# Investigating the Role of Self-Awareness on Trust-Relevant Criteria in Distributed Ad Hoc Dyads

August Capiola
Air Force Research Laboratory
Wright-Patterson AFB, OH
august.capiola.1@us.af.mil

Krista N. Harris
General Dynamics Information Technology
Dayton, OH
krista.harris@gdit.com

Izz aldin Hamdan
General Dynamics Information Technology
Dayton, OH
izzy.hamdan@gdit.com

Gene M. Alarcon
Air Force Research Laboratory
Wright-Patterson AFB, OH
gene.alarcon.1@us.af.mil

Sarah A. Jessup
Consortium Research Fellows Program
Wright Patterson AFB, OH
sarah.jessup.ctr@us.af.mil

## Abstract

*Past research shows self-awareness is associated with aspects of trustworthiness. Recent qualitative data show this to be the case in computer-mediated, ad hoc contexts. Thus, experimental follow-up with manipulations of partner behavior and self-awareness was needed. A 2 (partner behavior: trustworthy, untrustworthy) x 2 (self-awareness: high, low) between-subjects, online experiment was conducted to investigate the role of self-awareness in the trust process. Self-awareness significantly affected perceptions of partner integrity and benevolence in ad hoc interactions before task engagement commenced. Although partner behavior affected task-relevant criteria, self-awareness did not moderate this main effect potentially due to the robust partner behavior effect. Self-awareness shapes initial ad hoc interactions, both cognition- and affect-based aspects of trustworthiness. Training and education regimens should investigate ways to promote self-awareness in computer-mediated, ad hoc teams to connote trustworthiness amongst partners.*

**Keywords:** Self-Awareness, Swift Trust, Ad Hoc Teams, Computer-mediated Interaction.

## 1. Introduction

Distributed work is increasingly common and necessary for organizational success. For example, classrooms and defense agencies have leveraged distributed work to adapt to global pandemics (Pham et al., 2020) and centralized intelligence vulnerabilities (AFWERX, 2019), respectively. Effective distributed work necessitates effective collaboration between parties. To ensure effective collaboration, parties can leverage appropriate trust to accomplish mission success without depleting resources (Mayer & Gavin, 2005). In contexts comprising fast-changing constraints and team (dis)assembly, identifying what leads to appropriate trust is crucial for forming and preserving relations. Thus, research on *swift* trust in ad hoc interactions is important (Bloomqvist & Cook, 2018), and researchers have identified antecedents to swift trust (e.g., Capiola et al., 2020).

The present work isolates one antecedent to swift trust – self-awareness. We discuss the trust and swift trust literatures and how self-awareness has been identified as an antecedent of swift trust (Capiola et al., 2020) and may moderate the trust process. We then present results of an experiment and its implications for distributed work from a human-centered perspective.

### 1.1. Trust and Swift Trust

Trust is the willingness to accept vulnerability (Mayer et al., 1995). In their model, Mayer and colleagues situate trust as the mediator of antecedents to and consequences of trust. Consequences concern trust actions (i.e., behavioral risk-taking), whereas antecedents describe the trustor's perceptions of the referent's trustworthiness, namely their ability (how competent are they?), benevolence (do they have my best interest in mind?), integrity (do acceptable principles guide their behavior?), as well as the trustor's propensity to trust others *in general*. Antecedents predict trust, which in turn predict consequences, and the result of those consequences update the trustor's perceptions of the trustee and inform subsequent interactions. For a schematic of this model, see Mayer et al. (1995, p. 715). Meta-analytic data show support for this model in organizational (Colquitt et al., 2007)

URI: https://hdl.handle.net/10125/107080
978-0-9981331-7-1

and team contexts (De Jong et al., 2016), and recent experimental data has demonstrated the manipulation effects of trustworthiness on the trust process (Alarcon et al., 2022). The current manuscript focuses on antecedents to trust, specifically how antecedents predict fast-formed trust in ad hoc contexts.

Swift trust describes trust formed quickly between parties with little to no information about one another (Meyerson et al., 1996). Parties assembled ad hoc work for a finite time. Thus, trust formed *swiftly* in these contexts was initially hypothesized to be different from trust formed in interpersonal and organizational contexts. Since Meyerson et al.'s publication, researchers have investigated swift trust formed in a variety of contexts. In general, social norms and general tendencies/traits are shown to predict trust-relevant criteria in ad hoc teams (Crisp & Jarvenpaa, 2013). Despite views that antecedents to trust might not be relevant in ad hoc interactions (Robert et al., 2009), recent qualitative work demonstrates ability, benevolence, and integrity are relevant for trust formation in distributed ad hoc military teams (Capiola et al., 2020), and quantitative data found these antecedents are relevant for trust at dyad formation (Capiola et al., 2023). Schoorman et al. (2007) explained that some antecedents to trust (ability, integrity) may be more predictive of trust early in relationships before information on a party's benevolence can be garnered, aligning with work on trust in virtual teams (Jarvenpaa et al., 1998) and evidencing support for cognition-based antecedents being associated with performance in simulated marketplaces (Kanawattanachai & Yoo, 2002). A review article explicates why swift trust is important in a variety of contexts and points to the need for research in contexts of interest (Blomqvist & Cook, 2018). We investigated this in our current work, specifically testing how self-awareness relates to trust-relevant criteria and examining its moderating role on the trust process in ad hoc computer-mediated collaborations.

## 1.2. Self-awareness and Swift Trust Formation

To identify antecedents to swift trust, Capiola et al. (2020) performed a cognitive task analysis (CTA) of former defense intelligence officers who had worked in high stakes distributed ad hoc teams. For a graphical display of antecedents to swift trust in ad hoc teams, including their conceptual overlap with traditional antecedents from Mayer et al.'s (1995) model, see Capiola et al. (2020, p. 232). In their CTA, Capiola et al. identified self-awareness as an antecedent to swift trust. Self-awareness comprised example characteristics such as being humble and admitting mistakes, and Capiola et al. called for more research on this factor.

Self-awareness has been discussed as one of the main components of empathy (Decety & Jackson, 2004). It requires an understanding of one's strengths and also one's weaknesses (Goleman et al., 2002). Scharmer (2016) created the management tool Theory U as a framework for understanding participant self-awareness. The theory has three movements: observing, self-reflecting, and acting. Crook et al. (2021) advanced Theory U to Theory O by suggesting that the addition of feedback loops would emphasize the process of developing self-awareness and the importance of trust throughout this process.

Crook et al.'s (2021) findings have implications for information technology (IT) contexts. Their semi-structured interviews were conducted on leaders in information communication technology settings. Moreover, the emerging hybrid work environment post Covid-19 pandemic provides further impetus for investigating what constructs afford trust in computer-mediated work. The importance of perceived self-awareness of IT managers has been identified in past work (Sosik & Jung, 2003), as impression management (i.e., behaviors people direct toward others to maintain a positive perception of themselves; Jones & Pittman, 1982) and self-awareness are uniquely emphasized by IT consultants (Clark & Salaman, 1998). Sosik and Jung (2003) investigated the relationship between manager self-ratings on a variety of characteristics and compared them to their subordinates' ratings of their character, leading to a self-other correspondence measure of self-awareness. Results showed that agreement between these two ratings was associated with different impression management strategies supervisors undertook. It should be noted that Sosik and Jung's operationalization of self-awareness overlaps with integrity, that is, a correspondence between trustor and trustee in terms of the trustor's perception of the trustee's principles and consistent values. Other researchers have discussed the implications of self-awareness for leaders and organizations (e.g., Caldwell, 2009) stating that self-awareness is important for establishing relationships and keeping trust, and other research has found that self-awareness positively influences affective trust in teams (Barczak et al., 2010).

Relevant to ad hoc teams, Capiola et al. (2020) found self-awareness overlapped with Mayer et al.'s (1995) conceptualization of integrity, noting that those who admit to not possessing all the answers connote honesty and sound judgment (Capiola et al., 2020, p. 235). These are characteristics of integrity (Mayer et al., 1995), and Capiola et al. (2020) note the conceptual connection between self-awareness and integrity constructs. In the present work, we move beyond qualitative data and expect self-awareness to be quantitatively related to integrity. We follow Capiola et al.'s qualitative analysis with quantitative analysis, hypothesizing a main effect of a self-awareness manipulation on constructs in the trust process.

***H1:*** Prior to a trust manipulation, self-awareness is positively related to integrity perceptions, trust, and trust actions.

## 1.3. Self-awareness Moderates the Trust Process

Confidence is associated with trust in business contexts (Kahneman et al., 2011). Past work on financial advisors shows that confident advisors are preferred over unconfident ones (Price & Stone, 2004; Tetlock & Gardner, 2015). However, overconfidence in contexts rife with inherent uncertainty can suggest that someone ought not to be trusted (Gaertig & Simmons, 2018). Across eleven experiments, Gaertig and Simons (2018) found when advisors expressed uncertainty, they were *not* viewed less favorably so long as that uncertainty was appropriate and informative (i.e., expressed in ranges, probabilities, or likelihoods). Thus, confidence appropriately couched in uncertain terms is not necessarily rejected.

Additional research has shown that admission of uncertainty, mistakes, or self-criticism led to higher trustworthiness perceptions (e.g., Steijaert et al., 2021). Furthermore, investigating eyewitness testimony has demonstrated people lose credibility when they are found incorrect after seeming confident in a decision *more so* than those who were less confident (Tenney et al., 2007), demonstrating the importance of calibrated confidence. These conclusions overlap with the qualitative findings of Capiola et al. (2020) in that self-awareness may connote integrity. Though the participants in Tenney et al.'s (2007) research were reading from experimental law cases, the ad hoc nature of the interchange shows the importance of self-awareness in relying on another's actions. Tenney et al. offered two possible mechanisms for why the results occurred: either people are poorly calibrated in their metacognition when they are confident yet err, or they might be inferred to have poor intent or be deceptive due to self-interest. While the former characterizes ability in the trust process, the latter characterizes benevolence. These antecedents predict trust as well as trust actions directly (Colquitt et al., 2007), and understanding how they are shaped illuminates the process by which trust facilitates action.

It may be that confidence coupled with follow-through equates to calibrated confidence. In the present research, if word-deed alignment is upheld in terms of brazen confidence followed by benevolent action (i.e., trustworthy behavior), people may sense this as a cue of integrity and benevolence and be more likely to trust and reciprocate. Moreover, ability perceptions may, too, be enhanced when confidence is coupled with follow-through (Gaertig & Simmons, 2018). However, it may be that for self-awareness to moderate the trust process, interactions must deviate from the status quo such as a mistake taking place (Hendriks et al., 2016) or a reform intention being expressed (Altenmüller et al., 2021). Thus, contexts in which trust is violated may offer a boundary condition in which self-awareness moderates the trust process, whereby conditions in which trust is upheld suppress this effect and no differences will be detected between levels of self-awareness. Thus, we posit the following research question:

***RQ1*:** Do people perceive those with low and high self-awareness differently in terms of their ability, benevolence, and integrity, trust them differently, and engage in different trust behaviors in conditions where trust is upheld?

We hypothesize that people who have high self-awareness are perceived to have lower ability when they violate trust, but those who have low self-awareness will have lower benevolence *and* integrity when they violate trust. Ultimately, we should also see the same interaction pattern on the trust and trust action criteria as we do on the benevolence and integrity criteria.

***H2:*** Self-awareness will moderate the effect of partner behavior, such that those who violate trust with high (low) self-awareness will be perceived to have less ability (benevolence) and more (less) integrity compared to those with low (high) self-awareness.

***H3:*** Self-awareness will moderate the effect of partner behavior, such that those who violate trust with low self-awareness will be trusted less and receive fewer trustworthy behaviors from their partners compared to those with high self-awareness.

## 1.4. The Present Research

We assembled ad hoc dyads comprising one participant and one confederate partner. Participants were told they were playing a novel game with their partner. The partner would evidence low or high self-awareness prior to beginning the task with the participant. Across two rounds of the task, their confederate partner would offer trustworthy or untrustworthy behavior. The experiment allowed us to quantify the effect of self-awareness in team formation and investigate its moderating effect on the trust process in a computer-mediated context.

## 2. Method

### 2.1. Participants

The experiment was administered online utilizing Amazon's Mechanical Turk (MTurk). MTurk is a crowdsourcing platform where workers (i.e., participants) can complete Human Intelligence Tasks (HITs) and receive compensation. We required participants to be in the United States, speak English, and aged 18 to 99. The HIT was only available from 8:00 am to 5:00 pm EST since participants were under the impression they were paired with a human partner. The partner was a confederate, which we describe below. To ensure efficient data collection, we leveraged CloudResearch (Litman et al., 2017) which integrates with MTurk in online data collection. This protocol was approved by the Air Force Research Laboratory Institutional Review Board (FWR20200187E, v1.02).

An *a priori* power analysis using G*Power 3.1 (Faul et al., 2009) showed we required 128 participants assuming a medium effect size ($f = .25$), power = .8, and alpha = .05, with numerator $df = 1$ and four groups. Data were collected and inspected for completeness and quality (see Data Cleaning section) until the desired $N$ was achieved. Participants were aged 21-71 ($M = 37.13$, $SD = 10.42$), and 39.8% identified as female. Participants were compensated $3.00 base pay plus a $2.20 bonus (the highest amount they could earn based on performance) since they were paired with a confederate partner with pre-recorded behaviors.

### 2.2. Task

MTurk workers completed an adaptation of the Puzzle Task (Capiola et al., 2023), a computer-mediated game where two players match tetromino pieces to earn money for themselves and their partner. Players are provided with a bank of puzzle pieces that can be matched into the group or individual puzzle by clicking and dragging pieces on top of the corresponding match (Figure 1).

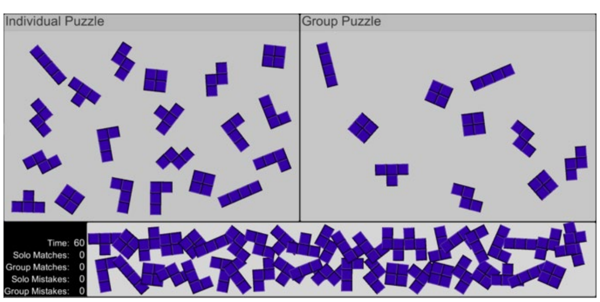


**Figure 1. Puzzle Task trial screen.**

Progress in the group puzzle benefits both players, while progress in the individual puzzle benefits the individual only. Both players complete the task simultaneously and have 60 seconds to match pieces. Participants receive $0.04 for correctly matched pieces in the individual puzzle, which consists of 20 pieces. For the group puzzle, participants split $0.06 ($0.03 per player) for each piece correctly matched. Each player has access to half of the group puzzle (10 pieces) so that both players can evenly contribute to the group puzzle (i.e., 20 pieces). When a player does not match a piece in the group puzzle, they penalize their partner $0.03 for each unmatched piece. At the end of each round, participants are provided with the results of the trial. The results page displays the participants' performance, their partner's performance, and any penalty received (Figure 2).

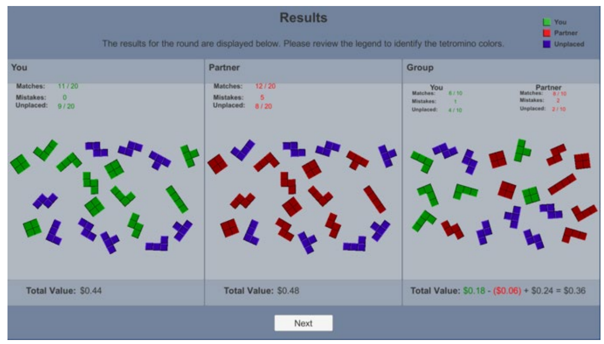


**Figure 2. Post-trial results.**

### 2.3. Independent Variables

**2.3.1. Partner Self-awareness.** Partner self-awareness was a between-subjects manipulation comprising two levels: low and high. In our study, self-awareness was manipulated (see Table 1) using a chat interface presented after the practice trial. In the chat, canned responses were presented to each participant after they sent the confederate a message of their own and a duration of 25 seconds had passed. The minimum 25-second delay to receive a confederate message was set to maintain the guise that the confederate partner took time to read and type. To generate these canned responses, we used the definition of self-awareness outlined by Capiola and colleagues (2020): "perceptions that the teammate approaches problems with intuition and innovation while maintaining awareness of their abilities and limitations," along with perusing qualitative data collected in a previous effort (Capiola et al., 2023).

**Table 1. Partner self-awareness manipulation.**

| Low Self-awareness Chat Message | High Self-awareness Chat Message |
|---|---|

| | |
|---|---|
| "Hey, I haven't played this game before. I'm guessing you haven't either. Either way, I'll be good at this. There's no way this is gonna be hard, we're gonna be fine. I got this whole thing figured out. I mean, who would make a mistake on this? I bet I could do both puzzles by myself, but we should work together." | "Hey, I haven't played this game before. I'm guessing you haven't either. Either way, I'll do my best. I don't know if you think this is gonna be hard but let's be ready. I'm sure you're figuring this out as we go like me. Hey, no one's perfect, but let's do our best. It looks like this game requires some teamwork, so we should work together." |

**2.3.2. Partner Behavior.** Partner behavior was a between-subjects manipulation with two levels: trustworthy and untrustworthy behavior. We randomly assigned participants to experience trustworthy or untrustworthy partner behavior in the first and second experiment round results page that displayed the partner's contribution to the group puzzle. In both conditions, the partner matched 8 out of 10 pieces in the group puzzle during the practice trial. In both experiment trials, the trustworthy partner matched 10 pieces into the group puzzle and the untrustworthy partner matched 3 pieces into the group puzzle.

## 2.4. Dependent Variables

All dependent variables were assessed with a 5-point agreement scale (1 = strongly disagree, 5 = strongly agree) except trust actions; see Table 2.

**Table 2. Dependent variables.**

| Criteria |
|---|
| **Self-Awareness Manipulation Check** |
| *My partner seems modest.* |
| *My partner is realistic about their capabilities.* |
| *My partner thinks they have all the answers.* |
| *My partner seems to have good instincts.* |
| **Trustworthiness** |
| **Ability:** *My partner is capable of performing well in this task.* |
| **Benevolence:** *My partner will go out of their way to help me in this task.* |
| **Integrity:** *My partner will be fair in this task.* |
| **Trust** |
| *I am willing to rely on my partner in this task, even though I cannot monitor their actions.* |
| **Trust Actions** |
| Assessed by the number of puzzle pieces contributed to the group puzzle; more matches indicate more behavioral trust. |

*Note.* Constructs are bold; specific items are italicized.

## 2.5. Procedure

Participants accepted the HIT from MTurk and clicked on a link that directed them to a website designed for the task. We used OnWebChat.com (an online chat service) to have participants request a code to begin the task. This was done so only one participant took part in the study at a time and to prevent bots from entering the website. Participants entered the code to access the first part of the study, which consisted of a demographic questionnaire, a Puzzle Task tutorial, and a 4-question knowledge check that ensured participants understood the task. Upon completion, participants were notified to request a second code to proceed to the actual experiment. Once the code was provided, participants began the Puzzle Task experiment and were informed that their (ostensible) partner had also been granted access to the task. Participants completed one practice round and two experimental rounds of the task and received feedback on their performance along with their partner's performance. Following each trial, trustworthiness and trust were assessed. Upon completion of the study, participants were debriefed and compensated.

## 2.6. Data Cleaning

Data were removed from the dataset if participants did not complete the study, completed the study more than once, failed to match any puzzle pieces (in either puzzle) in two or more trials, or missed three or more survey questions following each trial. Data from seven participants were removed based on these criteria. We collected data until the sample comprised 128 participants for adequate power.

# 3. Results

Independent samples *t*-tests were conducted in RStudio (RStudio Team, 2020) using the *lessR* package (Gerbing, et al., 2021) to assess the self-awareness manipulation check and test *H1*. Descriptive statistics can be found in Table 3, and the results of the *t*-tests can be found in Table 4. A 2 (partner behavior: trustworthy, untrustworthy) x 2 (self-awareness: high, low) between-subjects analysis of variance (ANOVA) was conducted in RStudio (RStudio Team, 2020) using the *afex* package (Singmann et al., 2015) to answer *RQ1* and test *H2* and *H3*. Descriptive statistics for the trustworthy and untrustworthy partner conditions can be found in Tables 5 and 6, respectively, and the results of the ANOVAs can be found in Table 7.

**Table 3. Descriptive statistics for criteria at low and high levels of self-awareness, pre-partner behavior manipulation.**

| | High Self-Awareness | | Low Self-Awareness | |
|---|---|---|---|---|
| Criterion | *M* | *SD* | *M* | *SD* |
| Ability | 4.00 | 0.69 | 3.98 | 0.61 |
| Benevolence | 3.94 | 0.69 | 3.60 | 0.75 |
| Integrity | 4.03 | 0.57 | 3.70 | 0.66 |
| Trust | 3.80 | 0.82 | 3.78 | 0.79 |
| Trust actions | 4.64 | 4.08 | 5.03 | 3.53 |

*Note*. High Self-Awareness *n* = 64; Low Self-Awareness *n* = 63.

**Table 4. Results of independent samples *t*-tests on criteria, pre-partner behavior manipulation.**

| Criterion | *df* | *t* | *p* | *d* |
|---|---|---|---|---|
| Ability | 1,125 | 0.14 | .891 | 0.02 |
| Benevolence | 1,125 | 2.62 | .010 | 0.46 |
| Integrity | 1,123 | 3.01 | .003 | 0.54 |
| Trust | 1,125 | 0.13 | .894 | 0.02 |
| Trust actions | 1,126 | -0.58 | .563 | 0.10 |

## 3.1. Manipulation Check

Participants in the high self-awareness condition rated their partner as more self-aware ($M$ = 4.06, $SD$ = 0.51) than those in the low self-awareness ($M$ = 2.95, $SD$ = 0.80) condition, $t(125) = 9.33$, $p < .001$. The self-awareness manipulation exhibited a strong effect ($d$ = 1.66), and the 4-item scale was reliable ($\alpha = .77$).

## 3.2. Main Effects of Self-awareness, Pre-Partner Behavior Manipulation

Following the self-awareness manipulation, but prior to the partner behavior manipulation, we assessed participant perceptions of their partner's integrity, trust, and trust actions. Participants in the high self-awareness condition had a significantly higher rating of their partner's integrity ($M$ = 4.03, $SD$ = 0.57) than those in the low self-awareness ($M$ = 3.70, $SD$ = 0.66) condition, $t(123) = 3.01$, $p < .01$, $d = 0.54$. Interestingly, participants in the high self-awareness condition had a significantly higher rating of their partner's benevolence ($M$ = 3.94, $SD$ = .69) than those in the low self-awareness ($M$ = 3.60, $SD$ = 0.75) condition, $t(125) = 2.61$, $p < .01$, $d = 0.46$; yet, this was not the case for those assigned to the high versus low self-awareness condition on the ability criterion. Participants in the high self-awareness condition did not significantly differ in trust toward their partner or trust actions than those in the low self-awareness condition. Together, we found partial support for *H1*.

**Table 5. Descriptive statistics for criteria across levels of self-awareness for trustworthy partners.**

| | High Self-Awareness | | | Low Self-Awareness | | |
|---|---|---|---|---|---|---|
| Criterion | *M* | *SD* | *n* | *M* | *SD* | *n* |
| Ability | 4.62 | 0.61 | 32 | 4.42 | 0.89 | 31 |
| Benevolence | 4.06 | 1.11 | 32 | 4.19 | 0.91 | 31 |
| Integrity | 4.31 | 1.03 | 32 | 4.26 | 0.86 | 31 |
| Trust | 4.10 | 1.08 | 31 | 4.19 | 0.87 | 31 |
| Trust actions | 5.34 | 3.75 | 32 | 5.19 | 3.21 | 32 |

**Table 6. Descriptive statistics for criteria across levels of self-awareness for untrustworthy partners.**

| | High Self-Awareness | | | Low Self-Awareness | | |
|---|---|---|---|---|---|---|
| Criterion | *M* | *SD* | *n* | *M* | *SD* | *n* |
| Ability | 3.94 | 1.01 | 32 | 3.59 | 1.07 | 32 |
| Benevolence | 2.72 | 1.20 | 32 | 2.47 | 1.16 | 32 |
| Integrity | 3.19 | 1.06 | 32 | 2.72 | 1.22 | 32 |
| Trust | 3.22 | 1.04 | 32 | 2.71 | 1.19 | 31 |
| Trust actions | 3.72 | 3.25 | 32 | 3.81 | 3.21 | 32 |

**Table 7. Results of two-way ANOVA on criteria.**

| **Criterion** / Predictor | *df* | *F* | *p* | $\eta_p^2$ |
|---|---|---|---|---|
| **Ability** | | | | |
| Partner Trustworthiness | 1,123 | 21.77 | <.001 | .15 |
| Self-Awareness | 1,123 | 2.87 | .093 | .02 |
| Partner Trustworthiness*Self-Awareness | 1,123 | 0.18 | .671 | .00 |
| **Benevolence** | | | | |
| Partner Trustworthiness | 1,123 | 61.62 | <.001 | .33 |
| Self-Awareness | 1,123 | 0.09 | .761 | .00 |
| Partner Trustworthiness*Self-Awareness | 1,123 | 0.95 | .332 | .01 |
| **Integrity** | | | | |
| Partner Trustworthiness | 1,123 | 50.89 | <.001 | .29 |
| Self-Awareness | 1,123 | 1.96 | .164 | .02 |
| Partner Trustworthiness*Self-Awareness | 1,123 | 1.23 | .269 | .01 |
| **Trust** | | | | |
| Partner Trustworthiness | 1,121 | 39.52 | <.001 | .25 |
| Self-Awareness | 1,121 | 1.20 | .275 | .01 |
| Partner Trustworthiness*Self-Awareness | 1,121 | 2.60 | .109 | .02 |
| **Trust actions** | | | | |
| Partner Trustworthiness | 1,124 | 6.38 | .013 | .05 |
| Self-Awareness | 1,124 | 0.00 | .958 | .00 |
| Partner Trustworthiness*Self-Awareness | 1,124 | 0.04 | .834 | .00 |

## 3.3. Interactions

**3.3.1. Ability.** A significant main effect of partner behavior on ability perceptions was detected, $F(1, 123)$

$= 21.77$, $p < .001$, $\eta_p^2 = .15$. Trustworthy partners were perceived to possess higher ability ($M$ = 4.52, $SD$ = 0.76) than untrustworthy partners ($M$ = 3.77, $SD$ = 1.05). We did not find a main effect of self-awareness on perceptions of ability. The interaction between partner behavior and self-awareness on perceptions of ability was not significant.

**3.3.2. Benevolence.** A significant main effect of partner behavior on perceptions of partner benevolence was detected, $F(1, 123) = 61.61$, $p < .001$, $\eta_p^2 = .33$. Trustworthy partners were perceived as more benevolent ($M$ = 4.13, $SD$ = 1.01) than untrustworthy partners ($M$ = 2.59, $SD$ = 1.18). We did not find a main effect of self-awareness on perceptions of benevolence. The interaction between partner behavior and self-awareness on perceptions of benevolence was not significant.

**3.3.3. Integrity.** A significant main effect of partner behavior on perceptions of partner integrity was detected, $F(1, 123) = 50.89$, $p < .001$, $\eta_p^2 = .29$. Trustworthy partners were perceived to possess higher integrity ($M$ = 4.29, $SD$ = 0.94) than untrustworthy partners ($M$ = 2.95, $SD$ = 1.16). We did not find a main effect of self-awareness on perceptions of integrity. The interaction between partner behavior and self-awareness on perceptions of integrity was not significant. Together, we did not find support for *H2*.

**3.3.4. Trust.** A significant main effect of partner behavior on participants' trust toward their partner was detected, $F(1, 121) = 39.52$, $p < .001$, $\eta_p^2 = .25$. Trustworthy partners were trusted more ($M$ = 4.15, $SD$ = 0.97) than untrustworthy partners ($M$ = 2.97, $SD$ = 1.14). We did not find a main effect of self-awareness on trust. The interaction between partner behavior and self-awareness on trust was not significant.

**3.3.5. Trust Actions.** A significant main effect of partner behavior on trust actions was detected, $F(1, 124) = 6.38$, $p < .05$, $\eta_p^2 = .05$. Participants assigned to the trustworthy partner condition made more group puzzle contributions ($M$ = 5.27, $SD$ = 3.46) than those assigned to the untrustworthy partner condition ($M$ = 3.77, $SD$ = 3.20). We did not find a significant main effect of self-awareness on trust actions. The interaction between partner behavior and self-awareness on trust actions was not significant. Together, we did not find support for *H3*.

Per *RQ1*, there was no statistical evidence that people perceive those with low and high self-awareness differently in terms of their ability, benevolence, and integrity, trust them differently, and engage in different trust behaviors in conditions where trust is upheld.

## 4. Discussion

This study explored an antecedent to swift trust, self-awareness, and its role in the trust process. In the Puzzle Task, participants played with a (un)trustworthy confederate partner who demonstrated high or low self-awareness. The results showed that those in the high self-awareness condition rated their partner as significantly more self-aware than those in the low self-awareness condition, suggesting self-awareness perceptions were effectively manipulated by the message. Examining initial trustworthiness perceptions showed that participants in the high self-awareness condition had a significantly higher rating of their partner's integrity compared to those in the low self-awareness condition. These results lend support to Capiola et al.'s (2020) postulate that self-awareness overlaps with Mayer et al.'s (1995) conceptualization of integrity, suggesting that those who admit to not having all the information are perceived as having sound principles.

An interesting finding was the significance of benevolence. Self-awareness is described as understanding not only one's strengths but also their weaknesses (Capiola et al., 2020), which was evoked in the self-awareness chat. However, the high self-awareness chat also stated, "…Either way, I'll do my best… It looks like this game requires some teamwork, so we should work together." Therefore, those in the high self-awareness condition gained an understanding of how their partner might act, as well as their suggestion to work together. This additional information may have impacted how participants perceived the benevolence of their partner. Results suggest that those who admit to not having all the information are perceived as more honest and having sound principles, overlapping with findings from Hendriks et al. (2016) and Altenmüller et al. (2021) on the dimensions of benevolence and integrity.

Dimensions of trustworthiness are often highly correlated (Colquitt et al, 2007), and participants may have had difficulty distinguishing between integrity and benevolence early in the interchange (Alarcon et al., 2022). Previous research suggests that integrity and benevolence are one variable (Gabarro, 1978) or that integrity should be split into two factors (behavioral integrity and values congruence) of which benevolence and value congruence are more aligned and predict affect-based trust (Tomlinson et al., 2020). These suggestions could explain the significance of benevolence along with integrity in the current experiment. We found no significant differences in high versus low self-awareness conditions on trust and trust actions criteria. This lack of support could be due in part to the fact that we measured trust with only one item.

Although we lacked evidence to support hypotheses on self-awareness moderating the effects of partner behavior, it is important to note that for ability, integrity, and trust, there are seemingly notable differences between high and low self-awareness for the untrustworthy partner. These findings could have lacked significance in part because they were masked by the trustworthy partner condition. As can be seen in Table 5, ability, integrity, and trust means were almost the same for the trustworthy partner, but in Table 6, the means were higher in the high self-awareness condition when paired with an *untrustworthy* partner. Even though we lacked significance, this could suggest a possible relationship between trustworthiness/trust and self-awareness, such that high self-awareness creates a buffer effect for trust and trustworthiness after a trust violation. As stated previously, similar research found that trustworthiness perceptions were higher for those who disclosed flaws compared to those not disclosing flaws (Hendriks et al., 2016) and admissions of uncertainty preserved credibility after being incorrect (Tenny et al., 2007). These results show that those who are perceived as more self-aware by admitting mistakes or uncertainty are seen more favorably, which could be reflected in our results. Though we have no statistical evidence that people perceive those with low and high self-awareness differently in terms of their ability, benevolence, and integrity, trust them differently, and engage in different trust behaviors in conditions where trust is upheld (*RQ1*), upon expressing uncertainty at the beginning of an interchange, violating trust could be seen as less impactful than if a person was confident in the task (e.g., Steijaert et al., 2021).

## 4.1. Implications

Appropriate levels of self-awareness are important for independent learning in IT contexts (Gravill et al., 2002), organizational contexts where leaders deal with organizational change (Crook et al., 2021), and multi-domain command and control defense contexts (Capiola et al., 2020). In the current work, the significance of integrity and benevolence regarding *initial* perceptions of self-awareness gives insight into how ad hoc teammates interact and understand each other, supporting recent quantitative data on anticipated trust in ad hoc dyad formation (Capiola et al., 2023). This could provide helpful information for those that are developing or joining an ad hoc team. For instance, if a person joining a team shows high levels of self-awareness, initial perceptions of integrity and benevolence should also be high. This information could also inform training and education regimens for those who will become members of ad hoc teams. Suggestions on etiquette to evoke self-awareness and thus aspects of trustworthiness may be a first, easy step toward trust in ad hoc team formation.

The present research has shown that self-awareness can be manipulated by a chat message. This provides helpful information to those that are going to be working in computer-mediated, distributed teams. Not only does this show that teammates gain an understanding of self-awareness through text alone, but that in fast-paced environments teammates can convey self-awareness in a quickly sent message. This knowledge could lead to swifter trust formation. Training and education regimens could use this information to create guidelines for quickly and succinctly sending messages to computer-mediated teammates to lead to high initial perceptions of swift trust antecedents such as self-awareness. Indeed, for robust distributed work to maintain efficiency, appropriate trust – and antecedents which facilitate its formation – will need to be leveraged.

## 4.2. Limitations and Future Research

We used the online chat option to manipulate self-awareness. Even though this manipulation was robust in terms of the manipulation check (and integrity and benevolence criteria pre-partner behavior manipulation), we did not find that self-awareness was a significant moderator. Future research would do well to see if the chat function continues to be robust in other studies or situations interested in self-awareness. Additionally, the chat option is certainly not the only way to manipulate self-awareness, and future research should explore other possibilities.

A post hoc power analysis showed that a $\eta_p^2$ of .02 or .01 required 387 and 779 participants to detect with 80% power, respectively. Moreover, although differences between high and low self-awareness conditions in the untrustworthy condition appeared to emerge, the post hoc Tukey correction is stringent to reduce Type I error. Thus, although the anticipated pattern of means emerged particularly for integrity and trust, future work may benefit from an increased sample size.

A recent paper on automation suggests that automation equipped with inner speech could improve its levels of self-awareness and in turn, increase interaction and trust in said automation (Geraci et al., 2021). The authors reasoned higher levels of [overt] self-awareness would be more transparent and understandable to humans, and self-dialog could enable self-reflection and involvement of others suggesting more predictable behavior. Regarding our work, future studies could include a chat option utilizing these suggestions, facilitating greater communication and collaboration between participants and confederates.

The current study examined the impact of self-awareness on swift trust within the online context of the Puzzle Task. Although it was ad hoc in nature, researchers should use caution when generalizing these results outside of this domain. Future research would do well to examine the relationship between self-awareness and swift trust in other computer-mediated domains.

### 4.3. Conclusions

Self-awareness expressed via chat affects initial perceptions of benevolence and integrity in ad hoc dyad formation. The effects of partner behavior on criteria of interest were not moderated by self-awareness. Connoting self-awareness is a fast etiquette to evoke trustworthiness in computer-mediated, dyad formation.

## 5. Acknowledgements

Approved for public release; distribution unlimited. AFRL-2023-1998; Cleared 25 April 2023. The views expressed are those of the authors and do not necessarily reflect the official policy or position of the Department of the Air Force, the Department of Defense, or the U.S. government. No potential conflict of interest was reported by the authors. This research was supported, in part, by the Air Force Research Laboratory (FA-8650-16-D-6616).

## 6. References

AFWERX. (2019). https://www.afwerxchallenge.com/mdo.

Alarcon, G. M., Capiola, A., Lee, M., & Jessup, S. A. (2022). The effects of trustworthiness manipulations on trustworthiness perceptions and risk-taking behaviors. *Decision*, *9*(4), 388–406. http://dx.doi.org/10.1037/dec0000189

Altenmüller, M.S., Lange, L.L., & Gollwitzer, M. (2021). When research is me-search: How researchers' motivation to pursue a topic affects laypeople's trust in science. *PLOS ONE 16*(7), Article e0253911. https://doi.org/10.1371/journal.pone.0253911

Barczak, G., Lassk, F., & Mulki, J. (2010). Antecedents of team creativity: An examination of team emotional intelligence, team trust and collaborative culture. *Creativity and Innovation Management*, *19*(4), 332–345. https://doi.org/10.1111/j.1467-8691.2010.00574.x

Blomqvist, K., & Cook, K. S. (2018). Swift trust: State-of-the-art and future research directions. In R. H. Searle, A. I. Nienaber, & S. B. Sitkin (Eds.), *The Routledge companion to trust* (pp. 29–49). Routledge.

Caldwell, C. (2009). Identity, self-awareness, and self-deception: Ethical implications for leaders and organizations. *Journal of Business Ethics*, *90*, 393–406. https://doi.org/10.1007/s10551-010-0424-2

Capiola, A., Alarcon, G. M., Hamdan, I., Jessup, S. A., Ryan, T. J., Johnson, D., & Panson, D. (2023). *What do I (and you) have to lose? Investigating effects of risk asymmetry on the trust process in distributed dyads.* [Manuscript submitted for publication]. Air Force Research Laboratory.

Capiola, A., Baxter, H. C., Pfahler, M. D., Calhoun, C. S., & Bobko, P. (2020). Swift trust in ad hoc teams: A cognitive task analysis of intelligence operators in multi-domain command and control contexts. *Journal of Cognitive Engineering and Decision Making*, *14*(3), 218–241. https://doi.org/10.1177/1555343420943460

Capiola, A., Fox, E. L., Stephenson, A., & Hamdan, I. (2023). "Is this even relevant?" Investigating the relevance of antecedents to trust in ad hoc dyads. *Proceedings of the 56th Hawaii International Conference on System Sciences,* pp. 5218–5227. https://hdl.handle.net/10125/103272

Clark, T., & Salaman, G. (1998). Creating the 'right' impression: Towards a dramaturgy of management consultancy. *Service Industries Journal*, *18*(1), 18–38. https://doi.org/10.1080/02642069800000002

Colquitt, J. A., Scott, B. A., & LePine, J. A. (2007). Trust, trustworthiness, and trust propensity: A metanalytic test of their unique relationships with risk taking and job performance. *Journal of Applied Psychology*, *92*(4), 909–927. https://doi.org/10.1037/0021-9010.92.4.909

Crisp, C. B., & Jarvenpaa, S. L. (2013). Swift trust in global virtual teams. *Journal of Personnel Psychology*, *12*(1), 45–56. https://doi.org/10.1027/1866-5888/a000075

Crook, N., Alakavuklar, O.N., & Bathurst, R. (2021). Leader, "know yourself": Bringing back self-awareness, trust and feedback with a theory O perspective. *Journal of Organizational Change Management*, *34*(2), 350–365. https://doi.org/10.1108/JOCM-05-2020-0131

De Jong, B. A., Dirks, K. T., & Gillespie, N. (2016). Trust and team performance: A meta-analysis of main effects, moderators, and covariates. *Journal of Applied Psychology*, *101*(8), 1134–1150. https://doi.org/10.1037/apl0000110

Decety, J., & Jackson, P. L. (2004). The functional architecture of human empathy. *Behavioral and Cognitive Neuroscience Reviews*, *3*(2), 71–100. https://doi.org/10.1177/1534582304267187

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

Gabarro, J. (1978). The development of trust, influence, and expectations. In A. G. Athos, & J. J. Gabarro (Eds.), *Interpersonal behavior: Communication and understanding in relationships* (pp. 290–303). Prentice Hall.

Gaertig, C., & Simmons, J. P. (2018). Do people inherently dislike uncertain advice? *Psychological Science*, *29*(4), 504–520. https://doi.org/10.1177/0956797617739369

Geraci, A., D'Amico, A., Pipitone, A., Seidita, V., & Chella, A. (2021). Automation inner speech as an anthropomorphic feature affecting human trust: Current issues and future directions. *Frontiers in Robotics and AI*, *8*, Article 620026. https://doi.org/10.3389/frobt.2021.620026

Gerbing, D. (2021). lessR: Less code, more results. R package version 4.1.4. https://cran.r-project.org/web/packages/lessR/index.html

Goleman, D., Boyatzis, R. E., & McKee, A. (2002). *The new leaders: Transforming the art of leadership into the science of results*. Little, Brown.

Gravill, J. I., Compeau, D. R., & Marcolin, B. L. (2002). Metacognition and IT: The influence of self-efficacy and self-awareness. *Proceedings of the Eight Americas Conference on Information Systems*, pp. 1055–1064. http://aisel.aisnet.org/amcis2002/147

Hendriks, F., Kienhues, D., & Bromme, R. (2016). Disclose your flaws! Admission positively affects the perceived trustworthiness of an expert science blogger. *Studies in Communication Science, 16*(2), 124–131. https://doi.org/10.1016/j.scoms.2016.10.003

Jarvenpaa, S. L., Knoll, K., & Leidner, D. E. (1998). Is anybody out there? Antecedents of trust in global virtual teams. *Journal of Management Information Systems*, *14*(4), 29–64. https://doi.org/10.1080/07421222.1998.11518185

Jones, E. E., & Pittman, T. S. (1982). Toward a theory of strategic self-presentation. In J. Suls (Ed.), *Psychological perspectives on the self* (pp. 231-262). Lawrence Erlbaum.

Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.

Kanawattanachai, P., & Yoo, Y. (2002). Dynamic nature of trust in virtual teams. *The Journal of Strategic Information Systems*, *11*(3-4), 187–213. https://doi.org/10.1016/S0963-8687(02)00019-7

Litman, L., Robinson, J., & Abberbock, T. (2017). TurkPrime.com: A versatile crowdsourcing data acquisition platform for the behavioral sciences. *Behavior Research Methods*, *49*, 433–442. https://doi.org/10.3758/s13428-016-0727-z

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integration model of organizational trust. *Academy of Management Review*, *20*, 709–734. https://doi.org/10.5465/amr.1995.9508080335

Mayer, R. C., & Gavin, M. B. (2005). Trust in management and performance: Who minds the shop while the employees watch the boss? *Academy of Management Journal*, *48*(5), 874–888. https://doi.org/10.5465/amj.2005.18803928

Meyerson, D., Weick, K. E., & Kramer, R. M. (1996). Swift trust and temporary groups. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organizations: Frontiers of theory and research* (pp. 166–195). Sage.

Pham, H. H., & Ho, T. T. H. (2020). Toward a 'new normal' with e-learning in Vietnamese higher education during the post COVID-19 pandemic. *Higher Education Research & Development*, *39*(7), 1327–1331. https://doi.org/10.1080/07294360.2020.1823945

Price, P. C., & Stone, E. R. (2004). Intuitive evaluation of likelihood judgment producers: Evidence for a confidence heuristic. *Journal of Behavioral Decision Making*, *17*, 39–57. https://doi.org/10.1002/bdm.460

Robert, L. P., Denis, A. R., & Hung, Y.-T. C. (2009). Individual swift trust and knowledge-based trust in face-to-face and virtual team members. *Journal of Management Information Systems*, *26*(2), 241–279. https://doi.org/10.2753/MIS0742-1222260210

RStudio Team (2020). *RStudio: Integrated development for R. RStudio, PBC, Boston, MA.* http://www.rstudio.com/

Scharmer, C. O. (2016). *Theory U* (2nd ed.). Berrett-Koehler Publishers.

Schoorman, F. D., Mayer, R. C., & Davis, J. H. (2007). An integrative model of organizational trust: Past, present, and future. *Academy of Management Review*, *32*(2), 344–354. https://doi.org/10.5465/AMR.2007.24348410

Singmann, H., Bolker, B., Westfall, J., Aust, F., & Ben-Shachar, M. S. (2015). afex: Analysis of factorial experiments. *R package version 0.13–145*.

Sosik, J. J., & Jung, D. I. (2003). Impression management strategies and performance in information technology consulting: The role of self-other rating agreement on charismatic leadership. *Management Communication Quarterly*, *17*(2), 233–268. https://doi.org/10.1177/0893318903256110

Steijaert, M. J., Schaap, G., & Riet, J. V. T. (2021). Two-sided science: Communicating scientific uncertainty increases trust in scientists and donation intention by decreasing attribution of communicator bias. *Communications*, *46*(2), 297–316. https://doi.org/10.1515/commun-2019-0123

Tenney, E. R., MacCoun, R. J., Spellman, B. A., & Hastie, R. (2007). Calibration trumps confidence as a basis for witness credibility. *Psychological Science*, *18*, 46–50. https://doi.org/10.1111/j.1467-9280.2007.01847.x

Tetlock, P. E., & Gardner, D. (2015). *Superforecasting: The art and science of prediction*. Crown.

Tomlinson, E. C., Schnackenberg, A. K., Dawley, D., & Ash, S. R. (2020). Revisiting the trustworthiness–trust relationship: Exploring the differential predictors of cognition- and affect-based trust. *Journal of Organizational Behavior*, *41*(6), 535–550. https://doi.org/10.1002/job.2448