggest that individuals draw from available information to thus enter a relationship with high levels of trust, and that high level of trust is assumed to persist barring evidence that suggests it is not warranted.

Taken together, these competing theories are at odds with one another, and yet, relatively little work has empirically examined swift trust, transformational trust over time, and how these processes interact over time. To advance theory on trust development, I thus use these competing predictions to conduct strong inference tests (Platt, 1964) and pit alternative theories against one another. As noted by Dalal, Bhave, and Fiset (2014), comparing theories of within-person variability supports the elaboration of theory to improve precision and scope. Whereas transformational theories of trust suggest that trust starts low and develops over time through interactions, theories of swift trust suggest that individuals can enter into an interaction with a high level of trust by drawing on environmental cues, personal assumptions, and past experiences in similar situations. As such, it's unclear whether trust will transform or will develop over time in collaborative interpersonal relationships. If transformational models are the best explanation of how trust develops in interpersonal collaborative relationships, we would expect that initial trust would be low and not significantly different from zero, but would grow and change with time. If swift trust is instead the best explanation of trust development, we would expect that initial trust would be high and significantly different from zero, but would not change significantly until a disconfirming event (e.g., a trust violation) warranted a drop in trust. Therefore, the following competing hypotheses are put forth:

Hypothesis 1: In collaborative interpersonal contexts, (a) initial trust (i.e., intercept) will be low and not significantly different from zero but change in trust development (i.e., slope) will be positive and significant (transformational theories), or (b) initial trust (i.e., intercept) will be high and significantly different from zero but change in trust development (i.e., slope) will be nonsignificant (swift trust).

Trust Dissolution

The majority of trust research has focused on the structure of trust, how it develops, and how it affects various organizationally-relevant outcomes (Schoorman et al., 2007). Only recently has research begun to focus on how trust violations, defined as a transgression that damages one's expectations of another's competence or intent, impact trust. However, understanding the impact of trust violations is critical for understanding how to best restore trust when they do occur.

Social exchange theory (Blau, 1964; Gouldner, 1960) and psychological contract theory (Rousseau, 1995) provide an explanation for why violations affect trust. Social exchange relationships are subjective, relationship-oriented interactions that are characterized by the exchange of socio-emotional benefits, mutual trust and commitment, long-term focus, and open-ended commitments (Lavelle, Rupp, & Brockner, 2007). Social exchange theory is rooted in the concept of exchange norms and thus, expectations. In particular, individuals have *general* expectations for exchange that serve as a stabilizing function in groups and are rooted in societal norms, as well as *specific* expectations that a particular exchange partner will conform to accepted norms and provide rewards for association. Furthermore, both social exchange theory and psychological contract theory suggest that exchanges and contracts can be either economic

or social in nature. Trust is also based upon expectations of behavior that are rooted in norms of conduct. In particular, trust expectations are developed through the fulfillment of exchange norms and thus, maintenance of psychological contracts among the trustor and trustee (Cropanzano & Mitchell, 2005).

Violation Type. Trust is based on what is put into and received from a relationship, economic and relational. Therefore, an imbalance in exchange results in dissatisfaction and decreased trust (Ambrose & Schminke, 2003; Aryee, Budhwar, & Chen, 2002; Khazanchi & Masterson, 2011). In a study examining whether trust served as an exchange deepener or uncertainty reducer in the relationship between organizational justice and performance, Colquitt, Lepine, Piccolo, Zapata, and Rich (2012) found that affect-based trust (i.e., intent) resulted in normative commitment whereas cognition-based trust (i.e., competence) reduced uncertainty. They concluded that trust based in a sense of caring and investment serves to deepen exchange norms whereas cognition-based trust reduces uncertainty in a partner's behavior. As competence-based trust is concerned with one's ability to perform a task, it can be formed through continual display of successful completion of tasks and broken by mistakes. Intent-based trust focuses on the intentions or objective of the other party, including their character or motives, thus allowing it to build through consistent displays of care and concern or well-intentioned behaviors, and damaged through betrayal (Schweitzer, Hershey, & Bradlow, 2006). Thus, competence- and intent-based violations signal a breach of the contract and norms for reciprocal exchange (the basis of expectations), and ultimately damage trust and trust-related behaviors (AET; Weiss & Cropanzano, 1996). Hence, after violations, trust enters a trust dissolution phase.

However, there is reason to believe that trust will be impacted differently depending on the type of violation. Attribution theory suggests that when evaluating trust, trustors first assess the locus of causality, or whether the violation is due to internal characteristics of the trustee or to external forces (Weiner, 1986). In particular, competence-based violations are generally considered to be out of the violator's volitional control (Weiner, 1986, 2001) and are generally evaluated at a more specific level (i.e., an individual can lack competence in one ability but be proficient in another). However, integrity and benevolence are generally perceived as a stable indicator that an individual is (un)trustworthy, such that if they lack integrity in one situation then that can be generalized across situations.

Following along this line of reasoning, when causality is attributed to dispositional bases (i.e., integrity) there is potential for spillover effects from intentional violations, such that trust in one's competence will be damaged even if the violation was one of intent. In other words, intentional violations may be so generalized that they also impact assessments of competence. For example, when individuals hold different political views from one another and use those views to engage in behaviors deemed unethical (thereby committing an intent-based violation), the trustee may not only lose trust the ethics or benevolence of the individual, but also attribute their alternative beliefs, values, and/or behaviors to a lack of intelligence (thus damaging competence-based trust). Therefore, I suggest that,

Hypothesis 2: Trust will dissolve significantly faster (i.e., a more negative slope) after an intentional violation than a competence violation.

Trust Restoration

Trust repair is defined as “those activities in which party 2 (the trustee) has taken advantage of the party 1’s (the trustor) vulnerability and seeks to restore the willingness of that party to be vulnerable in the future” (Kramer & Lewicki, 2010). Though repair and restoration are often used interchangeably within the literature, recent work argues that these terms may not be synonymous, as restoration implies trust is returned to previous levels and past violations are fully forgiven and forgotten. Conversely, trust repair implies that the relationship may be mended but the past cannot be erased, much like a broken vase that has been glued back together. It is worth noting, however, that though I use the term “trust restoration” here, it is simply because the term “trust repair” implies that a tangible, motivated action has been taken to correct the relationship. Trust can be restored after a violation through other, third party (i.e., structural) means or through repeated displays of predictable, positive behavior, without any forthright attempts to correct the issue.

Violation Type. Following a similar line of reasoning as offered for Hypothesis 2, given the inherent meaning attributed to an intentional violation as compared to one of competence, it is also expected that in addition to intentional violations having a more dramatic negative impact on trust, trust may also be more difficult to restore after an intentional violation than a competence violation. The conflict literature suggests that conflict arises as a result of perceived deprivation of resources or acceptable treatment because of the actions (or inactions) of another (see Salas, Shuffler, Thayer, Bedwell, & Lazzara, 2014, for brief review). This conflict can be either task-focused, reflecting problems surrounding the execution of tasks, or relationship-focused, reflecting interpersonal problems that result in tension among individuals. Empirical

and meta-analytic evidence suggests that relationship conflict is particularly detrimental to collaborative functioning and performance outcomes (De Dreu & Weingart, 2003; Shaw et al., 2011). Indeed, in a recent study examining downward trust spirals in small groups, Ferguson and Peterson (2015) found that reduced trust fueled relationship conflict, which in turn lowered intragroup trust even further over time. Importantly, this is not to say that trust cannot be restored after an intentional violation. However, because intentional violations are more affect-laden (i.e., more likely to incite deep emotional responses) and more generalizable across situations, it is expected that the negative emotion and friction will make it more difficult for individuals to assume risk and expect positive behaviors and outcomes from their partners. Instead, it is expected that the trustor will be wary of an individual's intentions following this type of violation. Therefore, a greater number of positive interactions over a longer period of time will be required to restore trust after an intentional violation than after a competence violation, which lacks the negative feelings of betrayal and the enduring attributions of character/integrity flaws and thus is expected to be restored more quickly and easily. Therefore, I hypothesize that,

Hypothesis 3: Trust will restore significantly slower (i.e., a less positive slope) after an intentional violation than a competence violation.

Repair Strategy. Though trust can be broken and may take more or less time to restore depending on the circumstances, there is evidence supporting the use of repair strategies for restoring trust. Recent reviews of the literature on trust development and repair have noted that to date, the quantitative empirical work on trust repair has largely focused on (1) the effects of verbal tactics such as apology (i.e., expressive vocal acts), accounts (i.e., excuses), and denial of accountability for the violation (Fulmer & Gelfand, 2013; Kim, Dirks, & Cooper, 2009; Kramer

& Lewicki, 2010; Schoorman et al., 2007), and (2) the extent to which repair strategies are more or less effective in repairing trust depending on the type of violation. The extant research supports the idea that specific repair efforts may be more or less effective depending on whether the violation was one of competence or intent. Kim, Dirks, Cooper, and Ferrin (2006) concluded that internal apologies (i.e., apologies that express regret and accept responsibility) were more effective in repairing trust after a competence violation, whereas external apologies (i.e., apologies that attribute the violation to some external party or event, such as accounts) were better for repairing trust after integrity violations. Similarly, Bakker, Leenders, Gabbay, Kratzer, and Engelen (2006) found that apologies were more successful in repairing competence-based trust and denial more effective in repairing integrity-based trust. Ferrin, Kim, Cooper, and Dirks (2007) found similar results; specifically, apologies were more effective in repairing competence-based trust and denial better for integrity-based trust repair. On the surface, it seems counterintuitive that providing an explanation or excuse, or denying a violation altogether would be useful in repairing trust. One explanation for these findings is that accounts are helpful in mitigating a negative understanding of an individual's motives or intentions (Bies, 1987); in other words, the violated party may be led to believe that the violator had no other choice, given the circumstances. In fact, accounts have even been cited as effective in influencing procedural fairness perceptions (Bies & Shapiro, 1988).

Dirks and colleagues (2009) provided an integrated summary of the relationship repair literature and suggested that there are three dominant approaches, or processes, for relationship repair: (1) attributional (i.e., repair provides information to offset negative inferences about

violator), (2) social equilibrium (i.e, repair restores relative standing of parties and reaffirms norms), and (3) structural (i.e., repair discourages/prevents future violations).

The first, attributional processes, has arguably been the most predominantly studied perspective in the trust literature. The attributional perspective suggests that trust is developed, violated, and restored through intra-individual cognitive processes regarding the extent to which behaviors are caused by the trustee or some external force (locus of causality), controllable, and stable (likely to occur again) (Tomlinson & Mayer, 2009; Weiner, 1986). The assumption is that individual differences are the primary determinant of behavior and thus, trustors are motivated to attribute behaviors to dispositional causes and trustees are motivated to shape those attributions (as being internal to themselves or due to external factors). Therefore, tactics such as social accounts, apologies, denial, or even compensation can be employed in an effort to convince the trustor that violations are due to external forces (i.e., something completely out of the violator's control) or are not likely to occur again in the future.

The second approach assumes that trust is a function of social equilibrium, such that equilibrium, or harmony, within the relationship should be developed and maintained. However, violations threaten this homeostasis and therefore, efforts must be made to repair the relationship. Trustees, thus, are motivated to engage in social rituals that restore equilibrium, such as providing an apology, offering compensation, or undergoing punishment. However, the key here is that the relationship between two individuals must be placed back into balance, rather than a cognitive assessment of whether the violation was in the violator's control and will occur again.

Finally, structural processes can also shape trust and exchange relationships. Here, the emphasis is on contextual factors that promote exchange. This perspective assumes that individuals are motivated to engage in exchange if it is profitable to do so and thus, structures provide credible assurance that individuals will adhere to exchange norms and future violations will be prevented or discouraged. Thus, unlike attributional and social equilibrium tactics that are implemented by the trustee, structural solutions include contextual motivators or deterrents such as incentives, monitoring or surveillance, regulation, policies and procedures, or other social norms.

Most of the literature has followed the attributional approach to investigate ways to repair negative inferences about the violator (such as apology, accounts). However, social equilibrium and structural approaches may have as much (or more) utility in restoring trust. Thus, to extend upon this work I examine the utility of compensation and surveillance in repairing relationships after violation events. A summary of relevant literature discussed below is provided in Table 1.

Table 1. Summary of trust restoration literature relevant to study hypotheses.

Article	Study Type	Participant Type	Key Findings	Relevance
Beugré (2011)	Historiometric content analysis	American Airlines union negotiations (event)	Social accounts (e.g., apology, justification, admission of wrong-doing) necessary but not sufficient to repair justice; instead, concrete actions are required (e.g., removal of offender).	Apology, Accounts, Structural
De Cremer (2010)	Experimental	Undergraduate students	When losses were allocated, violated parties are more likely to engage in trusting behavior when the violator has responded with compensation, whereas apologies were more effective when gains were allocated.	Apology, Compensation
De Cremer, van Dijk, & M Pilluda (2010)	2 experimental studies	Undergraduate students	Recipients of an unfair offer had a stronger desire to receive social information addressing the issue when they were uncertain if the allocating party knew the exact value of the resources.	Denial, apology
Desmet, De Cremer, & van Dijk, 2010)	Experimental	University students	When recipients were uncertain if the allocating party knew the exact value of the resources, denial led to lower judgments of trustworthiness than when an apology was offered.	Compensation
Desmet, De Cremer, & van Dijk (2011a)	Experimental	University students	Larger compensation resulted in higher trust when the transgressor provided it voluntarily, but compensation size had no effect when the compensation was forced by a third party.	Compensation
Desmet, De Cremer, & van Dijk (2011b)	4 experimental studies	University students	Voluntary compensation from a transgressor communicated repentance more when it was voluntary than forced, particularly for those with a low propensity to forgive.	Compensation
			The extent to which larger compensation elicited more trust depends on how clear the transgressor's intention to violate was, such that compensation was useful but attributions of bad intent moderated the effect of compensation size.	Compensation

Article	Study Type	Participant Type	Key Findings	Relevance
Desmet & Leunissen (2014)	Experimental	Study 1: Mturk Study 2: Undergraduate	Transgressors are willing to provide less compensation to a victim who believes the transgression was intentional, but only when there was no shared future interaction. When future interactions are imminent, transgressors' compensation is not impacted by intentionality feedback Penance (i.e., offer to pay) and regulation (i.e., system to assure future trustworthy behavior), two substantive/tangible trust repair strategies, can be effective in restoring trust to the extent that they are perceived as repentance (i.e., violator is regretful and committed to reform) Trustors saw signals of repentance as more informative when violation was in competence than integrity	Compensation
Dirks, Kim, Ferrin, & Cooper (2011)	4 experimental studies	Undergraduate students in Singapore	Despite the surface-level differences, substantive responses were comparable with apology (a non-substantive response).	Compensation, Structural
Elangovan, Auer-Rizzi, & Szabo (2015)	Experimental	Middle to senior level managers	Trust eroded regardless of the damage caused. However, repair lessened trust erosion compared to no repair, particularly when the trustee engaged in increasing levels of repair behavior.	Repair vs no repair
Ferrin, Kim, Cooper, & Dirks (2007)	Two experimental studies	Study 1: Graduate business students in US Study 2: Undergraduate business students in Singapore	Reticence is a suboptimal response to an integrity violation because, like apology, it fails to address guilt. And reticence is a suboptimal response to a competence violation because, like denial, it fails to signal redemption.	No repair, apology, denial
Haesevoets, Folmer, De Cremer, & Van Hiel (2013)	Experimental	Postgraduate students	Undercompensation after distributive harm is less effective in preserving relationships than equal compensation or overcompensation. However, in cases of undercompensation, relational strategies (i.e., apologies) facilitate preservation.	Compensation

Article	Study Type	Participant Type	Key Findings	Relevance
Haesevoets, Van Hiel, Folmer, & De Cremer (2014)	Study 1: Correlational Study 2 & 3: Scenario Study 4: Experimental	University students	Overcompensation was not more effective in preserving the relationship or in restoring cooperation as compared to equal compensation to the damage suffered. Overcompensation indicates lack of moral orientation and disfavorable interpersonal trust evaluations.	Compensation
Hareli & Eisikovits (2006)	Two policy-capturing studies	Undergraduate students in Israel	Knowledge that guilt and/or shame motivated the apology increased forgiveness, whereas knowledge that pity induced the apology decreased forgiveness. (Note: violation was an insult)	Apology
Hill (2013)	Study 1: Meta-analysis Study 2: Experimental	Study 2: Undergraduate students	Apologies that include remorse or compensation tend to have a stronger relationship with trust-related outcomes than apologies without these components, whereas apologies that acknowledged violation of rules and norms had smaller and sometimes negative effects.	Apology, Compensation
Kim, Cooper, Dirks, & Ferrin (2013)	Experimental	Undergraduate students	Trust is more difficult to repair with groups than individuals, but both groups and individuals were less trusting when violators denied wrongdoing for competence-based violations (rather than apologize) or apologized (rather than denied wrongdoing) for integrity-based violations.	Denial, apology
Kim, Dirks, Cooper, & Ferrin (2006)	Experimental	College students	Competence-based trust was repaired more by apologies with an internal attribution, whereas integrity-based trust was repaired more by apologies with external attribution.	Apology
Kim, Ferrin, Cooper, & Dirks (2004)	Two experimental studies	Study 1: Undergraduate students Study 2: Undergraduate and graduate students	Trust was repaired more when violators 1) apologized for competence violations but denied wrongdoing for integrity violations, and 2) apologized for violations where there was evidence of guilt but denied wrongdoing when there was evidence of innocence.	Denial, apology

Article	Study Type	Participant Type	Key Findings	Relevance
Lotz, Okimoto, Schlösser, & Fetchenhauer (2011)	Experimental	Undergraduate students Study 1 & 2: Undergraduate students Study 3: Undergraduate	Compensation was preferred over punishment after a distributive injustice and offender-focused moral outrage (but not self-focused emotions) predicted participants choosing to punish offenders.	Compensation, Structural
Miller, Visser, & Staub (2005)	Three experimental studies	and graduate students, and staff	When the incentive to cheat and surveillance were both high, targets who resisted cheating were seen as less honest than the average person.	Structural
Ohtsubo & Watanabe (2009)	Two policy-capturing studies; One experimental Study 1 & 2: Experimental	Undergraduate students in Japan	Participants found the costly apologizer (in terms of gift cost or inconvenience) to be more sincere than the no-cost apologizer. Participants in the costly apology condition also abstained from sending a complaint message to the unfair person.	Apology, Compensation
Ohtsubo & Yagi (2015)	Study 3 & 4: Correlational	All Studies: University students	Participants were more likely to make a costly apology (canceling plans to apologize or offering compensation) if the victim was seen as being valuable, or instrumental, in achieving participant's goals.	Compensation
Okimoto (2008)	Five experimental studies	University students	Compensation after a procedural injustice resulted in favorable evaluations of and higher identification with the group, but only when perceived as benevolent and when the injustice was relevant to one's identity with the group. Perceptions of membership value (as communicated by compensation) explained the findings.	Compensation

Article	Study Type	Participant Type	Key Findings	Relevance
Reb, Goldman, Kray, & Cropanzano (2006)	Study 1: Correlational Study 2: Experimental	Study 1: Recently terminated employees Study 2: Undergraduate students	Procedural injustices were associated with preference for instrumental remedies (monetary compensation) whereas interactional injustice was associated with a preference for punitive remedies (disciplinary action). "Supervisors" were more likely to trust "subordinates" when there was less monitoring because monitoring was perceived as compliance due to external sources rather than personal characteristics.	Compensation, Structural
Strickland (1958)	Experimental	Undergraduate students		Structural

Compensation. Compensation, or penance, represents a substantive (i.e., tangible) price paid to make amends and provide assurance beyond “cheap talk” (Bottom et al., 2002) that a similar violation will not occur in the future. Recent research has provided evidence that compensation is useful in restoring trust. For instance, Hill (2013) conducted an experimental study and a meta-analysis on the topic and found that apologies that include compensation tended to have a stronger relationship with trust-related outcomes. However, much of the work on compensation has focused on the amount of compensation provided, indicating that offers of small amounts of reparations are as effective as larger amounts (Bottom et al., 2002), that voluntary compensation was more effective than when it was forced (Desmet, Cremer, & van Dijk, 2011), and that the extent to which larger amounts of compensation had an impact on trust depended on the intentionality of the violation (Desmet, De Cremer, & van Dijk, 2011).

Therefore, compensation is expected to be useful in repairing trust because it provides some indication that the violator is remorseful and that (s)he will make attempts to prevent similar violations in the future. Social equilibrium perspectives suggest that when relationships are in a state of disequilibrium, the relationship can be repaired through social rituals that reaffirm the relationship standing and norms. Indeed, compensation represents an expression of care and concern and an attempt to restore balance in the relationship. In a series of five studies, Okimoto (2008) found that compensation functions as a symbol of concern for the victim of a violation and resulted in higher identification with and evaluation of the group, as long as it was perceived as benevolent and not as forced.

However, in line with attribution theory and previous research, providing compensation is expected to be effective primarily in restoring trust after a competence violation. Because

providing compensation is a signal to the trustor that causality can be attributed to the trustee's disposition, the evidence on trust repair overwhelmingly suggests that acknowledgement of guilt is damaging for intent-based trust because it confirms suspicions that they lack integrity and concern. As such, compensation is not expected to be as useful in repairing trust after an intentional violation but is expected to be useful in repairing trust after a competence violation.

Surveillance. Structural solutions are often implemented in the workplace to deter unwanted behavior and minimize the likelihood of future trust violations. These include rules, contracts, regulation processes, monitoring or surveillance systems, and other controls intended to deter and/or punish for violations (Sitkin & Roth, 1993). Surveillance is defined as “the systematic investigation or monitoring of the actions or communications of one or more persons” (Wigan & Clarke, 2006; p. 391). Though monitoring and surveillance are used interchangeably in the literature, I use the term “surveillance” for this study to distinguish it from the positive, mutually beneficial forms of monitoring often discussed in the teams literature. For the purposes of this study, monitoring and surveillance is instead approached as a structure that is implemented as opposed to the teamwork behaviors engaged in by a team's members. In the case of personal surveillance, this generally only occurs when there is a specific reason for the monitoring, for instance to deter against particular behaviors or repression of existing behaviors, such as detailed TSA screenings for individuals who are suspected of having ties to terrorist organizations. Security safeguards serve several functions, including deterrence and prevention of unwanted behavior, retribution, and building public confidence (Wigan & Clarke, 2006). Surveillance can be used as a basis for taking action against a violator and for building confidence that something is being done to reduce the likelihood of future threats.

Surveillance, or performance monitoring, is commonly defined by the types of activities that constitute it and its scope includes a wide breadth of behaviors. In providing practical guidance for the implementation of performance monitoring systems, Amsler, Findley, and Ingram (2001; cf Cohen, 2008) described it as consisting of (1) direct observation; (2) inspection of completed work; (3) inspection of work in progress; (4) checklists; (5) performance indices; (6) one-on-one performance reviews; (7) follow-up conversations; (8) informal meetings; (9) tickle files to prompt follow-up; (10) team meetings; (11) formal presentations; (12) written reports by subordinates; (13) reports by other individuals; (14) self-reports; and (15) electronic surveillance.

The dominant focus in research and practice has been on management implementing surveillance. As organizations increasingly become team-based and employees must work together in collaborative partnerships, it is becoming increasingly relevant for peers to need or want these systems to be in place because their own outcomes depend upon a partner's behaviors and contributions (similar to the way to which the organization's or manager's outcomes are dependent upon subordinates' actions). However, in peer-to-peer relationships, elaborate surveillance systems are likely not within the scope of control of the peer collaborator. Instead, in horizontal peer relationships, surveillance is more likely to take the form of reporting on other individuals (see item 13 above), either by initiating or accepting third party surveillance (e.g., by a manager). In other words, it is not likely that a typical employee can create an elaborate surveillance system of their own that would have any true implications for reforming behaviors, but it is within their power to tell a supervisor who does have the authority to take corrective

action against an employee who has made an error or intentionally engaged in questionable or unethical behaviors.

Though monitoring and surveillance have increasingly been implemented with technological advances, relatively little work has investigated structural solutions in relationship repair, particularly in terms of the individual factors that influence favorability and decisions to implement (Chen & William, 2005). However, this may be due to researcher bias toward attributional approaches, and structural solutions may, in fact, be fruitful in restoring exchange relationships. Indeed, studies have found that trust and monitoring are negatively related (McAllister, 1995); thus, using monitoring may actually decrease trust (Kramer, 1999). From an attributional perspective, surveillance promotes fear and suspicion that behaviors are solely due to external forces and that the violator cannot be trusted to behave in acceptable ways in the absence of such systems, thereby increasing vigilance and decreasing idiosyncratic credit.

However, from a structural perspective, solutions such as surveillance can reduce uncertainty and are expected to be useful in repairing trust because it protects the trustor and provides some level of reassurance that the trustee will not engage in the behaviors again when being monitored. Though attributions of intent may not be repaired under surveillance, it does provide some level of trust in the system, or an assurance that risk of future violations is reduced. Thus, it is expected that surveillance will be faster to restore trust after an intentional violation than would compensation. Thus, I thus hypothesize that,

Hypothesis 4: The effect of violation type on the rate at which trust is restored will be moderated by repair strategy, such that (a) after an intentional violation, trust will restore significantly faster (i.e., a more positive slope) when surveillance is implemented

than when compensation is offered, and (b) after a competence violation, trust will restore significantly faster (i.e., a more positive slope) when compensation is provided than when surveillance is implemented.

Summary of Hypothesized Relationships

In summary, I expect that the patterns of trust development, dissolution, and restoration will differ based on initial levels of trust and/or trust development, whether the violation was one of competence or intent, and the repair strategy employed. A summary of the study hypotheses can be found in Table 2.

Table 2. Summary of study research questions and hypotheses.

H1	In collaborative interpersonal contexts, (a) initial trust (i.e., intercept) will be low and not significantly different from zero but change in trust development (i.e., slope) will be positive and significant (transformational theories), or (b) initial trust (i.e., intercept) will be high and significantly different from zero but change in trust development (i.e., slope) will be nonsignificant (swift trust).
H2	Trust will dissolve significantly faster (i.e., a more negative slope) after an intentional violation than a competence violation
H3	Trust will restore significantly slower (i.e., a less positive slope) after an intentional violation than a competence violation.
H4	The effect of violation type on the rate at which trust is restored will be moderated by repair strategy, such that (a) after an intentional violation, trust will restore significantly faster (i.e., a more positive slope) when surveillance is implemented than when compensation is offered, and (b) after a competence violation, trust will restore significantly faster (i.e., a more positive slope) when compensation is provided than when surveillance is implemented.

CHAPTER THREE: METHODS AND MATERIALS

Design & Participants

In this study, violation type and repair strategy were manipulated in a 2 (violation type: competence, intentional) x 2 (repair strategy: compensation, surveillance) factorial design. This study utilized two sets of manipulations in order to examine the differential effects of competence- and intentional trust violations and the utility of compensation versus surveillance in repairing trust. Participants were randomly assigned to one of four experimental conditions: (1) competence violation followed by an offer of compensation from the offender, (2) competence violation followed by the option for the victim to implement surveillance, (3) intentional violation followed by an offer of compensation from the offender, and (4) intentional violation followed by the option for the victim to implement surveillance. These conditions comprised the inter-individual, or between-person, factors. Both the participant and experimenter were blind to the randomly assigned condition. Table 3 provides a summary of the number of participants in each of the four conditions.

Table 3. Summary of conditions by sample location.

Country	Violation Type	Repair Strategy		Total
		Surveillance	Compensation	
Spain	Competence	20	15	35
	Intentional	11	7	18
	Total	31	22	53
US	Competence	19	16	35
	Intentional	18	16	34
	Total	37	32	69
Total	Competence	39	31	70
	Intentional	29	23	52
	Total	68	54	122

A total of 122 participants, including 53 undergraduate students from Spain and 69 undergraduate students from the United States participated in the study, totaling 610 cases over five rounds of gameplay. Originally, I intended to examine the trust development, dissolution, and restoration processes in two separate samples; however, the sample sizes were too small for these analyses. Therefore, for the purposes of this dissertation study I collapsed across samples. Small sample sizes also precluded analyses of measurement equivalence, though psychometrics were examined and are reported below.

Among the participants, 62.3% (N=76) were female and 37.7% (N=46) were male. Participants were between the ages of 18 and 41 (Mean = 21.23, SD = 3.36). Participants in the United States were recruited via the psychology department research management system and participants in Spain were recruited via classroom solicitation. Participants in both locations were provided with course credit in exchange for their participation as well as a debriefing at the conclusion of the experiment detailing the experimental purpose and design.

Experimental Task

Fulmer and Gelfand (2013) suggested that testing of trust trajectories, as well as examining individual differences or social-contextual factors that influence these patterns, can be done using experimental methods. In particular, they suggest that variants of the Trust Game, in which a computer-programmed partner engages in multiple social exchanges with a participant, are particularly appropriate for observing the impact of violations on trust dissolution and trust restoration. The platform utilized for this study was a modified version of *Colored Trails*, an interdependent, multi-player, computer-based task that can be played by humans, computers, or heterogeneous groups consisting of both humans and computer agents (Grosz et al., 2004). This

platform has been used previously in studies of human behavior (e.g., Katz, Amichai-Hamburger, Manisterski, & Kraus, 2008; Wildman, 2010) and is appropriate for answering the research questions in this study for several reasons.

First, in the modified version of the game used for this study, each participant completed the task with a computer agent, which allows for the occurrence of a controlled, convincing, and scripted trust violation and repair effort. Though participants believed they were participating with a partner in another location, all partner behaviors and manipulations were controlled by a computer-programmed agent. Both the experimenter and participant were blind to the conditions. Human confederates were not employed to enact the manipulations because studies have found that offender likeableness affects forgiveness after a violation (Bradfield & Aquino, 1999). Therefore, the use of a computer agent allowed me to control for offender characteristics, such as personality or other dispositional variables that could affect trust development, dissolution, and repair in face-to-face contexts.

Second, *Colored Trails* provided an interdependent context that required the combined efforts of the teammates in order to achieve the team goal. In the modified version used for this study, participants were part of a humanitarian aid mission tasked with navigating through the wilderness to bring food and supplies to a neighboring village. For each round of game play, there was an ideal shortest path upon which players should have traveled to get the supplies to town in the shortest amount of time. More specifically, players were required to travel across a 13 x 13 game board in order to reach the town (See Figure 2). Deviating from the shortest path caused food to spoil; however, it was necessary for players to deviate from the optimal path to pick up additional supplies (i.e., water, medicine) on their way to the village. These resource

pickups were negotiated by the players at the beginning of each round in order to optimize desired outcomes. There were also pieces of additional information regarding hazards and bonuses throughout the wilderness that are unique each player. Hazards were areas of the wilderness that caused additional food to spoil, whereas bonuses were opportunities to gain additional food rations. These pieces of information could be shared among players, enabling the team to make the best decisions for creating the shortest path.



Figure 2. Screenshot of example Colored Trails game board.

Third, *Colored Trails* provided a mixed-motive context, in that participants had both an individual and a team goal. The individual goal was to collect as many coins as they could along the way. The team goal was to get as many food rations to the town as possible, which could only be achieved by navigating the shortest possible path or by collecting bonus food rations along the way. These two goals were designed to be at odds with each other, meaning that pursuing the individual goal of collecting coins would require deviating from the shortest path and thus would spoil the food; pursuing the team goal meant not being able to collect coins on the way to the village. Sharing the information could also allow the other player to collect coins without any penalty to the team, as collecting a bonus food ration could compensate for deviating from the shortest path in order to collect coins for personal gain.

To instill motivation to perform well on these goals and to invest participants in performing well on the task, participants were told at the beginning of the experiment that there would be a tangible incentive for performance on each goal: one \$100 USD gift card would be awarded to the highest individual and team performers. The team reward was intended to encourage collaboration among members in order to achieve optimal team performance results, whereas the individual reward was intended to instill a sense of competition among members. Because individuals may be motivated by personal gain or group gain, I included these incentives to ensure all participants were motivated to put forth effort on the task.

Violation Type

During round three of game play, one of two scripted violation types were randomly assigned by the task software (as shown in Figures 3 and 4). The two types of scripted violation included a mistake (i.e., a competence violation; specifically, forgetting to pick up the agreed-

upon assigned resource) and acceptance of a bribe by a bandit in the wilderness (i.e., an intent violation). Acceptance of the bribe indicated a choice, or intentional decision, to pursue individual goals rather than team goals, whereas a mistake signaled an unintentional error. Participants were informed of the possibility for an encounter with a bandit who would attempt to bribe them as well as the potential for forgetting to pick up the agreed-upon resources along the way. In each round, participants were asked to verify that they have included their assigned resource in their path prior to completing the round, to make the computer's mistake more salient. Information regarding the ramifications for committing these violations was also provided. Both the competence and intentional trust violations harmed the team goal such that 100 food rations were forfeited. However, in the intentional violation condition, the violator personally benefited from the sale of food rations in exchange for coins, whereas in the competence violation condition there was no personal gain for making the mistake. Participants were made aware of these differences during training (see Appendix A for the full training protocol and content).

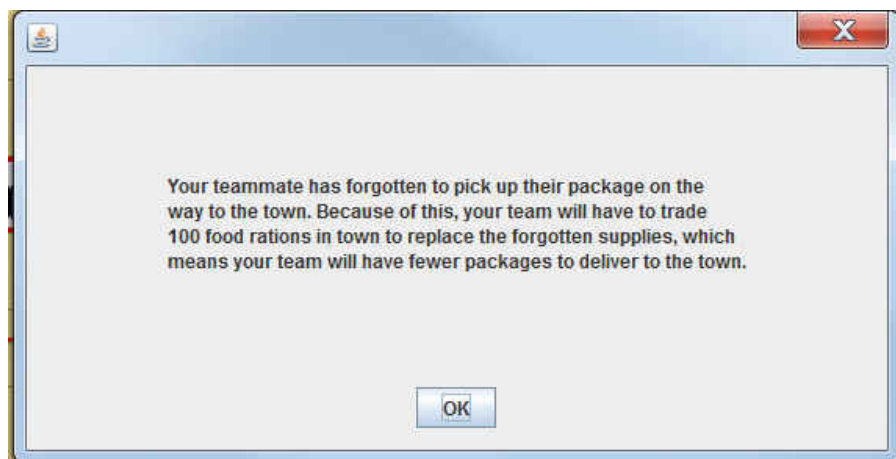


Figure 3. Screenshot of competence violation.



Figure 4. Screenshot of intentional violation.

Repair Strategy

At the conclusion of the fourth round, one of the two repair strategies was randomly chosen by the software. In the compensation condition (Figure 5), the computer offered the participant 10 coins to compensate for harm done to the team as a result of making a mistake or accepting a bribe. Because the compensation amount was the same for both violation types (regardless of whether there was personal gain in coins or not), the amount offered was set at 10 coins to ensure some small token was offered but that it was not so high an amount as to be deemed inappropriate or odd in the case of the mistake, in which case the violator would be providing compensation from coins collected previously and not in connection with the violation. Desmet, De Cremer, and van Dijk (2011a) found that as long as the compensation was provided voluntarily (and not forced by a third party), the offer signaled repentance. Thus, the low amount was considered appropriate. Participant interviews conducted during pilot testing also indicated that the amount offered was sufficient.

In contrast, the surveillance condition (Figure 6) created the perception that there was a system in place in which negative behaviors could be monitored by the experimenter. In other words, in this condition, the participant was provided the opportunity from the game to notify the experimenter of the violation and provide a detailed account of what occurred. Because this study focused on interpersonal collaborative relationships (in which victims typically have little opportunity to monitor behavior themselves with any real consequence), I opted to mimic real-world conditions in organizations; namely, surveillance implemented by peers would be in the form of notifying a third party in an authority role who could implement surveillance systems and use their position of power to exact a change in behavior. Again, participant interviews from the pilot sessions indicated that this form of surveillance was more externally valid for peer-to-peer collaborative partnerships than if the participant was given the ability to implement surveillance monitoring on their own.



Figure 5. Screenshot of compensation manipulation.

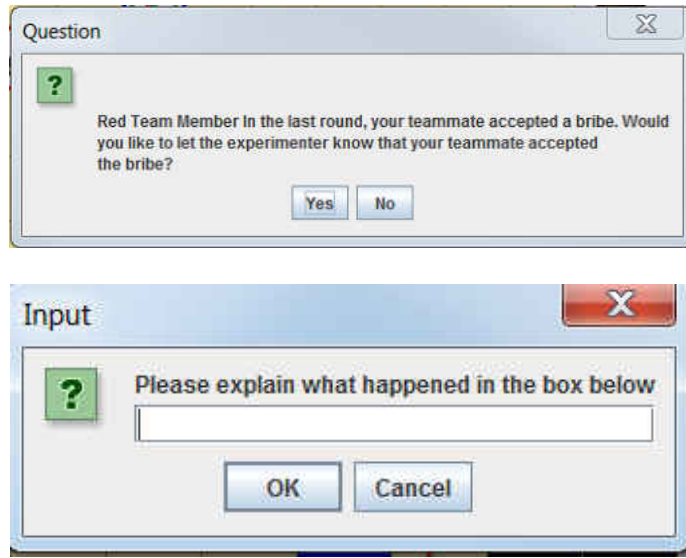


Figure 6. Screenshot of surveillance manipulation.

Procedure

Figure 7 chronologically summarizes the events that occurred during the experiment. Upon entering the laboratory, participants were guided to an assigned desk labeled with a team number. After completing the informed consent, participants were told they would be playing a computer game with a participant in another location and that the purpose of the study was to examine collaborative interactions among virtually distributed dyads. Prior to beginning the experiment, participants engaged in a team building exercise and a brief training to learn about the experimental task. Training was delivered via an interactive tutorial that explained the purpose of the game, goals, how to assign resources and maneuver, and how to share information with teammates. At the conclusion of the training content, five multiple-choice questions were presented to participants to test their knowledge (see Appendix A). Participants were not able to complete the training until they had provided the correct response for each of the test questions.

Participants then completed a set of measures assessing individual differences, including demographics.

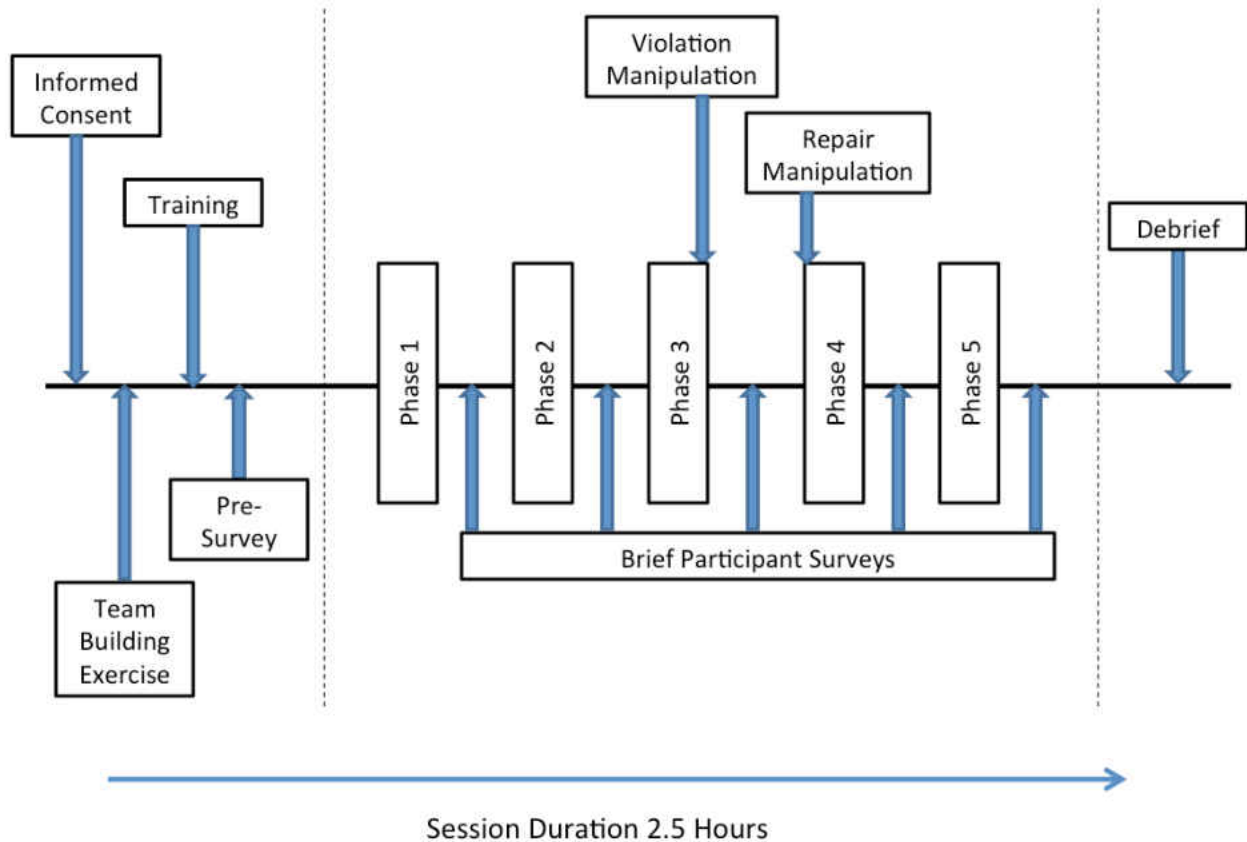


Figure 7. Chronological flowchart of experimental procedure.

After completing a team building exercise (described below), training module, and a set of measures assessing individual differences, participants began the experimental task. The task consisted of five total rounds of game play in which participants were required to work together interdependently to accomplish a team goal. Self-report measures of trust were completed after each round. Rounds one and two consisted of normal game play intended for assessment of baseline levels of trust and trust development before the violation. In round three, a randomly

assigned trust violation (i.e., competence/mistake, intent/bribe) occurred and trust was measured to evaluate the effect of violation on trust dissolution. At the end of round four, the computer agent employed a randomly assigned trust repair strategy (i.e., compensation, surveillance and trust was again measured to examine the utility of the repair strategy in repairing trust. A fifth round of game play examined effects of repair strategy over time. At the conclusion of the experimental session, participants were debriefed regarding the nature of the study.

Team Building Exercise

Because I utilized a computer agent instead of another participant in each of the dyadic teams, the participants were unable to infer information about their teammate through natural, face-to-face interaction (Jarvenpaa, Knoll, & Leidner, 1998). To ensure believability of the computer agent “confederate” as a human partner and to establish baseline expectations about their teammates, participants engaged in a team building task prior to beginning game play. Participants were asked to provide information regarding their achievements as well as activities they enjoy. They were then provided with scripted information about their “teammate’s” achievements and a set of interests that they had in common. To control for gender biases, participants were told their partner was of the same gender. In total, the team building task took approximately 10 minutes to complete. The complete form and scoring protocol can be found in Appendix B.

Measures

Prior to participating in the task, participants completed a set of individual difference measures, including demographics. Measures of trust were assessed after each round of game play. All self-report measures were translated into Spanish for the Spain participants.

Specifically, the measures were translated and back-translated by different individuals to ensure the translations accurately reflected the content of the original measure. An unbiased third party fluent in both English and Spanish then verified that the item content was equivalent in both versions of the measures.

Demographics

Demographic items, including age, gender, education level, employment status, and educational performance were collected prior to beginning the task. See Appendix C for the full scale.

Trust

Trust was assessed after each round of game play using Wildman, Fiore, and Salas' (in progress) measure of trust and distrust. This 16-item two-dimensional measure assesses trust and distrust as separate factors, including eight items assessing positive expectations regarding their partner's conduct and eight items focused on negative expectations. Sample items include, to what extent do you feel "Confident that the other team member will try to do things that benefit the team?" (trust) and "Afraid that the other team member will make a mistake?" (distrust). Items were rated on a 6-point scale from not at all (1) to very much so (6). See Appendix D for the full scale.

For the purposes of this study, only trust items were utilized because distrust was not explicitly hypothesized as distinct from trust. Though reliabilities were generally high ($\alpha \leq .90$) when including all items and reverse-scoring the distrust items, the results of a series of confirmatory factor analyses indicated that a two-factor model of trust and distrust as separate dimensions fit the data better (RMSEA = 0.087, CFI = 0.99, $\chi^2 = 196.54$) than a one factor model

with trust and distrust combined (RMSEA = 0.216, CFI = 0.91, $\chi^2 = 691.69$). Subsequent models including only the trust items were thus analyzed. A two-factor model that allowed the competence- and intent-based items to correlate (RMSEA = 0.10, CFI = .98, $\chi^2 = 43.55$) fit the data similarly to a one-factor model (RMSEA = 0.11, CFI = .98, $\chi^2 = 50.15$). Means, standard deviations, and reliabilities are reported in Tables 4 through 6 for the combined, Spain, and United States samples. Results of the series of confirmatory factor analyses can be found in Table 7.

Table 4. Means, standard deviations, and correlations for trust, combined sample

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1. Trust T1	(.91)				
2. Trust T2	0.67**	(.96)			
3. Trust T3	0.25**	0.43**	(.95)		
4. Trust T4	0.33**	0.52**	0.77**	(.96)	
5. Trust T5	0.40**	0.57**	0.63**	0.79**	(.97)
<i>M_{TOTAL}</i>	4.97	4.89	3.73	4.15	4.32
<i>SD_{TOTAL}</i>	0.69	0.91	1.32	1.27	1.22

Note: $N = 119$ (cases removed using listwise deletion). * denotes significance at $p < .05$. ** denotes significance at $p < .01$.

Table 5. Means, standard deviations, and correlations for trust, Spain

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1. Trust T1	(.91)				
2. Trust T2	0.61**	(.92)			
3. Trust T3	0.46**	0.61**	(.95)		
4. Trust T4	0.44**	0.58**	0.86**	(.96)	
5. Trust T5	0.39**	0.45**	0.70**	0.78**	(.96)
<i>M_{SP}</i>	4.81	4.61	3.72	4.05	4.12
<i>SD_{SP}</i>	0.62	0.76	1.21	1.17	1.07

Note: $N = 50$ (cases removed using listwise deletion). * denotes significance at $p < .05$. ** denotes significance at $p < .01$.

Table 6. Means, standard deviations, and correlations for trust, United States

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1. Trust T1	(.90)				
2. Trust T2	0.68**	(.97)			
3. Trust T3	0.15	0.36**	(.95)		
4. Trust T4	0.27*	0.49**	0.72**	(.96)	
5. Trust T5	0.37**	0.61**	0.60**	0.80**	(.98)
<i>M_{US}</i>	5.09	5.09	3.37	4.22	4.48
<i>SD_{US}</i>	0.72	0.96	1.40	1.35	1.30

Note: *N* = 69 (cases removed using listwise deletion). * denotes significance at $p < .05$. ** denotes significance at $p < .01$.

Table 7. Confirmatory factor analysis results for trust measure.

<i>Model</i>	<i>RMSEA</i>	<i>CFI</i>	χ^2
Trust & Distrust			
One-factor	.22	.91	691.69
Two-factor (Trust/Distrust)	.09	.99	196.54
Trust Only			
Two-factor (Competence/Intent)	.10	.98	43.55
One-factor	.11	.98	50.15

Analyses

Following recommendations made by Bliese & Ployhart (2002), Ployhart and Vandenberg (2010), Singer and Willett (2003), and others, discontinuous growth modeling was used to test the study hypotheses. Discontinuous growth models are appropriate when change is assumed to be discontinuous, meaning there is a breaking point at which change abruptly changes in directionality (R. E. Ployhart & Vandenberg, 2010). Because this study examines trust development (trust assumed to be steady or increasing), trust dissolution (trust assumed to be steady or decreasing), and trust restoration (trust assumed to be steady or increasing), sudden

changes in trust are expected to occur as a function of the violation (see Figure 1). Therefore, use of linear or nonlinear (cubic, quadratic) models is inappropriate, as these models force the data to fit to a curve that does not adequately represent the data. Instead, discontinuous growth models model time according to where the break is expected to occur and is commonly accepted in the literature (e.g., Bliese & Ployhart, 2002; Bliese, McGurk, Thomas, Balkin, & Wesensten, 2007; Bliese, Wesensten, & Balkin, 2006; Hale, Ployhart, & Shepherd, 2015; Singer & Willett, 2003).

All tests of the study hypotheses utilized the open-source statistical computing environment R (R Core Development Team, 2005), specifically the Multilevel (Bliese, 2013) and Nonlinear and Linear Mixed Effects (NLME) models packages (Pinheiro & Bates, 2000), which uses the random coefficient model to estimate longitudinal change. Random coefficient modeling (often referred to as hierarchical linear modeling and a form of multilevel modeling) provides several benefits over repeated measures general linear models and latent growth curve models that are well-suited for the hypothesized change trajectories. Namely, random coefficient models allow for both inter- and intra-unit change while accounting for non-independence of the data, handle missing data well, and allow for truly non-linear estimation (R. E. Ployhart & Vandenberg, 2010).

For the purposes of this study, I generally expected that trust would increase over Times 1 and 2, drop at a transition at Time 3, then increase again afterward through Times 4 and 5 (though these patterns are expected to vary as a function of the between-person, or inter-individual, predictor variables). Discontinuous growth modeling allows for the examination of intra-individual change in trust levels and trajectories during each of the phases (Level 1), as well as estimates of how trust levels and rate of change are affected by inter-individual factors

including violation type and repair strategy (Level 2). To estimate changes in means and slopes, four Level 1 parameters were included in the model: an intercept (representing initial trust status), a development slope, a dissolution transition, and a restoration slope. Transition parameters compare means between two phases (e.g., dissolution transition compares mean trust during the development and restoration phases), representing the immediate impact of an event (i.e., the trust violation). Slope parameters represent the rate of change as indicated by the steepness of a line formed by multiple measurement occasions of trust within a single phase (e.g., Times 1 and 2 in the development phase), such that steep slopes represent a faster rate of change.

The effects of time were captured with three Level 1 predictors (Equation 1). Because the theoretical interest in this study was in how the restoration slopes differed based on violation type and repair strategy and not on how the restoration slope was different from the development slope, coding recommendations made by Raudenbush and Bryk (2002) for a piecewise discontinuous model were followed. The first predictor, trust development, was coded as a vector of sequential numbers (0, 1, 1, 1, 1). The second predictor, trust dissolution, was dummy-coded to represent the time before and after the violation transition (0, 0, 1, 1, 1). The third predictor, trust restoration, was coded to reflect its absence during development and the transition (0, 0, 1, 2, 3). Table 8 provides an example of the data structure for a single participant.

Table 8. Data structure for one participant.

Subject ID	Round	Trust	Development	Dissolution	Restoration	Violation Type	Repair Strategy
150	1	3.50	0	0	0	0	0
150	2	3.88	1	0	0	0	0
150	3	2.38	1	1	1	0	0
150	4	2.75	1	1	2	0	0
150	5	3.13	1	1	3	0	0

*Note: Development = development slope, or linear growth rate of trust during the development phase, prior to the violation. Dissolution = dissolution transition, or impact of violation on trust. Restoration = restoration slope, or linear growth rate of trust during the restoration phase following the violation transition. Violation Type = violation type coded for competence violation or intentional violation. Repair strategy = repair strategy coded for surveillance or compensation.

The formal analytical strategy can be broken into two primary phases. In Phase 1, the intra-individual growth trajectories were modeled to determine the extent to which there were individual differences in trust over time. Following recommendations made in the extant literature (e.g., Bliese & Ployhart, 2002; Bliese et al., 2007; Lang & Bliese, 2009; Pinheiro & Bates, 2000), a Level 1 model was first calculated to examine within-person change. The time elements (i.e., time modeled as development, dissolution, and restoration following the timing of the violation and repair manipulations) were included in the Phase 1 model to examine intra-individual growth trajectories prior to estimating between-person sources of variability. The ICC(1) derived from this model provided an estimate of the percentage of the residual variance that could be accounted for by individual differences (Level 2). In Phase 2, individual difference variables (i.e., violation type and repair strategy) were added to the Level 2 model to explain the residual variance in the intercept, slopes, and/or transition parameters.

CHAPTER FOUR: RESULTS

Phase 1: Level 1 Analyses, Assessment of Intra-individual Trust Over Time

In Phase 1, a baseline Level 1 model was estimated in order to calculate the intraclass correlation coefficients (ICC), or the between-person variability associated with each of the parameters after controlling for the design elements. Following recommendations in the literature by Bliese and others, a sequential approach was taken whereby models were contrasted to determine the variability in each of the parameters attributable to inter-individual differences.

In the first model (Equation 1), only the intercept parameter was allowed to vary (i.e., random effect associated with the error term in Equation 2), whereas the slopes for development, transition, and restoration were modeled as fixed effects held constant across individuals.

Level 1

$$\text{Trust}_{ti} = \pi_{0i} + \pi_{1i}\text{DEV}_{ti} + \pi_{2i}\text{DIS}_{ti} + \pi_{3i}\text{RES}_{ti} + \varepsilon_{ti} \quad (\text{Eq. 1})$$

Level 2

$$\pi_{0i} = \gamma_{00} + \zeta_{0i} \quad (\text{Eq. 2})$$

$$\pi_{1i} = \gamma_{10} \quad (\text{Eq. 3})$$

$$\pi_{2i} = \gamma_{20} \quad (\text{Eq. 4})$$

$$\pi_{3i} = \gamma_{30} \quad (\text{Eq. 5})$$

In step 2 of Phase 1, models with fixed versus random slope parameters were contrasted to determine the degree to which inter-individual differences exist in each of the parameters. At each step, the -2 log-likelihood values were contrasted for the model with fixed parameters versus models that allowed parameters to vary across individuals to determine if including a random error term significantly improved model fit. The best fitting model at each step was retained. Results of these tests for slope variability in the Level 1 model can be found in Table 9. The first model (represented in Equations 1 through 5 above) restricted all slope parameters to be equal across individuals. The second model built upon the first model to also allow the

development slope to vary between individuals and had better fit than the intercept-only model (thus adding an error term to Equation 2). The third model allowed the development and transition slopes to vary (by adding an error term to Equation 3) and fit the data significantly better than model 2. Finally, the fourth model allowed all three slopes to vary (by adding an error term to Equation 4) and the contrast results indicated that it was the best fitting model. This suggests that there is significant individual variability on initial trust, trust development, trust dissolution, and trust restoration.

Table 9. Tests for slope variability in Level 1 model.

Model	Random Parameters	df	AIC	-2LogLik	Test	L.Ratio	p-val
1	Intercept	6	1640.10	1628.10			
2	DEV	8	1583.95	1567.96	1 vs 2	60.15	<.0001
3	DEV, DIS	11	1525.08	1503.08	2 vs 3	64.87	<.0001
4	DEV, DIS, RES	15	1485.15	1455.14	3 vs 4	47.93	<.0001

Prior to estimating the model to examine the conditional ICC, an examination of the within-individual error structure, particularly for autocorrelation and heteroscedasticity, was also conducted (Bliese & Ployhart, 2002). In particular, separate analyses were conducted to contrast model fit for the baseline model (intercept and all slopes allowed to vary) with a model that also included an error-structure term. In the first contrast, an autocorrelation term was included to determine if there was a significant lag 1 serial autocorrelation, which would indicate that the correlation among trust assessments would be more highly correlated when the measurement time points were closer to one another. Contrast results provided no evidence of a lag1 autocorrelation (log-likelihood ratio = 0.04, $p = .84$). In the second contrast, a test for

heteroscedasticity was conducted to determine if the amount of residual variance was significantly different across measurement occasions. There also was not evidence for a significant amount of heteroscedasticity (log-likelihood ratio = 3.02, $p = .08$). Contrast results for both terms were non-significant and thus, the final model for Level 1 did not include these within-individual error terms. The model estimates for the final Level 1 model are provided in Table 10 (Model 1).

Intraclass Correlation Coefficient

The ICC(1) was calculated using the parameter estimates from the final Level 1 model. In the current study, ICC(1) indicates the proportion of the variability in trust that is due to between-person differences across the five measurements of trust. The ICC(1) is calculated as
$$\frac{\text{Intercept (between-person) variance}}{\text{Intercept variance} + \text{Residual (within-person) variance}}$$
 (Lang & Bliese, 2009). Results indicated that 54% of the total variance in trust across time (ICC = .54), a considerable amount (Bliese, 2000), could be attributed to between-person differences. This variability can be seen in Figure 8, which consists of plots for each individual who participated in the study.

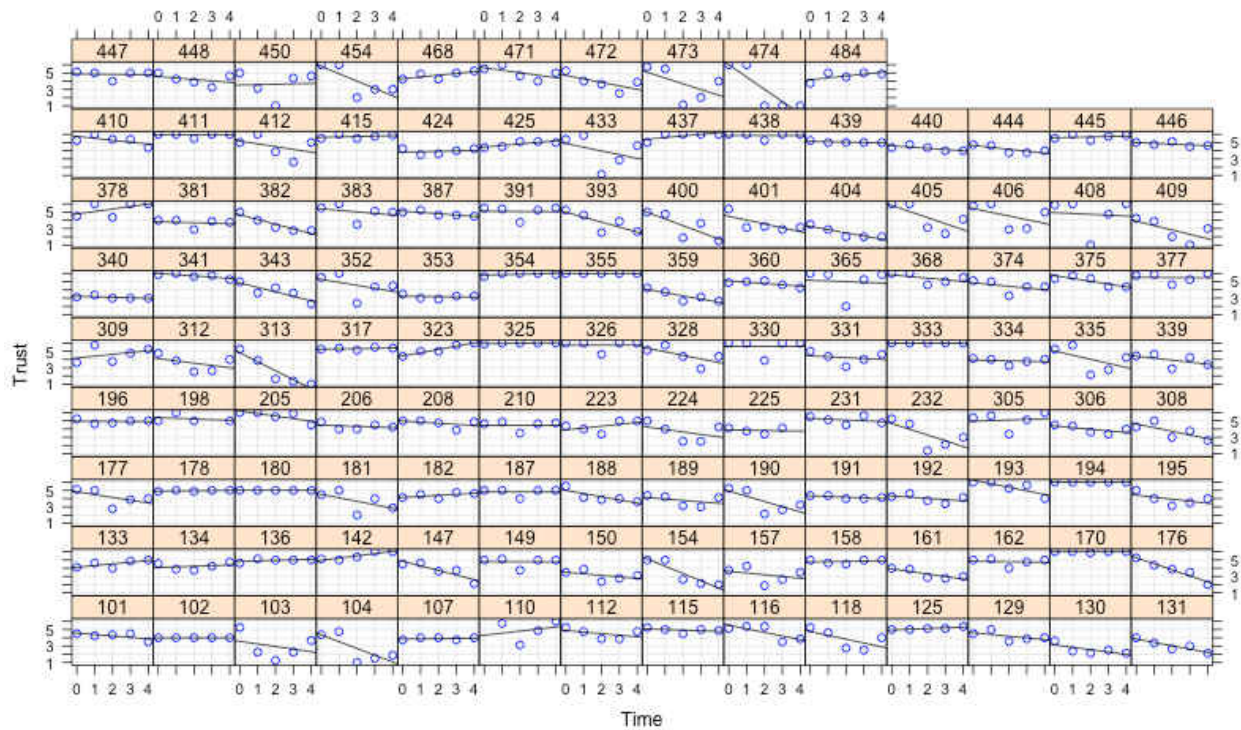


Figure 8. Individual participant trust trajectories.

Hypothesis 1

The competing theories hypothesis and strong inference test posed in this study sought to investigate the competing theories of transformational models of trust and swift trust in collaborative interpersonal contexts. Specifically, trust transformation would be supported by a pattern of low initial trust (i.e., intercept not significantly different than zero) and development of trust between Times 1 and 2 (i.e., significant development slope). Theories of swift trust, on the other hand, would be supported by evidence of high initial trust (i.e., intercept significantly different from zero) and no development of trust (i.e., non-significant development slope).

Results from the final Level 1 model (see Table 10, Model 1) suggest that initial levels of trust were generally high and significantly different from zero ($\pi_{0i} = 4.97, p < .01$). Furthermore,

though there was significant dissolution of trust ($\pi_{2i} = -1.42, p < .01$) and significant restoration ($\pi_{3i} = 0.30, p < .01$), on average, trust did not develop early in the relationship. In fact, trust decreased slightly by .07 points, although this change was not significant ($p = .28$). This pattern of results suggests that initial trust was high and did not change significantly from Time 1 to Time 2. Further examination indicated that the flat development slope was not caused by a ceiling effect, as trust was measured on a 6-point scale. Of the 121 participants who had complete data to estimate changes in trust during the development period, 50 participants indicated their trust decreased slightly (41.3%), 22 had no change in trust (18.2%), and 49 had a positive change in trust (40.5%), with 110 of the participants (91%) changing one point or less (positive or negative) during this time. Furthermore, there was less variance in the trust development slope ($\tau = .09, SD = .30$) than in dissolution ($\tau = 1.91, SD = 1.38$) and restoration ($\tau = .19, SD = .44$). The pattern of trust development across all participants can be seen in Figure 9. Given trust was high initially and generally did not develop over time, the pattern of results provide support for theories of swift trust and Hypothesis 1b was supported.

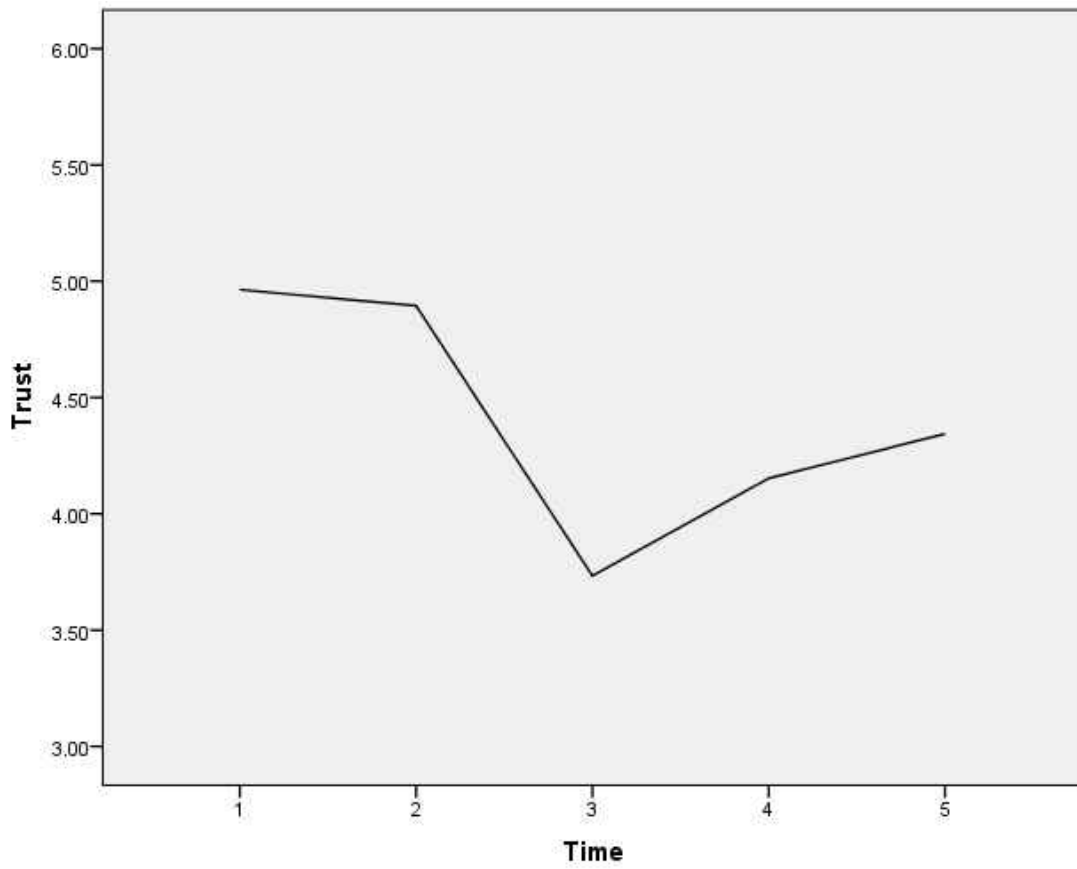


Figure 9. Trust trajectory (mean levels of trust) across participants for all measurement periods.

Table 10. Results for final Level 1 model and hypothesis tests.

Fixed Effects	Model 1		Model 2		Model 3		Model 4	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Level 1 Model (π)								
Intercept	4.97***	0.06	5.04***	0.08	5.03***	0.08	5.06***	0.11
Development	-0.07	0.07	-0.07	0.07	-0.07	0.06	-0.07	0.07
Dissolution	-1.42***	0.15	-1.34***	0.17	-1.42***	0.15	-1.43***	0.15
Restoration	0.30***	0.05	0.30***	0.05	0.37***	0.06	0.32***	0.06
Level 2 Model (γ)								
Violation Type			-0.16	0.13	-0.16	0.12	-0.35**	0.16
Repair Strategy							-0.06	0.16
Violation Type * Repair Strategy							0.42*	0.24
Violation Type * Dissolution			-0.21	0.17				
Violation Type * Restoration					-0.16***	0.06	-0.01	0.08
Repair Strategy * Restoration							0.12*	0.08
Violation Type * Repair Strategy * Restoration							-0.32***	0.12
Pseudo R ²			0.017		0.014		0.060	
Variance Components								
	Model 1		Model 2		Model 3		Model 4	
	Var	SD	Var	SD	Var	SD	Var	SD
Intercept (B/T)	0.27	0.52	0.27	0.52	0.27	0.52	0.26	0.51
Development slope	0.09	0.30	0.10	0.31	0.10	0.31	0.10	0.31
Dissolution transition	1.90	1.38	1.97	1.40	1.91	1.38	1.90	1.38
Restoration slope	0.19	0.44	0.19	0.44	0.18	0.42	0.19	0.43
Residual (W/I)	0.23	0.48	0.23	0.48	0.23	0.48	0.23	0.48

Note: * denotes significance at $p < .10$. ** denotes significance at $p < .05$. *** denotes significance at $p < .01$. Violation type coded as 0 for competence and 1 for intentional. Repair strategy coded as 0 for surveillance and 1 for compensation.

Model 1 = Final Level 1 model and test of competing trust development theories. Model 2 = Test of effect of violation type on dissolution. Model 3 = Test of effect of violation type on restoration. Model 4 = Test of interaction between violation type, repair strategy, and restoration.

Phase 2: Level 2 Analyses, Assessment Inter-individual Differences in Trust Over Time

Phase 2 consisted of adding the between-person Level 2 predictors, trust violation type and repair strategy type, to examine parameter variability according to the best fitting model in Phase 1 (the final Level 1 model). Because these are categorical predictors being entered into a regression equation, dummy codes were assigned for both violation type (0 = competence, 1 = intentional) and repair strategy (0 = surveillance, 1 = compensation). Thus, the equations including all Level 2 variables is as follows:

Level 1

$$\text{Trust}_{ti} = \pi_{0i} + \pi_{1i}\text{DEV}_{ti} + \pi_{2i}\text{DIS}_{ti} + \pi_{3i}\text{RES}_{ti} + \varepsilon_{ti} \quad (\text{Eq. 6})$$

Level 2

$$\pi_{0i} = \gamma_{00} + \zeta_{0i} \quad (\text{Eq. 7})$$

$$\pi_{1i} = \gamma_{10} + \zeta_{1i} \quad (\text{Eq. 8})$$

$$\pi_{2i} = \gamma_{20} + \gamma_{21}\text{VT} + \zeta_{2i} \quad (\text{Eq. 9})$$

$$\pi_{3i} = \gamma_{30} + \gamma_{31}\text{VT} + \gamma_{32}\text{RS} + \gamma_{33}(\text{VT} * \text{RS}) + \zeta_{3i} \quad (\text{Eq. 10})$$

Before presenting the results of the random coefficient models for Hypotheses 1 through 3, it should be noted that in growth modeling, time is a Level 1 predictor of the outcome at a given time (in this case, three separate time variables to represent each phase, which ultimately summarize the trajectory in its totality). When between-person (Level 2) variables are modeled as predictors of Level 1 variables (e.g., time), an interaction term between the Level 1 and Level 2 variable is created in order to predict overall growth in the outcome. In the analyses herein, therefore, the main effects of trust patterns in a particular time period (e.g., during trust restoration) are modeled as an interaction. For instance, trust violation type as a predictor of the magnitude of trust dissolution is mathematically represented by Violation Type x Restoration. Extending upon this, when two Level 2 predictors interact with a Level 1 time variable (e.g., Hypothesis 4, in which violation type and repair strategy interact to predict the rate at which trust

is restored), a three-way interaction is created. For the current study, following a procedure similar to Hale and colleagues (2015), only parameters and higher-order interactions of interest were added to each separate set of analyses.

Hypothesis 2

Hypothesis 2 suggested that trust dissolution would be greater after an intentional violation as compared to a competence violation. To test for systematic differences in trust dissolution, violation type was entered as a Level 2 predictor of the Level 1 parameter for trust dissolution (Equation 9). On average, trust decreased by 1.42 points as a result of the violation. However, as indicated in model 2 of Table 10, regression results indicated that there was not a significant effect of violation type on trust dissolution ($\gamma = -0.21, p = .14$). A visual examination of dissolution after a competence versus intent violation can be seen in Figure 10, which supports the statistical findings.

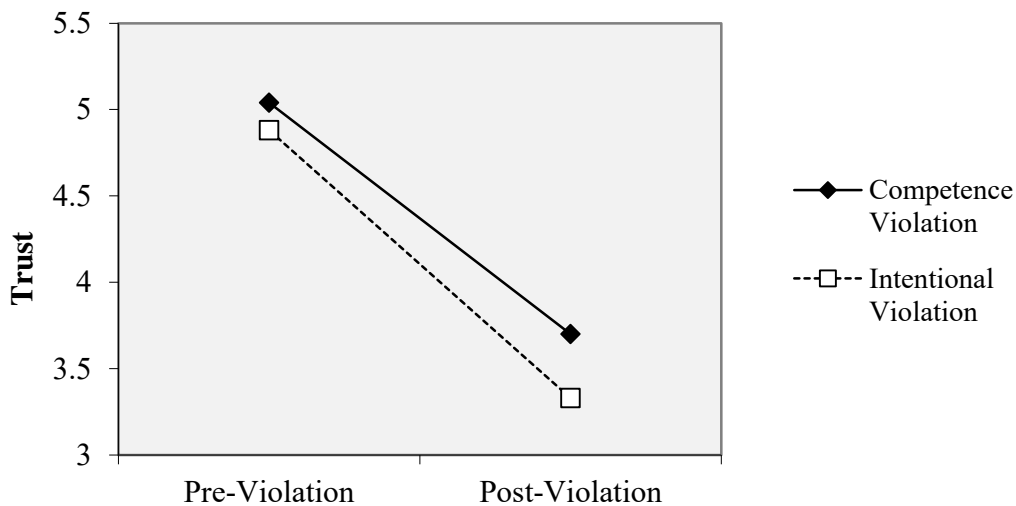


Figure 10. Trust dissolution after a competence versus intentional violation.

Additional analyses were conducted to determine if the different types of violations had significantly different impacts on trust in competence versus trust in intent. In particular, the same model as above was evaluated, but by separating trust in competence and trust in intent as separate constructs. As indicated in Table 11 and Figures 11 and 12, results suggested that whereas intentional violations were significantly more damaging than competence violations in terms of dissolving trust in intent (Model 2b; $\Upsilon = -0.37$, $p < .05$), there was no significant difference in the impact of intentional violations on competence-based trust dissolution ($\Upsilon = -0.03$, $p = .87$). In both cases, however, trust dissolution was significant (competence-based trust dissolution, $\Upsilon = -1.44$, $p < .001$; intent-based trust dissolution, $\Upsilon = -1.64$, $p < .001$). These results suggest that intentional and competence violations were equally damaging to perceptions of ability, but intentional violations were more damaging to perceptions of character than competence. Thus, these results provided support for Hypothesis 2.

Table 11. Competence-based and intent-based trust dissolution.

Fixed Effects	Model 2a		Model 2b	
	Coef	SE	Coef	SE
Level 1 Model (π)				
Intercept	5.06***	0.08	5.01***	0.09
Development	-0.04	0.07	-0.11	0.08
Dissolution	-1.41***	0.13	-1.27***	0.17
Restoration	0.30***	0.05	0.31***	0.05
Level 2 Model (Υ)				
Violation Type	-0.10	0.12	-0.20	0.14
Violation Type * Dissolution	-0.03	0.18	-0.37**	0.18
Pseudo R ²	0.008		0.013	
Variance Components	Model 2a		Model 2b	
	Var	SD	Var	SD
Intercept (B/T)	0.24	0.49	0.32	0.57
Development slope	0.09	0.30	0.10	0.32
Dissolution transition	2.10	1.45	1.99	1.41
Restoration slope	0.21	0.46	0.20	0.44
Residual (W/I)	0.26	0.51	0.30	0.55

Note: * denotes significance at $p < .10$. ** denotes significance at $p < .05$.

*** denotes significance at $p < .01$. DEV = Trust development.

DIS = Trust dissolution. RES = Trust restoration.

VT = Violation type, coded as 0 for competence and 1 for intentional.

Model 2a = Trust in competence as outcome

Model 2b = Trust in intent as outcome

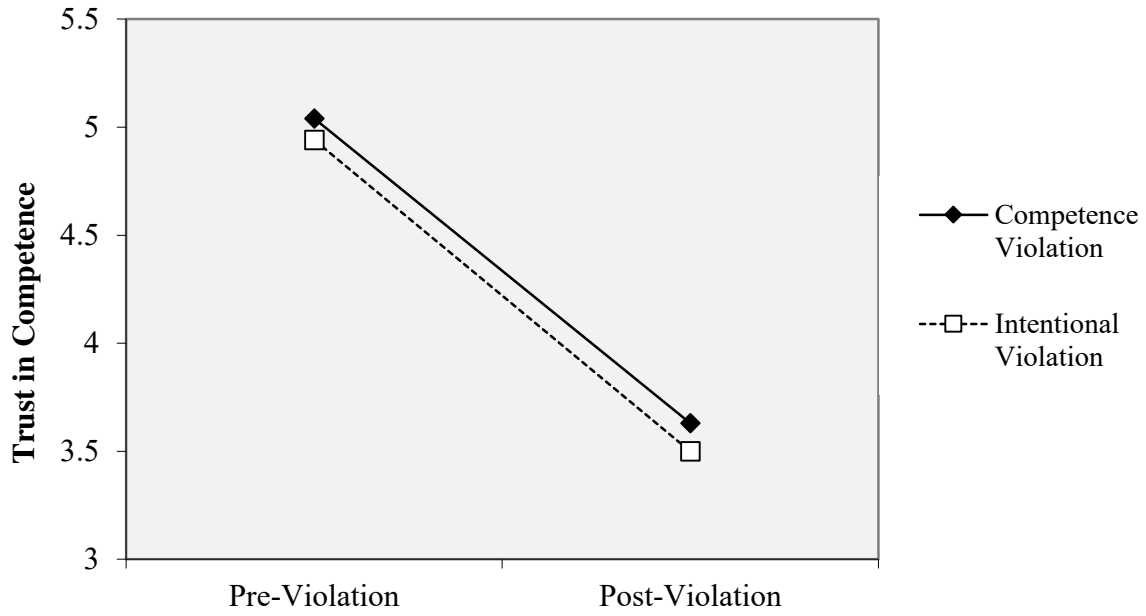


Figure 11. Competence-based trust dissolution after a competence versus intentional violation.

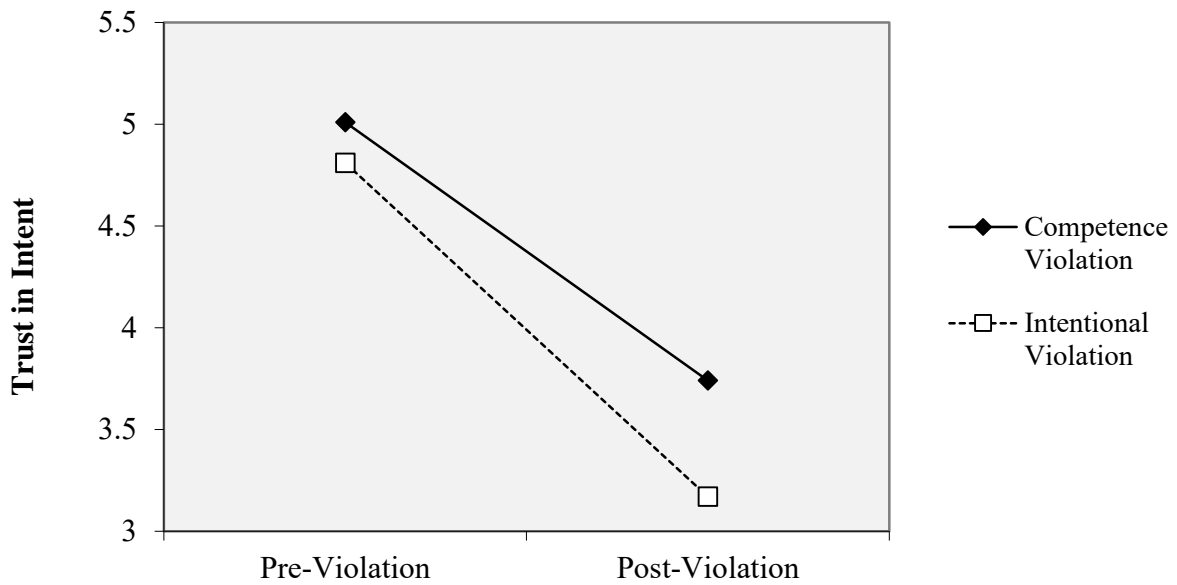


Figure 12. Intent-based trust dissolution after a competence versus intentional violation.

Hypothesis 3

Hypothesis 3 focused on the differential effects of trust violation type in predicting trust restoration. On average, trust increased by .30 points per time period during restoration. According to results presented in model 4 of Table 10 for the tests of Hypothesis 4, the main effect of trust violation type on trust restoration was not significant. However, following suggestions made by Bliese and colleagues (2007) a separate model without the main effect of repair strategy on restoration and interaction between violation type and repair strategy was estimated. This was done to ensure the t-value for the main effect of violation type on restoration was not suppressed by the interaction terms. Indeed, as indicated by the results presented for Model 3 of Table 10 and Figure 13, the rate at which trust was restored was significantly slower after an intentional violation than after a competence violation ($\gamma = -0.16, p < .01$). Thus, Hypothesis 3 was supported.

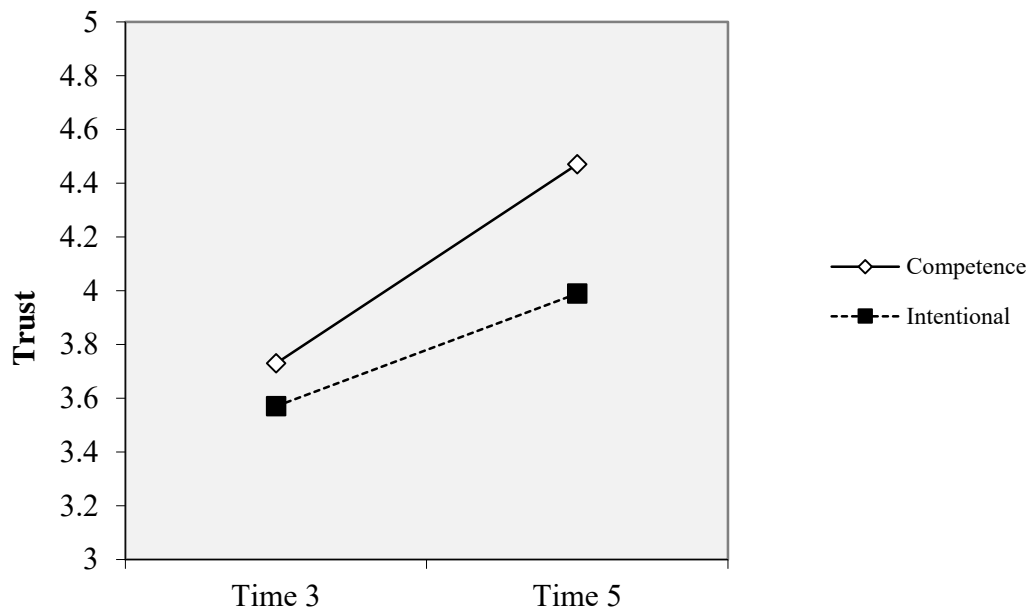


Figure 13. Trust restoration after a competence versus intentional violation.

Hypothesis 4

Finally, Hypothesis 4 suggested that the effect of trust violation type on trust restoration would be moderated by repair strategy, such that (a) trust would be repaired more quickly after an intentional violation if surveillance was implemented, whereas (b) trust would restore more quickly after a competence violation if compensation was offered. As indicated in model 4 of Table 10 and as shown in Figure 14, the interaction between violation type, repair strategy, and restoration was significant ($\gamma = -0.32, p < .05$). However, to test the hypotheses, examination of the simple interactions was necessary. Following recommendations made by Spiller, Fitzsimons, Lynch, and McClelland (2013) for examining simple effects in the case of a 2 x 2 x continuous three-way interaction, I conducted a series of follow-up analyses (see Table 12). Spotlight analyses provide estimates of the simple effects of a variable at specified values of another. Because violation type and repair strategy were dummy-coded as 0's and 1's, the results for the simple effects presented in Table 10 only tell part of the story. For instance, in model 4a of Table 12, the interaction term for violation type and the restoration slope provides an estimate of the difference in the rate of restoration after an intentional violation compared to a competence violation when surveillance is implemented. Conversely, the interaction term for repair strategy and restoration provides an estimate for the difference in the rate of restoration when compensation is provided compared to when surveillance is implemented after a competence violation.

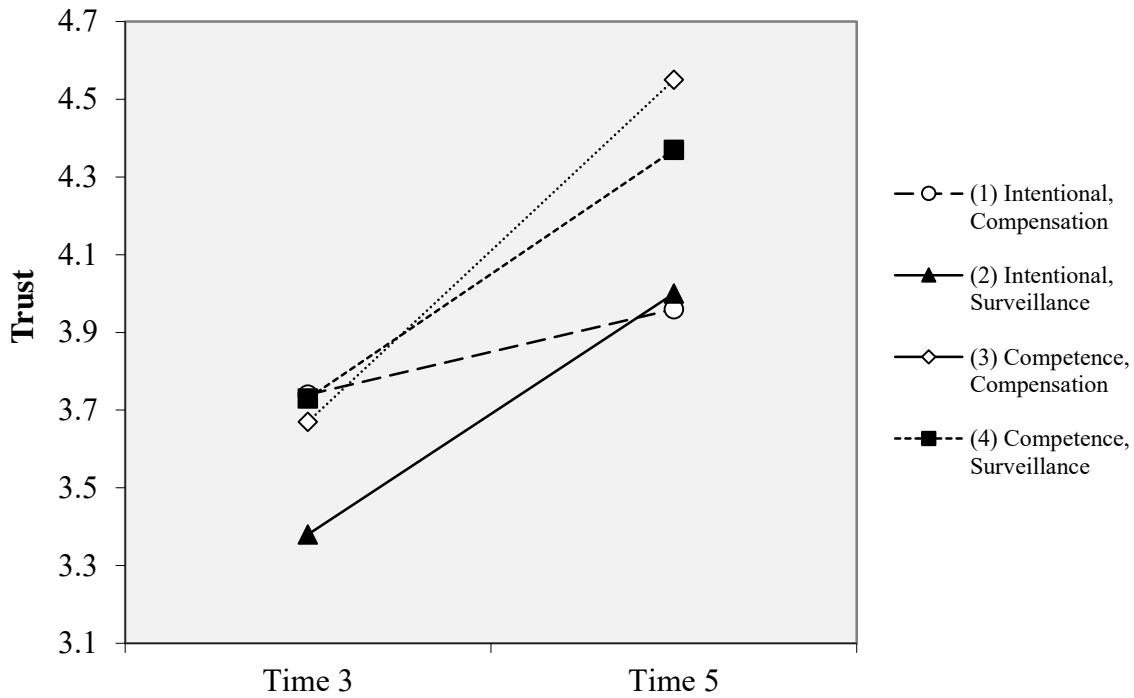


Figure 14. Trust restoration by condition

Therefore, three additional analyses were conducted to analyze all simple effects contained in the higher-order interaction. In support of Hypothesis 4a, the interaction term for repair strategy and restoration in Model 4d was significant, indicating the rate of restoration was faster when surveillance was implemented after an intentional violation as compared to when compensation was offered ($\gamma = 0.33, p < .05$). However, Hypothesis 4b was not supported. As indicated by the interaction term for repair strategy and restoration in model 4a, though the effect approached significance ($\gamma = 0.12, p = .10$), restoration was not significantly faster when compensation was provided after a competence violation as compared to when surveillance was provided. These patterns are visually depicted in Figure 14.

Table 12. Spotlight analyses for interaction between violation type, repair strategy, and trust restoration.

Fixed Effects	Model 4a		Model 4b		Model 4c		Model 4d	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Level 1 Model (π)								
Intercept	5.06***	0.11	5.00***	0.12	4.72***	0.13	5.07***	0.14
Development	-0.07	0.07	-0.07	0.07	-0.07	0.07	-0.07	0.07
Dissolution	-1.43***	0.15	-1.43***	0.15	-1.43***	0.15	-1.43***	0.15
Restoration	0.32***	0.06	0.44***	0.07	0.30***	0.07	0.11	0.08
Level 2 Model (Υ)								
Violation Type	-0.35**	0.16	0.07	0.19	0.35**	0.16	-0.07	0.19
Repair Strategy	-0.06	0.16	0.06	0.16	0.36*	0.19	-0.36*	0.19
Violation Type * Repair Strategy	0.42*	0.24	-0.42*	0.25	-0.42*	0.25	0.42*	0.25
Violation Type * Dissolution								
Violation Type * Restoration	-0.01	0.08	-0.33***	0.09	0.01	0.08	0.33***	0.09
Repair Strategy * Restoration	0.12*	0.08	-0.12*	0.08	-0.20**	0.09	0.20**	0.09
Violation Type * Repair Strategy * Restoration	-0.32***	0.12	0.32***	0.12	0.32***	0.12	-0.32***	0.12

Note: * denotes significance at $p < .10$. ** denotes significance at $p < .05$. *** denotes significance at $p < .01$.

Model 4a = Intentional (VT) and Compensation (RS) coded as 1. Same results as Model 3 in Table 5.

Model 4b = Intentional (VT) and Surveillance (RS) coded as 1.

Model 4c = Competence (VT) and Compensation (RS) coded as 1.

Model 4d = Competence (VT) and Surveillance (RS) coded as 1.

CHAPTER 5: DISCUSSION

Drawing upon theories of collaboration and relationship repair, this study presents theory and empirical evidence supporting the investigation of interpersonal trust in collaborative partnerships as a process that evolves over time. More specifically, this study investigated competing theories of trust development, including transformational theories (that suggest trust begins low and develops over time) and swift trust (that suggests trust begins and remains high when individuals can draw from available information). This study also investigated the relative impact of competence versus intentional violations on trust dissolution, or the immediate short-term decrease in trust, as well as the long-term effects of these two types of violations on the rate at which trust restored in the long-term. Finally, the joint effects of violation type and repair strategy (namely, compensation and surveillance) on the rate at which trust was restored was investigated.

Hypothesis 1 was a strong inference test that tested competitive theories to determine if trust development in collaborative interpersonal contexts would follow swift trust theories or transformational theories, specifically if it would be high at the outset and remain at that level through development or if it would start at low or nonexistent levels and increase over time. Results indicated that trust was indeed high at the outset and stayed at that level until trust was violated at Time 3. Further examination of the results of Model 1 (Table 10) indicate that trust had a steep decline after the violation and steady growth thereafter, providing further support that individuals truly trusted their teammates at the outset and that the reported trust levels were likely calibrated to actual trust levels. Thus, although the time period for trust development only consisted of two time points, an examination of the rate of change relative to change elsewhere

in the model suggests when individuals need to begin working together immediately, they draw from existing knowledge structures, or mental models, to derive expectations for behavior. In this case, the participants (undergraduate students) were likely accustomed to working with their peers on tasks and assumed they would be able to complete a simple task and would not intentionally detract from the team goals. In other words, when working with a new partner whom they know little about, people are able to draw from what they know in order to enter the relationship with a high level of trust.

Hypothesis 2 proposed that trust would be damaged more by an intentional violation. Though the initial hypothesis test of the violation's impact on overall trust did not find evidence that intentional violations were more damaging to overall trust, results of follow-up analyses investigating trust in competence and trust in intent separately did find support for this hypothesis. Specifically, in line with the theoretical arguments put forth in the hypothesis development, these results suggest that intentional violations were more damaging to perceptions of character than were competence violations, and were equally damaging to perceptions of ability as compared to competence violations. In other words, whereas competence violations had relatively less impact on perceived integrity, intentional violations demonstrated spillover effects to damage not only trust in integrity but also perceived ability.

Additionally, Hypothesis 3 proposed that trust restoration would be slower after an intentional violation than a competence violation, which was also supported. Taken together, the findings from Hypotheses 2 and 3 are interesting because together they provide support for the notion that intentional violations are considered to be so generalizable and such a flaw that they not only effect short-term and long-term trust but also exhibit spillover to also affect perceived

ability despite the lack of actual evidence of decreased capability to perform the task at hand. Simply stated, when a person makes a mistake it damages trust in his or her ability to perform the task but trust can be restored relatively quickly; however, intentionally causing harm damages trust in both one's integrity and their ability, and this damage is long-lasting and difficult to repair.

Finally, Hypothesis 4 suggested that there would be an interaction between violation type and repair strategy in predicting trust restoration. Indeed, this interaction accounted for six percent of the variance in trust over time, of which 4.6% was above and beyond violation type alone (1.4%). Results provided support for Hypothesis 4a, indicating that trust did increase at a faster rate after an intentional violation when surveillance was implemented as compared to when compensation was offered. On the other hand, Hypothesis 4b, which proposed that after a competence violation trust would restore at a faster rate of change if compensation was offered than if surveillance was implemented, was not supported. However, the effect size for this relationship was significant at $p < .10$ and therefore should not be completely dismissed, as the relationship may hold with a larger sample or more measurement time points. This suggests that after an intentional violation, surveillance is a better repair strategy to use than an offer of compensation, but offering compensation to make up for harm done is a slightly better option when the offense is accidental.

One important note should be made regarding interpretation of results of Hypotheses 3 and 4, which investigated trust restoration. In the statistical model, trust restoration was modeled as a linear growth function from times 3 through 5. Though a model with a quadratic polynomial for the restoration term was also estimated, it did not provide better fit than the linear model.

Namely, though particular individuals or conditions may have had non-linear growth slopes (e.g., trust increased and then decreased again during restoration), the quadratic functional form did not fit the overall data better. Therefore, following recommendations made by Bliese (2000) and others, I retained the linear growth model.

Implications

The study findings have important methodological, theoretical, and practical implications. In terms of advancing theory and methods related to examining trust development, violation, and repair, this study has several implications. First, this study suggests at a basic level that the investigation of alternative trust repair strategies and their utility in repairing trust is a fruitful endeavor. This study provides empirical evidence for the use of surveillance technologies in collaborative contexts. Though surveillance has been examined from the trustee's standpoint (i.e., how the individual feels about *being* monitored) and is typically examined from the lens of organizational hierarchies or authority, less is known about surveillance or other structural methods of repairing interpersonal trust amongst peers in collaborative relationships. This study provides a starting point for examining other strategies that can be employed by the trustor, rather than the trustee, in terms of restoring trust.

While the results related to trust repair strategies are important, another important goal of this research was to extend upon existing research by taking a process-based approach to studying how trust evolves. Despite the abundance of theory suggesting that trust changes over time, this study is one of the first to examine trust as a process that unfolds with time. As discussed previously, AET emphasizes that attitudes can vary not only between individuals but also within. Indeed, this assertion has received empirical support in previous studies, with one

study finding that 60% of the variance in mood and affect reside within-person (Miner, Glomb, Hulin, & Anonymous, 2005). However, conventional methods for assessing attitudes are focused around between-person analysis and treat within-person variance as error. To address this issue, the emotions literature has begun to utilize experience sampling methods (ESM) and multilevel statistical analysis in order to assess both within and between person effects (Judge et al., 2010). This study investigated trust over multiple measurement time points, both within- and between individuals. Indeed, the results of this study found that when examining trust over time, approximately 54% of the residual variance was attributable to inter-individual, or between-person, factors whereas 46% was attributable to within-person variation. This suggests that the current commonplace cross-sectional designs are missing a substantial portion of the story.

Overall, this study provides evidence that factoring time into investigations of organizational phenomena is an important next step for furthering organizational research. The results of the current study indicated that although there may not be significantly larger impacts on overall trust immediately after a violation depending on the type of violation, the rate at which trust restores is different depending on the violation type. Furthermore, the effects of the type of violation and repair strategy jointly interacted with time to suggest that the rate at which trust changes is different depending on the type of violation and the type of repair strategy. One important consideration to draw from these findings is that cross-sectional theory does not perfectly translate to theories of time. Therefore, though one type of repair strategy may have a large immediate impact, it may be the case there are diminishing returns over time, meaning trust may increase quickly at first and then level off again. Similarly, it may be the case that it takes time for a repair strategy to have an effect and that the utility of a particular repair tactic is not

evident until some period of time has passed. Therefore, too few time periods or measurements that are not timed appropriately may miss important details (Ployhart, Holtz, & Bliese, 2002). In particular, Ployhart and colleagues (2010, 2013) suggest that longitudinal theory should seek to answer questions of how long the effects should occur, if the strength of the effect will change over time, why the strength of the effect should change, and what the process of change is.

This study also has several practical implications. First, study findings suggested that in collaborative contexts, trust may not need to develop over long periods of time but rather begin at a high level and remain as such (at least until a violation occurs). Therefore, if organizations need trust to begin at a high level, environmental cues or information that serves as a basis for trust expectations can be provided. For instance, to foster high trust early in a new partnership or collaboration, supervisors can be instructed to provide information about the educational background or work experience of an individual, or other personal information that provides insight into an individual's character (e.g., interests, hobbies) can be provided.

Second, though all violations should be avoided in collaborative contexts, as both competence and intentional violations have significant impacts on trust levels and trust is important for a myriad of organizational outcomes, the findings suggest that intentional violations take substantially longer to recover from. Therefore, particular emphasis should be placed on ensuring individuals are behaving with high integrity. Though much of our science and our selection techniques focus on the knowledge and skills of an employee or teammate, behavior in interpersonal interactions can be even more important in some respects. As such, this reinforces the idea that organizations should focus on the behavioral integrity of the individuals

in the organization, through selection and promotion (e.g., personnel records) or development (e.g., ethics training, mentoring, conflict resolution).

Third, though studies have found that surveillance can be detrimental to an employee's well-being and attitudes when they know they are being monitored, this study suggests that in interdependent peer relationships, the knowledge that a third party is watching for problems can be effective for repairing trust perceptions after a violation. This idea can also be extended to other contexts, such as in educational settings, where students are dependent upon each other for their class grades on group projects. Creating an environment where the individual can choose to notify an authority figure can help to restore trust and reboot the relationship. Thus, organizations should ensure their members understand that the worst kind of offense is one done on purpose, but if they do engage in unethical behavior the best course of action is for supervisors to create a climate that makes it acceptable and accessible for subordinates to report ethical issues.

Limitations and Future Research

As with other empirical work, there are limitations to this study. First, this was a laboratory study with undergraduate students and therefore, these research questions should be investigated in other types of organizations (e.g., employees in corporations, hospitals) and relationships (e.g., friends, spouses, supervisor and subordinate) to determine if the results are generalizable to other populations. Though many of the results were highly significant, effect sizes tend to be higher in controlled experiments and thus may not play out in organizational settings. This study utilized a computer agent confederate and thus, the interactions were relatively controlled based on programming decisions. Though participants interviewed during

debriefing for pilot sessions indicated that the computer agent was believable and they were unaware that it was not another person, the interactions were one-way, meaning they were highly controlled and thus may not be generalizable to person-person interactions. Future research should investigate trust violation and repair when both participants are human to determine if there are interactive effects that might change these trust trajectories.

Additionally, in the surveillance manipulation, participants were provided the opportunity to notify the experimenter, but it was not mandatory and nothing was reported to the experimenter in reality. Thus, there were no true ramifications to the “confederate” agent’s outcomes. However, in real-world dyadic interpersonal relationships, the implementation of surveillance would likely be known (at least eventually) by the offender and thus could have implications for how (s)he engaged with the trustor. Simply stated, knowing that a partner has told an authority figure about the transgression could be construed as tattle-taling and thus would impact not only the trust of the trustor but also the violator’s perceptions of relationship quality and future behaviors toward the trustor. Given the literature on surveillance from the trustee’s perspective as being detrimental to employee attitudes, future research should investigate third-party surveillance from both perspectives simultaneously.

Third, though this study used a longitudinal approach to investigate trust as a process, examining trust perceptions after five distinct performance episodes. However, because it was a laboratory study, the time periods between these assessments was short and the entire study session was approximately two hours. Therefore, the pattern of trust development, dissolution, and restoration may be different over longer periods of time and thus should be studied either in

a controlled laboratory setting with multiple sessions or in organizational contexts, such as using experience sampling methods.

Fourth, though I attempted to investigate the study hypotheses separately in the US and Spain samples, due to sample size issues in some of the cells, this led to problems with the data and thus, I concluded that the findings would not be theoretically meaningful if the samples were separated. As such, for the current study US and Spain participants were combined into a single sample. Similarly, though measurement equivalence analyses were planned for the current study to verify that trust was being conceptualized in the same way over time, again there were sample size issues and thus the model fit indices would not have been accurate if reported. Additional data collection in the future may help to alleviate these sample size issues.

From a theoretical standpoint, there are several areas for future research that can build upon these findings. First, in line with Mayer and colleagues, this study focused on trust only and not distrust. However, Lewicki and colleagues have suggested that distrust is a separate and distinct negatively-valenced construct characterized by paranoia and fear rather than the absence of trust. Future research should investigate how distrust evolves over time as a distinct process from trust.

Furthermore, this study focused explicitly on the process by which trust unfolds over time. However, there was considerable between-person variability as indicated by the ICC, suggesting that there may be important individual differences that further explain how trust develops, dissolves, and restores. Similarly, trust has been linked to a wide variety of organizational outcomes. Future research should investigate the dynamic relationships between these antecedents and outcomes to determine if, for instance, they are related only under certain

conditions or at certain points, if the strength of the relationship changes over time, or if the relationships remain stable. The use of longitudinal, process-focused approaches and the examination of time-varying predictors and dynamic relationships will have important implications for application of findings from the current literature base.

Conclusion

In sum, the findings from the study provide three main take-aways. First, trust does not need to develop over the long-term in collaborative relationships. Instead, swift trust, or high trust at the outset of a relationship, can be fostered by providing information or cultivating experiences that individuals can draw from in making trust assessments. Second, intentional acts of harm in collaborative relationships are worse than accidental wrongdoings in both the immediate and the long-term. Organizations can help to mitigate these problems by (1) avoiding ethical issues and conflict through selection or training protocols, or (2) by putting safeguards in place to monitor problem employees, including providing opportunities for others to report problems when they arise. Finally, trust evolves over time and it is important for organizations and researchers alike to consider when events occur, how long they have an impact, and how the impact of a violation or repair strategy may increase or diminish as time passes.

APPENDIX A: TRAINING PROTOCOL & KNOWLEDGE TEST

Training Protocol & Knowledge Test

Welcome to the Color Trails Game training! Today you will be playing a computer game where you and a partner are part of a humanitarian aid organization, and your job is to navigate across a stretch of wilderness in order to deliver food to a town in need.

Continue

You will be the Blue Player in the game. The path you draw will be blue, and all icons outlined in blue “belong” to you.

Previous
Continue

The basic goal of the game is to deliver as much food to the town as possible. At the end of this experiment, both team members will have an opportunity to receive an Amazon gift card if they deliver the most food to the town as a team. At the same time, both players have the opportunity to collect gold coins as you travel across the wilderness by crossing the squares with treasure chests on them. You can only collect coins that are outlined in your color. Each coin square gives you 40 coins.

Previous
Continue

These gold coins do not help the team, but the individual who collects the most gold coins will have an opportunity to receive an Amazon gift card at the end of the experiment. This is in addition to the gift card that can be earned based on food delivery.

Previous
Continue

So now that you understand the goal, let’s talk about how to play the game. Each player begins their journey at the “start” square at the bottom of the grid and must determine a path through the wilderness that ends at the town at the top of the grid.

Previous
Continue

You may only move in up, down, left, and right directions (no diagonals). The areas you see in black are impassable areas; you cannot draw your path through black squares.

Previous
Continue

Along the way, your team must pick up the medicine and water that is placed within the grid, and each player can only pick up one of the two packages. If your team fails to pick up one of the

packages, your team will have to spend 100 food rations once reaching the town to buy the supplies you forgot, meaning your team will lose 100 food rations as a result of the mistake. At this time please click on the water icon on the game board.

At this time please click on the medicine icon on the game board.

You and the other player must plan routes to pickup and deliver this water and medicine, along with your food, to the town. You will both begin the game with equal amounts of food to transport. Each square of travel consumes 1 ration of food, thus shorter routes consume less food and vice versa. Also, the amount of food you deliver during each round will influence how much food you start with during the next round – meaning, the more food you waste, the less food you have to deliver in the next round (and the less extra compensation your team can earn).

Previous
Continue

Along with the medicine and water pickup points, there are other important spaces in the wilderness that you can cross, which can either help or hurt the team:

Previous
Continue

Bonus (green circle with green plus sign in middle) – this adds 10 food rations to your delivery.

Previous
Continue

Hazard (exclamation point inside triangle) – this removes 10 food rations from your delivery.

Previous
Continue

A good way to increase your team score is to make sure you avoid hazards and pass through bonuses that are near your desired path. If you cross any hazards and bonuses of either color, even if you can't see them, they will still impact the team score. If at any time during the game you need to see a description of the icons on your screen, you can check the “show descriptions” box on the bottom of the game screen. At this time, please click the “show descriptions” checkbox.

Previous
Continue

And one more thing – in each round of Color Trails, it is possible that either player will be approached by a wilderness bandit who may offer that player a bribe. This can happen randomly in any round – you will receive a popup message like the one you see here. If you are approached by a wilderness bandit during the game, you will have the choice to accept or decline the bribe

that is offered to you. This bribe will have consequences for the team's goal, so consider it carefully if you are approached!

Previous
Continue

You have encountered a bandit in the wilderness who is offering to give you 100 gold coins in exchange for 100 of the team's food rations that you are transporting. Will you accept this bribe?

Accept
Do not accept

There are five basic steps you must take in every round of Color Trails

Previous
Continue

The first step is to decide which team member is going to pick up the food and water. To do this, you can propose goals by clicking the "assign goals" button on the bottom right of the game screen. Choose which team member will be responsible for collecting medicine or water respectively. Either player may choose this option, thus whichever player selects it first will have their proposal displayed by the other first. It is of no importance which player proposes this choice, so long as both players agree to who will pick up water and who will pick up medicine. At this time, please click the assign goals button.

The second step is to share information about the wilderness with your partner, if you would like to do so. You have the option to share with your teammate the hazards and bonuses on your screen that are outlined in your color. Keep in mind that if you do not share this information, the other player will not know about these spots on the grid. Sharing them will allow your teammate to plan his or her route to include/avoid these spaces. You can share an item with your teammate by right clicking it and selecting "Share with red team member/Share with blue team member." At this time, please right click the highlighted hazard and share it.

Share with Red Team Member

The third step is to draw your route to the village. Remember, you must pick up your assigned objective (either water or medicine, as decided in step 1), and then deliver your objective to the village. While planning your route, be mindful of the different "information" on the map. To draw your path, click on the squares to indicate the route you would like to take (remember, you can only make up, down, left, and right movements). Click continue to see a path being drawn.

Previous
Continue

The fourth step is to travel along your path. Once you have completed drawing the route that you

wish to take, select the “Hit the road!” button on the bottom right of the game screen. Wait quietly at the computer until your other team member has finished their route and hit the road as well. At this time, please click the “Hit the road!” button.

After each round of the game, please complete the survey shown and wait quietly until your other team member has finished.

Previous
Continue

You have now completed the Color Trails training. At this time you will be given five questions to evaluate your understanding of the game.

Previous
Continue

Please click on your answer.

1. **What is the main goal of the game?**
 - a. To cross as many hazards as possible
 - b. To collect as many gold coins as possible
 - c. *To deliver as much food to the town as possible (Correct Answer)*
 - d. To draw the longest path possible

That is correct!

That is incorrect. Please try again.

Please click on your answer

2. **Which of the following shows the correct order of steps in the game?**
 - a. Share information, assign goals, hit the road, draw path
 - b. *Assign goals, share information, draw path, hit the road (Correct Answer)*
 - c. Draw path, assign goals, share information, hit the road
 - d. Share information, hit the road, draw path, assign goals

That is correct!

That is incorrect. Please try again.

Please click on your answer.

3. **How do you share information with the other player?**
 - a. Yell it at them from the other room
 - b. Type it in the chat window
 - c. Tell the experimenter to tell them
 - d. *Right-click the information and select “Share with Red Team Member” (Correct Answer)*

That is correct!

That is incorrect. Please try again.

Please click on your answer

4. **What will NOT harm your team's score?**
 - a. Accepting the bribe
 - b. Hazard squares
 - c. *Bonus squares (Correct Answer)*
 - d. Forgetting to pick up water and medicine packages

That is correct!

That is incorrect. Please try again.

Please click on your answer

5. **Which of the following will improve your individual score?**
 - a. *Accepting the bribe (Correct Answer)*
 - b. Hazard squares
 - c. Bonus squares
 - d. Forgetting to pick up water and medicine packages

That is correct!

That is incorrect. Please try again.

You have completed your training. At this time, please message the experimenter through GoogleTalk to let them know you are done. He or she will provide further instructions.

APPENDIX B: TEAM BUILDING EXERCISE

Team Building Form

Instructions: Please answer the following questions about yourself. Do not speak with the other participant as you make your selections.

Please choose the most appropriate answer choice

1. What is your gender?
 - a. Male
 - b. Female

2. What is your current overall GPA?

3. What is your current education level?
 - a. Freshman
 - b. Sophomore
 - c. Junior
 - d. Senior

4. When do you anticipate graduating?
 - a. By end of Summer 2015
 - b. Between Fall 2015 and Summer 2016
 - c. Between Fall 2016 and Summer 2017
 - d. After Summer 2017

5. Have you received any awards for academic achievement?
 - a. Yes
 - b. No

6. Are you currently employed or hold an internship position?
 - a. Yes
 - b. No

Instructions: Please choose five of the statements below which best represent what you do in your spare time. Do not speak with the other participants as you make your selections.

- Plan a vacation with friends or family
- Write poetry or song lyrics
- Visit family members
- Call your friends
- Do gardening
- Download apps for your phone
- Draw or sketch
- Play a game on your computer
- Go outside and play a sport with others
- Use your phone to browse the internet
- Play games on your phone
- Read poetry or novels
- Listen to music and dance
- Text message people
- Walk or play with your pet outside
- Workout at home
- Have a dinner party
- Sing in a choir or band
- Go jogging
- Build or fix computers
- Call your parents or other family members
- Make arts and crafts
- Go out to eat with friends
- Go to a concert
- Clean your apartment or house
- Watch a sporting event with friends
- Play video games on a console
- Go hiking or camping
- Watch a play
- Go out with friends
- Browse through the internet on your computer

_____ Play an instrument

Answer Sheet: Color Codes

_____ Plan a vacation with friends or family

_____ Write poetry or song lyrics

_____ Visit family members

_____ Call your friends

_____ Do gardening

_____ Download apps for your phone

_____ Draw or sketch

_____ Play a game on your computer

_____ Go outside and play a sport with others

_____ Use your phone to browse the internet

_____ Play games on your phone

_____ Read poetry or novels

_____ Listen to music and dance

_____ Text message people

_____ Walk or play with your pet outside

_____ Workout at home

_____ Have a dinner party

_____ Sing in a choir or band

_____ Go jogging

_____ Build or fix computers

_____ Call your parents or other family members

_____ Make arts and crafts

_____ Go out to eat with friends

_____ Go to a concert

_____ Clean your apartment or house

_____ Watch a sporting event with friends

_____ Play video games on a console

_____ Go hiking or camping

_____ Watch a play

_____ Go out with friends

_____ Browse through the internet on your computer

_____ Play an instrument

	Socially Oriented (Green)	Artistically Oriented (Yellow)	Actively Oriented (Blue)	Technology Oriented (Red)
Blue Team Member				

Answer Sheet: Scoring

Team Building Response

Information About Your Teammate

Below is information provided by your teammate.

Gender: [Insert Participant Gender]

Current overall GPA: 3.65

Education level: Junior

Anticipated graduation: Between Fall 2015 and Summer 2016

Currently employed or holding an internship position: Yes

Similarity in Leisure Activities

Based on what you and your teammate indicated as activities you like to engage in, you are BOTH: [Check the activity type to match that of the participant]

_____ Socially oriented

_____ Artistically oriented

_____ Actively oriented

_____ Technology oriented

APPENDIX C: DEMOGRAPHIC ITEMS

Scale

See below for each question. Note: ** indicates alternative, equivalent question asked for Spain participants.

Items

1. What is your sex:
 - Male
 - Female
2. What is your age?

3. What is your race or ethnic background? (check all that apply)**:
 - White/Caucasian, Anglo, European American; not Hispanic
 - Black/African American
 - Hispanic or Latino, including Mexican American, Central American
 - Asian or Asian American, including Chinese, Japanese
 - Pacific Islander or Native Hawaiian
 - American Indian
 - Alaskan Native
 - Middle Eastern, including Northern African, Arabic, West Asian, and others
 - Other: Please Describe _____
4. If you chose more than one race or ethnic group in the previous question, which one do you most identify with**?
 - White/Caucasian, Anglo, European American; not Hispanic
 - Black/African American
 - Hispanic or Latino, including Mexican American, Central American
 - Asian or Asian American, including Chinese, Japanese, and others
 - Pacific Islander or Native Hawaiian
 - American Indian
 - Alaskan Native
 - Middle Eastern, including Northern African, Arabic, West Asian, and others
 - Other: Please Describe _____
5. If you marked Middle Eastern in the previous question, which ethnic group are you a descendant of? (Mark all that apply)
 - Arabs
 - Turks
 - Persians
 - Jews
 - Kurds
 - Aramean Syriacs
 - Armenians
 - Azeris
 - Circassians
 - Greeks

- Georgians
- Emiratis
- Iranians
- South Asians
- Other: Please Describe _____

6. What is your Mother's race or ethnicity**?

- White/Caucasian, Anglo, European American; not Hispanic
- Black/African American
- Hispanic or Latino, including Mexican American, Central American
- Asian or Asian American, including Chinese, Japanese
- Pacific Islander or Native Hawaiian
- American Indian
- Alaskan Native
- Middle Eastern, including Northern African, Arabic, West Asian
- Other: Please Describe _____

7. What is your father's race or ethnicity**?

- White/Caucasian, Anglo, European American; not Hispanic
- Black/African American
- Hispanic or Latino, including Mexican American, Central American
- Asian or Asian American, including Chinese, Japanese
- Pacific Islander or Native Hawaiian
- American Indian
- Alaskan Native
- Middle Eastern, including Northern African, Arabic, West Asian
- Other: Please Describe _____

8. Where were you born? (City, State; Country if outside the US)

9. Is there a country other than the country in which you were born that you identify most with?

10. Where was your mother born? (City, State; Country if outside the US)

11. Where was your father born? (City, State; Country if outside the US)

12. Are you fluent in more than one language? If so, which languages, in order of most fluent to least fluent?

13. What language does your mother speak? If she speaks more than one language, list the languages in order of most fluent to least fluent.

14. What language does your father speak? If he speaks more than one language, list the languages in order of most fluent to least fluent.

15. Marital Status:

- Single
- Married
- Separated
- Divorced
- Widowed
- Living with Another
- Domestic Partnership

16. Class:

- Freshman
- Sophomore
- Junior
- Senior

If Senior – please indicate your year (i.e. 4th year, 5th year, etc.) _____

17. How many credit hours are you enrolled in this semester? _____

18. Major: _____

19. Minor: _____

20. Do you have any other degrees?

- Yes
- No

If Yes, please list them here: _____

21. What is your employment status?

- Not Employed
- Self-Employed
- Student
- Employed Full-Time
- Employed Part-Time

22. UCF GPA (or high school if you haven't started classes): _____

23. SAT Score**:

Verbal**:

Math**:

24. ACT Score**:

25. Are you the first one in your immediate family to attend college? (Yes/No)

26. What is the highest education level of your mother?

- High School
- Some College
- 2-year College Degree
- 4-year College Degree
- Some Graduate School
- Master's Degree
- Doctorate (including a Juris Doctorate – law degree)

27. What is the highest education level of your father?

- High School
- Some College
- 2-year College Degree
- 4-year College Degree
- Some Graduate School
- Master's Degree
- Doctorate (including a JD)

28. What is your employment status?

- Not employed
- Self-employed
- Student
- Employed Full-Time
- Employed Part-Time

APPENDIX D: TRUST SCALE

Trust & Distrust

Wildman, J. L., Fiore, S. M., & Salas. E. (in progress). Development of trust and distrust measures. *Unpublished Working Draft*. Institute for Simulation and Training, University of Central Florida.

Scale

1 = Not at all → 6 = Very much so

Items

To what extent do you feel:


1. Assured that the other team member will make intelligent decisions? (TC)
2. Confident that the other team member will try to do things that benefit the team? (TI)
3. Afraid that the other team member will purposefully do something that isn't helpful? (DI)
4. Faith that the other team member can do the task at hand? (TC)
5. Suspicious about the other team member's reasons behind certain decisions? (DI)
6. Convinced that you can rely on the other team member to try his/her hardest? (TI)
7. Confident in the other team member's ability to complete a task? (TC)
8. Nervous that the other team member will betray you? (DI)
9. Afraid that the other team member will make a mistake? (DC)
10. Confident that the other team member will do as they say? (TI)
11. Positive that the other team member will try and do what is best for the team? (TI)
12. Compelled to keep tabs on the other team member to be sure things get done? (DC)
13. Certain that the other team member will perform well? (TC)
14. Cautious about the other team member's intentions for the team? (DI)
15. Paranoid that the other team member will fail? (DC)
16. Worried that the other team member will do something wrong? (DC)

Note: TC = Competence-based trust; TI = Intent-based trust; DC = Competence-based distrust; DI = Intent-based distrust. Only TC and TI items utilized in the current study.

APPENDIX E: TRANSLATION CERTIFICATION

Certification of translator competence. I, Nayade Ramirez, hereby certify that the above is an accurate translation of the original document of informed consent, measures, debrief form, experimenter script, team building task, and training module in Spanish for the study of Virtual Collaboration in a Computer Game (UCF # 64-01-8116) of the, and I'm competent in both English and Spanish to render such translation. Furthermore, the Spanish informed consent has been modified to include a statement indicating students may choose an alternative assignment for extra credit if they wish, as per the request of the UCF IRB initial review response.

January 22, 2013
Date


Nayade Ramirez

APPENDIX F: UAM LETTER OF SUPPORT



Facultad de Psicología

Institutional Review Board, University of Central Florida
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, FL USA 32826-3246

October 19, 2012

To whom it may concern:

Permission has been granted to allow the University of Central Florida (FWA00000351) to conduct the research titled "Virtual Collaboration in a Computer Game" at Universidad Autónoma de Madrid, Madrid, Spain, with the assistance of Dr. Ramón Rico and his research team. Dr. Rico and his research team will be fully CITI trained prior to engaging in research activities and will be responsible for all research preparation and data collection that occurs at Universidad Autónoma de Madrid. They will also be involved in all other aspects of the research process, including the handling and analysis of data. Universidad Autónoma de Madrid will defer to the University of Central Florida's IRB for research approval on this project.

Sincerely,



Prof. J. Antonio Carralosa

Director Departamento de Psicología Social y Metodología Universidad Autónoma de Madrid
28049 Madrid, España.

APPENDIX G: UCF IRB HUMAN SUBJECTS APPROVAL LETTER



University of Central Florida Institutional Review Board
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: Amanda L Thayer and Co-PIs: Eduardo Salas

Date: February 19, 2015

Dear Researcher:

On 2/19/2015 the IRB approved the following human participant research until 02/18/2016 inclusive:

Type of Review: IRB Continuing Review Application Form
Expedited Review

Project Title: Virtual Collaboration in a Computer Game

Investigator: Amanda L Thayer

IRB Number: SBE-12-08760

Funding Agency: DOD/ARO

Grant Title:

Research ID: 1047687

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30 days 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 02/18/2016, 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).

All data, including signed consent forms if applicable, must be retained and secured per protocol for a minimum of five years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained and secured per protocol. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

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., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 02/19/2015 02:36:30 PM EST

IRB manager

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