The Value of Distrust in Computer-Based Decision-Making Groups

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Abstract

We present a creative approach to improve the effectiveness of decision-making groups in solving nonroutine problems by introducing increased distrust into the group. Our theory is proposed through an extension and empirical test of Schul et al.’s [1] distrust model in an online group decision-making domain. We find that an increase in distrust among group members led to an increase in group decision accuracy for nonroutine problems. This demonstrates that through a distrust stimulus, members of decision-making groups can better solve nonroutine problems. This paper also demonstrates how simple environmental abnormalities can increase distrust and trust in computer-based decision-making groups. Various trust- and distrust-related measures were also tested and validated to further research in this area.

1. Introduction

What are the common threads that make groups successful at their particular decision-making tasks when the tasks that they work on are completely different? Some tasks are routine and familiar, requiring little cognitive effort, while others can be nonroutine and require significant cognitive effort. Thus far, literature on group decision-making has produced mixed results.

The phenomenon of interest of our study is the effectiveness of group-decision making outcomes within the domain of computer-mediated communication (CMC) when solving routine or nonroutine decision tasks. To improve the predictably and control of our phenomenon of interest in our domain, we build and extend a model of distrust and trust in CMC-based, group-decision making from a recent model proposed and supported by [1].

Schul et al. [1] proposed and supported a model of distrust that explains how an increase in trusting beliefs increases routine mental actions and an increase in distrusting beliefs increases nonroutine mental actions. Their study used the domain of individual decision makers, and they showed that encouraging trusting beliefs in routine tasks and encouraging distrusting beliefs in nonroutine tasks both improved individual decision outcomes in the corresponding tasks.

The contributions of the Schul et al. [1] article are exciting when it comes to individual decision making, as it is one of the first to provide a strong explanation and tie between trust / distrust, the nature of a decision task, and decision outcomes. Research asserts that separate thought patterns underlie trust and distrust [2], and the Schul et al. article not only confirms this, but shows how these differences can affect decision-making outcomes. However, they left three gaps in their research that we build on: (1) their model has not been extended to group decision making, (2) their model has not been tested with CMC-based communication, and (3) they did not expressly measure trust and distrust.

We build on their model first by extending it to CMC-based groups engaged in routine and nonroutine decision-making tasks. We also bring in leading measures of trust / distrust to further validate that the underlying mechanisms of trust / distrust are indeed responsible for the outcomes of the Schul et al. model. We believe these extensions can naturally be made to groups: Together, members in a group create an environment of trust and distrust. Although each person in the group has his or her own levels of trust or distrust, studies show that trust increases with individuals in normal situations analogous to the way that trust within groups increases [3]. Along with this, the mental actions of a group are the culmination of the thinking of the group [4]. Thus, we believe the aligning of trust / distrust within a group with the nature of a group’s task (i.e., routine / nonroutine) will have a similar affect on group-decision making outcomes as with individual outcomes. These suppositions and background lead to our research questions:

RQ1. Do routine group decision-making tasks in computer-based group settings create more trust and less distrust than in nonroutine tasks?

RQ2. Can distrust be further introduced into a computer-based group decision task by scripting in an environmental abnormality?
RQ3. Will increased distrust in computer-based decision groups help improve the decision accuracy in familiar or unfamiliar tasks?

2. Background

The relationship between trust and distrust is still being debated. Recent IS literature holds that trust and distrust are separate constructs [5, 6]. Conversely, some psychology literature considers trust and distrust to be opposites on a continuum [1]. Consistent with IS literature, we treat trust and distrust as distinct.

Trust: Trust is one’s perception that the actions of a person or thing will be beneficial [1]. Trust is also defined as the willingness to depend upon another person or thing will be beneficial [1]. Trusting intentions is the willingness to depend on another person in a given situation. Trusting beliefs is “a generalized expectancy... that the word, promise, or statement of another individual can be relied on” [8, p. 1] because that person is competent and benevolent in a given situation [7].

One important factor that influences trust is dispostion to trust. “Disposition to trust is a general, ...not situation specific, inclination to display faith in humanity and to adopt a trusting stance toward others” [9, p. 728]. A person with a high disposition to trust would be more likely to trust than a person with a low disposition to trust. The level of trust in an interaction, therefore, does not begin at zero, but begins with a starting point that varies from person to person [10].

Distrust: Recent IS literature has established distrust as a construct separate from trust. Distrust is a “confident negative expectations regarding another's conduct” [11, p. 439]. This means that distrust is not merely a lack of confident positive expectations, but is an active emotional state. Research asserts that separate thought patterns and emotions underlie trust and distrust [2]. Trust is characterized by calm, assurance, and security [2], whereas distrust is generally motivated by suspicion, wariness, and doubt [6]. Distrust is often used synonymously with suspicion, indicating a perception that others may be concealing something or intending to deceive [12]. Distrust is generally characterized by powerful emotions such as fear, anger, and paranoia, and these emotions invoke a “human survival instinct” [2].

Distrust creates an increased awareness and need to question, manifested through reduced willingness to rely upon the responses of others and an increased need to check the work of others [13]. “In preparing to cope with a potentially invalid message, receivers increase the complexity of their processing ...” [14, p. 676] This increased complexity has both positive and negative effects on performance [1].

2. Theoretical model and hypotheses

We propose a theoretical model that explains and predicts how these two constructs influence group decision-making outcomes. We create this theoretical model by applying Schul et al.’s [1] model of distrust in individual decision making to a group decision making context. Among other things, we combine Schul et al.’s explanation of the effect of distrust on an individual’s success in tasks with an explanation of the similarities between how groups and individuals build trust [3]. We also support how groups will act similarly to individuals by explaining how self-monitoring groups can have better results when there is not complete trust [15].

2.1. Theoretical overview

Our study is a direct extension of the Schul et al. model of distrust in individual decision-making, depicted in Figure 1. Schul et al. explain normality as a common antecedent of trust and distrust, and propose that normality has a positive effect on trust and a negative effect on distrust [1]. Normality is the perception that the environment is both safe and usual and that there is no need to worry. It connotes familiarity, predictability, and the absence of unusual levels of risk. In an environment of normality, a person automatically accepts perceived messages about and from the environment as valid. In other words, when there is no perception of unfamiliarity or unusual risk, there is little reason to further investigate the unknown.

Conversely, when an environment has low levels of normality, a person doubts the validity of the perceived communication and consequently searches the environment for falsehoods. Thus, a person who perceives low levels of normality is aware of the potential for unknown elements to arise in the environment and is more likely to experience distrusting beliefs; these distrusting beliefs help compel a person to strive to discover what is unsafe, unusual, or unknown in the environment [5].

More important than how normality helps trigger trusting or distrusting beliefs are the effects of these beliefs. Schul et al. [1] propose that an increase in trusting beliefs increases routine mental actions, and an increase in distrusting beliefs increases nonroutine mental actions. A mental action is an automatic mental process in the brain [16]. Routine mental actions result in responses congruent with a perceived message, while nonroutine mental actions result in responses incongruent with a perceived message [14].

In the distrust model (see Figure 1), trusting beliefs precede routine mental actions because the very nature of normality (e.g., familiarity, predictability) evokes automatic mental responses [1]. Under trusting
circumstances, one does not doubt the intentions or motives of the trusted. This lack of scrutiny leads one to accept that the situation is as it appears. Accepting that a situation is as it appears encourages behavior and thinking congruent with the way the individual dealt with the environment previously. This thought process characterizes a routine mental action.

Because distrusting beliefs signal a lack of normality, they increase nonroutine mental actions that in turn (1) work to protect the individual from perceived vulnerability and (2) trigger a search for the unknown. When one perceives low levels of normality, situations that would be unscrutinized in a trusting environment will be examined more closely. When one is expecting deception, routine mental actions are discarded in order to defend against the expected deceit. Schul et al. [14] demonstrated, in an individual decision-making context, the difference between routine and nonroutine mental actions caused by increasing distrusting beliefs. Specifically, when Schul et al. seeded subjects with distrust and gave them a word to associate, such as “night,” subjects responded with an incongruent word, such as “light.” However, when subjects were treated with trust and given a word to associate, such as “night,” subjects would respond with a congruent word, such as “dark.” This is consistent with other psychological research demonstrating that people primed with a picture or word are faster at recognizing pictures or words that have the same valence (positive-positive or negative-negative) than pictures or words that have a different valence (positive-negative) [17].

Routine mental actions predict success in routine tasks because mental actions precede physical action. A routine task is one in which “the problem is already defined, causal linkages are evident, the nature of the decision needing to be made is known, [and] disagreements over preferences are less prominent” [18]. The best way to have success in a routine task is for the person doing the task to have routine strategies (methods of accomplishing the task) quickly come to mind [1]. If nonroutine strategies (new ideas or new methods) come to mind, success in routine tasks becomes more difficult, because considering new ways to accomplish that task will only slow one down [1].

The inverse is true for nonroutine tasks: the best way to have success in nonroutine tasks is to have nonroutine mental actions [1]. A nonroutine task “require[s] a wider spectrum of abilities like analytical skills, adaptability to new environments, management skills, the ability to communicate with coworkers (and other social skills)” [19]. For nonroutine tasks, routine mental actions limit success because, by definition, a nonroutine task requires nonroutine thinking.

Schul et al. [1] performed three experiments to test their theoretical model that predicts how distrust will influence individual decision making. The first and second were job-assessment experiments. Participants were either seeded with distrust or not. After this, participants were given a series of applicants to evaluate. The only information provided to participants was the level of two characteristics for each applicant, given one applicant at a time. Each participant then predicted the success level of the applicant. After this input, the participant was given the actual success level of the applicant. The actual success level was built on a positive-linear rule (more characteristic equals more success) or a negative-linear rule. The results of this experiment showed that those without distrust were quicker to find the positive-linear trend, while those with distrust were quicker to find the negative-linear trend. The distrusting individuals were more likely to adjust, and noticed the positive-linear rule sooner than the trusting individuals noticed the negative-linear rule.

In the third experiment, participants were shown a realistic drawing of either a trustworthy-looking face or an untrustworthy-looking face. Each participant was told to think about this face as they did matchstick arithmetic problems. A special font was used which made the numbers appear as if they were made of matchsticks. The numbers were Roman numerals forming an equation such as IX = X - III. Participants were to move only one matchstick to make the incorrect equation into a correct one. (In this case, the equation is made correct by changing the 3 to a 2 and the 10 to an 11, i.e. IX = XI - II.) There were eight problems in total. Four of these problems, such as the one above, were considered routine. In these four, only the numbers were changed. The other four problems were considered nonroutine and were solved by changing a number and an operator (e.g., Problem: XI = VI - IV; Solution: X = VI + IV). The success rates of
the trusting participants were higher than the distrustful participants on routine problems, while the opposite was true for nonroutine problems. This third experiment is the basis for our experiment.

2.2. Extending distrust model to groups

This study extends Schul et al.’s distrust theory by moving from an individual-level conceptualization to a group-level decision-making setting in an online CMC environment. We also propose the extension that routine problems increase trust and decrease distrust, while nonroutine problems have the opposite effect.

To extend Schul et al.’s model of trust and distrust from an individual to a group environment, we assess the difference between trust and distrust in a group versus individual setting.

Group trust is more than a group of individuals having their own individual levels of trust. Individuals in a group depend upon each other and upon the group as a whole [20]. This creates many more factors to group trust, such as cohesiveness, cooperation, coordination, and effective communication [20]. We include these extra antecedents as part of normality, as the individual causes of normality are outside the scope of our current research.

The definition of normality maintains validity in a group setting. Empirical studies show that trust increases with individuals in normal situations analogous to the way that trust within groups increases in normal situations [3]. For example, in a group environment where a physician and nurse interact, it is considered normal for the doctor to have more authority and a relatively more dominant position. When doctor and nurse behave consistently with this perception of normality, trust increases [3]. Thus, when all group members behave as expected, the level of intra-group trust increases, as each group member fulfills his or her respective role [3]. In this way, the normality of the group increases, which then increases the level of intra-group trust.

We must also assess whether increased levels of intra-group trust (distrust) lead to increased routine (nonroutine) mental action in groups as well as individuals. Several studies demonstrate this effect.

Geng et al. [13], investigating the effects of intra-group distrust, demonstrated the behavioral consequences of distrust in an online group setting and found that relatively newer members in a group are unable to get away with cheating as easily as older group members, since newer group members are not as trusted by the group as the relatively older ones. Introducing new members lessens normality, increasing distrust and triggering nonroutine mental actions; in this way, group members attempt to avoid the effects of the cheating and social loafing.

Langfred [15] studied the effect of trust in self-monitoring teams, and showed that when members of self-monitoring teams trust each other, there is less monitoring of team members. A low level of monitoring allows errors to slip by unnoticed and therefore team performance suffers. In our terms, as the team begins to trust, routine mental actions become more frequent than nonroutine mental actions; therefore, performance suffers in nonroutine tasks.

The mental actions of a group can be viewed as a aggregate of its members. Social-decision scheme theory [4] says that group interaction is a combinatorial process that can aggregate individual preferences. Research shows that groups and individuals can perform the same tasks, but to varying degrees of effectiveness [21]. Other studies support the assertion that group performance is a function of the ability of individual members [e.g., 22, 23].

Based on the established relationship between individual behavior and group behavior, we assert that if distrust can help an individual in nonroutine decision-making tasks, distrust will also help groups in nonroutine decision-making tasks. Thus, if individuals under a distrust treatment perform better on nonroutine tasks [1], it follows that groups are likely to exhibit similar behavior.

Our second extension of the theoretical model is that routine problems will increase trust and decrease distrust compared to nonroutine problems. This effect is primarily due to the effects of normality on trust and distrust. Normality increases trust and decreases distrust [1, 5]. A routine task is one in which the problem solver will feel comfortable because the problem is clearly defined and the decision to be made is known [18]. This comfort increases the sense of normality, and thus trust. The increase in normality also decreases distrust [1]. In the same way, nonroutine problems engender lower trust and higher distrust because normality will be negatively affected. When confronted with an unfamiliar question, problem-solvers are forced to seek unfamiliar solutions. This search decreases normality and increases distrust.

It is important to recognize the relative levels of trust and distrust may vary from individual to individual within a group. To account for this variance, McKnight et al. [24] measured the difference between an individual’s disposition to trust and distrust. This way, the difference between these two constructs more fully represents change in trust due to an outside stimulus (in our study, from a routine or nonroutine problem). McKnight et al. [6] applied this same principle to disposition to distrust and distrust. Disposition to trust is defined as the tendency of an individual to trust others; disposition to distrust is the tendency of an individual to distrust others [6].
2.3. Operationalized hypotheses

If the distrust theory holds in groups, groups that experience an abnormal environment will engage in more nonroutine mental actions than those in normal environments. In our study we influence the normality of the environment in two ways: (1) a group receiving either a routine (normal) task or a nonroutine (non-normal) task, (2) a group receiving an additional treatment indicating there may be group members trying to undermine the decision process (not a normal environment) or no such treatment (a normal environment). Thus, we created a 2x2 experiment involving a routine and nonroutine task (operationalized as a familiar and unfamiliar task) and the presence or absence of a distrust treatment. Accordingly, we predict the following:

- **H1a.** The trust experienced during a familiar, computer-mediated, decision-making group task should be higher than the trust experienced during a familiar task that includes an additional distrust treatment.
- **H1b.** The distrust experienced during a familiar, computer-mediated, decision-making group task should be lower than the distrust experienced during a familiar task that includes an additional distrust treatment.
- **H2a.** The trust experienced during an unfamiliar, computer-mediated, decision-making group task should be higher than the trust experienced during an unfamiliar task that includes an additional distrust treatment.
- **H2b.** The distrust experienced during an unfamiliar, computer-mediated decision-making group task should be lower than the distrust experienced during an unfamiliar task that includes an additional distrust treatment.
- **H3a.** The trust experienced during a familiar, computer-mediated, decision-making group task should be higher than the trust experienced during an unfamiliar task.
- **H3b.** The distrust experienced during a familiar, computer-mediated decision-making group task should be lower than the distrust during an unfamiliar task.
- **H4a.** The trust experienced during a familiar, computer-mediated decision-making group task should be higher than the trust experienced during an unfamiliar task that includes an additional distrust treatment.
- **H4b.** The distrust experienced during a familiar, computer-mediated decision-making group task should be lower than the distrust during an unfamiliar task that includes an additional distrust treatment.

If the theory holds for groups, then groups that are highly trusting and doing familiar (i.e., routine) tasks should experience more decision optimization than those doing the same tasks but are less trusting. This is because the former will perform routine task strategies that have proven to be optimal. Conversely, distrusting groups should experience more decision optimization because they will perform nonroutine task strategies that are more helpful to decision making in unfamiliar (i.e. nonroutine) tasks. We operationalize group distrust as the average of the measures of distrust for individual group members. We operationalize decision optimization as the degree of correctness of decisions in a group. We make our predictions for decision optimization on the individual level (all individuals recorded their final decisions) and on a group level for the final converged group decision.

- **H5a.** Individuals in groups experiencing a familiar computer-mediated decision-making group task should have higher decision accuracy than individuals in groups experiencing a familiar task that includes an additional distrust treatment.
- **H5b.** Groups experiencing a familiar computer-mediated decision-making group task should have higher converged decision accuracy than groups experiencing a familiar task that includes an additional distrust treatment.
- **H6a.** Individuals in groups experiencing an unfamiliar computer-mediated decision-making group task should have lower decision accuracy than individuals in groups experiencing an unfamiliar task that includes an additional distrust treatment.
- **H6b.** Groups experiencing an unfamiliar computer-mediated decision-making group task should have lower converged decision accuracy than groups experiencing an unfamiliar task that includes an additional distrust treatment.

3. Methodology

**Participants:** Participants were from a large private university in the western U.S. Participants were volunteers from an introductory, sophomore-level IS course required of all business students and open to all university students. Participants were awarded minor extra credit and an entry for prize drawings. All standard human-subjects protocols were followed and institutional-review board approval was given. Among all 212 participants, the mean of the total years of education was 14.39 with standard deviation of 1.27. Of these, 75.7% were male and 24.3% were female.

**Design:** Our study involved randomly assigned groups working on one of four conditions: (1) nonroutine Excel group-decision task with distrust intervention, (2) routine Excel group-decision task
with distrust intervention, (3) nonroutine Excel group-decision task with no distrust intervention, and (4) routine Excel group-decision task with no distrust intervention. Routine tasks were built by adapting questions participants encountered previously in both lectures and homework. The nonroutine tasks required adapting the same set of skills to more difficult problems not previously encountered in participants’ coursework. Thus, we describe the routine task as familiar, and the nonroutine task as unfamiliar.

In total, there were 70 groups. Most groups were comprised of three participants. In cases where the number of participants was not divisible by three, groups of four were created with the remainder. No statistical differences were found between these groups and three-person groups. Because groups were truly randomized to conditions after arriving at a laboratory session, the design was not fully balanced: 76 participants received condition 1; 62 received condition 2; 77 received condition 3; 65 received condition 4.

**Measures:** The study directly measures six constructs, which include disposition to trust, disposition to distrust, trusting beliefs, distrusting beliefs, routine decision optimization, and nonroutine decision optimization. The four trust/distrust-related constructs were measured using scales adapted from McKnight et al [6, 24, 25]. Routine decision optimization and nonroutine decision optimization are operationalized by a measure of decision accuracy.

**Procedures:** Interested students provided consent, completed a pre-survey, and signed up for an experiment time via an online form. The introductory survey queried demographics and measured participants’ disposition to trust and disposition to distrust. This served as a baseline in determining the effects of the experiment.

Participants selected a computer workstation and were directed to log in to the session website. Alternating computers were assigned the routine and nonroutine Excel problem. This format helped to prevent cheating and to restrict communication to only the assigned team through the online chat interface. Workstations were randomly organized into teams. No participant sat adjacent to a member of his or her team.

After being assigned to a group, each participant went through a short training on group chat in Google Talk: Labs Edition. A powerful point of control in our laboratory experiment was that all team communication occurred via Google Talk. Participants could not communicate with team members orally.

After every team had entered into a group chat, some groups received the distrust treatment. If the team was assigned to receive the distrust treatment, the instructions on the Web site were modified to include a paragraph warning participants that a member of their group may try to undermine the final group answer. Each team was given an Excel problem to solve. Participants were instructed to work with their team through the group chat client. They were encouraged to reach consensus before submitting a final answer within a 20-minute limit. However, team members were responsible for individually submitting their own answers and had the ability to submit a dissenting answer. After submission, each participant completed the post survey.

Individual answers were given a point value based on whether or not one attempted the problem and whether or not the answer given was correct. Individual answers were then compared within the group to determine whether there was consensus. All answers were scored independently by at least two graders. Scoring discrepancies were revisited in conference to ensure consistency.

To minimize the risk of validity threats, we chose a sample of similar students, introduced lag between the pre-test and the treatment session, used multiple control groups, and randomized both group and treatment assignments. At the time of the experiment, all participants had completed the same in-class training on Excel, so we could ensure all participants had similar baseline training and similar knowledge.

### 4. Data analysis

**Factorial validity:** All of the constructs in our model are reflective, and thus we followed the latest established procedures for establishing factorial validity for reflective indicators. To do so, we analyzed factorial validity using partial least squares (PLS), using PLS-GRAPH version 3.0. PLS is especially suited for early theory development as opposed to situations where prior theory is highly developed. In the latter, further testing and extension are the primary objectives; and other methods, such as maximum likelihood or generalized least squares, are often preferred. Though our hypotheses testing was done using MANOVA, we used PLS for factorial because of the underlying nomological relationships of the trust and distrust constructs.

To establish the factorial validity of our reflective indicators, we followed procedures in [26]. To establish convergent validity, we generated a bootstrap with 200 resamples. We then examined the t-values of the outer model loadings; all of the outer loadings were significant at the .05 level. These results indicate strong convergent validity in our model for the reflective constructs.

To establish discriminant validity of our reflective indicators, we used two established techniques: (1) correlating the latent variable scores against the indicators and (2) calculating the average variance extracted (AVE). Both analyses indicate very strong
discriminant validity. All of the constructs demonstrated high levels of discriminant validity for both approaches; thus, no items were dropped. Finally, to establish reliability, PLS computes a composite reliability score as part of its integrated model analysis (Table 1). Each reflective construct in our research model demonstrated high levels of reliability that more than meets the standard thresholds.

Common method bias: To diminish the likelihood of common methods bias in our data collection, the pre-experiment measures were collected approximately two weeks before the experiment was conducted. We also randomized items within the instrument so that participants would be less apt to detect underlying constructs, another potential source of common methods bias. However, all data was collected using a similar-looking online survey; thus, we still need to test for common methods bias to establish that it is not a likely factor in our data collection. To do so, we used two approaches.

The first approach was to conduct Harman’s single factor test. This test required that we run an exploratory unrotated factor analysis on all of the first-order constructs. The aim of the test is to see if a single factor emerges that explains the majority of the variance in the model. If so, then common-method bias likely exists on a significant level. The result of our variance in the model. If so, then common-method bias was supported at $F(1,118)=13.95, p<0.000$ with a medium effect (d=0.31). H2b indicates that groups with the unfamiliar condition should have lower distrust ($\mu=3.12, SD=0.80$) than the distrust found in the unfamiliar condition with an additional distrust treatment ($\mu=3.68, SD=1.29$). H2b was supported at $F(1,139)=8.25, p=0.005$ with a medium effect (d=0.49).

No covariates were significant except for disposition to trust, which partially predicted trust at $F(1,139)=3.72, p=0.056$ with a small effect (d=0.33).

H3a indicates that group with the familiar condition (without the additional distrust treatment) should have higher trust ($\mu=5.98, SD=0.72$) than the trust found in the unfamiliar condition (without the additional distrust treatment) ($\mu=4.81, SD=1.00$). H3a was supported at $F(1,126)=60.94, p<0.000$ with a very large effect (d=1.4).

H3b indicates that group with the familiar condition (without the additional distrust treatment) should have lower distrust ($\mu=2.39, SD=0.92$) than the distrust found in the unfamiliar condition (without the additional distrust treatment) ($\mu=3.12, SD=0.80$). H3b was supported at $F(1,126)=25.62, p<0.000$ with a large effect (d=0.91). No covariates were significant except for disposition to distrust, which partially predicted distrust at $F(1,126)=7.22, p=0.008$ with a medium effect (d=0.48).

H4a indicates that groups with the familiar condition and (without the additional distrust treatment) should have higher trust ($\mu=5.98, SD=0.72$) than the trust found in the unfamiliar condition with the additional distrust treatment ($\mu=4.42, SD=1.27$).

H4a was supported at $F(1,131)=70.92, p<0.000$ with a huge effect size (d=1.48). H4b indicates that group with the familiar condition (without the additional distrust treatment) should have lower distrust ($\mu=2.39, SD=0.92$) than the distrust found in the unfamiliar condition with the additional distrust treatment ($\mu=3.68, SD=1.29$). H4b was supported at $F(1,131)=40.60, p<0.000$ with a very large effect (d=1.12). No covariates were significant.

H5a indicates that individuals in groups with the familiar condition should have higher decision accuracy ($\mu=98\%$ correct, $SD=18\%$) than individuals in groups in the familiar condition with the additional distrust treatment ($\mu=97\%$ correct, $SD=12\%$). H5a was not supported at $F(1,125)=0.22, p=0.641$. No covariates were significant. H5b indicates that groups with the familiar condition should converge to higher decision accuracy for the final group answer ($\mu=99\%$ correct, $SD=6\%$) than groups in the familiar condition with the additional distrust treatment ($\mu=97\%$ correct, $SD=9\%$). H5b was not supported at $F(1,139)=0.555, p=0.461$. 

H6a indicates that individuals in groups with the unfamiliar condition should have lower decision accuracy (μ=8% correct, SD=27%) than individuals groups in the unfamiliar condition with the additional distrust treatment (μ=32% correct, SD=47%). H6a was supported at F(1,149)=14.75, p=0.000 with a medium effect (d=0.63). No covariates were significant. H6b indicates that groups with the unfamiliar condition should converge to a lower decision accuracy for the final group answer (μ=8% correct, SD=22%) than groups in the unfamiliar condition with the additional distrust treatment (μ=32% correct, SD=39%). H6b was supported at F(1,48)=6.73, p=0.013 with a large effect (d=0.76).

We also explored whether there were any time completion differences, because additional distrust may have slowed groups down. Time to completion for the familiar condition (μ=18.22 minutes, SD=6.15) vs. the familiar condition with the distrust treatment (μ=19.68 minutes, SD=6.33) was insignificant at F(1,127)=1.76, p=0.187. Time to completion for the unfamiliar condition (μ=43.35 minutes, SD=10.51) vs. the unfamiliar condition with the distrust treatment (μ=40.74 minutes, SD=9.77) was insignificant at F(1,153)=2.54, p=0.113.

5. Summary of Results

This study produced several important results, with medium-to-huge effect sizes. We present these results in terms of the research questions proposed in the introduction.

Q1: In answering this question, we found that computer-based groups working on familiar Excel decision-making tasks had more trust (H3a) and less distrust (H3b) than similar groups working on unfamiliar tasks. These results support the underlying theory that unfamiliar tasks invoke nonroutine mental actions that increase distrust and decrease trust; meanwhile, familiar tasks invoke routine mental actions that increase trust and decrease distrust.

Q2: To answer this question, we introduced a group-environment abnormality by providing a suggestion in the script for those receiving the distrust treatment that a person in their group might be trying to undermine the decision results. We found that a familiar Excel decision-making task in a CMC group setting produced more trust (H1a) and less distrust (H1b) than groups in the same setting that had the additional distrust treatment. Likewise, we found that groups with unfamiliar tasks had more trust (H2a) and less distrust (H2b) than the same groups with the additional distrust treatment. Moreover, groups with familiar tasks had more trust (H4a) and less distrust (H4b) than groups with unfamiliar tasks and the additional distrust treatment. These results provide strong evidence that environmental abnormalities can be used to invoke further levels of distrust (and lowered trust) than would normally be obtained by mere differences in the familiarity versus unfamiliarity of a task. Thus, distrust can be raised and trust lowered through two methods: (1) Using a less familiar task, (2) introducing an environmental abnormality. The most powerful combination is to use both approaches.

Q3: Our underlying theory predicts that the advantages of distrust only apply to nonroutine (unfamiliar) problems where nonroutine approaches to problem solving are advantageous. We tested this theoretical proposition and found there were no individual-level (H5a) or group-level (H5b) decision accuracy differences in comparing familiar tasks with familiar tasks that had the additional distrust treatment (and thus had higher distrust and lower trust). Thus, true to the theory, additional distrust did not help in this scenario; however, it did not hurt. Yet, true to the theory, we found that individual-level (H6a) and group-level (H6b) decision accuracy was higher in unfamiliar tasks that had an additional distrust treatment than in unfamiliar tasks without the treatment. Hence, we supported the underlying theory that heightened distrust heightens use of nonroutine mental actions useful to solving nonroutine problems.

6. Contributions

Our research provides several important contributions. First, we extend Schul et al.’s distrust model in two ways. We extend the distrust model from...
using the aforementioned measures. Making groups. These effects were tested and validated can easily increase trust in computer-based decision-making groups. In a similar manner, simple environmental abnormalities can easily increase distrust in computer-based decision-making groups. These effects were tested and validated using the aforementioned measures.

McKnight et al.’s new distrust measures effectively measured participant’s post-test distrust state. We re-validated McKnight et al.’s trust, disposition to trust, distrust, and disposition to distrust measures. Together, these tests help to validate the nomological network of distrust and trust measures.

Fourth, we demonstrate how simple environmental (or contextual) abnormalities can easily increase distrust in computer-based decision-making groups. In a similar manner, simple environmental abnormalities can easily increase trust in computer-based decision-making groups. These effects were tested and validated using the aforementioned measures.

An individual setting to a group setting. Our findings show that the effect of distrust extends effectively to groups. We also extended Schul et al.’s model by testing in the domain of CMC-based decision making.

Second, we tested and measured distrust and trust within the Schul et al.’s distrust model. In the original Schul et al. paper, the states of distrust or trust were simply assumed to be present based on an introduced stimulus. However, distrust was never measured, so it was never discovered whether or not distrust was actually induced, nor to what extent. Our measures provide conceptual and empirical validation of the underlying mechanisms proposed by Schul et al.

Third, our study tested and validated the trust and distrust measures in their nomological network.

Fifth, a significant contribution of this paper is evidence that simple environmental abnormalities such as seeding distrust about another group member can have a significant effect on group-decision accuracy.

### 7. Limitations and future research

There are some limitations to our study that present future research opportunities. First, using unfamiliar groups may have introduced a baseline of distrust in routine (familiar) tasks that interferes with trust. Further research could thus check if using a group with familiarity among its members will create a baseline of trust, rather than a baseline of distrust.

We may have also introduced a baseline of distrust by using computer-mediated communication (CMC). This baseline would be especially confounding if it interfered with the level of trust for those groups that worked on accomplishing a routine task. The use of unfamiliar technology may have inflated the level of distrust and negatively affected the level of trust.

Our study was also limited to groups that had no previous experience together. There remains a gap on the effect of a distrust stimulus on existing groups with experience among the members. Thus, it would be interesting to study whether or not the results of our experiment would be the same for groups where members know one another and have worked together for some time. This scenario may introduce a baseline of trust that may affect the results; further research would be needed to determine this effect.

## Table 2. Summary of hypothesis testing

<table>
<thead>
<tr>
<th>Hyp.</th>
<th>Supported?</th>
<th>Effect size</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a</td>
<td>Yes, $p&lt;0.000$</td>
<td>medium</td>
<td>Familiar tasks invoke more trust than familiar tasks with the additional distrust treatment.</td>
</tr>
<tr>
<td>H1b</td>
<td>Yes, $p=0.002$</td>
<td>medium</td>
<td>Familiar tasks invoke less distrust than familiar tasks with the additional distrust treatment.</td>
</tr>
<tr>
<td>H2a</td>
<td>Partial, $p=0.074$</td>
<td>small</td>
<td>Unfamiliar tasks invoke more trust than unfamiliar tasks with the additional distrust treatment.</td>
</tr>
<tr>
<td>H2b</td>
<td>Yes, $p=0.005$</td>
<td>medium</td>
<td>Unfamiliar tasks invoke less distrust than unfamiliar tasks with the additional distrust treatment.</td>
</tr>
<tr>
<td>H3a</td>
<td>Yes, $p&lt;0.000$</td>
<td>very large</td>
<td>Familiar tasks invoke more trust than unfamiliar tasks.</td>
</tr>
<tr>
<td>H3b</td>
<td>Yes, $p&lt;0.000$</td>
<td>large</td>
<td>Familiar tasks invoke less distrust than unfamiliar tasks.</td>
</tr>
<tr>
<td>H4a</td>
<td>Yes, $p&lt;0.000$</td>
<td>huge</td>
<td>Familiar tasks invoke more trust than unfamiliar tasks with the additional distrust treatment.</td>
</tr>
<tr>
<td>H4b</td>
<td>Yes, $p&lt;0.000$</td>
<td>very large</td>
<td>Familiar tasks invoke less distrust than unfamiliar tasks with the additional distrust treatment.</td>
</tr>
<tr>
<td>H5a</td>
<td>No, $p=0.641$</td>
<td>n/a</td>
<td>There was no difference in individual decision accuracy between familiar tasks and familiar tasks with the additional distrust treatment.</td>
</tr>
<tr>
<td>H5b</td>
<td>No, $p=0.461$</td>
<td>n/a</td>
<td>There was no difference in group decision accuracy between familiar tasks and familiar tasks with the additional distrust treatment.</td>
</tr>
<tr>
<td>H6a</td>
<td>Yes, $p&lt;0.000$</td>
<td>medium</td>
<td>Individual decision accuracy was higher in unfamiliar tasks that had an additional distrust treatment than in unfamiliar tasks.</td>
</tr>
<tr>
<td>H6b</td>
<td>Yes, $p=0.013$</td>
<td>large</td>
<td>Group decision accuracy was higher in unfamiliar tasks that had an additional distrust treatment than in unfamiliar tasks.</td>
</tr>
</tbody>
</table>
Group size was also relatively small (only three members). This may preclude conclusions concerning larger groups until future research can verify the effect on larger groups.

Since groups were limited to 20 minutes, the entire experiment was relatively short. The effect of distrust and trust on groups solving lengthier tasks should be further researched.

Lastly, the group convergence results show the very strong influence/conflation of the individual decisions on the group decisions (the convergence to the group decision on an individual level likely occurred very early on for some participants). Thus, it may be useful to look at other forms of individual influence on group decision making to see if different group processes result in optimal/suboptimal decisions.

8. References


