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MSc IN ORGANISATIONAL BEHAVIOUR

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**Trust Formation in Virtual Teams: A Vignette  
Experiment on the Interplay Between Authentic  
Leadership and Media Richness**

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**Master Project**

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Submitted in September 2013

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## Introduction

Due to advances in technology and globalisation of activities, an increasing number of organisations have set up virtual teams, whose members are geographically dispersed and communicate through electronic means. In these teams, leaders now have to interact with their followers solely through computer-mediated communication (CMC). This is nevertheless a delicate task, especially for people-oriented leaders. Those, along with several researchers, may very well consider that in CMC, “social standards will be less important and communication will be more impersonal” (Kiesler, Siegel, & McGuire, 1984, p. 1126). They may even favour media such as audio-video conferences instead of e-mails, because they are thought to be more able to convey visual cues or other rich contextual information facilitating collaboration and reducing ambiguity and complexity. This ability has been coined media richness (Daft & Lengel, 1986) and received much attention from researchers. It also stirred up fear, as “when social context cues are weak, people's feelings of anonymity tend to produce relatively self-centred and unregulated behaviour” (Sproull & Kiesler, 1986, p. 1495). Is it then safe to trust virtual colleagues and leaders, knowing they could just hide their real selves behind a screen? Can they still make ethical decisions in this uninhibited virtual environment? These concerns are still valid, as the recent ethical meltdowns have shown that “all too often, we have seen people looking for direction and willing to offer their trust, which has been tragically misplaced” (Gardner, Avolio, Luthans, May, & Walumbwa, 2005, p. 344). Trust formation and ethical decision-making are of an increasing importance in these new virtual teams. No later than four years ago, Prof Bruce J. Avolio and his colleagues were raising even more questions: “What effect will leadership mediated through technology have on trust formation? Will the nature of the technology such as its richness or transparency be a factor in building trust in virtual teams?” (Avolio, Walumbwa, & Weber, 2009, p. 440). These questions remain.

The present research is an attempt at providing some answers by understanding the impact of authentic leadership on trust formation and ethical decision-making in virtual teams. To do so, special attention will be given to the mediating role of social identification. Findings from the literature on trust in authentic leadership, in computer-mediated communication and in virtual teams will be integrated in this research. Literature which will be discussed has looked into trust formation in authentic leadership, in CMC and in virtual teams separately. No study looking into the particular relationship between authentic leadership, trust and virtual teams has been found, despite research on transformational leadership (See Hambley, O’Neill, & Kline, 2007; Purvanova & Bono, 2009). Authentic leadership may nevertheless be an interesting style to apply to virtual teams because values such as integrity have already been considered important to build trust in virtual teams (Jarvenpaa, Knoll, & Leidner, 1998). In addition, previous research not only in authentic

leadership, but also in CMC and virtual teams, have suggested the mediating role of social identification in trust formation (Avolio, Gardner, Walumbwa, Luthans, & May, 2004; Chattopadhyay, George, & Shulman, 2008; Joshi, Lazarova, & Liao, 2009; Krebs, Hobman, & Bordia, 2006). Integrating all these findings and intuitions from different disciplines, the present research is an attempt at determining whether authentic leaders will be able to build trust and encourage ethical decisions even in virtual teams.

***Research question: To what extent do authentic leadership and media richness interplay to build trust and encourage ethical decisions in virtual teams?***

This research will look at this research question with several research objectives. It will first examine the interplay between authentic leadership in building trust both in the leader and in the team. It will then try to determine the factors allowing this interplay to happen, particularly by examining the role played by social identification. These objectives will raise several hypotheses which will be answered with an online vignette experiment manipulating both authentic leader and media richness to study their effects on trust, ethical decisions-making and other individual outcomes. The sample consists of undergraduate business students from Aston University and employees from Ubisoft, a global video-game company.

The project is organised as follows. First, relevant literature will be discussed and hypotheses will be drawn. Second, the methodology will be detailed, including a description of the task and variables as well as ethical considerations. Third, results will be presented, discussed and put into perspective. Finally, recommendations will be provided to practitioners willing to apply the findings of the present research.

## **Literature Review**

Due to the multi-disciplinary nature of the research topic, literature from various disciplines will be discussed. Organisational literature will first give an understanding of authentic leadership, trust and social identification. Research in communication will then provide an account of the specificities of virtual interactions and go deeper into the mechanisms of social identification. Finally, these findings from different disciplines will be integrated in two main hypotheses.

### ***Authentic leadership***

Authentic leaders are "individuals who are deeply aware of how they think and behave and are perceived by others as being aware of their own and others' values/moral perspective, knowledge, and strengths; aware of the context in which they operate; and who are confident, hopeful,

optimistic, resilient, and high on moral character" (Avolio, Luthans, & Walumbwa, 2004, p. 4). Authentic leadership is composed of four components which are self-awareness, internalized moral perspective, balanced processing, and relational transparency (Avolio et al., 2009). Self-awareness is the understanding of one's strengths, weaknesses and impact on others. Internalized moral perspective is a self-regulatory process relying on one's moral values to guide one's behaviours and decisions consistently. Balanced processing refers to one's ability to analyse data and gather other people's opinions before making a decision. Relational transparency is the ability to present one's true self to others instead of a distorted self (Walumbwa, Avolio, Gardner, Wernsing, & Peterson, 2008). Some of these dimensions also resonate with other leadership styles. The internalized moral perspective dimension has similarities with the moral component of ethical leadership (Gardner et al., 2005). However, the moral component of ethical leadership seems to rely on reward and accountability to support ethical behaviours whereas authentic leadership is about role modelling. Furthermore, the dimensions of self-awareness, relational transparency and balanced processing are not captured in ethical leadership (Walumbwa et al., 2008). Authentic leadership theory has also some similarities as well as differences with transformational leadership theory. Both authentic and transformational leaders are inspirational, intellectually stimulating and role models. However, authentic leaders have something more as they are deeply self-aware and endorse their leadership position in an authentic manner without impression management or manipulation (Walumbwa et al., 2008).

#### *Trust formation via authentic leadership and social identification*

With such high moral standards and honesty, authentic leaders are likely to create positive expectations among their followers, thus enhancing their trust (Avolio, Gardner, et al., 2004). Trust is often defined as "a willingness to be vulnerable to the actions of another party" (Mayer, Davis, & Schoorman, 1995, p. 712) or a "willingness to rely on another's actions in a situation involving the risk of opportunism" (1995, p. 378). It is also a belief that others will behave in helpful or not harmful ways (Gambetta, 1988). One key predictor of trust is the perception of trustworthiness, which can be divided in perceptions of ability (i.e. skills or competencies), benevolence (i.e. the concern for protection), and integrity (i.e. the adherence to an acceptable set of principles) (Mayer et al., 1995). Trust can be directed toward an individual such as a leader or even toward a collective entity such as a team. Authentic leaders foster trust in their team through several mechanisms. They are often perceived as having a strong sense of honesty and integrity, and these have been proven to make followers feel connected to them, thus enhancing their trust (Mayer et al., 1995). Another specificity of authentic leaders is that they demonstrate individualised concern which in turn helps building

trust (Jung & Avolio, 2000). Their transparency and self-awareness can enhance trust among followers as well (Gardner et al., 2005). The relationship between authentic leadership and trust proposed by Gardner and colleagues has also been investigated by empirical research. Clapp-Smith and colleagues (2008) demonstrated that followers perceiving their leader as authentic also trusted this leader more. On a group-level, Walumbwa and colleagues (2011) recently found that authentic leadership was enhancing group trust levels, thus affecting followers' performance and citizenship behaviours.

Furthermore, the impact of authentic leaders on followers is strengthened by leading by example and setting high moral standards. This establishes among followers a social identification with the collective and a personal identification with the leader (Avolio, Gardner, et al., 2004; Kark & Shamir, 2002). Social identification could be defined as "the extent to which an individual sees the self in terms of a particular group membership" (van Knippenberg, 2011, p. 1079). It facilitates leadership as it is a source of social influence which also transforms group interests into self-interests. Social identification to the collective is fostered by authentic leaders specifically because they create in their teams deep and high levels of moral values such as honesty and integrity (Avolio, Gardner, et al., 2004). Personal identification to an authentic leader is established by making salient to the followers the values they share with their leader or with leader prototypicality, which is the extent to which "a leader is perceived to be group prototypical – that is, to embody the group identity" (van Knippenberg, 2011, p. 1079-1080). Hogg (2001) further explains that "as people identify more strongly within a group, the basis for leadership perceptions, evaluations, and endorsement becomes increasingly influenced by prototypicality; prototypical members are more likely to emerge as leaders, and more prototypical leaders will be perceived to be more effective" (p. 191). Robins and Boldero (2003) also suggest an explanation based on Higgins' (1987) self-discrepancy theory. In their relational discrepancy theory, trust is enhanced if two individuals share parts of themselves and especially parts of their ideal selves. Avolio and colleagues (2004) applied this theory to authentic leadership by saying that authentic leaders, by being transparent and self-aware, make salient their values, strengths and weaknesses to their followers and encourage them to be transparent likewise. It is then easier for followers to notice the self-aspects they share with their authentic leaders, thus enhancing the quality of their relationship and their trust.

As "both trust in a focal leader and trust in general others (such as management) may be of importance in maintaining cooperation" (Den Hartog, 2003, p. 133), the trust in other co-workers or in the group as a collective identity should also be discussed. Leaders have been identified as influential third parties to build trust between co-workers (Lau & Liden, 2008), and they "set the

tone for relationships within the work group and influence the environment in which the work group is embedded" (2008, p. 1131). As discussed previously, authentic leaders influence the group by fostering social identification to the collective (Avolio, Gardner, et al., 2004). Building upon social identity theory, it has also been found that leaders have greater influence on the group depending on their group prototypicality (Hogg & Knippenberg, 2003; Hogg, 2001). The group members may perceive each other as fair and trustworthy if they identify with a fair and trustworthy leader (Seppälä, Lipponen, & Pirttilä-Backman, 2012). In addition to leader group prototypicality, shared group membership can also enhance trust among group members (Williams, 2001). Brewer (1981) explained that shared group membership reduces the risk of interpersonal trust and the need to know the trustee personally. "As a consequence of shifting from the personal level to the social group level of identity, the individual can adopt a sort of "depersonalized trust" based on category membership alone" (1981, p. 356). This kind of depersonalised trust has also been coined "identification-based trust" (Kramer & Wei, 1999; Lewicki & Bunker, 1996). Seppälä and colleagues (2012) further explained that shared group membership "reduces the psychological distance between group members and group interests are experienced as self-interests by individual members" (2012, p. 2). Social identification is thus enhancing trust in the group in addition to trust in the leader.

### *Trust formation in virtual environments and teams*

The literature previously discussed is about authentic leadership and trust among traditional teams with members geographically close to each other. To properly understand trust in virtual teams, literature can also be borrowed from computer-mediated communication (CMC) studies. A first widely used concept of the CMC literature is media richness (Daft & Lengel, 1986), which is the ability of a medium to convey visual cues or other rich contextual information facilitating collaboration and reducing ambiguity and complexity. Depending on this ability, media can be ranked on a continuum from poor to rich. Rich media are those representing many interpersonal cues also available in face-to-face interactions, and poor media are those suppressing many of these cues. In situations of low media richness (i.e. in interactions using poor media), the number of interpersonal cues is reduced and the fidelity of these cues is also lower. Regarding trust and cooperation, poor media such as text communications were found to have lower cooperation than richer media such as video or face-to-face (Bos, Olson, Olson, Wright, & Gergle, 2002; Jensen, Farnham, Drucker, & Kollock, 2000) due to this loss in interpersonal cues. However, text communications still show higher levels of collaboration than no communication at all (Sally, 1995). To qualify these outcomes of media richness, Walther (1992) suggested with his Social information



processing model that “given sufficient time and message exchanges for interpersonal impression formation and relational development to accrue, and all other things being equal, relational valences in later periods of CMC and face-to-face communication will be the same.” (p.69). In other terms, the effects of media richness will tend to mitigate over time and with the help of linguistic and typographic manipulations, making the distinction between face-to-face and virtual communication irrelevant at some point. He also suggested that situations of low media richness led to an over-reliance on the cues that were available, sometimes increasing trust levels. Walther further argued in his hyperpersonal communication model that there are even “several instances in which CMC has surpassed the level of affection and emotion of parallel face-to-face interaction” (Walther, 1996, p. 17). One of these instances is the shared social categorisation allowed by CMC. Participants who share a social category in a computer-mediated interaction like each other more and believe they are more similar because salient cues to group differences are lost or reduced. These findings are also in line with the Social Identity Explanation of De-individuation Effects framework (SIDE; Reicher, Spears, & Postmes, 1995). The SIDE framework states that visual anonymity and lack of individuating information can minimise intragroup differences and maximise intergroup differences, thus increasing social identity. This increased sense of belonging to the group then leads to perceive other group members as more similar and trustworthy. It also makes individuals match their behaviours to the group norm or the behaviours of a prototypical group member. In other words, the less visual cues are transmitted by the media, the less the individual differences are perceived and the more imagined group norms are followed.

Theories such as Media Richness (Daft & Lengel, 1986), Social information processing (Walther, 1992), and the SIDE framework (Reicher et al., 1995) aforementioned have also been used in recent research on virtual teams (Schiller & Mandviwalla, 2007). In line with the SIDE framework, the effects of gender diversity have been shown to be less strong in virtual teams (Chattopadhyay et al., 2008), and age dissimilarity was negatively related to trust in face-to-face groups but not in virtual groups (Krebs et al., 2006). Jarvenpaa and Leidner (1999) found using other models that virtual teams experienced fragile and temporal swift trust, and that trust was facilitated in virtual teams by social communication and enthusiasm. Studying other antecedents of trust in virtual teams, Jarvenpaa, Knoll and Leidner (1998) suggested that perceived integrity was a key characteristic of trust formation in early stages of virtual team development, which is an interesting basis to study authentic leadership.

The literature that has been discussed states that authentic leadership is facilitating trust in leader due to the positive values this style conveys and to the exemplarity of the leader to which team

members identify. Team members can also direct their trust toward the team as a collective entity, especially when their leader is prototypical or when they have a strong sense of social identity and group membership. The literature about CMC and virtual teams is suggesting that prototypicality and social identification are strengthened under conditions of low media richness because similarities are increased and differences are decreased. Trust could then be increased when salient group norms of honesty and integrity are being enhanced in situations of low media richness. Integrating all these findings, the following hypotheses can therefore be made:

***Hypothesis 1: Authentic leadership and trust in the leader will be more positively related under conditions of low media richness***

***Hypothesis 2: Authentic leadership and trust in the team will be more positively related under conditions of low media richness***

## **Methodology**

### **Methodological perspective**

The previous hypotheses were drawn using a deductive approach, which can be used because the current literature in leadership, computer-mediated communication and trust is sufficient to predict the occurrence of the phenomena that will be controlled and studied (Collis & Hussey, 2009). The hypotheses were tested using an online laboratory-based true-experimental research design. A true experiment research strategy consists in manipulating independent variables, randomly assigning participants to conditions, measuring effects on dependent variables and keeping all other variables constant (Stone-Romero, 2004). A laboratory research setting aims at designing a specific context including elements from natural settings for the purpose of manipulating independent variables and studying the effects (Stone-Romero, 2004). The experiment follows a two (Authentic Leadership vs. Non-Authentic Leadership) by two (High Media Richness vs. Low Media Richness) design.

The experimental research design has been considered appropriate for the present research due to the precise nature of the concepts involved. Distributing a questionnaire in organisations would have increased the ecological validity of this research, but it would have blurred the interplay between media richness and authentic leadership. Indeed, the media richness concept is not as clear in an organisational context, because "all technologies in virtual teams are used for direct communication between team members, and thus the richness continuum does not apply to these exchanges"

(Kirkman & Mathieu, 2005, p. 703). In addition, an experiment can expose participants to a leader possessing only the stereotypical characteristics of authentic leadership, thus controlling the effects of other alternative variables or antecedents.

This experiment was conducted online using the Qualtrics website. Conducting this experiment online allowed participants to take part in it whenever they wanted and in a comfortable way (Salgado & Moscoso, 2003) without being coerced by a lab setting or an experimenter (Reips, 2002). The traditional drawbacks of online experiments such as drop-out were also avoided because of the captive nature of the sample.

## **Participants**

The sample consisted of eighty-six participants. Eighty of them were undergraduate business students enrolled in a course about virtual teams at Aston University. Participation was entirely voluntary and students were aware that non-participation did not incur any adverse effects or consequences for their performance on the course. These students received an email invitation from the researcher, who was unknown to them so they would not feel pressured to participate. Each invitation contained a unique individual but anonymous URL link to the experiment. Reminders were sent out later to ensure maximum participation. The other six participants are employed in an organisation approached for the purpose of this project. These participants received a generic link to the experiment in an e-mail sent by a HR representative. This complementary sample was included to add more practical and organisational relevance to the present research. Participants were randomly and evenly allocated to conditions and table 1 presents the repartition in each condition. The sample was equally balanced in terms of gender, with 48% of respondents being male and 52% being female. The respondents were relatively young, the average age being 21.52 years ( $SD = 2.89$ ). They had work experience ranging from 0 to 19 years with 2.53 years on average ( $SD = 3.052$ ). Only 41% of participants spoke English as their first language. A two-way independent ANOVA was performed to determine whether demographic characteristics brought differences between conditions. No significant differences have been found based on these characteristics, and they did not affect the conclusions drawn either. Table 2 presents a summary of the demographic results.

## **Experimental task**

The task to execute was executed individually without interactions between participants and has been inspired from vignette experiments. Vignettes are “short descriptions of a person or a social situation which contain precise references to what are thought to be the most important factors in

the decision-making or judgment-making processes of respondents” (Alexander & Becker, 1974, p. 94). These stories are standardised across participants. They are followed by questions to assess their impact on decision making. Vignettes have been used in studies of trust in virtual settings (See Robert, Denis, & Hung, 2009) and have the advantage of disguising the focus of the experiment to avoid social desirability and provide personalised and standardised situations (Alexander & Becker, 1974). The vignette used in the present research was based on a contrastive vignette technique (CVT; Cavanaugh & Fritzsche, 1985) to examine the extent to which differences in the description provided to participants influence their responses. Participants had to read a vignette about a fictional organisation, a leader persona and a trust dilemma (See Appendix 2).

Participants were asked to imagine they have been part of a virtual team of mergers and acquisitions analysts in the corporate finance department of a rapidly growing fictional organisation. They were provided details on their role in the team and the work they have been accomplishing. This context was given to all participants regardless of the condition they were attributed to. A trust dilemma was then introduced, inspired by personal integrity vignettes from Fritzsche and Becker (1984). This dilemma was about whether or not to disclose a personal error to the leader or the colleagues. The personal error was designed so that both choices bore risks and opportunities for the organisation and participants’ career and reputation. On one hand, disclosing it would avoid losses for the organisation but require additional work and damage the employee’s reputation and career prospect. On the other hand, hiding the error would make the organisation lose money and create a slight risk of damaging the leader’s reputation.

### **Manipulation of independent variables**

In addition to the standardised description and dilemma provided to all participants, vignettes introduced different descriptions of the leader depending on the condition (Contrastive Vignette Technique; Cavanaugh & Fritzsche, 1985). Participants read a description of either an authentic or a non-authentic leader communicating either via text or video.

**Authentic Leadership** was manipulated by exposing the participants to a persona possessing characteristics of either an authentic leader or a non-authentic leader. Descriptions of authentic or non-authentic leader personas were inspired from Ross (2013). The authentic leader persona has been described as high on self-awareness, internalized moral perspective, balanced processing, and relational transparency (Avolio et al., 2009), and the non-authentic leader persona as low on the same dimensions. The authentic leader was described as seeking feedback, soliciting various viewpoints, displaying his emotions, being consistent with his moral beliefs, and having a clear vision of his strengths, weaknesses and values. The non-authentic leader was described as rarely seeking

feedback, relying on his own viewpoint, hiding his emotions, rarely being consistent with his moral beliefs, and not knowing his strengths, weaknesses and values (See Appendix 2).

**Media Richness** was manipulated by exposing the participants to either a text or audio-video congratulation message from the leader persona. The content of the message was strictly identical across conditions (See Appendix 2). For the audio-video condition, the congratulation message has been recorded prior to the experiment and the leader persona played by the experimenter who was unknown to participants (See Appendix 2). The video has been integrated in the web questionnaire by being hosted privately on YouTube, which was a service supposed to be already known to participants. A play button had to be clicked manually in order to watch the video.

## Measures

### Manipulation checks

To assess the success of the authentic leadership manipulation, the post-experiment questionnaire asked participants to rate the leader persona on the Authentic Leadership Questionnaire (ALQ; Walumbwa et al., 2008) composed of 16 items using a 5-point frequency scale (See Appendix 3). Permission has been granted by the copyright owner to use the full questionnaire for the present research (See Appendix 4). The 41 participants in the high authentic leadership conditions ( $M = 3.86$ ,  $SD = .61$ ) and the 45 participants in the low authentic leadership conditions ( $M = 2.38$ ,  $SD = .90$ ) demonstrated as expected a significant difference in ALQ scores ( $t[78] = -9.06$ ,  $p < .001$ ). These results suggest that the manipulation was successful.

Participants would have been properly exposed to the media richness condition if they had carefully read or watched the congratulation message. Due to technical constraints, the video had to be launched manually using a play button. Thus, a major concern was that some participants may not watch the video, considering it as of secondary importance or being blocked by a lack of technical understanding. A recall manipulation check has then been used to verify that participants did watch the video. The question asked about a detail mentioned at the end of the message. A successful manipulation of media richness would be that both conditions show similar success levels on this recall, thus showing that the audio-video condition has not been disrupted by technical issues. The 44 participants in the high media richness conditions ( $M = 1.73$ ,  $SD = .43$ ) and the 42 participants in the low media richness conditions ( $M = 1.76$ ,  $SD = .45$ ) demonstrated as expected no significant difference in recall ( $t[84] = .364$ ,  $p = .717$ ). These results suggest that the manipulation was successful because participants have been exposed to either the video or the text with the same intensity.

## Dependent variables

Unless otherwise mentioned, all the dependent variables were measured on 5-point Likert scales from “Disagree strongly” to “Agree strongly”.

**Trust in the leader and trust in other team members** are the main dependent variables. They were assessed using a 5-item intrateam trust scale adapted from De Jong and Elfring (2010) (See Appendix 3) with high reliability found both in the literature ( $\alpha = .91$ ) and in the present sample ( $\alpha = .88$ ;  $\alpha = .82$ ). The scale included items such as “I am able to count on my team members for help if I have difficulties with my job” or “I can rely on my team members to keep their word” as well as a direct measure of trust. The post-experiment questionnaire included two versions of this scale, one set of items assessing trust in the leader and a second one assessing trust in other team members. Trust was also assessed in an alternative way and to some extent with eight additional items designed specifically around the vignette.

**Leader prototypicality** was assessed with 6 items adapted from Platow and van Knippenberg (2001) with high reliability found in the literature ( $\alpha = .91$ ), plus one direct measure (See Appendix 3). This scale used items such as “[my leader] stands for what people in the team have in common” or “[my leader] is not representative of the kind of people in the team” (reverse scored), and the direct measure asked “[my leader] is very similar to me”. The 7-item scale used was found to be reliable ( $\alpha = .88$ ).

**Social identification** to the team was assessed using 8 items from Hogg, Hains and Mason (1998) found reliable both in the literature ( $\alpha = .89$ ) and in the present sample ( $\alpha = .93$ ) (See Appendix 3). Participants rated their agreement with items such as “I felt similar to the team as a whole in terms of general attitudes and opinions” or “I felt I would fit into the team well”.

**Additional items related to the vignette** were designed and added to the post-experiment questionnaire to assess self-sacrifice, divulgence of a personal error and sense of protection (See Appendix 3). Self-sacrifice was assessed by asking the importance of one’s career over one’s organisation, team or leader reputation. Willingness to disclose a personal error used items such as how likely the participants were to inform their leader or their team about their mistake and ask for their help. To assess the extent to which participants felt protected by their leader, a scale was specifically designed for this research and used four items such as “my leader will protect me if I inform him about the error” (See Appendix 3). This scale has been found reliable in the present sample ( $\alpha = .86$ ). The sense of protection by the team members was assessed using the same scale but replacing “my leader” by “my team members”. This scale had a similar reliability than the leader version ( $\alpha = .85$ ). In addition to these measures, two items were included to assess the experienced

quality of the virtual contact with the leader (See Appendix 3). Finally, participants were asked to answer common questions about their gender, age, first language and work experience.

## **Ethical considerations**

Informed consent was collected online prior the experiment and participation was based on the provision of informed consent from those wishing to volunteer (See Appendix 1). It was implied that all participants were competent enough to understand the information and the voluntary nature of their participation. No metadata about computers or internet providers' characteristics were collected as they were unnecessary for the analysis. Data was protected throughout the research as the database was secured by a password and only accessed by the experimenters for the analysis.

## **Results**

### **Hypothesis testing**

#### **Hypothesis 1**

Hypothesis one predicts that authentic leadership and trust in the leader will be more positively related under conditions of low media richness.

In order to examine this hypothesis, several two-way independent analyses of variance (ANOVAs) were used to test the effects of the interaction between authentic leadership and media richness on trust in leader. Table 3 presents the results of these tests. None of these results reached enough statistical significance to support hypothesis one ( $p > .10$ ). However, results indicated a non-significant trending in the predicted direction. Scores of trust in the authentic leader were higher with low media richness ( $M = 3.77, SD = .57$ ) than with high media richness ( $M = 3.60, SD = .41$ ).

#### **Hypothesis 2**

Hypothesis two predicts that authentic leadership and trust in the team will be more positively related under conditions of low media richness.

Several two-way independent ANOVAs were then used to test the effects of the interaction between authentic leadership and media richness on trust in the team. The results are presented in table 4. The tests yielded a non-significant interaction effect between authentic leadership and media richness on trust in the team,  $F(1, 82) = 0.15, p > .10$ , thus not supporting hypothesis two. Despite non-significance, scores of trust in team followed the predicted direction, the effects of authentic

leadership being strengthened by low media richness ( $M = 3.61$ ,  $SD = .58$ ) compared to high media richness ( $M = 3.46$ ,  $SD = .59$ ).

However, there was a significant interaction effect between authentic leadership and media richness on the sense of protection by the team,  $F(1, 82) = 4.14$ ,  $p < .05$ . This indicates that participants felt differently protected by their team depending on their leader's style and the medium used to convey his message. Specifically, participants being exposed to a non-authentic leader felt more protected by the team when media richness was low ( $M = 3.57$ ,  $SD = .67$ ) than when it was high ( $M = 3.21$ ,  $SD = .65$ ); whereas participants following an authentic leader felt more protected by the team when media richness was high ( $M = 3.35$ ,  $SD = .70$ ) than when it was low ( $M = 3.08$ ,  $SD = .85$ ) (See Figure 1). Similar interaction effects and directions were found for the items "my team members will protect me if I inform them about the error" and "I trust my team members to have my interests at heart when deciding how to handle this situation" (See table 4).

In addition, the two-way independent ANOVAs yielded marginally significant interaction effects between authentic leadership and media richness on whether or not informing the team members about the mistake,  $F(1, 82) = 3.61$ ,  $p = .06$ , and not hiding this information,  $F(1, 82) = 3.39$ ,  $p = .07$ . This indicates that participants made different ethical and potentially self-damaging decisions depending on their leader's style and the medium used to convey his message. Specifically, participants following a non-authentic leader were more likely to inform their team members about their mistake when media richness was low ( $M = 4.09$ ,  $SD = .68$ ) than when it was high ( $M = 3.57$ ,  $SD = .84$ ); whereas participants being exposed to an authentic leader were more likely to make the same decision when media richness was high ( $M = 3.76$ ,  $SD = .77$ ) than when it was low ( $M = 3.55$ ,  $SD = 1.23$ ) (See Figure 2). A similar direction has been found for the negatively-coded item "hide this information from your team members" (See table 4).

Despite hypothesis two not being supported, interesting and unexpected significant results have been found. These results suggest that participants felt more secure in their team following an authentic leader using high media richness, or a non-authentic leader using low media richness.

## Post hoc analyses

As the interplay between authentic leadership and media richness could not be fully understood, post hoc analyses were performed in order to gain additional insight in these two concepts separately.



### Understand the effects of authentic leadership

Isolating the effects of authentic leadership, the present research found several interesting results explaining how authentic leaders can create trust and foster ethical decisions.

The literature previously discussed suggests that leader prototypicality mediates the relationship between authentic leadership and trust. Participants' score on the Authentic Leadership Scale were used as the continuous independent variable, their scores on leader prototypicality as a mediator, and those on trust in leader as the dependent variable. This hypothesis has been proven using linear regressions, following the Baron and Kenny's (1986) procedure to test mediational hypothesis. The first step is to establish the relationship between the independent and the dependent variables. The second step is to show the relationship between the independent variable and the mediator. The third step is to establish the effect of the mediator on the dependent variable when the effect of the independent variable is controlled for. The fourth and final step is to establish the complete mediation across the variables. These are done statistically with three regression analyses.

The first regression analysis is between the dependent variable and the independent variable and has to be significant. Authentic leadership was significantly and positively associated to trust in leader (Beta .743,  $p < .001$ ) and accounts for 55.2% of its variance. This shows a main effect between authentic leadership and trust in leader. The second regression analysis is between the independent variable and the mediator and has to be significant as well. Authentic leadership was also significantly and positively associated with leader prototypicality (Beta .737,  $p < .001$ ), accounting for 54.4% of the difference in variance and thus establishing a main effect between authentic leadership and leader prototypicality. The final regression analysis is between the independent and the dependent variables, controlling for the mediator. It has to lead to a change in  $R^2$  of almost zero and a significant relationship between the mediator and the dependent variable. Leader prototypicality accounted for a 58.8% of the variance in trust in leader and is also strongly associated with it (Beta .480,  $p < .001$ ). Authentic leadership accounted for an additional 6.9% of the variance in trust in leader over and above leader prototypicality, which was not significant as expected. Its Beta value had also decreased from .743,  $p < .001$  to .388,  $p < .001$ . The effects of authentic leadership on trust in leader are thus mediated by leader prototypicality. As the Baron and Kenny's (1986) procedure does not test the significance of this mediational hypothesis, the Sobel's (1982) test was used to determine its significance. There is a significant, indirect effect of authentic leadership on trust in the leader via leader prototypicality, as the  $p$ -value for the Sobel test is below .001. Table 5 summarises the results of these linear regressions.

To further understand the effects of authentic leadership, a one-way ANOVA has been conducted on the dependent variables. The results indicate that authentic leadership significantly affected the extent to which participants asked their leader for help ( $F[1, 84] = 5.96, p < .05$ ), trusted their leader to help them ( $F[1, 84] = 5.71, p < .05$ ), thought it was more important to protect their leader's reputation than their own ( $F[1, 84] = 4.18, p < .05$ ) and how much they rated the quality of contact with the leader ( $F[1, 84] = 10.93, p < .001$ ). Authentic leadership also significantly affected the participants' scores on trust in leader ( $F[1, 84] = 25.49, p < .001$ ) and leader prototypicality ( $F[1, 84] = 30.65, p < .001$ ). Participants felt they belonged more to the team ( $F[1, 84] = 6.41, p < .05$ ). In each of these significant differences, mean scores are greater for authentic leaders than for non-authentic leaders (See table 6).

These results show the relationship between authentic leadership and trust in leader are mediated by leader prototypicality. They also suggest that team members following an authentic leader tend to take more ethical decisions or protect their leader even if it could damage their own reputation.

### **Understand the effects of media richness**

Isolating the effects of media richness, the present research found interesting results regarding social identification in situations of low media richness.

The effects of media richness have been studied using a one-way ANOVA. The results indicate that media richness significantly affected the extent to which participants felt their leader was representative of the kind of people in their team ( $F[1, 84] = 7.61, p < .05$ ) and rated the quality of contact with their leader ( $F[1, 84] = 5.23, p < .05$ ). It also significantly affected their scores of social identification with the team ( $F[1, 84] = 4.23, p < .05$ ), especially the extent to which they were glad to be members of the team ( $F[1, 84] = 7.01, p < .05$ ), felt committed to the team ( $F[1, 84] = 6.08, p < .05$ ) and trusted their team members ( $F[1, 84] = 4.43, p < .05$ ). In each of these significant differences, mean scores are greater with low media richness than with high media richness (see table 7).

These results suggest that people who do not see their leader or team members identify themselves stronger with their team and find their leader more representative of how they imagine the other team members.

### **Additional results**

Finally, several correlations have also been found significant and seemed to add some more relevance to the present research (See Table 8). On one hand, trust in the leader was strongly correlated to informing him about the mistake ( $r[84] = .32, p < .01$ ), asking him for help ( $r[84] = .43, p$

< .001), feeling protected by him ( $r[84] = .62, p < .001$ ), and thinking that protecting his reputation is more important than protecting one's own ( $r[84] = .47, p < .001$ ). These items were also correlated to leader prototypicality (See Table 8). On the other hand, trust in the team was strongly correlated to informing team members about the mistake ( $r[84] = .36, p < .001$ ), asking them for help ( $r[84] = .34, p < .001$ ), feeling protected by them ( $r[84] = .58, p < .001$ ), and thinking that protecting the team's good name was more important than protecting one's own ( $r[84] = .23, p < .05$ ). In addition, social identification with team was correlated to the sense of protection by both the leader ( $r[84] = .25, p < .05$ ) and the team ( $r[84] = .41, p < .001$ ).

These additional correlations on trust are consistent with the main results as well as with the literature. Trusting one's leader and team is related to feeling protected by them and to making an ethical decision with their help.

## **Discussion**

### **Overview of findings**

The two main hypotheses related to the impact of authentic leadership and media richness on both trust in the leader and trust in the team have not been successfully supported. However, interesting and surprising results have been found in supplementary analyses. They suggest that participants felt more secure in their team and were more likely to inform their colleagues about a potentially self-damaging ethical issue while following either an authentic leader relying on high media richness, or a non-authentic leader using low media richness. Concerning findings related to authentic leadership, supplementary analyses also revealed that leader prototypicality mediated the relationship between authentic leadership and trust in the leader. In addition, authentic leadership increased the likeliness to take ethical decisions in this scenario, despite the risks toward the individual's reputation and career. Authentic leaders were also considered more prototypical and were more trusted than non-authentic leaders. Concerning media richness, results revealed that the leader was considered more representative of the team in situations of low media richness, and that low media richness generated higher levels of social identification with the team than high media richness. On a side note, correlations found that trusting one's leader and team was related to feeling protected by them and to making an ethical decision with their help.

### **Discussion**

Hypothesis one predicted that authentic leadership and trust in the leader will be more positively related under conditions of low media richness. Despite strong support from literature, this

hypothesis has not been demonstrated. This failed attempt is delicate to discuss because this experiment was subject to several limitations. These limitations will be covered in depth later, but it seems that the media richness manipulation was not efficient enough to create a strong interplay with authentic leadership. Indeed, authentic leadership did make an impact on trust in leader. But regarding media richness, participants have been exposed only a few minutes to the leader and in a non-interactive way, which may have been insufficient.

Hypothesis two predicted that authentic leadership and trust in the team will be more positively related under conditions of low media richness. This hypothesis have not been demonstrated either. In addition to the limitations explained before, the absence of significant results may be due to the fact that media richness has been manipulated only for the leader. Other team members remained invisible and did not exchange any communication with the participant. Thus, the effects of media richness may have been reduced even more than for hypothesis one. As the manipulation was not strong enough to prove an interaction between authentic leadership and media richness on trust in leader, it was unlikely to prove this interaction on trust in the team as well.

Despite these hypotheses not being supported, the post hoc analyses brought many interesting results which can be discussed. The literature previously discussed mentioned that leaders "set the tone for relationships within the work group and influence the environment in which the work group is embedded" (Lau & Liden, 2008, p. 1131). The results which have been found in the present study clearly show that the leader, regardless of his or her leadership style and the richness of interactions, does have an impact on the way followers perceive their team members. Surprisingly, the only significant effects were about the perception of team members and not the perception of the leader, even though only the leader's style and visibility were manipulated. This suggests that the followers' perception of their leader matters, as results varied depending on whether they saw and heard their leader or not. The results also show that media richness bears more complex and subtle debates than the ones about its presence or absence. In this research, its effects and directions even differed depending on the leader's style. The question is then not about which media richness is the best anymore, as it was raised in early cues-filtered-out approaches of CMC, but about finding the contingencies allowing each media richness to flourish. The rational actor approach (Kling, 1980) is interestingly following this direction, as it states that the impacts of technology use on behaviours come "not from the technology itself, but from the choices individuals make about when and how to use it" (Markus, 1994, p. 122). The user may choose one medium over another to communicate depending on the situation, thus influencing the outcomes beyond the characteristics of the medium itself.

More specifically, the results of this experiment show that individuals feel more protected by their team members and are more likely to trust them with ethical but potentially self-damaging issues when they interact with either an authentic leader they can see or a non-authentic leader they cannot see. As this finding was unexpected, the present research could not study this effect deeply. However, it seems that not seeing the non-authentic leader made him appear less threatening, which is interestingly pointing to the communication literature on idealisation and deceptions in virtual environments or even in online dating. In addition, it seems that the positive effects of authentic leadership appeared strengthened by high media richness. On the contrary, the negative effects of non-authentic leader were mitigated, thanks to low media richness, to a point to which the non-authentic leader was even able to generate more trust in the team and ethical decision than an authentic leader. This finding is surprisingly telling that even a non-authentic leader can have positive outcomes if poor media are used to communicate with followers. An explanation may be that the leader was so untrustworthy that participants directed their trust and need for protection to their colleagues instead. In a way, this also contradicts the literature predicting that norms of the group would be more followed in situations of low media richness. On one hand, the norms of inauthenticity created by the non-authentic leader were not followed with low media richness. On the other hand, the norms of authenticity created by the authentic leader were more followed with high media richness.

Authentic leadership also yields interesting results on its own. This experiment further studied the impact of an authentic leader on ethical decision-making. Following an authentic leader increases the likelihood to report to the leader a potentially self-damaging mistake with ethical consequences. This finding is not surprising due to the moral component of authentic leadership and its similarities with ethical leadership (Gardner et al., 2005). As expected from the hypotheses by Avolio and colleagues (2004), the leader prototypicality mediated the relationship between authentic leadership and trust in the leader, thus strengthening the importance of the role modelling aspect of this leadership style.

Regarding media richness, the present research found to some extent that the leader is considered more representative of the kind of people in the team when media richness is low. This finding is in line with the media richness literature related to the shared social categorisation happening when salient cues are removed. A possible explanation is that people tend to have an idealised image of their leader and the other team members if they cannot see them. When the leader becomes visible, a discrepancy appears between their ideal representation and the actual representation. The leader is not as imagined anymore. Besides, this experiment did not manipulate the representation of the

other team members. Thus, participants kept imagining them and the visible and actual leader may have been considered less representative of the team than these imagined team members. Similarly, low media richness was also associated with stronger social identification with the team as a whole, which is again in line with the CMC literature. This is interesting as well, as media richness has been manipulated only for the leader, which implies once more that the perception of the leader does have an impact on the perception of the team as a whole.

Correlations that have been looked at highlight that trust has strong links with ethical decision-making and feeling protected by one's leader or team. However, the main finding of these correlations is that they strengthen the intuition from Den Hartog (2003) that "both trust in a focal leader and trust in general others (such as management) may be of importance in maintaining cooperation" (2003, p. 133). Indeed, trust in the leader, regardless of the leader's authenticity, and trust in the team were both related to different outcomes. One may trust his or her team but not his or her leader, and vice-versa. By focusing too much on trust in leader and too less on trust in the team, one can miss out the fact that colleagues can also play an important role in fostering a positive ethical climate.

## **Limitations**

The results from the present research are subject to several limitations. A first limitation is related to the media richness concept that has been used. Media richness is an old concept. Despite its clarity and theoretical relevance, it may show little ecological validity in real virtual teams. Indeed, "all technologies in virtual teams are used for direct communication between team members, and thus the richness continuum does not apply to these exchanges" (Kirkman & Mathieu, 2005 p. 703). Even in virtual teams interacting only by e-mails, it is rare that the leader is staying visually anonymous to the followers. It may have then been more ecologically valid to study a concept such as virtuality, which is "the extent to which team members use virtual tools to coordinate and execute team processes, the amount of informational value provided by such tools, and the synchronicity of team member virtual interaction" (Kirkman & Mathieu, 2005 p. 700). Media richness may also have experimental limitations. Walther (1992) argued that time-constrained experiments may not allow the effects of media richness to appear, because the transmission of social information is considerably slower in computer-mediated communication.

The experimental design also brought other limitations to the present research. First, this experiment was conducted without interaction between participants due to time and cost constraints. Despite the fact that vignette experiments are conducted individually and are designed around this limitation, this is not common in traditional CMC and virtual team experiments. In these

experiments, participants interact together through media such as text or audio-video conference. It is then likely that the present research found little impact of media richness due to the fact that the interaction was limited to a mere pre-recorded message from the leader. This message could have also added some limitations to the research. First, the video was lasting only a few minutes, which may have been too short to create a proper effect in high media richness conditions. Second, the physical appearance of the leader could have biased the results, especially those related to leader prototypicality, because the actor was young and possessed a foreign accent, which may not have been considered stereotypical or convincing enough by some participants. In addition to this limitation, the present experiment did not include any face-to-face control group to qualify the results. This would not have been appropriate due to the choice of a vignette design, but it could have been interesting if more interaction were to be added to the scenario. It is also a common practice to include such control group in CMC or virtual team experiments (See Purvanova & Bono, 2009; Robert et al., 2009). Regarding the authentic leadership conditions, the results could have been deeper with a comparison between an authentic leader, a non-authentic leader, and a more neutral leader. The present experiment only exposed participants to either the positive or the negative sides of the authentic leadership continuum, but not to another style such as transactional leadership which could have served as a control group for leadership conditions. Regarding the context of the experiment, the identification with the team may have also been reduced due to the anonymity of the imagined team members, who have not been attributed any name or history.

This research may have also been limited by its sample. Only eighty-six participants took part in the experiment. A bigger sample could have brought more interesting findings by removing the data from participants having failed the recall question or the non-native speakers. The response rate among the student sample was 59%, which is good, but the corporate sample only brought six additional participants. As a result, most of this sample was composed of students. This limits the external validity of this research, and also creates a risk that the findings only apply to a young student population (Smart, 1966).

## **Implications**

A first general direction for future research is to keep using a multi-disciplinary approach when studying virtual teams and virtual workplaces. Disciplines such as information systems, communication and social psychology have already started exploring this terra incognita, but “the role of CMC within the organization is a profoundly neglected topic in the organizational literature” (O’Kane, Palmer, & Hargie, 2007). Inspiration could even be found outside academic literature, as E-leadership is now even being done in virtual environments such as video games by people who did

not receive formal leadership training. For example, Reeves and colleagues (2007) made an interesting first attempt at “looking at leadership through of lens of online games” to provide “a number of insights about the future of leadership in business” (2007, p. 31). These insights could provide new hypotheses for future research on leadership and trust in virtual teams. In addition, the results of the present experiment suggests that a rational actor approach (Kling, 1980; Markus, 1994) may be more appropriate to study further the effects of media richness. For example, Markus (1994) examined the reasons why managers kept choosing e-mail to communicate on certain delicate topics instead of switching to a richer media. She then claimed that “however advanced our communication technologies may become, and however much they may incorporate the sense of “being there” or even move beyond it, their effects will always depend, at least in part, on how people understand these technologies and choose to use them” (1994, p. 146). A similar approach should be taken in order to understand why leaders should choose one media over another to foster trust in their team, depending on the context, their style, or any other variable which could disrupt the belief that richer is necessarily better.

In addition to this contingency approach, future research should introduce more levels of media richness than what was done in the present experiment, or should at least include a face-to-face control condition. It could also look at new and more complex tools which are being implemented and used in organisations, such as enterprise social networks or virtual collaborative spaces. Regarding the impact of leader perception on trust in virtual teams, a new scale has been created in the present research to study the sense of protection by the leader or the team. This scale has been found reliable enough to be used in future research. To further explain the unexpected results of this experiment, future experiments could look in more details at how the leader is being perceived by participants, especially regarding how threatening he or she may be considered or the influence of sub-variables such as visual cues and body language. They could also add more depth to the media richness conditions by adding new conditions related to the visual anonymity of participants, as this variable has been found relevant in the SIDE framework (Reicher et al., 1995). Particularly intriguing was the finding that the best scores on trust and ethical decisions have been achieved when the leader was non-authentic and communicated with low media richness. This deserves more attention in order to fully understand the underlying processes. On a side note, future research should not forget that both trust in the leader and trust in the team are important to look at.

## **Conclusion**

This research was trying to find the extent to which authentic leadership and media richness interplay to build trust and encourage ethical decisions in virtual teams. To do so, two hypotheses



were examined using a vignette experiment. It was suggested that low media richness will lead to a more positive relationship between authentic leadership and trust both in the leader and in the team. Unfortunately, the results did not confirm these hypotheses. However, interesting findings were found incidentally. First, followers' perception of their leader has an impact on how they perceive their colleagues. Second, individuals feel more protected by their colleagues and are more likely to trust them with ethical but potentially self-damaging issues when they interact with either an authentic leader using high media richness or a non-authentic leader using low media richness. This clearly shows that, in a virtual team, even a non-authentic leader can have positive outcomes if the right medium is chosen to communicate with followers. The interplay between authentic leadership and media richness has then been found to be much more subtle than expected. Media richness is a complex concept going far beyond the early continuum suggesting that the richer, the better. Individuals can influence the outcomes sometimes more than the media itself. They are rational actors choosing one media over another to communicate, and this needs to be further investigated by future research. The real questions for practitioners then become which media to choose, when and for which purpose? However, both practitioners and researchers will have to face the growing complexity of these questions. Organisations are at this very moment implementing new communication technologies blurring the media richness continuum. Employees will have to communicate through enterprise social networks, virtual collaborative spaces, virtual environments, serious games, or even remote robots allowing them to display visual cues from a distance. There is virtually no limit to the media which can still be invented to communicate. More guidance is yet to be provided in order to adapt to this continuous flow of new technologies – without drowning and, like Faust, becoming dependent "upon creatures of our own making".

## **Recommendations**

The present research will be relevant for practitioners and organisations possessing, advising, leading or wanting to build virtual teams. By understanding the specificities and challenges for leadership brought by computer-mediated communication, these practitioners can finally add the "E" in "E-leadership" (Avolio & Kahai, 2003). In addition, leaders' ability to establish and maintain trust has been identified as a key practice leading to virtual team effectiveness (Malhotra, Majchrzak, & Rosen, 2007). More generally, trust in leadership is associated with practically relevant outcomes such as commitment, organizational citizenship behaviour, intention to stay or belief in information (Dirks & Ferrin, 2002).

The first specificity of E-leadership is its reliance on computer-mediated communication. Even if no comparison with transactional styles of leadership were conducted, the findings point out that even poor media such as e-mails are not necessarily task-oriented and exempted from more positive forms of social interactions. Communicating through technology, being visually anonymous or geographically isolated in a virtual team is not necessarily an obstacle to the formation of trust. This should be even more remembered to practitioners as the recent events in Yahoo! have brought back the Manichean debates of cues-filtered out approaches when Marissa Meyer, CEO of Yahoo!, banned teleworking in her organisation. In a leaked internal memo, the HR head declared that “to become the absolute best place to work, communication and collaboration will be important, so we need to be working side-by-side”, adding “we need to be one Yahoo! and that starts with physically being together” (J. Reses, personal communication, February 22, 2013). Practitioners should instead embrace a rational actor approach (Kling, 1980; Markus, 1994) and keep in mind the potential benefits of virtual communication. They could formally assess their needs in terms of virtual leadership by informing leaders of the communication media at their disposal, along with the advantages and drawbacks associated to each medium. A costless and easy implementation of this idea would be to simply provide them electronic resources and index cards created by HR and IT departments. The present research already suggests that authentic leaders should rely on audio-video messages and non-authentic leaders on text messages to make their followers feel protected and foster a climate of ethical decision-making. It also found that a leader communicating by text only could be considered as more prototypical or representative of the team, which is then facilitating trust.

A second useful finding for organisations is that the perception of the virtual leader does have an impact on followers. Audio-video messages from the leader had different impacts on followers than text messages. This suggests that impression management is also important in virtual teams. Organisations may now even possess enterprise social networks providing each employee a personal profile similar to a Facebook page. Contrary to the World Wide Web, in which identities can be falsified and are difficult to verify (Turkle, 1997), organisational communications are rarely anonymous. It is then likely that, provided with such a tool, followers will check the profiles of their leaders and top managers to form a general impression on them. Leaders should then be made aware that keeping their profiles up-to-date or even including pictures or audio-video messages could have an impact on the way their e-mails are received.

The present research is also making a case for more authenticity and integrity in virtual environments, especially because temptations to invade privacy or strengthen controls of

teleworkers are strong. However, despite the fact that modern information systems allow communications and virtual activities to be monitored, unethical behaviours of managers and employees are nevertheless happening. As Gardner and colleagues (2005) were writing about authentic leaders, “we believe that through the development of such leaders, as well as authentic followers, positive ethical climates and sustainable follower accomplishments can be achieved” (2005, p. 344). The results of the present experiment confirmed this belief to some extent by indicating that people following authentic leaders tend to make more ethical decisions, even if these decisions may put them in danger of losing their reputation or their job. Organisations should then be made clear that possessing and developing authentic leaders among their managers is likely to foster a positive culture in which decisions are systematically ethical. Tools such as the Authentic Leadership Questionnaire (ALQ; Walumbwa et al., 2008) “may prove to be a useful means of providing early evidence to identify those leaders who may not always adhere to the highest ethical and moral principles in terms of their decisions, actions, and behaviors” (Walumbwa et al., 2008, p. 121). This tool can be purchased online for \$0.50 to \$2 per administration depending on the number of employees, which is a reasonable amount to identify authentic leaders across an organisation (See Appendix 4 for contact details). It can also be completed in approximately fifteen minutes by either followers or leaders, which is convenient. The results of the present research also suggest that even if some leaders were to receive very low scores of authentic leadership, it may not be an obstacle to trust formation and ethical decision-making if they communicate mostly through e-mails and avoid audio-video contacts with their followers.

This research also benefited from a multi-disciplinary approach invoking organisational, communication and information systems literature. Such approach should also guide practitioners wanting to find guidance on leadership and trust in virtual teams. Depending on their own backgrounds, they should not hesitate to seek help in both HR and IT departments of their organisations. IT employees will probably know the communication tools they implemented in the organisation, along with their advantages and drawbacks in terms of usage and cost. HR employees can provide guidance on communication and leadership. In addition to this formal internal collaboration, practitioners should keep themselves informed of new academic publications in these multiple disciplines or even collaborate with researchers. This collaboration can bring results at a very low cost, as it is mutually benefiting both the organisation and the researcher. However, the terra incognita of virtual environments is still yet to be fully discovered. The present research studied trust in virtual teams using the authentic leadership style. Other studies have focused on transformational or transactional styles (See Kahai, Sosik, & Avolio, 2003; Ruggieri, 2009). What if these traditional leadership styles were not embracing enough the potential of virtual

environments? At this very moment, young people yet to enter organisations are already experimenting some of these new forms of virtual leadership in their connected lives and their online video games (Reeves et al., 2007). They will bring these experiences, needs and sensibilities to the workplace when they enter it. Both practitioners and researchers must be ready to hear and understand them in order to embrace these new leadership styles specifically designed to virtual environments.

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## Appendices

### Appendix 1: Consent form

In the final lecture on the BH2286 Effective Teamwork module, we will be discussing the effectiveness of virtual team working in modern organisations. As part of your learning on this topic, there is an opportunity to take part in a short online exercise that will provide you with an experience of virtual working, which will act as a useful reflection in class. The data you provide will be used to explore how decision making is made in virtual environments and will contribute to the MSc thesis of Jean-Francois Stich. Please take time to read the following information carefully.

Participation in the study will take approximately 20 minutes. The exercise will consist of role-playing a consultant working in a virtual team. You will be asked to read a short scenario and answer some questions based on your perceptions. There are no known risks involved in this exercise.

Participation is entirely voluntary and non-participation does not incur any adverse effects or consequences for your performance on the module. You are free to withdraw at any time from the experiment. No sanction will be taken against any student of the University who refuses to participate in or withdraws from the experiment.

You will not be asked to reveal your identity, and confidentiality will be guaranteed as experimenters will have no contact whatsoever with you during the exercise due to its online nature. No metadata about your computer or internet provider's characteristics will be collected as they are unnecessary for the analysis. Data will be protected throughout the research as the database is secured and only accessed by the experimenters for the analysis. The research has been reviewed by Aston University's Ethics Committee.

If you need any further information, please contact Mr Jean-François Stich at [stichj@aston.ac.uk](mailto:stichj@aston.ac.uk).

If you have any complaints about the way in which the exercise has been conducted, you should contact the Secretary of the University Ethics Committee on [j.g.walter@aston.ac.uk](mailto:j.g.walter@aston.ac.uk) or telephone 0121 204 4869.

**If you agree with the above-stated conditions and are willing to participate in the exercise, please select "I agree" and click next.**

I agree

I disagree



## Appendix 2: Vignettes

### Condition: High Authentic Leadership / High Media Richness

Please imagine that you are in the following context and situation.

The context:

For the past twelve months, you have been working as a Mergers and Acquisitions (M&A) analyst in the corporate finance department of *AperTech*, a large organisation operating in the high tech industry and growing rapidly due to its multiple acquisitions. You work as part of a virtual team in which you and your fellow M&A analysts work together flexibly and communicate using virtual technology. This means that your team members often work from different locations, and it is not very often that everyone gets together face-to-face.

All of the M&A analysts in your team, including yourself, work under supervision of Jeff, the Chief Financial Officer (CFO) of *AperTech*. In terms of his leadership style, Jeff regularly seeks feedback from you before making decisions that will impact the team. He solicits viewpoints from you and the other team members that challenge his own positions, as he realises you are the ones who know the job best. Jeff also frequently displays his own true emotions and emphasises the need for everyone on your team to speak their mind. In talking to older colleagues who have worked with Jeff for many years, you learn that Jeff's actions on the job have always been consistent with his moral beliefs and as a result he makes decisions based on his core values. When you once asked him about his career and how he became so successful to be promoted to CFO, he was able to describe to you very clearly his strengths, weaknesses, goals and core values, and the impact they have had on the company, his career and the colleagues he works with.

The situation:

The project that your team have been working on for the past few months has come to an end. *AperTech* has expressed interest in acquiring *Prometeo*, a young and promising but expensive start-up, and your M&A team has had to evaluate the future success of this acquisition.

Your part of the project was to conduct a global environment analysis of the high tech industry in which *Prometeo* operates. You collected and analysed lots of data to monitor and forecast the macro environment, such as increases in computing power and data storage capacity. Your findings suggested that environmental forces should not hinder the acquisition to a great extent. Jeff and the rest of your team members considered these findings promising enough to conclude that the acquisition is viable and together you gave the go ahead to the CEO of *AperTech*.

Following this great success for your M&A team, you participated in a final videoconference with Jeff and the rest of your team to congratulate each other and celebrate. You also received the following personal congratulation message from Jeff:



*\*Content of the video message\**

*Hello! Thanks a lot for the work you accomplished on this project. You have worked hard to get the report done on time. It was not easy to collaborate remotely, but you produced an excellent and comprehensive piece of work.*

*I really hope the acquisition of Prometeo will yield the promising results we anticipated. I just got contacted by the CEO who is satisfied with the report. He will sign the acquisition contract soon and sends his congratulations to you and the team. Good job!*

Satisfied with this outcome, you decide to review the report that you and your team submitted. Reading through your part of the report, you suddenly realise in panic that you made a mistake in your calculations on data storage costs which went unnoticed by everyone else! The increase in cost will actually be much more rapid than expected and this will inevitably lead to a severe drop in profits over one year.

This leaves you in a real dilemma. On one hand, it is highly unlikely that your error will be picked up. The acquisition will probably fail over the long term but it is unlikely that you will personally take any blame for it. However, should the error get picked up, your team leader Jeff will be highly discredited, and your company will lose a considerable amount of money. Disclosing this error would avoid further losses for *AperTech*. However, it would delay and possibly even cancel the acquisition and admitting your error will weaken your reputation and career prospects. You will also require the help of your team members to correct your estimates and re-determine whether the acquisition should proceed or not, which will take some time.

### Condition: High Authentic Leadership / Low Media Richness

Please imagine that you are in the following context and situation.

The context:

For the past twelve months, you have been working as a Mergers and Acquisitions (M&A) analyst in the corporate finance department of *AperTech*, a large organisation operating in the high tech industry and growing rapidly due to its multiple acquisitions. You work as part of a virtual team in which you and your fellow M&A analysts work together flexibly and communicate using virtual technology. This means that your team members often work from different locations, and it is not very often that everyone gets together face-to-face.

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The situation:

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### **Condition: Low Authentic Leadership / High Media Richness**

**Please imagine that you are in the following context and situation.**

The context:

For the past twelve months, you have been working as a Mergers and Acquisitions (M&A) analyst in the corporate finance department of *AperTech*, a large organisation operating in the high tech industry and growing rapidly due to its multiple acquisitions. You work as part of a virtual team in which you and your fellow M&A analysts work together flexibly and communicate using virtual technology. This means that your team members often work from different locations, and it is not very often that everyone gets together face-to-face.

All of the M&A analysts in your team, including yourself, work under supervision of Jeff, the Chief Financial Officer (CFO) of *AperTech*. In terms of his leadership style, Jeff rarely seeks feedback from you before making decisions that will impact the team. He does not solicit viewpoints from you and the other team members that challenge his own positions, even if you are the ones who know the job best. Jeff also rarely displays his own true emotions and does not emphasise the need for everyone on your team to speak their mind. In talking to older colleagues who have worked with Jeff for many years, you learn that Jeff's actions on the job have rarely been consistent with his moral beliefs and as a result he makes decisions which contradict his core values. When you once asked him about his career and how he became so successful to be promoted to CFO, he was unable to describe to you very clearly his strengths, weaknesses, goals and core values, and the impact they have had on the company, his career and the colleagues he works with.

The situation:

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**Please imagine that you are in the following context and situation.**

The context:

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## Appendix 3: Post-experiment questionnaire

With your leader, Jeff, and team members in mind, how likely are you to...

Inform your leader about your mistake in the report	1	2	3	4	5
Hide this information from your leader and let the acquisition proceed anyway	1	2	3	4	5
Inform your team members about your mistake in the report	1	2	3	4	5
Hide this information from your team members and let the acquisition proceed anyway	1	2	3	4	5
Ask your leader for help in fixing this error in the report	1	2	3	4	5
Ask your team members for help in fixing this error in the report	1	2	3	4	5

1: Very Unlikely; 2: Unlikely; 3: Undecided; 4: Likely; 5: Very Likely

With your leader, Jeff, and team members in mind, to what extent do you agree with the following statements

I think it is more important to protect the <i>AperTech's</i> business than my reputation and career	1	2	3	4	5
I think it is more important to protect my leader's reputation than my reputation and career	1	2	3	4	5
I think it is more important to protect my teams' good name than my reputation and career	1	2	3	4	5
My leader will protect me if I inform him about the error	1	2	3	4	5
My leader will ensure my career is not affected if I inform him about the error	1	2	3	4	5
I trust my leader to have my interests at heart when deciding how to handle this situation	1	2	3	4	5
I trust my leader to help me with this difficulty	1	2	3	4	5
My team members will protect me if I inform them about the error	1	2	3	4	5
My team members will ensure my career is not affected if I inform them about the error	1	2	3	4	5
I trust my team members to have my interests at heart when deciding how to handle this situation	1	2	3	4	5
I trust my team members to help me with this difficulty	1	2	3	4	5

1: Disagree strongly; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Agree strongly

With your leader Jeff in mind, rate how much you agree with the following statements:

I am able to count on my leader for help if I have difficulties with this report	1	2	3	4	5
I am confident that my leader will take my interests into account when making decisions regarding this report	1	2	3	4	5
I am confident that my leader will keep me informed about issues that concern my work in this report	1	2	3	4	5
I can rely on my leader to keep his word	1	2	3	4	5
I trust my leader	1	2	3	4	5
My leader represents what is characteristic about the team	1	2	3	4	5
My leader is representative of the team	1	2	3	4	5
My leader is a good example of the kind of people in the team	1	2	3	4	5
My leader stands for what people in the team have in common	1	2	3	4	5
My leader is not representative of the kind of people in the team	1	2	3	4	5
My leader is very similar to most people in the team	1	2	3	4	5
My leader is very similar to me	1	2	3	4	5

1: Disagree strongly; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Agree strongly

With your team members in mind, rate how much you agree with the following statements:

I am able to count on my team members for help if I have difficulties with the report	1	2	3	4	5
I am confident that my team members will take my interests into account when making decisions regarding the report	1	2	3	4	5
I am confident that my team members will keep me informed about issues that concern my work in this report	1	2	3	4	5
I can rely on my team members to keep their word	1	2	3	4	5
I trust my team members	1	2	3	4	5
I was glad to be a member of the team	1	2	3	4	5
I felt committed to the team	1	2	3	4	5
I felt that the team was important to me	1	2	3	4	5
I felt similar to the team as a whole in terms of general attitudes and opinions	1	2	3	4	5
I liked the other members as a whole	1	2	3	4	5
I felt I would fit into the team well	1	2	3	4	5
I felt I identified with the team	1	2	3	4	5
I felt I belonged to the team	1	2	3	4	5

1: Disagree strongly; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Agree strongly

Your leader Jeff:

says exactly what he means.	0	1	2	3	4
admits mistakes when they are made.	0	1	2	3	4
encourages everyone to speak their mind.	0	1	2	3	4
...	0	1	2	3	4

0: Not at all; 1: Once in a while; 2: Sometimes; 3: Fairly often; 4: Frequently, if not always

What did your leader Jeff say in the personal message you received from him?

- He said that the CEO hasn't read the report yet but will certainly appreciate the great job you did
- He said that the CEO is satisfied with the report and congratulates you and your team

When you finished the report, Jeff contacted you with a personal message congratulating you on your performance. To what extent did this message make you feel in close contact with Jeff

1: Disagree strongly; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Agree strongly

How would you rate the quality of contact of this contact that you had with Jeff?

1: Very poor; 2: Poor; 3: Average; 4: Good; 5: Very good

What is your gender?

Male/Female

What is your age?

NUMERICAL INPUT

Is English your first language?

Yes/No

How many years of work experience do you have?

NUMERICAL INPUT

## Appendix 4: Permission to use the Authentic Leadership Questionnaire



[www.mindgarden.com](http://www.mindgarden.com)

To whom it may concern,

This letter is to grant permission for the above named person to use the following copyright material;

Instrument: Authentic Leadership Questionnaire (ALQ)

Authors: Bruce J. Avolio, William L. Gardner, and Fred O. Walumbwa

Copyright: "Copyright © 2007 Authentic Leadership Questionnaire (ALQ) by Bruce J. Avolio, William L. Gardner, and Fred O. Walumbwa. All rights reserved in all medium."

for his/her thesis research.

**Three sample items** from this instrument may be reproduced for inclusion in a proposal, thesis, or dissertation.

The entire instrument may not be included or reproduced at any time in any other published material.

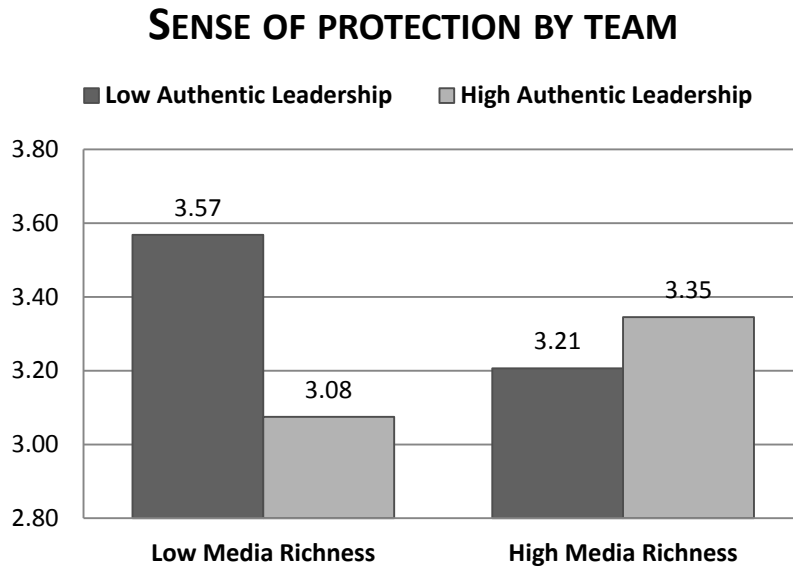
Sincerely,

A handwritten signature in black ink, appearing to read "Robert Most", with a long horizontal line extending to the right.

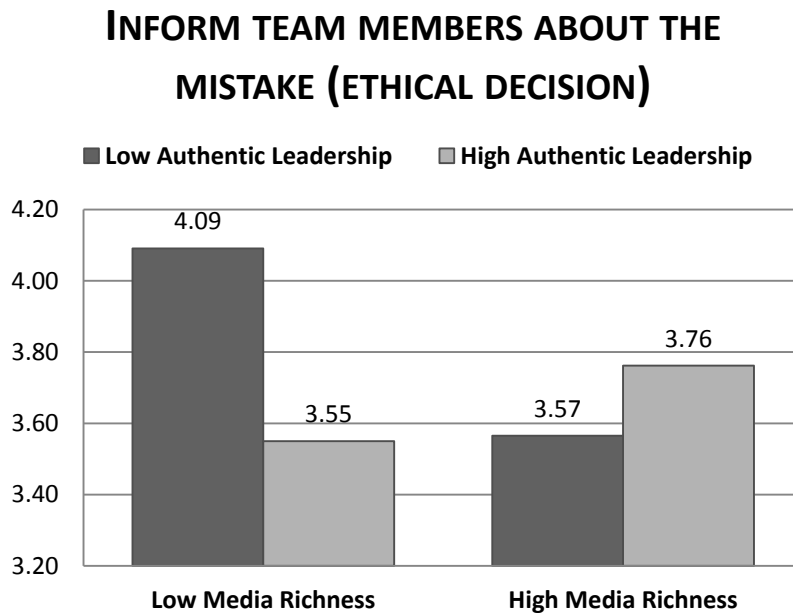
Robert Most  
Mind Garden, Inc.  
[www.mindgarden.com](http://www.mindgarden.com)

## Figures

**Figure 1: Interaction effect between Authentic Leadership and Media Richness on the sense of protection by the team**



**Figure 2: Interaction effect between Authentic Leadership and Media Richness on informing team members about the mistake**



## Tables

**Table 1: Repartition in conditions**

*Repartition of Participants in Conditions*

		Media Richness		
		High	Low	Total
Authentic Leadership	High	21	20	41
	Low	23	22	45
Total		44	42	86

**Table 2: Demographic results***Age and Work Experience*

	N	M	SD
What is your age?	85	21.52	2.89
How many years of work experience do you have?	86	2.38	2.99

*Gender*

Gender	N	Percentage
Male	41	48%
Female	45	52%

*First Language*

Is English your first language?	N	Percentage
Yes	31	41%
No	51	59%

*Demographic Data Per Group (Two-Way independent ANOVA)*

		High AL / High MR	High AL / Low MR	Low AL / High MR	Low AL / Low MR	F	Sig.
What is your gender? (1=Female; 2=Male)	Mean (SD)	1.57 (0.51)	1.5 (0.51)	1.52 (0.51)	1.5 (0.51)	0.091	.965
What is your age?	Mean (SD)	21.95 (2.68)	21.25 (3.91)	21.22 (2.24)	21.68 (2.75)	0.304	.822
Is English your first language? (1=No; 2=Yes)	Mean (SD)	1.76 (0.44)	1.35 (0.49)	1.65 (0.49)	1.59 (0.5)	2.692	.052
How many years of work experience do you have?	Mean (SD)	2.15 (2.25)	2.92 (3.11)	1.74 (1.85)	2.77 (4.26)	0.732	.536
Sample (1=Student, 2=Organisation)	Mean (SD)	1.1 (0.3)	1.1 (0.31)	1.04 (0.21)	1.09 (0.29)	0.197	.898



**Table 3: ANOVAs for Hypothesis 1 (interaction)**

*Interaction Between Authentic Leadership and Media Richness on Trust in the Leader*

	df	Mean Square	F	Sig.
Inform your leader about your mistake in the report	1	0.004	0.004	.947
Hide this information from your leader and let the acquisition proceed anyway (negatively coded)	1	0.147	0.152	.698
Ask your leader for help in fixing this error in the report	1	0.365	0.313	.577
I think it is more important to protect my leader's reputation than my reputation and career	1	0.063	0.061	.805
Sense of protection by leader ( $\alpha = .864$ )	1	0.422	0.637	.427
My leader will protect me if I inform him about the error	1	0.105	0.099	.754
My leader will ensure my career is not affected if I inform him about the error	1	1.192	1.599	.210
I trust my leader to have my interests at heart when deciding how to handle this situation	1	0.847	0.826	.366
I trust my leader to help me with this difficulty	1	0.069	0.076	.784
Trust in Leader ( $\alpha = .881$ )	1	0.003	0.005	.944
I am able to count on my leader for help if I have difficulties with this report	1	0.059	0.072	.789
I am confident that my leader will take my interests into account when making decisions regarding this report	1	1.737	2.009	.160
I am confident that my leader will keep me informed about issues that concern my work in this report	1	0.147	0.213	.646
I can rely on my leader to keep his word	1	0.010	0.012	.914
I trust my leader	1	0.289	0.337	.563

**Table 4: ANOVAs for Hypothesis 2 (interaction)**

*Interaction Between Authentic Leadership and Media Richness on Trust in the Team*

	df	Mean Square	F	Sig.
Inform your team members about your mistake in the report	1	2.916	3.611	.061
Hide this information from your team members and let the acquisition proceed anyway (negatively coded)	1	3.099	3.390	.069
Ask your team members for help in fixing this error in the report	1	0.030	0.027	.870
I think it is more important to protect my teams' good name than my reputation and career	1	0.349	0.387	.535
<u>Sense of protection by team (<math>\alpha = .846</math>)</u>	<u>1</u>	<u>2.140</u>	<u>4.137</u>	<u>.045</u>
<u>My team members will protect me if I inform them about the error</u>	<u>1</u>	<u>4.012</u>	<u>5.316</u>	<u>.024</u>
My team members will ensure my career is not affected if I inform them about the error	1	1.437	1.647	.203
<u>I trust my team members to have my interests at heart when deciding how to handle this situation</u>	<u>1</u>	<u>3.341</u>	<u>4.336</u>	<u>.040</u>
I trust my team members to help me with this difficulty	1	0.676	1.071	.304
<u>Trust in Team (<math>\alpha = .816</math>)</u>	<u>1</u>	<u>0.048</u>	<u>0.148</u>	<u>.702</u>
I am able to count on my team members for help if I have difficulties with the report	1	0.264	0.408	.525
I am confident that my team members will take my interests into account when making decisions regarding the report	1	0.167	0.300	.585
I am confident that my team members will keep me informed about issues that concern my work in this report	1	0.078	0.131	.718
I can rely on my team members to keep their word	1	0.095	0.166	.685
I trust my team members	1	0.022	0.047	.829

*Note.* Items are underlined when they are statistically significant

**Table 5: Linear Regression – mediating role of Leader Prototypicality between Authentic Leadership and Trust in Leader**

*Analysis 1: Regression Analysis Between Authentic Leadership and Trust in Leader*

	B	Std. Error B	Beta
Constant	1.559	0.179	
Authentic Leadership	0.557	0.055	<u>.743</u>

Notes.  $R^2 = .552$  ( $p < .001$ )

Authentic Leadership: ALQ score

Underlined items: Correlation is significant at the 0.01 level (2-tailed)

*Analysis 2: Regression Analysis Between Authentic Leadership and Leader Prototypicality*

	B	Std. Error B	Beta
Constant	1.399	0.171	
Authentic Leadership	0.525	0.052	<u>.737</u>

Note.  $R^2 = .544$  ( $p < .001$ )

Underlined items: Correlation is significant at the 0.01 level (2-tailed)

*Analysis 3: Regression Analysis Between Authentic Leadership and Trust in Leader, Controlling for Leader Prototypicality*

	B	Std. Error B	Beta
Constant	0.85	0.211	
Leader Prototypicality	0.507	0.1	<u>.48</u>
Authentic Leadership	0.292	0.071	<u>.388</u>

Note.  $R^2 = .588$ ,  $\Delta R^2 = .069$  ( $ps < .001$ )

Underlined items: Correlation is significant at the 0.01 level (2-tailed)

**Table 6: One-way ANOVA for Authentic Leadership**

*One-Way ANOVA for Authentic Leadership*

	df	Mean Square	F	Sig.
Ask your leader for help in fixing this error in the report	1	7.068	5.956	.017
I think it is more important to protect my leader's reputation than my reputation and career	1	4.238	4.182	.044
I trust my leader to help me with this difficulty	1	5.048	5.710	.019
I felt I belonged to the team	1	3.631	6.408	.013
Trust in Leader	1	12.780	25.485	.000
Leader Prototypicality	1	13.191	30.653	.000
How would you rate the quality of contact of this contact that you had with Jeff?	1	10.733	10.930	.001

*Table of means*

		M	SD
Ask your leader for help in fixing this error in the report	Low AL	3.13	1.18
	High AL	3.71	0.98
I think it is more important to protect my leader's reputation than my reputation and career	Low AL	2.56	1.03
	High AL	3.00	0.97
I trust my leader to help me with this difficulty	Low AL	3.22	1.02
	High AL	3.71	0.84
I felt I belonged to the team	Low AL	3.47	0.84
	High AL	3.88	0.64
Trust in Leader	Low AL	2.91	0.86
	High AL	3.68	0.50
Leader Prototypicality	Low AL	2.64	0.77
	High AL	3.43	0.51
How would you rate the quality of contact of this contact that you had with Jeff?	Low AL	3.00	1.07
	High AL	3.71	0.90

**Table 7: One-way ANOVA for Media Richness**

*One-Way ANOVA for Media Richness*

	df	Mean Square	F	Sig.
(My leader is not representative of the kind of people in the team)	1	7.204	7.611	.007
Social Identification with the team	1	1.427	4.229	.043
I was glad to be a member of the team	1	3.208	7.011	.010
I felt committed to the team	1	2.892	6.082	.016
I trust my team members	1	2.030	4.426	.038
How would you rate the quality of contact of this contact that you had with Jeff?	1	5.466	5.232	0.025

*Table of means*

		M	SD
(My leader is not representative of the kind of people in the team)	Low MR	3.24	1.01
	High MR	2.66	0.94
Social Identification with the team	Low MR	3.86	0.56
	High MR	3.60	0.60
I was glad to be a member of the team	Low MR	4.00	0.66
	High MR	3.61	0.69
I felt committed to the team	Low MR	4.07	0.71
	High MR	3.70	0.67
I trust my team members	Low MR	3.76	0.73
	High MR	3.45	0.63
How would you rate the quality of contact of this contact that you had with Jeff?	Low MR	3.60	0.99
	High MR	3.09	1.05

**Table 8: Correlations**

*Correlation Table*

	Trust in Leader	Leader Prototypicality	Trust in Team	Social Identification with the team
Inform your leader about your mistake in the report	<u>.322</u>	.252		
Ask your leader for help in fixing this error in the report	<u>.429</u>	.271		
I think it is more important to protect my leader's reputation than my reputation and career	<u>.465</u>	<u>.378</u>		.242
Sense of protection by leader	<u>.618</u>	<u>.506</u>		.246
Inform your team members about your mistake in the report			<u>.361</u>	<u>.283</u>
Ask your team members for help in fixing this error in the report			<u>.338</u>	
I think it is more important to protect the AperTech's business than my reputation and career			.243	
I think it is more important to protect my teams' good name than my reputation and career			.228	
Sense of protection by team			<u>.577</u>	<u>.409</u>

*Note.* Underlined items: Correlation is significant at the 0.01 level (2-tailed).

Other items: Correlation is significant at the 0.05 level (2-tailed).