The Moderating Role of Virtuality on Trust in Leaders and the Consequences on Performance

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Abstract

Virtual leadership is a phenomenon that has strongly risen in importance in recent years. Therefore, the study at hand took a closer look at the way in which virtuality affects the trust in leaders, which again influences the performance of employees. In a questionnaire, in which 121 participants took part, the influence of virtuality on the relationship between the trustworthiness of a team-leader and the trust in that leader was investigated. Moreover, the effect of trust on the performance was examined. Thereby, virtuality was split into the two components geographical and temporal/cultural virtuality based on Chudoba, Wynn, Lu, and Watson-Manheim [1], trustworthiness, a proven antecedent of trust for non-virtual contexts was split into its three components ability, integrity and benevolence [2], and performance was assessed by the participants’ general work satisfaction and their in-role performance. The results showed that, as hypothesized, the virtuality of the relationship between leader and employee significantly influenced the relationship between trustworthiness and trust. Furthermore, the perceived trust significantly influenced both performance measures. However, the influence of virtuality on the relationship between trustworthiness and trust was more complex than expected. Only geographical virtuality moderated the relationship of ability on trust, and temporal/cultural virtuality moderated the relationship of benevolence on trust. The relationship of the leader’s integrity and trust was not moderated by the virtuality of the context at all. Interestingly, our data did not support a direct connection between the perceived ability of a leader and the trust in that leader. Theoretical and practical implications of these results are highlighted.

1. Introduction

Due to the globalization and development of electronic information and communication technologies (ICT) new forms of work have emerged [3, 4]. More people work in virtual teams than ever before and to some degree virtuality is increasingly prevalent in most teams [5]. Although there are examples of highly self-organized virtual teams, there is general consent that virtual teams operate better under managerial guidance [5]. This means that even though many teams are geographically and culturally dispersed, they still have to be managed by one leader. New working condition factors such as physical, communicative, organizational and cultural distance [6], force leaders to adapt to this new emerged context. Therefore, there are various aspects of leadership that have to be redefined from traditional to virtual teams. Aspects such as motivation, communicating vision and especially building up trust are different in face-to-face compared to virtual situations [7]. This means there are new challenges in virtual teams [3, 8] such as building emotional aspects of trust in relationships [9]. Trust is an important facet in teams and was found to be the key to effective inter-organizational team networking [10]. Furthermore trust needs frequent face-to-face interaction, meaning that team members have to meet in person from time to time [11]. However, how can trust in leadership be built under these circumstances and what are the effects of virtuality on it? Does trust in leadership have a positive effect on the performance of a virtual team? Therefore, this study focused on the impact of trustworthiness on employees’ trust in leaders and its effects on performance under the aspect of virtuality. Recent research shows that although the topic of virtual teams and trust has been studied, only 2% of articles published in the selected top IS journals have discussed this crucial topic [12]. Therefore more research is needed in this field. To the best of our knowledge the combination of a varying degree of virtuality on the relationship between trustworthiness and trust in a team leader has not been placed in one study.
2. Theoretical Foundations and Hypotheses

2.1. The Relationship between Trustworthiness and Trust

Trust is the most intensely debated aspect of virtual teams [13]. Considering the literature on virtual teams, the interest in trust can be traced back to two main reasons. First of all, trust is seen as a “formula of success” for virtual teams by various authors; for example, trust has been found to enhance communication and improve overall team performance [14, 15]. Accordingly, Lipnack and Stamps [4] suggest, based on their observation of several virtual teams in companies such as IBM, Sun Microsystems, and Motorola, that the success and failure of virtual teams is primarily contingent upon trust. This can be explained by the metaphor, that trust functions like the glue that holds and links virtual teams together [15, 16]. Moreover, Handy [11] argues that the only way to work with people whom one doesn’t see is by trusting them. Secondly, it is a huge challenge to develop trust in virtual teams, which is why factors fostering trust need to be examined thoroughly in association with virtual teams [14, 17]. “Trust […] tends to be somewhat like a combination of the weather and motherhood; it is widely talked about, and it is widely assumed to be good for organizations. When it comes to specifying just what it means in an organizational context, however, vagueness creeps in” [18]. Trust is a popular construct, on which a number of conceptual and empirical perspectives have been taken. It has become an important influence factor in disciplines like psychology and micro-organizational behavior [19, 20], sociology [21], and economics [22]. On the one hand, this interdisciplinary interest in trust causes a multi-perspective view on the construct, on the other hand it also leads to some confusion about the definition and operationalization of trust [2, 23]. There is still no definition of trust in the scholarly literature that is universally accepted [24, 25]. Each of the previously mentioned bodies of literature has taken its own stance on trust, which hampered an integrated view on trust [26]. Nevertheless several authors adopted a multidisciplinary view on trust in economic contexts, which includes positive expectations towards the trustee and a willingness to become vulnerable as critical components [26, 27] [24]. Another reason that might make the development of a universal definition of trust difficult is that it simultaneously incorporates individual processes, group dynamics and organizational factors. As mentioned above, researchers have defined trust in many different ways. For our study, we adopted the definition by Mayer et al. [2], who define trust as “the willingness of a party to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party”. This definition played a central role for many other authors as well (e.g. [20, 28, 29]). Additionally, similar definitions have been used such as the “willingness to rely on another” [27] or the “intention to accept vulnerability to another” [24]. Vulnerability is one important aspect in the definition of trust. It can be defined as “the goods and things one values and whose care one partially entrust to someone else, who has discretion over him or her” [30]. In other words, being vulnerable involves that there is something of importance at stake (i.e., reputation, health, safety, investments). Furthermore, vulnerability presumes a state of uncertainty on behalf of the trustor about the trustee’s intentions and future actions. It follows that vulnerability and uncertainty are important antecedents of trust as outcomes then become consequential and unpredictable for the trustor [27, 31]. The precedent specifications on trust also show that risk, being dependent on uncertainty and vulnerability, and interdependence are two conditions that must exist for trust to become important [22, 24, 32, 33]. To trust someone involves thinking that this person is trustworthy [2, 23, 34]. This implies a causal connection between trustworthiness and trust. Referring to Mayer et al. [2], the three characteristics of trustworthiness are ability, integrity and benevolence. In a dyadic relationship, one approach to understand why one party will hold a greater or lesser amount of trust for another party is to regard these characteristics of the trustee. Due to the notion of attributes and actions of the trustee, a higher or lower level of trust is brought towards this person [2]. Therefore, we constructed trust from a behavioral aspect in this study. Ability depicts the group of skills, competencies, and characteristics that enable the trustee to be perceived as qualified within some specific domain. Therefore, trust is domain specific, because the trustee may be an expert in one area whereas he displays little aptitude, knowledge or experience in another area. To give an example: Although a technician will receive trust on tasks related to his technical area, the same individual may not be trusted to perform tasks outside of his sphere of competence (e.g., initiate the contact to an important customer) [2]. Benevolence is the extent to which a trustee is believed to have a positive orientation towards the trustor, i.e., feeling
interpersonal care and concern, and the willingness to do good to the trustor beyond an egocentric profit motive. Benevolence suggests that the trustee has some specific attachment to the trustor, which, for example, causes the trustee to help the trustor, even though there is neither an obligation to do so nor an extrinsic reward [2]. Integrity involves the trustee’s perception that the trustee abides to a set of principles endorsed by the trustee. This means that the trustee must follow some set of principles and that these are also deemed acceptable by the trustor. Unless this is the case, a trustee would not be considered to have personal integrity from the standpoint of the trustor. For example, a trustee that commits solely to the principle of profit seeking at all costs would only be rated high in integrity if the trustor acknowledges this. Consistency of a party’s past actions, credible communication about the trustee from a third party, the belief that the trustee has a strong sense of justice, and the extent to which the party’s deeds correspond with his words, are all issues that influence the evaluation of a party’s integrity [2]. It is important to note that for the evolution of trustworthiness not the actual disposition of attributes of the trustee, but its perception by the trustor is essential [16]. Furthermore, the belief in another person’s trustworthiness does not necessarily imply that one will also trust this person, but the possibility exists.

Ability, benevolence and integrity are all essential components of developing trust. They are separable constructs, meaning that they can vary independently, but nevertheless related to each other [2]. Imagine a situation in which one party is low in ability and therefore needs the help of a specialist. The evaluation on both benevolence and integrity can nevertheless be high. Generally speaking, if ability, benevolence, and integrity were all perceived as high, the trustee would definitely be considered quite trustworthy. However, it is not necessary that he is rated high on all three trustworthiness dimensions to be trusted. Therefore trustworthiness can be thought of as a continuum, rather than the trustee being either trustworthy or not. This implies that the significance of each antecedent for the formation of trust may vary according to the situation [2]. To sum up, it can be said that there is a general consensus among researchers that trust is a critical element to any form of collaboration [2, 24, 26, 32]. In correspondence with teams, Duarte and Snyder [35] claim, “without trust, building a true team is almost impossible”. Recent research by Colquitt and colleagues [23] showed that the three characteristics of trustworthiness have a unique, significant influence on trust. To analyze the effect of trustworthiness and trust in the context of leadership, we developed a model in which the trustworthiness-characteristics of a leader are linked up with the development of trust in that leader in a virtual context. Therefore, we hypothesize the following:

\[ H_1: \text{Trustworthiness is positively related to trust in leadership.} \]

\[ H_{1a-c}: \text{Ability (a), integrity (b), and benevolence (c) are positively related to trust in leadership.} \]

### 2.2. The moderating Role of Virtuality

To understand the concept of trust in the context of virtual teams, it is necessary to develop a clear understanding of what constitutes such teams. As mentioned earlier, there are more people working in virtual teams than ever. Virtuality is even noted to be a potential characteristic of all teams [36]. Therefore, virtual teamwork is getting increasingly important nowadays, as they are an example for infinite networking, crossing geographical, temporal, functional, organizational and cultural boundaries [3]. For example, an increasing number of employees are co-working geographically dispersed [5, 37, 38]. These geographically separated networks, e.g. consisting of members from various countries, which are often apart by many miles or even continents, are trying to reach shared goals for the duration of a task [4]. Therefore communication and collaboration primarily is based on electronic communication media and technology, such as email, telephone and video conferencing [5, 37, 38] as there are flexible communication structures needed to allow an interaction between distributed individuals working across distance, time and culture [4, 39]. That means there is a reduced need to be co-located [1] as the collaboration with co-workers, supervisors and other employees of the company is mainly based on information and communication technologies (ICT). In fact, some participants may never meet face-to-face, even though they form a group across e.g. time zone differences [4]. Although virtual teamwork and computer-mediated networks have been a current topic in a lot of research and literature, it still seems to be difficult to describe and define what “virtuality” really means (i.e. [1]). While co-located teams have the choice whether and when to use technology, virtual teams don’t. They must communicate electronically. But not only the use of technology makes up a virtual team, there is also a range from slightly virtual teams to extremely virtual teams [37]. In other words, there is no single cut-off point at which a team becomes a virtual team, as virtual teaming can be described along a continuum of virtuality [3, 7, 36, 40]. Griffith and colleagues [36] state that team virtuality occurs when team members
spend time in any virtual context. This implies a lack of face-to-face meetings and therefore a lack of informational cues, which are present in other forms of communication. Fact is that technology plays an extensive role in the characterization of virtual work environments. ICTs are recognized to be the precursor of virtuality. Due to the lack of face-to-face interaction, the team members have to rely on them. So they have become integrated into virtual work processes [41]. Furthermore ICTs help to improve the flexibility required and to cope with the increasing dynamics of the new working conditions [42]. They also assist in overcoming hidden boundaries in the cooperation like geographic separation and cultural differences [1]. Nevertheless there are virtual teams along the virtuality continuum which avoid the use of advanced ICTs [37]. As already mentioned earlier, previous studies addressing virtual teams implied the importance of trust in virtual contexts [9]. At the same time the question remains whether the possibility of developing trust under the conditions of virtual teamwork is even given [11, 14]. For example Handy [11] said that “trust needs touch”, that means, that one can’t trust someone when never met in person before. This implies that it is problematic to trust people one doesn’t know well and hasn’t “observed in action over time” [11]. Furthermore there is a paradox relationship between virtuality and meeting someone in person. For instance, Naisbitt and Philips [43] described a positive relationship between technology and touch. The more people used technology, the more they wanted to spend time with other people. That means the more virtual the organization gets the more its’ people want to interact face-to-face [11, 43]. According to Lipnack and Stamp [4], trust has always been important within groups, especially for the success of virtual networks or teams. Even though trust seems to be difficult to develop in virtual settings (e.g., [11, 14]), some scholars suggest that trust, being an important component for virtual cooperation, can exist in virtual teams (e.g. [8, 10, 14]). Recent research actually confirmed the possibility of establishing trust in leaders in virtual teams [44]. It was found that trust is regardless of culture or international experience [14, 45]. However in previous research scholars came to the point that cultural diversity and trustworthiness of colleagues are significantly related to each other [46]. Virtuality consists of different vectors, such as working geographically dispersed, across distance, time and culture. It is important to understand this dimensionality in the context of the relationship between trustworthiness and trust and the relationship between trust and performance in virtual teams. For example, it would be useful for leaders to know, which performance-increasing actions they should implement in dependence of the degree of virtuality. Chudoba and colleagues [1] implemented an index of virtuality according to the attributes of virtual teams. For this study we derived a three-dimensional-construct out of this: team distribution (geographical), workplace mobility (temporal) and variety of cultural backgrounds (cultural). Due to the physical dispersion, which also brings along time differences, virtual teams in some cases communicate asynchronously. When team members have to work across different time zone, they often work at different working hours. Therefore cooperation gets more complex as work-coordination and shared activities become more complicated [47] This circumstance is captured in the temporal virtuality factor [1]. Geographical virtuality on the other hand stands for virtual teams working in different geographical locations (e.g., [1, 37]) like in different cities or countries. Cultural virtuality stands for the circumstance that virtual teams often include more members with different cultural backgrounds than co-located teams [1, 47]. Culture can be defined as “the collective programming of the mind that distinguishes the members of one group or category of people from another” [48]. One of the cultural issues is the language barrier [49]. So these are the three dimensions explaining when, where and how individuals of a virtual team work together. Referring to the previous section, which is based on the findings of scholars on the relationship between virtuality and trust, we suggest virtuality as a moderator of the relationship between trustworthiness and trust, which leads to the following hypothesis:

\[ H_2: \text{Virtuality moderates the relationship between trustworthiness and trust in leaders.} \]

Some challenges that came up with the emergence of virtual teams have already been mentioned (e.g. [3, 50]). Another one of them is the strengthened need to empower the members of virtual teams [40]. Thereby the leader should use empowerment tools, take over the role of a coach and be supportive of the team members. Furthermore, leaders have to trust their team members in making essential decisions [51]. Empowerment is a complex construct and closely associated with team effectiveness [51]. One of the four dimensions of empowerment is that team members experience autonomy for their work processes [51]. For example, team members are able to make important decisions without the explicit approval of their supervisor. Hence it is a motivational construct based on trust and is important for virtual teams and their tasks [40]. Therefore we argue that as in virtual teams more
operational tasks are given to the employees than in non-virtual teams, the leader’s ability plays a subordinated role with increasing virtuality. Based on the changed demands on management in virtual teams, we make the following assumption:

**H2a:** Virtuality moderates the relationship between ability and trust in leaders in such a way that it will weaken the positive impact of ability on trust the more virtuality is given.

In contrast, integrity and benevolence both play a superior role in virtual teams. This is because employees are operating multiple tasks and furthermore take over more personal responsibility due to the needed empowerment process explained in the upper section. Therefore we argue that it is important for them to trust that their leader stands behind them. This leads to the next two hypotheses:

**H2b:** Virtuality moderates the relationship between integrity and trust in leaders in such a way that it will strengthen the positive impact of integrity on trust the more virtuality is given.

**H2c:** Virtuality moderates the relationship between benevolence and trust in leaders in such a way that it will strengthen the positive impact of benevolence on trust the more virtuality is given.

2.4. Trust in Leadership as Predictor of Performance

As already mentioned, leaders need to be trusted by their followers because trust is the glue that binds the followers to the leader [52]. Since the publication of Mayer et al. [2], their construct of trust has been widely accepted and adopted in organizational research. In their model, trust is defined as “the willingness to be vulnerable” [2]. Extending this to the relationship between leaders and their team members, trust in the leader can be viewed as the willingness of team members to be vulnerable with reference to their leader. As explained earlier, we assume that the development of trust is at least partly based on perceptions of the trustee’s ability, integrity, and benevolence towards the trustee in the workplace. In other words, team members are more likely to trust their leader if they believe in his ability, integrity, and benevolence. Furthermore, trust is treated as a result of the social exchange process, which goes beyond standard economic exchange and develops the perception of mutual duties [53]. When team members believe that their leaders cannot be trusted, they are likely to feel psychologically distressed, which affects team members’ will being [54]. Therefore trust in the leader is associated with a higher performance in terms of higher levels of job satisfaction, and lower levels of perceived work stress and stress symptoms [54]. This is very important because leaders are responsible for many activities that have a significant impact on team members’ performance [55]. Team performance is defined as “the extent to which the productive output of a team meets or exceeds the performance standards of those who review and/or receive the output” [56]. Dirks [57] argues that when team members have established trust in their leaders, it “allows the team members to suspend their questions, doubts, and personal motives and instead throw themselves into working toward team goals”. On the other side, if team members feel that their leader is not worthy of their trust, they may divert attention from assigned activities and duties that contribute to the achievement of organizational goals [58, 59]. Consequently, it is asserted that once a trusting relationship has been established, team member’s trust in the authentic leader will increase their subsequent performance. More specific, it is argued that team members’ trust in their leaders is positively associated with in-role performance, which refers to activities that are related to employees’ formal role requirements [60]. Solely enacting leadership behaviors do not guarantee that team members will be satisfied or that they will be motivated to perform well, whereby general satisfaction describes whether team members are happy, contented and fulfilling their desires and needs at work [61]. Team members need to trust their leader in order to feel positive about the leader and to exert extra effort to perform effectively. If team members believe that the leader is not gravely concerned about their welfare, lacks integrity, or is incompetent, they will be unlikely to trust the leader and not motivated to fully cooperate with the leader thereby adversely affecting their performance. Trust in leaders is therefore important because it is an antecedent of risk-taking behavior [2]. In the early literature on organizational psychology [62-65], the significance of trust in leadership for effective teams and organizations is illustrated. Researchers have also begun to empirically examine the effects of trust in leadership on workplace outcomes including organizational citizenship behavior, information sharing, goal acceptance [66, 67], performance and satisfaction with the leader [57, 67]. Willems [68] found evidence that followers’ trust in leadership is positively associated with in-role performance. In summary, it can be stated that concerning the team level several authors argued that trust in leaders affects behavior and performance in virtual teams (e.g. [23, 44, 69, 70]). However, empirical research on the relationship between trust in the leader and
performance on the individual level in virtual contexts is limited. Therefore we took a closer look at trust in leaders and its consequences on employees’ in-role performance and their general satisfaction. This paper contends that employees, who built up trust in their leaders, will be more likely to reciprocate in terms of their in-role performance and general satisfaction. Consequently, it is hypothesized that there is a positive relationship between employees’ trust in the leader and both in-role performance and general satisfaction. This leads to the following hypotheses:

\[ H_3: \text{Trust in leaders is positively related to individual performance.} \]

\[ H_{3a-b}: \text{Trust in leaders is positively related to in-role performance (a) and general satisfaction (b).} \]

![Figure 1. The research model](image)

3. Method

3.1. Sample and Procedure

Our participants were a total of 121 people, of whom 44% were women and 56% men, working at least in parts virtually with their leader. In this context the leader is defined as a first line manager or direct supervisor. That means the virtual collaboration could be national or international and had to include other communication forms than face-to-face interaction, e.g. email, telephone, videoconference. The surveyed persons were 19 to 57 years old with an average age of 33 years (SD = 7.98). Concerning their employment status the majority of 82% worked in a full-time employment, 11% were self-employed, 7% were working students, 3% worked part-time and no one was temporary employed. As multiple choice answers were possible, the employment-answers do not add up to 100%. Because of the fact that our participants were distributed in several stations, mainly throughout Germany and Europe, data was collected using a web survey. Furthermore this method of collecting data renders the opportunity to reach internationally working people and to be completed asynchronously by the participants. As a pretest, the original survey was reviewed in the period of two days by nine persons to check the spelling and the structure of the questions. Respondents were asked to identify any item that was unclear or difficult to answer. The actual web survey was conducted in a period of two weeks in November. As the online-questionnaire was edited with Unipark (EFS Survey), a generated web survey-link was sent out to the participants by email. The form letter included the official requirements to take part in the study, as it was necessary to work at least in parts virtually with one’s leader. Furthermore the introductory page of the web survey included the basic information about the survey and summarized the prior conditions that were needed to participate. We contacted over 200 possible participants to complete the online questionnaires. Most of these participants were working acquaintances from various globally acting companies. We raffled an Apple TV and a 50€ Amazon voucher among all participants.

3.2. Measures

**Dependent Variables.** The Performance at work was measured in two ways: Firstly, with six items concerning the employees’ in-role performance derived from Turnley et al. [71]. And secondly with six items assessing the general satisfaction adapted from Neuberger and Allerbeck [61]. An example-item is “I fulfill all the responsibilities specified in my job description” and “How satisfied are you with your working conditions?”. Each item was measured on a five-point scale with responses ranging from “strongly disagree” to “strongly agree” for in-role performance and from “very unsatisfied” to “very satisfied” for general satisfaction. The operationalizations of performance had the following reliabilities: in-role (.746), general satisfaction (.879).

**Independent Variables.** The three dimensions of trustworthiness, ability (seven items), integrity (six items) and benevolence (five items) were used to evaluate the perceived trustworthiness of the leader by his followers. The items were derived from Mayer et al. [2] and altered slightly to reflect the context in our study. An example-item is “I feel very confident about my leader’s skills”. We measured the items with a five-point-scale from “strongly disagree” to “strongly agree”. Each of the three dimensions had very good reliabilities with the following Cronbach’s \( \alpha \): ability (.913), integrity (.846) and benevolence (.893). Trust was measured by three items derived from Brockner et al. [72] and again slightly altered to reflect the attendant context. An example-item is “I trust my leader to treat me fairly”. Each item was
measured on a five-point scale with responses ranging from “strongly disagree” to “strongly agree”. The reliability was Cronbach’s \( \alpha = .934 \). For measuring virtuality we used eight items to evaluate the three discontinuities derived from Chudoba et al. [1] and altered them slightly to reflect the working conditions with one’s leader. The participants replied on a five-point scale from “strongly disagree” to “strongly agree”. An example-item is “I collaborate with my leader in different sites or geographies”. As the results of a factor analysis revealed a different structure than the originally published three factor version by Chudoba et al. [1], we merged two of the three factors, namely cultural and temporal virtuality, to one factor called temporal/cultural virtuality. Additionally, one item of the original temporal virtuality scale had to be removed, as it did not match the same dimension. This can be explained by the different focus, which lay on the employee instead of on the leader. Furthermore, two items of the geographical virtuality scale were removed, as these items did not reflect the same dimension as the other ones, which focused on mobility. The two items measuring geographical virtuality had a reliability of Cronbach’s \( \alpha = .587 \). Temporal/cultural virtuality with its three items had a Cronbach’s \( \alpha = .826 \). 

**Control Variables.** We controlled for age and gender. Age was measured in years and gender was measured with two categories (female = 1, male = 2).

### 4. Results

In the following section results are reviewed. In all regression analysis age and gender were inserted as control variables, but did not show an effect at any time when entered with the rest of the hypothesized predictors. All analyses were conducted with an alpha-level of five percent; hence directional hypotheses were compared with \( p \leq .10 \). All analyses were conducted in IBM SPSS Statistics 19.0.0. H1 postulated that trustworthiness is positively related to trust in leadership that is to say that a higher trustworthiness of the leader goes hand in hand with higher trust in the leader. This hypothesis was further split up in three sub-hypotheses dedicated to the three sub-dimensions of the trustworthiness-construct. H1a supposed a positive relationship between ability of the leader and trust in the leader. H1b predicted a positive influence of integrity of the leader on trust and in H1c benevolence was assumed to positively influence trust in the leader as well. To test these assumptions a regression analysis on trust was performed, entering the three sub-dimensions of trustworthiness as independent variables. Age and gender were inserted as control variables. Results partly confirmed the hypothesized relationships.

Concerning H1b and H1c, the revealed pattern matched the predictions: Benevolence showed a positive, significant regression weight on trust, \( \beta_b = .503, t_b (119) = 7.225, p_b = .000 \) as did integrity, \( \beta_i = .413, t_i (119) = 5.696, p_i = .000 \). Ability on the other hand did not reach significance, \( \beta_a = .016, t_a (119) = .264, p_a = .792 \) (see Table 1). Neither age nor gender had a significant effect on trust, when entered together with the trustworthiness dimensions. When entered alone, age showed a significant, negative influence on trust, \( \beta_{age} = -.271, t_{age} (119) = -2.711, p_{age} = .008 \), while gender did not reach significance, \( \beta_{gender} = -.174, t_{gender} (119) = -1.746, p_{gender} = .083 \). In other words, these results show that the higher an employee assessed the benevolence of the leader, the higher was his trust in this leader. The same holds for integrity, stating that the perceived integrity of a leader enhances the trust towards the leader. Therefore H1b and H1c were not rejected. Concerning the ability of a leader, there was no such relationship, indicating that a leader’s ability does not significantly influence the trust brought towards him. H1a hence had to be rejected.

**Table 1. Hierarchical regression analysis between trustworthiness sub-dimensions and trust**

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SD B</th>
<th>( \beta )</th>
</tr>
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<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.031</td>
<td>.011</td>
<td>-.271***</td>
</tr>
<tr>
<td>Gender</td>
<td>-.320</td>
<td>.183</td>
<td>-.174</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.001</td>
<td>.006</td>
<td>-.008</td>
</tr>
<tr>
<td>Gender</td>
<td>-.030</td>
<td>.100</td>
<td>-.016</td>
</tr>
<tr>
<td>Benevolence</td>
<td>.537</td>
<td>.074</td>
<td>.503***</td>
</tr>
<tr>
<td>Integrity</td>
<td>.518</td>
<td>.091</td>
<td>.413***</td>
</tr>
<tr>
<td>Ability</td>
<td>.018</td>
<td>.069</td>
<td>.016</td>
</tr>
</tbody>
</table>

Note. \( R^2 = .061 \) for step 1; \( \Delta R^2 = .680 \) for step 2 (\( p < .00 \)).

*** \( p < .001 \); ** \( p < .01 \); * \( p < .05 \).

H2 stated virtuality to moderate the effect between trustworthiness and trust. Due to the three sub-dimensions of trustworthiness (ability, integrity and benevolence) the sub-hypotheses of H2 further developed the moderation effect for each trustworthiness dimension. Moderation analyses following Baron and Kenny [73] were conducted to test H2a, b and c. Therefore, trust was regressed on all three trustworthiness dimensions as well as on the interaction terms of each trustworthiness dimension.
with either geographical or temporal/cultural virtuality. Again, age and gender were entered as control variables. H2a predicted, the higher the level of virtuality between leader and employee, the less the leader’s ability influences the trust of the employee in that leader. H2a was partly supported by the data: While geographical virtuality turned out to significantly moderate the relationship between ability and trust, $\beta_g = -.130$, $t_g(119) = -1.878$, $p_g = .072$, the interaction term of ability and temporal/cultural virtuality did not receive a significant regression weight, $\beta_{t/c} = .026$, $t_{t/c}(119) = .510$, $p_{t/c} = .611$. A two-way interaction analysis [74] with geographical virtuality as a moderator partly supports the direction of H2a: The higher virtuality the more negative was the influence of ability on trust (figure 2).

Therefore a higher virtuality not only weakened the relationship between ability and trust, but even caused ability to have a negative effect on trust. T-statistics support this result: Participants, who worked under low geographical virtuality ($\leq$ median) trusted significantly more in a virtual leader with high ability ($>$ median) than in a virtual leader with low ability ($\leq$ median), $t(66) = 3.820$, $p = .000$. Participants of high geographical virtuality ($>$ median) significantly trusted less in a virtual leader with high ability ($>$ median) than in a virtual leader with low ability ($\leq$ median), $t(51) = 4.570$, $p = .000$. Therefore H2a was partly rejected. H2b stated the higher the level of virtuality between leader and employee, the more the leader’s integrity influences the trust of the employee in that leader. This hypothesis was not supported by the data: Neither the interaction term of geographical virtuality, nor the interaction term of temporal/cultural virtuality with integrity became significant, $\beta_{g} = -.054$, $t_{g}(119) = -.622$, $p_{g} = .566$, but temporal/cultural virtuality did moderate the relationship, $\beta_{t/c} = .136$, $t_{t/c}(119) = 1.819$, $p_{t/c} = .063$. A two-way interaction analysis with temporal/cultural virtuality as a moderator supports the direction of H2c: The positive influence of benevolence on trust increases with an increase in virtuality. Figure 3 visualizes this result. Again, t-tests support this result as the t-statistics of high ($>$ median) and low ($\leq$ median) benevolence is higher for high temporal/cultural virtuality, $t(70) = 6.885$, $p = .000$, than for low temporal/cultural virtuality, $t(47) = 4.197$, $p = .000$. An overview of the results can be seen in table 2. Hence, H2c was not rejected.

Table 2. Regression analysis for virtuality as a moderator

To operationalize performance two separate constructs were used. On the one hand the general satisfaction of the surveyed employees was assessed and on the other hand subjects were asked to rate their own in-role performance. The general hypothesis, H3, stated that trust in one’s leader has a positive influence on the performance of the led
employee, subdivided in H3a, which postulated a positive relationship between trust and the general satisfaction of the led employee, and H3b, which assumed a positive influence of trust on the employee’s in-role performance. To test H3a, a regression analysis on general satisfaction was conducted with trust as independent variable, entering age and gender as control variables. This relationship was supported by our data. The regression weight for trust on general satisfaction was positive and statistically significant, \( \beta = .648, t(119) = 9.103, p = .000 \) (see Table 3). Neither age nor gender had a significant effect on general satisfaction, once trust was entered into the regression analysis. When only age and gender were entered in the regression analysis with general satisfaction as dependent variable, age as well as gender showed a significant, negative effect on general satisfaction, \( \beta_{\text{age}} = -.202, t_{\text{age}}(119) = -2.008, p_{\text{age}} = .047 \) and \( \beta_{\text{gender}} = -.222, t_{\text{gender}}(119) = -2.208, p_{\text{gender}} = .029 \). These results indicate that an increased trust in the leader goes hand in hand with a higher general satisfaction of the led employee. Based on these results, H3a was not rejected.

### Table 3. Regression analysis for general satisfaction

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SD B</th>
<th>( \beta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.019</td>
<td>.009</td>
<td>-.202**</td>
</tr>
<tr>
<td>Gender</td>
<td>-.330</td>
<td>.149</td>
<td>-.222**</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.002</td>
<td>.007</td>
<td>-.026</td>
</tr>
<tr>
<td>Gender</td>
<td>-.162</td>
<td>.116</td>
<td>-.109</td>
</tr>
<tr>
<td>Trust</td>
<td>.525</td>
<td>.058</td>
<td>.648***</td>
</tr>
</tbody>
</table>

Note. \( R^2 = .050 \) for step 1; \( \Delta R^2 = .294 \) for step 2 (\( p < .00 \)).

\*** p < .001; ** p < .01; * p < .05.\

To analyze the validity of H3b, a regression analysis on in-role performance was performed, using trust in leader as independent variable and inserting age and gender as control variables. H3b was supported by the data. Trust received a significant, positive regression weight, \( \beta = .233, t(119) = 2.513, p = .013 \). Age and gender had no effect on in-role performance; neither with nor without trust as further predictor (see Table 4). This finding indicates that none of those two variables has a direct influence on the employee’s in-role performance. Increased trust in the leader however encourages the in-role performance of led employees. Therefore H3b could be maintained. Nevertheless the effect of trust on general satisfaction was stronger than on in-role performance.

### 5. Discussion

Considering the above reported results, this study brings to light several contributions. First of all the relationship between trustworthiness and trust as well as the relationship between trust in the leader and employees’ performance [23] were replicated in a virtual environment. Secondly we were able to provide evidence that the relationship between trustworthiness and trust is at least partly moderated by virtuality. Results revealed that, as stated in H1b and 1c, the benevolence as well as the integrity of a leader both positively influence the trust brought towards this leader by his followers. However, ability (H1a) did not have a significant influence on trust. This is interesting as ability, as well as benevolence and integrity, is a sub-dimension of the construct trustworthiness, which is supposed to be an antecedent of trust [75]. Taking the following considerations into account, this result is less surprising: Trust, according to Brockner and colleagues [72], focuses on rather soft aspects, that is, whether a leader treats his employees well and fairly. Hence, the ability of a leader cannot possibly play a significant role compared to the constructs integrity and benevolence, because the leader’s ability does not directly influence the employees’ well-being, while his integrity and benevolence do. Furthermore, with regards to H2, moderation analysis revealed that the relationship between benevolence and trust as well as between ability and trust were moderated by virtuality. More precisely the relationship between benevolence and trust (H2c) was moderated by temporal/cultural virtuality, while the relationship between ability and trust (H2a) was moderated by geographical virtuality. The relationship between integrity and trust (H2c) was not moderated by virtuality at all. These findings are interesting for several reasons, which shall be discussed in the upcoming section. With reference to benevolence, the results revealed that the positive influence of benevolence on trust gains in importance with an increasing temporal/cultural virtuality. Under low temporal/cultural virtuality, trust in the leader varies less in dependence of the leader’s benevolence than under high temporal/cultural virtuality, where trust in the leader varies strongly in dependence of his benevolence. These findings indicate the importance of perceived benevolence of the leader in a virtual context. As an employee, who works virtually with
his leader, has to take a pass on a lot of meta-
communication like gestures and facial expressions,
which are part of face-to-face communication, the
employee does not have the opportunity to interpret
informal signals of the leader. Therefore the
employee has to know with certainty that the leader
represents his interests, is supportive and stands
behind him in uncertain situations. Exactly these
features are captured in the construct of benevolence.
Only cultural/temporal virtuality moderates the
relationship between benevolence and trust. Trust
appears to be more difficult when different cultural
backgrounds are present. This can be explained with
the help of research on diverse cultures and the
findings that actions and non-actions have differing
meanings in different cultures (e.g. [76]). Therefore it
can easily happen between people with different
cultural backgrounds that misunderstandings arise
and as a result blind faith hampers. Interestingly,
virtuality did not influence the relationship between
integrity and trust at all. Having a closer look at the
definition of integrity, this result becomes
explainable. As explained earlier, the assessed
integrity of a trustee depends on the perception
whether the trustee has a similar sense of justice and
principles [2]. This assessment may be easier in non-
virtual contexts, but there is no obvious reason why
the perceived integrity should differ between virtual
and non-virtual contexts. Hence, it is reasonable that
there was no moderation found. H3 treated the
influence of trust in a leader on the employee’s
performance. The results indicate that the higher the
level of trust in a leader, the better is the employee’s
performance. Both measures showed a significant
positive relationship with trust. However, the
relationship between trust and general satisfaction
was stronger than the relationship between trust and
in-role performance. This result underlines the
powerful influence of trust on rather soft, as well as
rather hard performance measures. This research
assumed that participants did not meet face-to-face.
Research however claims that even teams that are
expected to work purely remote meet face-to-face
sometimes [77]. Future research should include this
in the analyses. Future research should investigate
the influence of integrity, benevolence and ability on
trust in virtual teams regarding the assessment of
colleagues instead of leaders. There, ability should
play a significant role in the prediction of trust.
Future research could also extend our results to other
performance data such as the external assessment of
the employees’ performance by their leaders or
colleagues or data on the profitability of the
economic entity.

6. References


