Exploring the Impact of Non-Verbal Cues on Trust and Creative Performance in Virtual Teams

Personal information

Luc Quaedackers
S1057205

Supervisors

Dr M.M. Weiss

Dr S.M. Ritter

Abstract

The surge in remote work recently has necessitated a greater reliance on virtual team collaboration, including creative tasks. As creativity drives innovation and is vital in a hyper-competitive environment, understanding how virtual teamwork impacts team creativity becomes essential. This study focuses on the role and impact of non-verbal cues on creativity and trust among team members in virtual environments. Advances in communication technologies have significantly improved the richness of virtual communication, sparking interest in studying the effects of non-verbal cues. An online experiment involving 34 groups of three participants was conducted, requiring completion of a creative task under conditions with and without non-verbal cues. The study revealed that non-verbal cues significantly influenced affective trust but not cognitive trust. Further, the absence of non-verbal cues significantly affected the creative performance of the groups. Interestingly, groups without access to non-verbal cues generated a higher fluency and uniqueness of ideas and increased novelty. However, the absence of non-verbal cues negatively influenced the perceived usefulness of ideas. Affective trust, although playing a role in mediating the impact of some creative performance indicators, did not uniformly influence all measures of creativity. The findings suggest that while different forms of trust might influence the creative performance of online teams, non-verbal cues have a more direct and substantial impact on creative performance. The study invites reconsideration of existing virtual team protocols and encourages a rethinking of established assumptions about trust and non-verbal cues in virtual creative collaboration.

Contents

Introduction

Background

Co-creation is crucial in various aspects of business, such as the development of new products and services, marketing strategies, and overall organizational growth (Ind & Coates, 2013; Priharsari et al., 2020). This is reflected by the large amount of research that has been done on innovation and creativity within teams (Abi Saad & Agogué, 2023; Anderson et al., 2014). The advancement of communication technologies has made virtual environments increasingly accessible, leading to a surge in online collaboration and the formation of virtual teams across organizations (Garro Abarca et al., 2020). While virtual teams offer numerous benefits like enhanced efficiency, flexibility, and the ability to tap into diverse and globally distributed talent (Dulebohn & Hoch, 2017), the impact on creativity, a vital component of co-creation, is underexplored (Reiter-Palmon et al., 2021). Creativity is critical for driving innovation in hyper-competitive environments (Abi Saad & Agogué, 2023; Dueholm Muller et al., 2013; Nemiro, 2016; Reiter-Palmon et al., 2021), and virtual work is becoming the new norm in how we work in the future (Abi Saad & Agogué, 2023). Therefore, understanding the influence of virtual teams on creative performance is crucial for organizations to strive within the new norm of work.

The COVID-19 pandemic had a profound impact on organizations worldwide and accelerated the adoption of virtual teams (Abi Saad & Agogué, 2023; Lund et al., n.d.). The COVID-19 pandemic has had overwhelming impacts on economies, organizations, and employees worldwide, forcing them to adapt to new ways of working (Ganesan et al., 2021; Tønnessen et al., 2021). Social distancing measures led to a significant increase in remote work, as companies sought to protect their employees and prevent further spread of the virus (Güner et al., 2020; Tønnessen et al., 2021). This shift towards remote work was made possible by digital tools like telecommunication and video conferencing, which have improved rapidly to make effective collaboration in virtual teams possible (Garro-Abarca et al., 2021). As a result, digital work methods have solidified their position as the new norm for many organizations, defining the future of work (Brem et al., 2021; Garro-Abarca et al., 2021; Savić, 2020; Tønnessen et al., 2021).

Given the rise in virtual teamwork and the likelihood of its continued prevalence in the future, understanding the influence of virtual teams on creative performance is critical for organizations that seek to thrive in ever-changing environments (Anderson et al., 2014; Dueholm Muller et al., 2013; Reiter-Palmon et al., 2021). While recent studies suggest an impact on creativity within virtual teams (Abi Saad & Agogué, 2023; Allen et al., 2015; Brucks & Levav, 2022; Gong et al., 2022), the reasons behind this effect remain under-explored (Abi Saad & Agogué, 2023; Allen et al., 2015; Gong et al., 2022). More comprehensive research is needed to find the underlying reasons behind this effect (Brucks & Levav, 2022; Reiter-Palmon et al., 2021). This knowledge gap presents a compelling opportunity for further exploration and has significant implications for organizational success in the increasingly digital world.

Several factors influence creative performance within teams. Trust plays a significant role in idea generation and co-creation processes (Allen et al., 2015; Brattström et al., 2012; Chen et al., 2021; Marlow et al., 2017) Although research on group trust is still limited, existing studies suggest a positive relationship between group trust and creativity (Chen et al., 2021; de Clercq et al., 2009). Trust enhances an individual's ability to share their knowledge with team members, which is necessary for a creative process (Koskinen et al., 2003). A creative process inherently involves the generation of new ideas, which can be risky. As a result, a certain level of trust is needed to bring forward new and potentially risky ideas (Brattström et al., 2012; Chen et al., 2021). Trust fosters psychological safety, enabling individuals to take risks and share information (Barczak et al., 2010; Carmeli & Spreitzer, 2009; Nemiro, 2016). However, establishing trust in virtual environments may be more challenging due to limitations in social context, personal interaction, and communication (Marlow et al., 2017; Tseng & Yeh, 2013). Considering these challenges, it is crucial to further explore how trust is affected in an online setting.

One key difference between online and face-to-face communication is the presence of non-verbal cues (Danton & Bushnell, 2023; Hall et al., 2019; Troje, 2023). Non-verbal cues play an essential role in communication and consist of body language, facial expressions, gestures, eye contact and other visual or auditory signals that convey a message without the use of words (Hall et al., 2019; Marlow et al., 2017; Riedl, 2022; Troje, 2023)   Non-verbal cues are mostly sent unconsciously but can still convey a message that impacts social relationships (Hall et al., 2019; Marlow et al., 2017; Troje, 2023). With non-verbal cues, observing the reaction without requesting the information is made possible, which increases communication effectiveness and adds nuance to the message (Gajadhar & Green, 2003; Marlow et al., 2017; Nemiro, 2016). This, in turn, can increase comfort among team members

(Bond-Barnard et al., 2018; Marlow et al., 2017). Although communication technology has advanced significantly, there remains a gap between face-to-face and virtual interactions (Brucks & Levav, 2022; Gilson et al., 2014). One example is that there is a lack of social presence, as not everything can be seen or felt (Bergiel et al., 2008; Nemiro, 2016). This can lead to adverse consequences of the group's ability to communicate (Danton & Bushnell, 2023). The lack of non-verbal cues may give rise to miscommunications and disruptions in dialogue, which can hinder the formation of trust and limit the creative output within virtual teams (Barczak et al., 2010; Danton & Bushnell, 2023; Marlow et al., 2017). However, the evolving landscape of technology is pushing the envelope of virtual communication, enabling us to explore new avenues to mitigate this challenge (Brem et al., 2021; Garro-Abarca et al., 2021; Tønnessen et al., 2021). With the present migration towards remote work and the growing reliance on virtual teams, gaining a more profound insight into the interpretation and perception of non-verbal cues in virtual environments, and their influence on trust and creative output, is not just intriguing but critically important for the sustainability of organizations in a rapidly digitizing world. With this backdrop, our study aims to navigate through these issues, dissecting the function of trust and non-verbal cues in bolstering creativity within virtual teams.

Research gap and objective

The existing literature on trust-building and creative performance within virtual teams has addressed that more research can be done on the role of non-verbal cues in shaping these processes (Marlow et al., 2017; Reiter-Palmon et al., 2021; Tseng & Yeh, 2013). The research gap, therefore, lies in understanding how non-verbal cues influence trust-building within virtual teams (Brattström et al., 2012; Chen et al., 2021) and how this, in turn, impacts their creative performance (Anderson et al., 2014; Reiter-Palmon et al., 2021). To address this research gap, the following research question has been formulated:

"How do non-verbal cues play a role in trust-building within virtual teams and their subsequent impact on creative performance?"

To provide a robust answer to this research question, an online experiment will be conducted with a sample of students and professionals. These participants will work on a creative task within virtual teams. This experimental approach allows us to examine the effects of non-verbal cues on trust and creativity in a controlled setting.

This study aims to make three key contributions to the understanding of trust-building and creative performance in virtual teams. First, by exploring the underexplored role of non-verbal cues in trust-building within virtual environments (Marlow et al., 2017; Tseng & Yeh, 2013). This will enhance the theoretical understanding of trust dynamics in virtual teams (Brattström et al., 2012; Chen et al., 2021)

Second, using an online experimental approach with a diverse sample. This will strengthen the methodological thoroughness of the field and lay the foundation for future empirical investigations (Anderson et al., 2014; Reiter-Palmon et al., 2021). Former studies have collected data on trust building in online settings (Brucks & Levav, 2022). However, this was not the main focus of the study.

Finally, the findings will have practical implications for organizations looking to optimize virtual teamwork (Garro-Abarca et al., 2021; Tønnessen et al., 2021). By identifying factors that enhance trust and creativity in virtual settings, this research can inform the design and management of virtual teams, helping organizations adapt more effectively to the ever-evolving landscape of remote work (Abi Saad & Agogué, 2023; Brem et al., 2021). Furthermore, these discoveries can be of assistance to organizations that are still adapting to remote or hybrid work arrangements, as not all businesses have fully embraced this new way of working (Danton & Bushnell, 2023). This study could serve as a catalyst to reevaluate existing virtual team protocols within companies. Firms like Atlassian and GitHub have devised rules and rituals to optimize remote collaboration, attributing their success in using online tools to these established practices (Goff-dupont, 2020; Treas & Farrer, n.d.). However, these claims have largely remained unchallenged. This study's findings may prompt a necessary review of these protocols in light of new insights.

Literature review

Creativity and innovation

It is important to understand the relationship between creativity and innovation within organizations, especially in today's world where technology changes and increasing competition have created an advantageous environment for these two aspects to become important contributors to organizational performance (Dess & Picken, 2000; Mumford & Hunter, 2005; Shalley et al., 2004). Creativity and innovation are connected parts of the same process, with creativity being the seed of innovation and described as the development of creative ideas (Anderson et al., 2014; Beesley & Cooper, 2008; Drazin et al., 1999; Hargadon

& Bechky, 2006; Mumford & McIntosh, 2017). Creativity is often associated with the stages of exploration, like idea generation and selection (Amabile & Pratt, 2016).

Simultaneously, innovation represents the successful execution of those creative ideas (Gaspersz, 2005), leading to the implementation and exploitation of them (Hülsheger et al., 2009). In this context, creativity can be seen as the path to invention, and innovation as the road from invention to success. The execution of novel ideas, products, and services, which typically underpin the competitive advantages and growth opportunities of numerous organizations, emphasizes the crucial role of creativity and innovation in maintaining a competitive edge in the market (Hon, 2012; Mehmood et al., 2022; Paulus & Dzindolet, 2008). This is because innovation can improve organizational performance, giving organizations a chance to gain a competitive advantage over their competitors. Although there is a growing focus on creativity and innovation within organizations and their operations (Paulus & Dzindolet, 2008), a trend that is also observed in government institutions, including the military (Kollars, 2017).

Creativity

Creativity is a complex phenomenon that plays a crucial role in driving innovation, growth, and societal development (Zhou & Hoever, 2014). In the dynamic business environment, the production of creative ideas has taken center stage, with a more in-depth understanding that captures a five-fold skill idea: fluidity (the capacity for generating numerous ideas), flexibility (the skill to conceive varied ideas), processing (the capability to encourage and enhance innovative ideas), originality (the talent for crafting unique ideas), and functionality (the aptitude for producing relevant and practical ideas) (Oldham & Cummings, 1996). Creativity is defined as the generation of novel and useful ideas, products, services, business models, work methods, or management processes (Zhou & Hoever, 2014). Various factors influence the development of creative ideas, such as individual differences, cognitive processes, and contextual influences (Barron & Harrington, 1981; Hennessey & Amabile, 2010; Madjar et al., 2011; Montag et al., 2012; Unsworth, 2001).

Factors influencing creativity

Recently, there has been a significant increase in academic exploration of various factors that could contribute to workplace creativity, indicating a growing focus on the research of creativity (Anderson et al., 2014; Reiter-Palmon et al., 2021; Shalley et al., 2004; Shalley & Gilson, 2004). Different meta-analyses have been conducted to examine the effects of different factors, like affect, rewards, stressors, and personality, on creativity (Baas et al., 2008; Byron et al., 2010; Byron & Khazanchi, 2012; Davis, 2009; Feist, 1998). In addition, psychological safety, and trust promotes creativity in a professional setting and thus have seen interest from different scholars (Dakhli & De Clercq, 2004; McAllister, 1995; Mehmood et al., 2022; Simons & Peterson, 2000). These studies provide valuable insights into the mechanisms underlying creativity and how to promote it in the workplace.

Organizational creativity

Organizational creativity, a specific aspect of creativity, refers to the generation of novel and useful ideas within an organizational context (Amabile, 1988; Anderson et al., 2014; Shalley et al., 2004). Creativity within organizations is crucial to keep developing in ever-changing environments and still be able to handle different challenges and create new competences (Abi Saad & Agogué, 2023; Barsh et al., 2008; Dueholm Muller et al., 2013; Nemiro, 2016; Reiter-Palmon et al., 2021). Research on organizational creativity investigates the role of individual and contextual factors in shaping creativity and how they interact (Woodman et al., 1993; Zhou & Hoever, 2014)

Team creativity

Team creativity refers to the generation of novel and useful ideas by individuals collaborating toward a common goal (Pirola-Merlo & Mann, 2004). Most creative work that gets done in organizations, will be done in groups of two or more (Hennessey & Amabile, 2010). Thus, this aspect of creativity is vital in modern organizations, as it facilitates the pooling of diverse perspectives, skills, and knowledge to generate innovative solutions (Amabile, 1988; Nemiro, 2010).

Research indicates that factors such as perceived expectations of creativity, task interdependence, and socializing can stimulate creative processes in teams (Shalley & Gilson, 2004). Team characteristics, including process skills, open sharing of information (Taggar, 2002), and learning behavior (Hirst et al., 2009), can positively impact individual creative performance. Group composition, such as cognitive diversity (Shin et al., 2012), also plays a role in team creativity.

Conversely, individual creativity and functional heterogeneity within a team can enhance the overall level of team creativity (Gong et al., 2022; Somech & Drach-Zahavy, 2013). By understanding and addressing the factors influencing team creativity, organizations can develop strategies to improve creative potential and drive innovation.

Online team creativity

The growing prevalence of virtual teamwork necessitates understanding the impact of online collaboration on team creativity (Abi Saad & Agogué, 2023; Reiter-Palmon et al., 2021). As businesses increasingly rely on digital tools and distributed talent, effective online collaboration becomes essential (Dulebohn & Hoch, 2017; Garro Abarca et al., 2020). This subsection explores the factors contributing to creative performance in virtual environments.

Research indicates that the type of communication media used is critical for fostering creativity in virtual teams (Grözinger et al., 2020). Video conferencing provides a more conducive environment for creativity compared to text-based communication, enabling online teams to perform comparably to face-to-face teams (Brucks & Levav, 2022; Grözinger et al., 2020). Moreover, dynamic, and positive leadership and frequent synchronous meetings strengthen team relationships and enhance creative performance (Fernandez, 2015).

However, virtual teams face challenges in building trust and psychological safety, which are vital for creativity (Han et al., 2017). Geographical dispersion may also impede the formation of personal connections, affecting creative collaboration (Edmondson, 1999; Nemiro, 2016). To optimize creativity in virtual work environments, organizations must address these challenges by selecting appropriate communication media, promoting effective leadership, and fostering trust and psychological safety among team members (Abi Saad & Agogué, 2023). By addressing these factors, businesses can harness the power of online collaboration to drive innovation in the increasingly digital world (Anderson et al., 2014; Dueholm Muller et al., 2013; Reiter-Palmon et al., 2021).

Trust

Concept of Trust

Trust is a complex social phenomenon that involves the willingness to rely on others, especially in situations of uncertainty and vulnerability (Mayer et al., 1995). It develops based on the belief that others will act in their best interest, fulfill their commitments, and behave in a reliable and predictable manner (Rousseau et al., 1998). Trust is essential for building and maintaining relationships, facilitating cooperation, and reducing transaction costs in various social and organizational contexts (Zaheer et al., 1998). Trust consists of both cognitive and affective components, which can influence individual and group behavior differently (Lewis & Weigert, 1985; McAllister, 1995)

Individual Trust

At the individual level, trust plays a crucial role in promoting cooperation, information sharing, and risk-taking (Mayer et al., 1995; McAllister, 1995). When individuals trust others, they feel more confident in sharing their ideas, knowledge, and resources, which can lead to innovation and learning (Dakhli & De Clercq, 2004; Simons & Peterson, 2000). Trust also encourages individuals to engage in creative risk-taking by providing a safe environment where they can experiment, and learn without fear of judgment or negative consequences (Edmondson, 1999). Moreover, cognitive trust, based on the rational assessment of another party's competence and reliability, can directly influence the willingness to share ideas and collaborate, thus affecting creativity (McAllister, 1995; Webber, 2008). In addition, trust can enhance individual motivation and commitment by creating a sense of psychological safety and support (Barczak et al., 2010; Carmeli & Spreitzer, 2009; Chen et al., 2021; Glaeser et al., 2000; Nemiro, 2016). A higher propensity to trust is associated with a greater likelihood of believing in others' good intentions, which can lead to increased commitment and engagement in collaborative activities (Glaeser et al., 2000)

Group Trust

Trust at the group level is essential for fostering collaboration, effective communication, and a positive team culture (Dirks & Ferrin, 2001; Webber, 2008). Trust among group members can reduce conflicts and enhance the overall quality of team interactions by promoting open communication, mutual understanding, and constructive feedback (Jehn, 1995; Simons & Peterson, 2000). Moreover, group trust can create a supportive and tolerant environment that encourages creativity and the exploration of new ideas (Carnevale & Probst, 1998; West & Anderson, 1996). High trust within a group can also mitigate the risk of opportunism and free riding, leading to a stronger commitment to collective goals and shared outcomes (Glaeser et al., 2000).

Impact of Trust on Creativity

While there is a consensus that trust is a crucial success factor in joint innovative developments, the literature on the effect of trust on creativity remains inconclusive (Chen et al., 2008; de Clercq et al., 2009; Taylor & Greve, 2006). On one hand, several studies suggest that trust can enhance creativity by fostering an open, supportive, and less competitive environment (Dakhli & De Clercq, 2004; Jehn, 1995; Simons & Peterson, 2000). Trust can enable team members to take risks, express their ideas, and engage in collaborative problem-solving, leading to increased innovation and learning (Taylor & Greve, 2006).

On the other hand, some research does not find a direct and positive impact of trust on creativity in teams (Chen et al., 2008; de Clercq et al., 2009). Despite the mixed evidence, it is clear that trust plays a vital role in shaping the dynamics of creative collaboration and can influence the success of joint developments in various ways (Brattström et al., 2012; Chen et al., 2021). Further research is needed to clarify the relationship between trust and creativity and to explore the underlying mechanisms and contextual factors that may moderate this relationship.

In conclusion, trust is a complex and multifaceted phenomenon that plays a critical role in promoting individual and group creativity in various social and organizational contexts. The impact of trust on creativity is shaped by cognitive and affective components, as well as individual and group-level dynamics. Understanding the various aspects of trust and their influence on creativity can provide valuable insights for enhancing collaboration, communication, and innovation in joint developments.

Non-verbal cues

Concept of non-verbal cues

Non-verbal cues are essential elements of communication that consist of body language, facial expressions, gestures, eye contact, and other visual or auditory signals that convey messages without the use of words (Hall et al., 2019; Marlow et al., 2017). In the light of this, facial expressions and body language play an important role in conveying emotional states (Meeren et al., 2005). These cues are usually transmitted unconsciously and can significantly impact social relationships and the effectiveness of communication (Marlow et al., 2017). Non-verbal cues add nuance to messages, allowing individuals to observe reactions without explicitly requesting information (Gajadhar & Green, 2003; Nemiro, 2016).

Effect of Non-verbal Cues

The role of emotional body language in communication is critical. Meeren et al. (2005) conducted an engaging experiment demonstrating that the judgment of facial expressions is significantly influenced by emotional body language. Non-verbal cues, including these emotional elements of body language, are essential in creating a comfortable environment among team members and enhancing the overall efficacy of communication (Bond-Barnard et al., 2018; Marlow et al., 2017). By providing additional contextual information, non-verbal cues reduce the likelihood of misinterpretation and ambiguity in messages. Moreover, when the face and body suggest contradicting emotional information, understanding facial expressions becomes difficult, often resulting in a bias towards the body language (Meeren et al., 2005). Such findings underline the significant role of non-verbal cues in improving task performance and nurturing effective team dynamics (Burgoon et al., 2002; Daft & Lengel, 1986).

Non-verbal Cues in a Virtual Setting

In a virtual setting, the lack of social presence may result in a reduced sense of connection and decreased information sharing among team members (Bergiel et al., 2008; Hogg & Reid, 2006; Nemiro, 2016). The restrictions of digital communication technologies can diminish the presence and effectiveness of non-verbal cues (Brucks & Levav, 2022; Gilson et al., 2014; Walther, 1992). This becomes particularly evident in a study by Martinez et al. (2016), where they determined that emotion recognition patterns differ when observing the face alone versus the body alone, with anger being more easily detected from body language. This can have profound implications in virtual meetings, where typically only faces are visible. The limited visibility could impair the accurate and quick perception of emotions, especially in high-stakes or conflict-prone situations where anger may become a factor, thereby exacerbating communication ambiguity and cognitive effort (Martinez et al., 2016; Riedl, 2022). However, recent advancements in communication platforms, such as Zoom, Slack, and Microsoft Teams, have introduced hybrid interaction approaches that include simultaneous text, audio, and video communication, partially addressing these challenges (Cheney et al., 2006; Jarvenpaa & Keating, 2021).

Hypotheses and conceptual model

The literature review presents the understanding that non-verbal cues, trust, and creative performance intertwine in a complex interaction within online team settings. Non-verbal cues play an essential role in communication, and significantly influence the creation of trust among team members (Marlow et al., 2017). It is further supported by the findings of Meeren et al. (2005) who concluded that emotional body language has a considerable effect on the interpretation of facial expressions. These findings have a significant role in improving task performance and nurturing effective team dynamics (Burgoon et al., 2002; Daft & Lengel, 1986). This intricate relationship between non-verbal cues and trust can lead us to our first hypothesis:

H_1: Non-verbal cues in a virtual setting have a positive effect on cognitive and affective trust.

Within the constraints of a virtual setting, these non-verbal cues gain increased significance due to the lack of physical proximity that may otherwise compromise the sense of connection and sharing (Bergiel et al., 2008; Hogg & Reid, 2006). Fortunately, recent technological advancements have enhanced the communicative power of non-verbal cues in virtual settings (Cheney et al., 2006; Jarvenpaa & Keating, 2021). This evolution in virtual communication has augmented the richness of information conveyed in virtual teams, which in turn creates a more favorable environment for information sharing and creating a sense of connection (Brucks & Levav, 2022; Gilson et al., 2014; Walther, 1992). Building upon the notion of enriched non-verbal communication in virtual environments, we propose our second hypothesis:

H_2: Non-verbal cues in a virtual setting have a positive effect on the creative performance of online teams.

Further exploration of the literature reveals that trust, whether cognitive or affective, plays a critical role in fostering collaboration, endorsing risk-taking, and boosting innovation within professional environments (Mayer et al., 1995; McAllister, 1995; Dakhli & De Clercq, 2004; Simons & Peterson, 2000). Hence, with the recognition of enhanced effectiveness of non-verbal cues in virtual teams, it is conceivable to assume that this might lead to a higher level of trust among virtual team members. Such trust then sets the stage for creative performance, acting as a psychological safety net that encourages risk-taking and idea generation (Zhou & Hoever, 2014). This leads to this study's third and hypothesis:

H_3: Perceived trust has a positive influence on the creative performance of online teams.

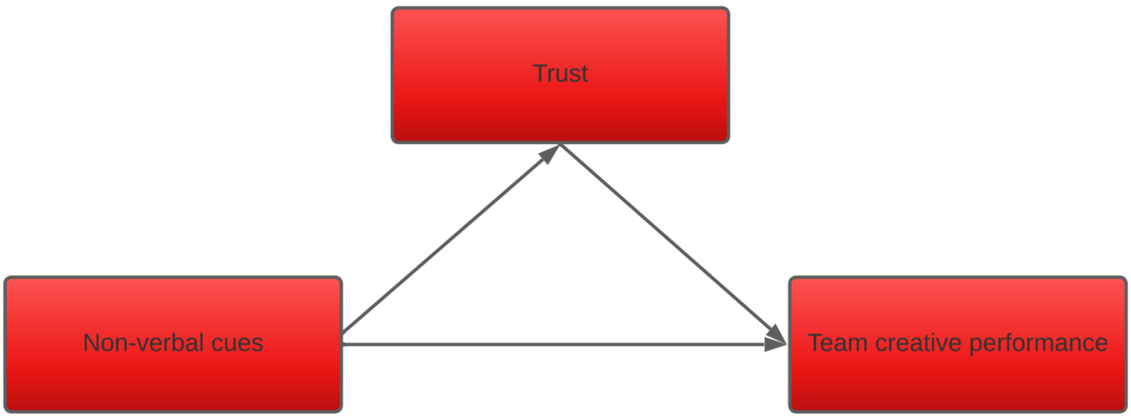
Taking all the hypotheses into account, there is the assumption that there would be an indirect positive effect of non-verbal cues on trust, which in turn has a positive effect on creative performance. Therefore, the last hypothesis is stated as:

H_4: There is a positive indirect effect of non-verbal cues on team creative performance through trust.

The conceptual model that guides this research can be found in Figure 1, draws from these hypotheses and interconnects these theoretical perspectives to create a visual.

Figure 1

Conceptual model



Methodology

Participants

The sample for this study will consist of students and professionals from various disciplines, who have experience working in virtual teams. The distribution of the teams was random, as participants could sign up for different time slots. A total of 102 participants finished the experiment, which resulted in a total of 34 teams. 15 teams contributed to the condition group (non-verbal cues absent) and 19 teams contributed to the control group (non-verbal cues present). Demographic details were collected and consolidated into a single table, offering an overview of the key characteristics of the participants across the two groups. The table can be found as table 1.

The composition of both groups primarily consists of males. In the Control group, participants typically hold bachelor’s degrees. In contrast, the Condition group presents a balanced mixture of HBO and master's degree holders. Both groups show a notable proportion of employed participants, with a smaller segment identifying as students.

There is a significant variety of nationalities in the Control group, with Greek being the most common after Dutch. The Condition group, on the other hand, solely consists of Dutch participants. The age of participants varies between groups, with the Control group displaying a wider range compared to the Condition group. These variations reflect the diverse backgrounds and characteristics of the study participants in each group.

Table 1

demographic

Measure	*Control group*	*Condition*
Age		
Mean	*30.88*	*28.80*
Std. deviation	*10.87*	*5.70*
Gender		
Male	*34*	*26*
Female	*23*	*19*
Third gender	-	-
Level of education		
High school	*12*	-
MBO	-	*7*
HBO	-	*17*
Pre-master	-	-
Bachelor WO	*31*	*3*
Master WO	*11*	*17*
PHD	*3*	-
HBO associate degree	-	
Employment status		
Student	*11*	*9*
Employed	*42*	*36*
Unemployed	*4*	-
Nationality		
Dutch	*3*	*45*
Greek	*34*	-
Austrian	*1*	-
Belgian	-	-
British	-	-
Indian	-	-
French	*1*	-
German	*11*	-
Polish	*1*	-
Portuguese	*5*	-
Turkish	*1*	-

Note. Control group n=57, Condition group n=45

Research Design

This study employs an online experimental design to investigate the role of non-verbal cues in trust-building within virtual teams and their subsequent impact on creative performance. The experimental design enables the manipulation of the independent variable (presence or absence of non-verbal cues) while controlling for others. The online setting allows for the control of experimental conditions and the measurement of the dependent variable (creative performance).

Procedure

The study starts with a virtual briefing, providing participants with an understanding of the research purpose and procedures. This is done with a standardized script that can be found in appendix 5. Following this, participants engage in two collaborative tasks within a 45-minute timeframe, either with non-verbal cues present or absent. The first activity is an icebreaker game, the moon survival task (Hall & Watson, 1970), introduced to foster familiarity among teams. The second, a creative task, challenges participants to generate new features for an existing desk chair design, serving as a measure of team creative performance.

The conditions dictate the communication tools that are present; the non-verbal cues present condition utilizes a video conferencing platform offering full interaction, while the alternate condition uses the same platform, excluding video, so that non-verbal cues are absent.

Upon completion of the tasks, participants fill out a survey assessing trust-perception. The creative output is then independently evaluated to provide an unbiased measure of creative performance. This structured approach ensures uniform experience and effective assessment of the research objectives.

Measures

In this study, 'Trust' was measured using an adapted version of McAllister's (1995) trust scale. The scale captures both cognitive and affective aspects of trust. Participants were asked to rate their level of agreement with the statements on a 7-point Likert scale. The specific items that were used can be found in appendix 2.

The measurement of affective trust consisted of four statements, which addressed the emotional bond with team members, the perceived level of care from teammates for the participant's well-being, their empathetic understanding of the participant's challenges, mutual support, and encouragement throughout the task. Cognitive trust was assessed via five statements that explored the confidence in teammates' skills and competence, the trust in their consistent performance and commitment, the perceived reliability and credibility of the information and ideas shared by team members, the belief in team members' decision-making capacities, and the uncertainty about the reliability of the information shared by teammates (with the latter statement reverse-scored).

Cronbach's Alpha was used to establish whether the components of the scale sufficiently intercorrelate that the grouped item measure the underlying variable. The results of the Cronbach's Alpha were higher than the threshold of .700, which means that the items are reliable.

Table 2

Cronbach's Alpha – Internal Reliability

Variable	Items	Cronbach's Alpha
Affective Trust	AFFCTV_TRST_1	.82
	AFFCTV_TRST_2	
	AFFCTV_TRST_3	
	AFFCTV_TRST_4	
Cognitive Trust	CGNTV_TRST_1	.78
	CGNTV_TRST_2	
	CGNTV_TRST_3	
	CGNTV_TRST_4	
	CGNTV_TRST_5_RC*	

Note. *Reversed coded item

This study measures creative performance on a team level using the outcomes of a collaborative task, reflecting findings from previous literature. Considerations include novelty, usefulness, creative fluency, and idea uniqueness (Shin & Zhou, 2003). 'Fluency' captures the generation of numerous ideas (Steinberg, 2007). 'Originality' signifies the uniqueness of an idea, a crucial characteristic of creative behavior. Teams receive points for unique ideas unmatched by other groups. The final two measures, 'perceived novelty' and 'perceived usefulness', align with the concept that creativity involves generating novel and useful ideas (Amabile, 1988; Hennessey & Amabile, 2010). Both measures receive ratings on a 1-5 scale, with 5 marking the highest score. To ensure consistent assessment of final creative outputs, additional evaluation is conducted by secondary and tertiary researchers within the thesis circle. When all creative outputs were assessed, the average novelty score and average usefulness score were used to evaluate the data.

Control variables

Every participant was required to fill out a survey. This survey incorporated assessment criteria to account for factors like age, gender, present circumstances, level of education, and nationality. Such factors are known to potentially influence the degree of creativity in virtual team settings (Martins & Shalley, 2011). Additionally, the survey collected information about whether the team members had any previous acquaintance with each other. A robustness test was performed to verify these findings, the results of which have been included as appendix 1.

Data Analysis

The analysis of the study's data was completed utilizing a combination of statistical methods. Descriptive statistics, as outlined by (Bos et al., 2002) were employed to summarize key sample attributes. Correlation analysis was conducted to scrutinize the relationships between the principal variables: trust, non-verbal cues, and creative performance, following the guidance of (Field, 2013)

Testing the hypotheses was also achieved through regression analysis, which allowed for detailed examination of the relationships between the dependent and independent variables. In this process, the study used the PROCESS macro in SPSS, for a nuanced exploration of direct, indirect, and conditional effects and interactions between variables (Hayes, 2021). This approach ensured a comprehensive understanding of the dynamics between trust, non-verbal cues, and creative performance.

Research ethics

In accordance with ethical research standards, participation in this study was entirely voluntary, and at no point were participants subjected to any physical or psychological discomfort. Participants were self-enrolled into scheduled study time slots. Before their engagement in the study, they were presented with a consent letter, the acceptance of which also served as a validation of their consent. The consent letter, modeled after a template provided by Radboud University, contained pertinent information regarding the confidentiality of research data, the voluntary nature of participation, and any compensation details. The letter of consent can be found in appendix 6.

Participants were also made aware of the video recording process that was to occur during the experimental session. This was done to ensure full transparency and obtain their explicit consent. All data collected during the study, including the video recordings, were stored confidentially and anonymously. The utmost care was taken to safeguard participants' privacy. As a further commitment to ethical research practice, all collected data were deleted upon completion of the report.

Results

Descriptive statistics

The descriptive statistics below provide a summary of the measurement statistics, the group statistics the correlation matrix. A total of 34 groups completed the online experiment, generating a dataset that facilitates the examination of the hypothesis.

Measurement statistics

The study measured affective trust, cognitive trust, creative fluency, unique ideas, average novelty, and average usefulness. Table 3 provides the overall descriptive statistics for these variables. Descriptive statistics were also analyzed for the control group (n=19) and condition group (n=15) separately, as seen in table 4

Table 3

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Affective Trust	34	3.42	6.75	5.54	.87
Cognitive Trust	34	4.00	6.93	5.77	.70
Creative fluency	34	8.00	67.00	28.44	13.59
Unique Ideas	34	.00	25.00	5.26	6.02
Average novelty	34	1.40	3.88	2.62	.69
Average Usefulness	34	2.63	3.80	3.24	.34
Valid N (listwise)	34				

Table 4

Group statistics

	Condition	Mean	Std. Deviation	Std. Error Mean
Affective Trust	Control	5.88	.68	.16
	Condition	5.12	.91	.23
Cognitive Trust	Control	5.79	.64	.15
	Condition	5.74	.79	.20
Creative Fluency	Control	23.37	10.82	2.48
	Condition	34.87	14.33	3.70
Unique Ideas	Control	3.16	4.65	1.06
	Condition	7.93	6.64	1.71
Average Novelty	Control	2.25	.65	.15
	Condition	3.08	.41	.10
Average Usefulness	Control	3.37	.35	.08
	Condition	3.08	.24	.06

Note. Control n=19, condition n=15

Correlation Matrix

The correlation matrix of all measured variables is shown in table 5. The data analysis revealed strong and significant relationships among several variables. The strongest correlation was observed between Creative Fluency and Unique Ideas ($r = .92$, $p < .01$), suggesting that higher levels of creative fluency are associated with a higher number of unique ideas. A moderately strong, significant positive relationship was also found between Unique Ideas and Average Novelty ($r = .67$, $p < .01$), indicating that as the uniqueness of ideas increases, so does their novelty.

However, not all significant correlations were positive. A strong negative relationship was found between Average Novelty and Average Usefulness ($r = -.85$, $p < .01$), implying that as novelty increases, usefulness tends to decrease. A similar pattern was found between Unique Ideas and Average Usefulness ($r = -.71$, $p < .01$), proposing that higher uniqueness might be linked to lower perceived usefulness. Lastly, Creative Fluency and Average

Usefulness also showed a significant negative correlation (r = -.59, p < .01), hinting at a possible trade-off between these two variables.

Table 5

Correlation matrrix

	Affective trust	Creative Fluency	Unique Ideas	Average Novelty	Average Usefulness
Affective Trust		.014	.16	-.12	.06
Creative Fluency			.92	.57	-.59
Unique Ideas				.67	-.71
Average Novelty					-.85
Average Usefulness					

*Note. **p < .01, * p < .05, N=34*

The impact of non-verbal cues on trust

Hypothesis 1 stated that non-verbal cues in a virtual setting have a positive effect on trust. To analyze this, two Analysis of Variance were conducted, one for each measure of trust. This statistical method is designed to examine the differences between two or more group means and is particularly beneficial when investigating the effects of different experimental conditions on a given variable (Hair et al., 2019). For each analysis, Levene's Test of Equality of Error Variances was conducted, the results can be found in Appendix 3. The effect of the control variables was also conducted in a robustness check, which can be found in appendix 1, there were no significant differences.

ANOVA for Cognitive trust

The effect of the experiment was measured for the control group (n=19, M=5.79, SD=0.64) contrasting the condition group (n=15, M=5.74, SD=0.79).

Table 6

Tests of Between-Subjects Effects
Dependent Variable: Cognitive Trust

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.019a	1	.02	.037	.85	.00
Intercept	1114.67	1	1114.69	2204.72	.00	.99
Condition Group	.02	1	.02	.04	.85	.00
Error	16.178	32	.51			
Total	1147.62	34				
Corrected Total	16.20	33				

a. R^2 = .00 (Adjusted R^2 = -.03)

However, the ANOVA revealed no significant effect of the condition group on cognitive trust ($p=0.85$, partial $\eta^2=0.00$). This result indicates that the ability to use non-verbal cues in a virtual setting did not significantly influence the level of cognitive trust among team members, accounting for 0.0% of the variance in cognitive trust scores between groups.

ANOVA for Affective trust

For affective trust, descriptive statistics revealed a higher mean score in the control group ($M=5.88$, $SD=0.68$) compared to the condition group ($M=5.12$, $SD=0.91$).

Table 7

Tests of Between-Subjects Effects
Dependent Variable: Affective Trust

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4.85a	1	4.85	7.80	.01	.20
Intercept	1013.13	1	1013.13	1631.02	.00	.98
Condition Group	4.85	1	4.85	7.81	.01	.20
Error	19.88	32	.62			
Total	1068.87	34				
Corrected Total	24.23	33				

a. R^2 = .20 (Adjusted R^2 = .17)

Importantly, the ANOVA revealed a significant effect of the condition group on affective trust ($p=0.01$, partial $\eta^2=0.20$). This finding suggests that the ability to use non-verbal cues in a virtual setting had a significant influence on the level of affective trust among team members, accounting for approximately 20.0% of the variance in affective trust scores between groups.

Testing Hypothesis 1

In conclusion, the role of non-verbal cues availability in a virtual setting appears to have significantly affected affective trust but not cognitive trust. Therefore, hypothesis H_1 is partially supported.

The impact of Non-verbal cues on creative performance

For the examination of Hypothesis 2, concerning the role of non-verbal cues in shaping creative performance, the instrument of choice was also Analysis of Variance. This approach was implemented on all the creative performance variables: Creative Fluency, Unique Ideas, Average Novelty, and Average Usefulness.

The chosen technique offered insights into the degree of influence of non-verbal cues, introduced through videoconferencing, on creative output during cooperative tasks. To maintain statistical integrity, the premise of homogeneity of variances was validated for each measure using Levene's Test for Equality of Error Variances. These results can be found in Appendix 3. The effect of the control variables was also conducted in a robustness check, which can be found in appendix 1, there were no significant differences.

ANOVA for Creative Fluency

The Creative Fluency scores of the control group (with non-verbal cues) and the condition group (without non-verbal cues) were compared. The control group showed a lower mean Creative Fluency (M = 23.37, SD = 10.82) than the condition group (M = 34.87, SD = 14.34). The ANOVA results highlighted a significant effect of the experimental condition on Creative Fluency (p = .012), making up 18.0% of the variation.

Table 8

Tests of Between-Subjects Effects
Dependent Variable: Creative fluency

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1108.23a	1	1108.23	7.11	.01	.18
Intercept	28427.29	1	28427.29	182.44	.00	.85
Condition Group	1108.23	1	1108.23	7.11	.01	.18
Error	4986.15	32	155.82			
Total	33597.00	34				
Corrected Total	6094.38	33				

a. R^2 = .18 (Adjusted R^2 = .15)

This suggests that prohibiting the use of videoconferencing significantly increased the number of distinct ideas produced by the participants, accounting for about 18.0% of the variance in Creative Fluency.

ANOVA for Unique Ideas

The effect on the number of Unique Ideas was also examined. The control group generated fewer Unique Ideas (M = 3.16, SD = 4.65) compared to the condition group (M = 7.93, SD = 6.64). The ANOVA results displayed a significant effect on the number of Unique Ideas produced ($p = .02$), explaining 16% of the variance.

Table 9

Tests of Between-Subjects Effects

Dependent Variable: Unique Ideas

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	191.16a	1	191.16	6.08	.02	.16
Intercept	1031.16	1	1031.16	32.82	.000	.51
Condition Group	191.16	1	191.16	6.08	.02	.16
Error	1005.46	32	31.42			
Total	2139.00	34				
Corrected Total	1196.62	33				

a. $R^2 = .16$ (Adjusted $R^2 = .13$)

This indicates that without the use of videoconferencing, the number of unique ideas that were produced by the groups significantly increased, explaining approximately 16% of the variance in Unique Ideas.

ANOVA for Novelty score

When looking at the novelty score, the condition group demonstrated a higher Average Novelty (M = 3.08, SD = 0.41) than the control group (M = 2.25, SD = 0.65). The ANOVA pointed out a significant impact of the condition on Average Novelty (, $p < .00$), accounting for 37.0% of the variance.

Table 10

Tests of Between-Subjects Effects
Dependent Variable: Average novelty

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5.82a	1.00	5.82	18.74	.00	.37
Intercept	237.92	1.00	237.92	765.99	.00	.96
Condition group	5.82	1.00	5.82	18.74	.00	.37
Error	9.94	32.00	.31			
Total	248.22	34.00				
Corrected Total	15.76	33.00				

a. R^2= .37 (Adjusted R^2 = .35)

This implies that the condition group had significantly increased the novelty of ideas generated by the participants, accounting for approximately 37.0% of the variance in Average Novelty.

ANOVA for Usefulness score

Finally, the effect on the Average Usefulness was investigated. The control group had a higher mean Average Usefulness score (M = 3.37, SD = 0.35) compared to the condition group (M = 3.08, SD = 0.24). The ANOVA showed the experimental condition significantly impacted Average Usefulness (p = .010), explaining 19.0% of the variance.

Table 11

Tests of Between-Subjects Effects
Dependent Variable: Average Usefulness

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.72[a]	1	.72	7.60	.01	.19
Intercept	348.45	1	348.45	3668.67	.00	.99
Condition_L_mean	.72	1	.72	7.61	.01	.19
Error	3.04	32	.10			
Total	360.90	34				
Corrected Total	3.76	33				

a. R^2 = .19 (Adjusted R^2 = .17)

This suggests that prohibiting the use of videoconferencing significantly decreased the perceived usefulness of the ideas produced by the participants, accounting for about 19.0% of the variance in Average Usefulness. Thus, the results indicate that the lack of videoconferencing negatively influenced the usefulness of the ideas generated in this context.

Testing Hypothesis 2

The results provide partial support for Hypothesis 2, suggesting that the absence of non-verbal cues had a significant impact on the creative performance of the groups. Interestingly, the condition without videoconferencing led to a higher fluency of ideas (M = 34.87 vs. M = 23.37), more unique ideas (M = 7.93 vs. M = 3.16), and increased novelty (M = 3.08 vs. M = 2.25).

However, the absence of non-verbal cues was not entirely beneficial for the creative performance. While it appeared to enhance the quantity and novelty of ideas, it seemed to adversely affect the perceived usefulness of the ideas generated, with a lower mean usefulness score reported (M = 3.08 vs. M = 3.37).

In summary, these findings support the hypothesis that non-verbal cues impact creative performance. However, the direction of the effect differs depending on the specific aspect of creative performance being considered.

The impact of cognitive trust on creative performance

The mediation analysis was conducted using PROCESS macro (Hayes, 2021). Model 4 was used, in which cognitive trust and later affective trust was positioned as the mediator between the experimental condition and the creative performance variables. The results of Cognitive Trust as a mediator can be found in table 12. The model summary in appendix 4 indicates that the overall models that were used are statistically significant. The effect of the control variables was also conducted in a robustness check, which can be found in appendix 1, there were no significant differences.

Table 12

PROCESS macro (model nr.4) mediation analysis Cognitive Trust

Relationship	*Total Effect*	*Direct Effect*	*Indirect Effect (Cognitive Trust)*	*95% CI Total Effect*	*95% CI Direct Effect*	*95% CI Indirect Effect*	*t Total Effect*	*t Direct Effect*
Cognitive Trust -> Condition -> Creative fluency	*11.50*	*11.88*	*-0.38*	*[2.72, 20.28]*	*[3.91, 19.84]*	*[-4.94, 3.67]*	*2.67*	*3.04*
Cognitive -> Condition -> Unique Ideas	*4.78*	*4.97*	*-0.20*	*[0.83, 8.72]*	*[1.57, 8.38]*	*[-2.31, 1.83]*	*2.47*	*2.98*
Cognitive -> Condition -> Novelty	*0.83*	*0.84*	*-0.01*	*[0.44, 1.23]*	*[0.44, 1.23]*	*[-0.09, 0.12]*	*4.33*	*4.33*
Cognitive ->Condition -> Usefulness	*-0.29*	*-0.30*	*0.01*	*[-0.51, -0.08]*	*[-0.51, -0.09]*	*[-0.07, 0.07]*	*-2.76*	*-2.85*

Note. Level of confidence for all confidence intervals in output: 95,0000. Number of bootstrap samples for percentile bootstrap confidence intervals: 5000

Creative Fluency

The absence of non-verbal cues (condition group) has a significant impact on creative fluency (b = 11.88, p = .01), and cognitive trust within the group also significantly influences creative fluency (b = 7.98, p = .01). However, it appears that the presence or absence of non-verbal cues (condition) does not significantly affect cognitive trust in the group (b = -0.05, p = .849). The total impact of the condition (presence or absence of non-verbal cues) on creative fluency is significant (b = 11.50, p = .012). This implies that whether a group can use non-verbal cues influences their creative fluency, regardless of the level of cognitive trust. The indirect effect of the condition group on creative fluency via cognitive trust is -0.38, indicating a slight decrease in the influence of the condition variable on creative fluency when cognitive trust is considered. However, considering the non-significant relationship between cognitive trust and the condition variable, this effect might not be significant.

Put simply, participants who couldn't use non-verbal cues tended to exhibit greater creative fluency compared to those who could, but the cognitive trust within the groups did not seem to significantly mediate this relationship.

Unique Ideas

Whether the groups had access to non-verbal cues or not significantly influences the number of unique ideas produced ($b = 4.97$, $p = .006$). Additionally, cognitive trust within the groups also has a significant effect on the number of unique ideas ($b = 4.18$, $p = .002$). Nevertheless, cognitive trust doesn't seem to be significantly affected by whether the groups could use non-verbal cues or not (condition) ($b = -0.05$, $p = .85$). The overall effect of the presence or absence of non-verbal cues (condition) on unique ideas remains significant ($b = 4.78$, $p = .02$), indicating that this impact is present regardless of the mediating effect of cognitive trust. The indirect effect of the condition variable on unique ideas, through cognitive trust, is -0.20. It suggests a slight reduction in the influence of non-verbal cues on the number of unique ideas when cognitive trust is considered. However, given the non-significant relationship between cognitive trust and the condition variable, this reduction may not be meaningful.

Groups with access to non-verbal cues tend to generate a higher number of unique ideas compared to those without access, but the level of cognitive trust within the groups does not seem to play a significant mediating role in this relationship.

Novelty Score

The presence or absence of non-verbal cues (condition) significantly affects novelty scores ($b = .84$, $p = .000$). However, cognitive trust within the group does not significantly influence these novelty scores ($b = .11$, $p = .44$). Once more, it appears that cognitive trust is not significantly influenced by whether the groups could use non-verbal cues or not (condition) ($b = -0.05$, $p = .85$). The total impact of the presence or absence of non-verbal cues (condition) on novelty scores is significant ($b = .83$, $p = .000$), suggesting that this effect is present regardless of the level of cognitive trust. The indirect effect of the condition group on novelty scores via cognitive trust is -0.01. However, given the non-significant relationship between cognitive trust and both the condition group and novelty scores, this indirect effect may not be consequential.

In other words, groups without access to non-verbal cues tend to yield higher novelty scores compared to those with such access, but the cognitive trust within the groups does not seem to play a significant mediating role in this outcome.

Usefulness Score

The presence or absence of non-verbal cues (condition variable) significantly influences the perceived usefulness scores ($b = -.30$, $p = .008$). In contrast, the level of cognitive trust within the group does not significantly predict the perceived usefulness scores ($b = -.11$, $p = .16$). As seen in the previous analyses, the level of cognitive trust doesn't appear to be significantly impacted by whether the groups could use non-verbal cues or not (condition variable) ($b = -0.05$, $p = .85$). The overall effect of the presence or absence of non-verbal cues (condition variable) on perceived usefulness scores is significant ($b = -.29$, $p = .01$). This implies that this effect persists irrespective of the level of cognitive trust. The indirect effect of the condition variable on perceived usefulness scores via cognitive trust is 0.01. However, given the non-significant relationship between cognitive trust and both the condition variable and usefulness scores, this indirect effect might not be consequential.

Thus, groups without access to non-verbal cues tend to receive lower perceived usefulness scores compared to those with such access, but the cognitive trust within the groups does not seem to play a significant role in mediating this outcome.

The impact of affective trust on creative performance

To explore the impact of affective trust on creative performance, the following PROCESS macro results were used, which can be found in table 13. The model summary in appendix 4 indicates that the overall models are statistically significant.

Table 13

PROCESS macro (model nr.4) mediation analysis Affective Trust

Relationschip	Total Effect	Direct Effect	Indirect Effect	95% CI Total Effect	95% CI Direct Effect	95% CI Indirect Effect	t Total Effect	t Direct Effect
Affective Trust -> Condition -> Creative Fluency	11.50	14.51	-3.01	[2.72, 20.28]	[4.86, 24.16]	[-9.02, 3.64]	2.67	3.07
Affective Trust -> Condition -> Unique Ideas	4.78	7.02	-2.24	[0.83, 8.71]	[2.95, 11.09]	[-5.47, 0.35]	2.47	3.52
Affective trust ->Condition -> Novelty	0.83	0.95	-0.12	[0.44, 1.23]	[0.52, 1.38]	[-0.30, 0.06]	4.33	4.46
Affective Trust -> Condition -> Usefulness	-0.29	-0.34	0.05	[-0.51, -0.08]	[-0.59, -0.10]	[-0.04, 0.15]	-2.76	-2.89

Note. Level of confidence for all confidence intervals in output: 95,0000 Number of bootstrap samples for percentile bootstrap confidence intervals: 5000

Creative fluency

The absence of non-verbal cues (condition) significantly impacts creative fluency (b = 14.51, p = .00). Additionally, affective trust within the group is a significant but weaker predictor of creative fluency (b = 3.96, p = .16). The overall effect of the presence or absence of non-verbal cues (condition) on creative fluency is also significant (b = 11.50, p = .01), indicating that this effect exists irrespective of the mediator (affective trust). The indirect effect of the condition group on creative fluency through affective trust is -3.01, suggesting a suppression effect. This means that the impact of the absence of non-verbal cues (condition group) on creative fluency is actually stronger when affective trust is not considered.

Unique ideas

In this case, both the absence of non-verbal cues (condition variable) (b = 7.02, p = .00) and affective trust (b = 2.95, p = .02) are significant predictors of unique ideas. The total effect of the presence or absence of non-verbal cues (condition) on unique ideas is significant (b = 4.78, p = .02), and the indirect effect of the condition group on unique ideas through affective trust is -2.24. This indicates that the positive effect of the absence of non-verbal cues on unique ideas is diminished when considering affective trust.

These results suggest that while both the absence of non-verbal cues and affective trust can independently enhance creative performance (measured by creative fluency and the generation of unique ideas), affective trust seems to suppress the relationship between the absence of non-verbal cues and these measures of creative performance.

Novelty score

The group with access to non-verbal cues (condition) significantly influenced novelty scores (b = .95, p = .00). On the other hand, affective trust significantly failed to predict novelty scores (b = .15, p = .23). The total effect of access to non-verbal cues (condition) on novelty score is significant (b = .83, p = .00), indicating an effect regardless of the mediator (affective trust). The indirect effect of access to non-verbal cues (condition) on novelty score through affective trust is -0.12, suggesting that the positive influence of access to non-verbal cues on novelty score is slightly reduced when considering affective trust. This implies that participants with access to non-verbal cues generally assessed their ideas as more novel compared to the control group, an effect slightly moderated by the level of affective trust.

The results suggest that, while the presence of non-verbal cues directly improves novelty of ideas, the role of affective trust is more complex. Affective trust does not significantly predict novelty scores, and its inclusion slightly reduces the positive effect of non-verbal cues on novelty.

Usefulness Score

The absence of non-verbal cues (condition) is a significant predictor of usefulness score (b = -0.34, p = .01). Conversely, affective trust does not significantly predict usefulness score (b = -0.07, p = .35). The overall effect of the absence of non-verbal cues (condition) on usefulness score is significant (b = -0.29, p = .01), implying an effect regardless of the mediator (affective trust). The indirect effect of the absence of non-verbal cues (condition) on usefulness score through affective trust is 0.05, indicating that the impact of the absence of non-verbal cues on usefulness score is weaker when considering affective trust.

Put simply, participants lacking access to non-verbal cues generally had their ideas rated as less useful compared to the control group, and this effect was somewhat lessened when factoring in the level of affective trust.

Testing hypothesis 3

In the context of Hypothesis 3, the proposed relationship centered around perceived trust and its potential positive influence on the creative performance of online teams. This investigation unfolded through the lens of two different forms of trust: cognitive and affective. Results showed a consistent pattern across all creative performance measures—creative fluency, unique ideas, novelty score, and usefulness score. However, cognitive trust within the groups did not significantly mediate these relationships. Despite the clear correlation between cognitive trust and creative performance, it had no significant influence on the relationship between non-verbal cues and creative performance in online teams. Consequently, cognitive trust's context offers only partial support to Hypothesis 3. In contrast, affective trust demonstrated less consistency in its effects. In terms of creative fluency and the generation of unique ideas, affective trust appeared to suppress the impact of non-verbal cues, indicating a stronger effect when affective trust wasn't factored in. Affective trust, while present, did not significantly predict novelty scores or usefulness scores.

In summary, though trust may play a role in online team creative performance, its influence as a significant mediating factor remains unclear. Therefore, both cognitive and affective trust contexts only offer partial support to Hypothesis 3.

Testing Hypothesis 4

Hypothesis 4 proposed a positive indirect effect of non-verbal cues on team creative performance through trust. However, findings revealed that trust's mediating role—both cognitive and affective—was inconsistent across all measures of creative performance. Non-verbal cues indeed had a significant impact on creative performance. However, when factoring in trust, the impact exhibited less uniformity. For creative fluency and unique ideas, the introduction of affective trust reduced the impact of non-verbal cues. Similarly, while non-verbal cues significantly influenced novelty scores, the same could not be said for affective trust.

These patterns suggest a more direct impact of non-verbal cues on creative performance, with trust not uniformly mediating this impact. Thus, Hypothesis 4 receives only partial support: while non-verbal cues can influence creative performance, their effects are not consistently mediated through trust. This suggests that non-verbal cues have a more direct, significant effect on online team creative performance.

Discussion

Theoretical implications

The study's findings offer a layered view of hypothesis 1, highlighting how non-verbal cues distinctly affect affective trust, but not cognitive trust. Echoing previous research (Marlow et al., 2017; Bond-Barnard et al., 2018; Daft & Lengel, 1986), affective trust benefits from emotional body language, reinforcing a positive team climate. However, a departure from traditional theories is evident in the non-impact of non-verbal cues on cognitive trust. While these cues are often linked to perceived reliability and competence, their significance diminishes in virtual settings. In these environments, trust is more heavily influenced by other factors such as consistent action, timely communication, and demonstrated expertise (Purvis et al., 2001). Reflecting this shift, Stachl et al. (2020) propose a focus on alternate trust indicators, like digital footprints, particularly relevant to the virtual context.

The findings that contradict Hypothesis 2 present an intriguing rethinking of creative performance dynamics in virtual environments. Rather than diminishing creativity, the absence of non-verbal cues appears to enhance it, a development that departs from conventional understandings and challenges well-established beliefs. This boost in creativity could be attributed to an environment of perceived anonymity that the absence of non-verbal cues creates (Chang, 2011; Gong et al., 2022). Recent studies, such as those by Bae, (2016), suggest that this perceived anonymity could alleviate fears of judgement or criticism, often acting as barriers to the free expression of ideas. Thus, participants are empowered to delve into more unique and novel thoughts, driving creative performance. These findings echo the Media Synchronicity Theory (MST), proposed by (Dennis et al., 2008), which asserts that teams undistracted by non-verbal symbols can concentrate more intently on the task at hand, potentially enhancing creative outcomes. MST's implications are increasingly recognized in virtual collaborations, a point emphasized by Lowry & Gaskin, (2014). A potential explanation for these observations can be found in the modern interpretation of the Social Presence Theory, where a reduction in non-verbal cues may alleviate cognitive overload, freeing mental resources for innovative thinking (Ho & McLeod, 2008). This cognitive liberation may enable participants to use text-based communication tools more effectively, allowing for reflective thought and careful formulation of ideas (Tidwell & Walther, 2002).

This reflective space could stimulate the generation of more profound and novel ideas and foster richer, more constructive feedback.

Hypothesis 3 suggests that perceived trust influences the creative performance of online teams, yet the results provide only partial support to this proposition. Both cognitive and affective forms of trust were investigated. While the cognitive trust-creativity correlation was present, cognitive trust did not significantly mediate the impact of non-verbal cues on creative performance, a departure from theories advocating its direct influence on collaborative tendencies (McAllister, 1995; Webber, 2008). Conversely, affective trust's influence was less consistent. It appeared to suppress the impact of non-verbal cues on creative fluency and the production of unique ideas, echoing Langfred's (2004) proposition that excessive trust may stifle individual initiative. However, it did not significantly predict novelty or usefulness scores, complicating theories that link trust to enhanced creativity (Chen et al., 2008; de Clercq et al., 2009). The patterns observed suggest a complex role of trust in creativity, where factors such as task complexity or team composition may play a part.

As for Hypothesis 4, it proposed that non-verbal cues positively influence team creative performance indirectly through trust. Despite this, the results reveal that the role of trust as a mediator is not consistent across all creative performance measures. Non-verbal cues significantly impacted creative performance; however, this impact was not uniformly mediated by trust. In fact, the introduction of affective trust appeared to decrease the effect of non-verbal cues on creative fluency and unique idea generation. These observations suggest a more direct impact of non-verbal cues on creative performance, challenging the notion that trust invariably mediates this effect. Thus, while non-verbal cues influence creative performance, their effects do not always run through trust, suggesting a more direct, significant effect on online team creative performance. This reinforces the idea that trust's emotional aspects shape the social environment (Palanski et al., 2011) and its role in creativity is likely nuanced and context dependent.

Managerial implications

This study offers invaluable perspectives for leaders aspiring to enhance creative performance within their virtual teams, challenging the prevailing belief in the necessity of non-verbal cues for fostering trust and creativity (Marlow et al., 2017; Bond-Barnard et al., 2018; Burgoon et al., 2002). Contrasting the theoretical framework that ties non-verbal cues with cognitive and affective trust enhancement (H_1) and subsequent creative performance improvement (H_2), the data reveal an intriguing counter-narrative—the apparent absence of non-verbal cues contradicting appears to increase creativity.

Such insights prompt a reconsideration of the reliance on videoconferencing tools for virtual collaboration. Instead of strictly using these “rich” media, experimenting with diverse communication modes could prove beneficial. Such a strategy echoes Media Synchronicity Theory (MST), advocating that optimal communication may require employing multiple media types to improve performance (Dennis et al., 2008).

Furthermore, the findings suggest a need to reassess conventional virtual collaboration practices. Rather than merely emulating face-to-face interactions, creating unique strategies tailored to the nuances of virtual interactions could be valuable. For instance, creative tasks might thrive without video, while other tasks might still demand it (Stachl et al., 2020; Purvis et al., 2001). In essence, the study encourages a recalibration of virtual team management strategies, urging companies to question the norm, experiment with alternate methods, and potentially uncover novel avenues to gain a competitive edge in the increasingly digital business realm.

Research limitations and future research

The study acknowledges certain limitations, including the inherent issues with self-reported measures Podsakoff et al. (2011) and a lack of full control over participants' environmental and internet conditions, which were vital for success, these limitations did not hamper the study, and therefore it is advised to take the following limitations into account.

The first one relates to the methodology used for the study. Despite the effort made to simulate real-world conditions, the experimental procedure may lack real-world validity as it involves a controlled online environment (Vashdi et al., 2013) Although this design improves uniformity, it doesn't fully capture the spontaneity and complexity of workplace interactions. Therefore, it could be interesting to see if this study will generate the same results in a real-world example that fully captures the complexity and spontaneity of workplace interaction. This could also be seen as an opportunity for following research to incorporate a mix-methods approach to get more in-depth results (Creswell & Creswell, 2017). For example, not only measuring perceived trust among team members, but also incorporating in-depth interviews with respondents to see how they experience the experiment.

The second limitation revolves around the sample size and demographics. The participant pool was largely homogenous, skewed towards the highly educated and primarily

Dutch individuals. Such limited diversity could influence the study's findings and hinder the wider applicability of the results. Cultural and educational backgrounds can impact how individuals perceive and utilize non-verbal cues, which might affect the trust levels and creative performance measured (Matsumoto & Hwang, 2013). Thus, future research needs to involve more diverse participants to extend the reach of the findings. Adding to this, a crucial limitation is the small sample size. Despite involving 34 groups, this small size limits the findings' generalizability. The inability to draw broader conclusions for larger populations and decreased statistical power potentially increase the risk of Type II errors (Field, 2013). Hence, future research should include larger, more diverse samples to improve reliability and the generalizability of the findings. The challenges that were found during this study that hampered an increase in sample size, was the time that was needed for participants to complete the experiment. During the recruiting process, many potential participants indicated that they did not have 45 minutes to spare, and thus did not attend the experiment. Although this was a mayor challenge, it could not be addressed or adapted, because of the experiments that were already completed.

In conclusion, while the present research offers fresh insights into creative performance in virtual teams, it also emphasizes the need to address these limitations in future investigations. This would involve the integration of larger and more diverse samples, and designs that successfully strike a balance between generalizability, realism, and precision.

Conclusion

This study underlines the non-pivotal role of non-verbal cues in building cognitive trust in virtual settings. Instead, action consistency, efficient communication, and proven expertise could emerge as critical. Interestingly, the lack of non-verbal cues can actually spark creativity, this might be due to fostering an atmosphere of perceived anonymity. The role of cognitive and affective trust in influencing creativity is more intricate than previously conceived, calling for in-depth exploration. As the world veers towards virtual interactions, more and more, these findings urge leaders to innovate their collaboration approaches, reassessing the weight given to visual cues during collaboration.

While acknowledging the limitations of this study, from methodological issues to a small sample size, it sets the stage for future research. Ultimately, this thesis encourages a rethinking of existing beliefs and fosters novel communication strategies, heralding a promising digital frontier in virtual team collaboration.

Bibliography

Abi Saad, E., & Agogué, M. (2023). Creativity in virtual teams: Systematic review, synthesis and research agenda. *Creativity and Innovation Management*. https://doi.org/10.1111/caim.12540

Allen, T. D., Golden, T. D., & Shockley, K. M. (2015). How Effective Is Telecommuting? Assessing the Status of Our Scientific Findings. *Https://Doi-Org.Ru.Idm.Oclc.Org/10.1177/1529100615593273*, *16*(2), 40–68. https://doi.org/10.1177/1529100615593273

Amabile, T. M. (1988). *A model of creativity and innovation in organizations*.

Amabile, T. M., & Pratt, M. G. (2016). The dynamic componential model of creativity and innovation in organizations: Making progress, making meaning. In *Research in Organizational Behavior* (Vol. 36, pp. 157–183). JAI Press. https://doi.org/10.1016/j.riob.2016.10.001

Anderson, N., Potočnik, K., & Zhou, J. (2014). Innovation and Creativity in Organizations: A State-of-the-Science Review, Prospective Commentary, and Guiding Framework. In *Journal of Management* (Vol. 40, Issue 5, pp. 1297–1333). SAGE Publications Inc. https://doi.org/10.1177/0149206314527128

Baas, M., De Dreu, C. K. W., & Nijstad, B. A. (2008). A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus? *Psychological Bulletin*, *134*(6), 779–806. https://doi.org/10.1037/A0012815

Bae, M. (2016). The effects of anonymity on computer-mediated communication: The case of independent versus interdependent self-construal influence. *Computers in Human Behavior*, *55*, 300–309. https://doi.org/10.1016/j.chb.2015.09.026

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

Barron, F., & Harrington, D. M. (1981). CREATIVITY, INTELLIGENCE, AND PERSONALITY. In *Ann. Rev. Psychol* (Vol. 32). www.annualreviews.org

Barsh, J., Capozzi, M. M., & Davidson, J. (2008). *Leadership and innovation 37*.

Beesley, L. G. A., & Cooper, C. (2008). Defining knowledge management (KM) activities: Towards consensus. *Journal of Knowledge Management*, *12*(3), 48–62. https://doi.org/10.1108/13673270810875859

Bergiel, B. J., Bergiel, E. B., & Balsmeier, P. W. (2008). Nature of virtual teams: A summary of their advantages and disadvantages. *Management Research News*, *31*(2), 99–110. https://doi.org/10.1108/01409170810846821

Bond-Barnard, T. J., Fletcher, L., & Steyn, H. (2018). Linking trust and collaboration in project teams to project management success. *International Journal of Managing Projects in Business*, *11*(2), 432–457. https://doi.org/10.1108/IJMPB-06-2017-0068

Bos, N., Olson, J., Gergle, D., Olson, G., & Wright, Z. (2002). *Effects of Four Computer-Mediated Communications Channels on Trust Development*.

Brattström, A., Löfsten, H., & Richtnér, A. (2012). Creativity, trust and systematic processes in product development. *Research Policy*, *41*(4), 743–755. https://doi.org/10.1016/J.RESPOL.2011.12.003

Brem, A., Viardot, E., & Nylund, P. A. (2021). Implications of the coronavirus (COVID-19) outbreak for innovation: Which technologies will improve our lives? *Technological Forecasting & Social Change*, *163*, 120451. https://doi.org/10.1016/j.techfore.2020.120451

Brucks, M. S., & Levav, J. (2022). Virtual communication curbs creative idea generation. *Nature 2022 605:7908*, *605*(7908), 108–112. https://doi.org/10.1038/s41586-022-04643-y

Burgoon, J. K., Stoner, G. M., Bonito, J. A., & Dunbar, N. E. (2002). *Trust and Deception in Mediated Communication*.

Byron, K., & Khazanchi, S. (2012). Rewards and creative performance: A meta-analytic test of theoretically derived hypotheses. *Psychological Bulletin*, *138*(4), 809–830. https://doi.org/10.1037/a0027652

Byron, K., Khazanchi, S., & Nazarian, D. (2010). The Relationship Between Stressors and Creativity: A Meta-Analysis Examining Competing Theoretical Models. *Journal of Applied Psychology*, *95*(1), 201–212. https://doi.org/10.1037/a0017868

Carmeli, A., & Spreitzer, G. M. (2009). Trust, connectivity, and thriving: implications for innovative behaviors at work. *Journal of Creative Behavior*, *43*(3), 169–191. https://doi.org/10.1002/j.2162-6057.2009.tb01313.x

Carnevale, P. J., & Probst, T. M. (1998). *Social Values and Social Conflict in Creative Problem Solving and Categorization* (Vol. 74, Issue 5).

Chang, C. M. (2011). New organizational designs for promoting creativity: A case study of virtual teams with anonymity and structured interactions. *Journal of Engineering and Technology Management*, *28*(4), 268–282. https://doi.org/10.1016/J.JENGTECMAN.2011.06.004

Chen, M. H., Chang, Y. C., & Hung, S. C. (2008). Social capital and creativity in R&D project teams. *R&D Management*, *38*(1), 21–34. https://doi.org/10.1111/J.1467-9310.2007.00494.X

Chen, Y., Yu, C., Yuan, Y., Lu, F., & Shen, W. (2021). The Influence of Trust on Creativity: A Review. In *Frontiers in Psychology* (Vol. 12). Frontiers Media S.A. https://doi.org/10.3389/fpsyg.2021.706234

Cheney, R. T., Hightower, P. B., Lowry, T. L., Roberts, N. C., & Romano, P. D. (2006). *The Impact of Group Size and Social Presence on Small-Group*. https://doi.org/10.1177/1046496406294322

Creswell, J. W., & Creswell J. David. (2017). *Research Design*.

Daft, R., & Lengel, R. (1986). Organizational Information Requirements, Media Richness and Structural Design. *Management Science*, 554–571.

Dakhli, M., & De Clercq, D. (2004). Human capital, social capital, and innovation: A multi-country study. *Entrepreneurship and Regional Development*, *16*(2), 107–128. https://doi.org/10.1080/08985620410001677835

Danton, M. H. D., & Bushnell, I. (2023). Zoom and its Discontents: Group Decision Making in Pediatric Cardiology in the Time of COVID (and Beyond). *Journal of Medical Systems*, *47*(1), 59. https://doi.org/10.1007/s10916-023-01944-1

Davis, M. A. (2009). Understanding the relationship between mood and creativity: A meta-analysis. *Organizational Behavior and Human Decision Processes*, *108*(1), 25–38. https://doi.org/10.1016/j.obhdp.2008.04.001

de Clercq, D., Thongpapanl, N., & Dimov, D. (2009). When good conflict gets better and bad conflict becomes worse: The role of social capital in the conflict-innovation relationship. *Journal of the Academy of Marketing Science*, *37*(3), 283–297. https://doi.org/10.1007/s11747-008-0122-0

Dennis, A. R., Fuller, R. M., & Valacich, J. S. (2008). Media, tasks, and communication processes: A theory of media synchronicity. In *MIS Quarterly: Management Information Systems* (Vol. 32, Issue 3, pp. 575–600). Management Information Systems Research Center. https://doi.org/10.2307/25148857

Dess, G. G., & Picken, J. C. (2000). Changing roles: Leadership in the 21st century. *Organizational Dynamics*, *28*(3), 18–34. https://doi.org/10.1016/S0090-2616(00)88447-8

Dirks, K. T., & Ferrin, D. L. (2001). The Role of Trust in Organizational Settings. *Organization Science*, *12*(4), 450–467. https://doi.org/10.1287/orsc.12.4.450.10640

Drazin, R., Glynn, M. A., & Kazanjian, R. K. (1999). Multilevel Theorizing about Creativity in Organizations: A Sensemaking Perspective. In *Source: The Academy of Management Review* (Vol. 24, Issue 2). https://about.jstor.org/terms

Dueholm Muller, S., Ulrich, F., Dueholm, S., & Müller, S. D. (2013). Creativity and Information Systems in a Hypercompetitive Environment: A Literature Review. *Communications of the Association for Information Systems*, *32*(7), 175–200. https://doi.org/10.17705/1CAIS.03207

Dulebohn, J. H., & Hoch, J. E. (2017). Virtual teams in organizations. *Human Resource Management Review*, *27*(4), 569–574. https://doi.org/10.1016/J.HRMR.2016.12.004

Edmondson, A. (1999). *Psychological Safety and Learning Behavior in Work Teams*.

Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review*, *2*(4), 290–309. https://doi.org/10.1207/s15327957pspr0204_5

Fernandez, D. B. (2015). Virtual R&D Project Teams: From E-Leadership To Performance. In *The Journal of Applied Business Research* (Vol. 31, Issue 5).

Field, A. (2013). *discovering statistics using ibm spss statistics: Vol.* SAGE publications.

Gajadhar, J., & Green, J. (2003). *An Analysis of Nonverbal Communication in an Online Chat Group*. http://www.topnz.ac.nz/

Ganesan, B., Al-Jumaily, A., Fong, K. N. K., Prasad, P., Meena, S. K., & Tong, R. K. Y. (2021). Impact of Coronavirus Disease 2019 (COVID-19) Outbreak Quarantine, Isolation, and Lockdown Policies on Mental Health and Suicide. *Frontiers in Psychiatry*, *12*, 471. https://doi.org/10.3389/FPSYT.2021.565190/BIBTEX

Garro Abarca, V. M., Palos-Sanchez, P. R., & Rus-Arias, E. (2020). Working in virtual teams: A systematic literature review and a bibliometric analysis. *IEEE Access*, *8*, 168923–168940. https://doi.org/10.1109/ACCESS.2020.3023546

Garro-Abarca, V., Palos-Sanchez, P., & Aguayo-Camacho, M. (2021). Virtual Teams in Times of Pandemic: Factors That Influence Performance. *Frontiers in Psychology*, *12*, 232. https://doi.org/10.3389/FPSYG.2021.624637/BIBTEX

Gaspersz, J. B. R. (2005). *Compete with Creativity Essay for the Innovation Lecture "Compete with Creativity" 2005, organized by the Dutch Ministry of Economic Affairs*.

Gilson, L. L., Maynard, M. T., Jones Young, N. C., Vartiainen, M., & Hakonen, M. (2014). Virtual Teams Research. *Https://Doi-Org.Ru.Idm.Oclc.Org/10.1177/0149206314559946*, *41*(5), 1313–1337. https://doi.org/10.1177/0149206314559946

Glaeser, E. L., Laibson, D. I., Scheinkman, J. A., & Soutter, C. L. (2000). Measuring trust. *Quarterly Journal of Economics*, *115*(3), 811–846. https://doi.org/10.1162/003355300554926

Gong, Z., Lee, L. H., Soomro, S. A., Nanjappan, V., & Georgiev, G. V. (2022). A systematic review of virtual brainstorming from the perspective of creativity: affordances, framework, and outlook. *Digital Creativity*, *33*(2), 96–127. https://doi.org/10.1080/14626268.2022.2064879

Grözinger, N., Irlenbusch, B., Laske, K., & Schröder, M. (2020). *Innovation and Communication Media in Virtual Teams-An Experimental Study*.

Güner, R., Hasanoğlu, İ., & Aktaş, F. (2020). Covid-19: Prevention and control measures in community. In *Turkish Journal of Medical Sciences* (Vol. 50, Issue SI-1, pp. 571–577). Turkiye Klinikleri. https://doi.org/10.3906/sag-2004-146

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (Eigth). Andover: Cengage Learning.

Hall, J. A., Horgan, T. G., & Murphy, N. A. (2019). Nonverbal Communication. *Annual Review of Psychology*, *70*(1), 271–294. https://doi.org/10.1146/annurev-psych-010418-103145

Hall, J., & Watson, W. H. (1970). The Effects of a Normative Intervention on Group Decision-Making Performance. *Human Relations*, *23*(4), 299–317. https://doi.org/10.1177/001872677002300404

Han, S. J., Chae, C., Macko, P., Park, W., & Beyerlein, M. (2017). How virtual team leaders cope with creativity challenges. *European Journal of Training and Development*, *41*(3), 261–276. https://doi.org/10.1108/EJTD-10-2016-0073/FULL/PDF

Hargadon, A. B., & Bechky, B. A. (2006). When collections of creatives become creative collectives: A field study of problem solving at work. In *Organization Science* (Vol. 17, Issue 4, pp. 484–500). https://doi.org/10.1287/orsc.1060.0200

Hayes, A. F. (2021). *Introduction to Mediation, Moderation, and Conditional Process Analysis Third Edition A Regression-Based Approach* (Third).

Hennessey, B. A., & Amabile, T. M. (2010). Creativity. *Annual Review of Psychology*, *61*, 569–598. https://doi.org/10.1146/annurev.psych.093008.100416

Hirst, G., Van Knippenberg, D., & Zhou, J. (2009). A Cross-Level Perspective on Employee Creativity: Goal Orientation, Team Learning Behavior, and Individual Creativity. In *Source: The Academy of Management Journal* (Vol. 52, Issue 2). https://about.jstor.org/terms

Ho, S. S., & McLeod, D. M. (2008). Social-Psychological Influences on Opinion Expression in Face-to-Face and Computer-Mediated Communication. *Communication Research*, *35*(2), 190–207. https://doi.org/10.1177/0093650207313159

Hogg, M. A., & Reid, S. A. (2006). Social Identity, Self-Categorization, and the Communication of Group Norms. *International Communication Association*, *16*. https://doi.org/10.1111/j.1468-2885.2006.00003.x

Hon, A. H. Y. (2012). When competency-based pay relates to creative performance: The moderating role of employee psychological need. *International Journal of Hospitality Management*, *31*(1), 130–138. https://doi.org/10.1016/j.ijhm.2011.04.004

Hülsheger, U. R., Anderson, N., & Salgado, J. F. (2009). Team-Level Predictors of Innovation at Work: A Comprehensive Meta-Analysis Spanning Three Decades of Research. *Journal of Applied Psychology*, *94*(5), 1128–1145. https://doi.org/10.1037/a0015978

Ind, N., & Coates, N. (2013). The meanings of co-creation. *European Business Review*, *25*(1), 86–95. https://doi.org/10.1108/09555341311287754/FULL/PDF

Jarvenpaa, S. L., & Keating, E. (2021). When do good communication models fail in global virtual teams? *Organizational Dynamics*, *50*(1), 100843. https://doi.org/10.1016/J.ORGDYN.2021.100843

Jehn, K. A. (1995). A Multimethod Examination of the Benefits and Detriments of Intragroup Conflict. In *Quarterly* (Vol. 40, Issue 2).

Kollars, N. (2017). Genius and mastery in military innovation. In *Survival* (Vol. 59, Issue 2, pp. 125–138). Routledge. https://doi.org/10.1080/00396338.2017.1302193

Koskinen, K. U., Pihlanto, P., & Vanharanta, H. (2003). Tacit knowledge acquisition and sharing in a project work context. *International Journal of Project Management*, *21*(4), 281–290. https://doi.org/10.1016/S0263-7863(02)00030-3

Langfred, C. W. (2004). *TOO MUCH OF A GOOD THING? NEGATIVE EFFECTS OF HIGH TRUST AND INDIVIDUAL AUTONOMY IN SELF-MANAGING TEAMS.*

Lewis, J. D., & Weigert, A. (1985). Trust as a Social Reality. *Social Forces*, *63*(4), 967–985. https://doi.org/10.1093/SF/63.4.967

Lowry, P. B., & Gaskin, J. (2014). Partial least squares (PLS) structural equation modeling (SEM) for building and testing behavioral causal theory: When to choose it and how to use it. *IEEE Transactions on Professional Communication*, *57*(2), 123–146. https://doi.org/10.1109/TPC.2014.2312452

Lund, S., Madgavkar, A., Manyika, J., Smit, S., Ellingrud, K., & Robinson, O. (n.d.). *The future of work after COVID-19 | McKinsey*. Retrieved March 12, 2023, from https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19#

Madjar, N., Greenberg, E., & Chen, Z. (2011). Factors for Radical Creativity, Incremental Creativity, and Routine, Noncreative Performance. *Journal of Applied Psychology*, *96*(4), 730–743. https://doi.org/10.1037/a0022416

Marlow, S. L., Lacerenza, C. N., & Salas, E. (2017). Communication in virtual teams: a conceptual framework and research agenda. *Human Resource Management Review*, *27*(4), 575–589. https://doi.org/10.1016/J.HRMR.2016.12.005

Martinez, L., Falvello, V. B., Aviezer, H., & Todorov, A. (2016). Contributions of facial expressions and body language to the rapid perception of dynamic emotions. *Cognition and Emotion*, *30*(5), 939–952. https://doi.org/10.1080/02699931.2015.1035229

Martins, L. L., & Shalley, C. E. (2011). Creativity in virtual work: Effects of demographic differences. *Small Group Research*, *42*(5), 536–561. https://doi.org/10.1177/1046496410397382

Matsumoto, D., & Hwang, H. C. (2013). Assessing Cross-Cultural Competence: A Review of Available Tests. *Journal of Cross-Cultural Psychology*, *44*(6), 849–873. https://doi.org/10.1177/0022022113492891

Mayer, R. C., Davis, J. H., & David Schoorman, F. (1995). An Integrative Model of Organizational Trust. In *Source: The Academy of Management Review* (Vol. 20, Issue 3).

McAllister, D. J. (1995). AFFECT- AND COGNITION-BASED TRUST AS FOUNDATIONS FOR INTERPERSONAL COOPERATION IN ORGANIZATIONS. *Academy of Management Journal*, *38*(1), 24–59. https://doi.org/10.2307/256727

Meeren, H. K., van Heijnsbergen, C. C., & de Gelder, B. (2005). *Rapid perceptual integration of facial expression and emotional body language* (Vol. 8). www.pnas.orgcgidoi10.1073pnas.0507650102

Mehmood, M. S., Jian, Z., Akram, U., Akram, Z., & Tanveer, Y. (2022). Entrepreneurial leadership and team creativity: the roles of team psychological safety and knowledge sharing. *Personnel Review*, *51*(9), 2404–2425. https://doi.org/10.1108/PR-07-2020-0517

Montag, T., Maertz, C. P., & Baer, M. (2012). A Critical Analysis of the Workplace Creativity Criterion Space. *Journal of Management*, *38*(4), 1362–1386. https://doi.org/10.1177/0149206312441835/FORMAT/EPUB

Mumford, M. D., & Hunter, S. T. (2005). Innovation in Organizations: A Multi-Level Perspective on Creativity. *Research in Multi-Level Issues*, *4*, 9–73. https://doi.org/10.1016/S1475-9144(05)04001-4/FULL/XML

Mumford, M. D., & McIntosh, T. (2017). Creative Thinking Processes: The Past and the Future. *Journal of Creative Behavior*, *51*(4), 317–322. https://doi.org/10.1002/jocb.197

Nemiro, J. E. (2010). The Creative Process in Virtual Teams. *Http://Dx.Doi.Org/10.1207/S15326934CRJ1401_6*, *14*(1), 69–83. https://doi.org/10.1207/S15326934CRJ1401_6

Nemiro, J. E. (2016). Connection in Creative Virtual Teams. *Journal of Behavioral and Applied Management*, *2*(2). https://doi.org/10.21818/JBAM

Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual factors at work. *Academy of Management Journal*, *39*(3), 607–634. https://doi.org/10.2307/256657

Palanski, M. E., Kahai, S. S., & Yammarino, F. J. (2011). Team Virtues and Performance: An Examination of Transparency, Behavioral Integrity, and Trust. *Journal of Business Ethics*, *99*(2), 201–216. https://doi.org/10.1007/S10551-010-0650-7/METRICS

Paulus, P. B., & Dzindolet, M. (2008). Social influence, creativity and innovation. *Social Influence*, *3*(4), 228–247. https://doi.org/10.1080/15534510802341082

Pirola-Merlo, A., & Mann, L. (2004). The relationship between individual creativity and team creativity: Aggregating across people and time. In *Journal of Organizational Behavior* (Vol. 25, Issue 2, pp. 235–257). https://doi.org/10.1002/job.240

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2011). Sources of Method Bias in Social Science Research and Recommendations on How to Control It. *Https://Doi.Org/10.1146/Annurev-Psych-120710-100452*, *63*, 539–569. https://doi.org/10.1146/ANNUREV-PSYCH-120710-100452

Priharsari, D., Abedin, B., & Mastio, E. (2020). Value co-creation in firm sponsored online communities: What enables, constrains, and shapes value. *Internet Research*, *30*(3), 763–788. https://doi.org/10.1108/INTR-05-2019-0205/FULL/PDF

Purvis, R. L., Sambamurthy, V., & Zmud, R. W. (2001). *The Assimilation of Knowledge Platforms in Organizations: An Empirical Investigation* (Vol. 12, Issue 2). https://www.jstor.org/stable/3086051

Reiter-Palmon, R., Kramer, W., Allen, J. A., Murugavel, V. R., & Leone, S. A. (2021). Creativity in Virtual Teams: A Review and agenda for Future Research. *Creativity*, *8*(1), 165–188. https://doi.org/10.2478/ctra-2021-0011

Riedl, R. (2022). On the stress potential of videoconferencing: definition and root causes of Zoom fatigue. *Electronic Markets, 32*(1), 153–177. https://doi.org/10.1007/s12525-021-00501-3

Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Introduction to Special Topic Forum: Not so Different after All: A Cross-Discipline View of Trust. In *Source: The Academy of Management Review* (Vol. 23, Issue 3).

Savić, D. (2020). COVID-19 and Work from Home: Digital Transformation of the Workforce. In *TGJ* (Vol. 16, Issue 2).

Shalley, C. E., & Gilson, L. L. (2004). What leaders need to know: A review of social and contextual factors that can foster or hinder creativity. *The Leadership Quarterly*, *15*(1), 33–53. https://doi.org/10.1016/J.LEAQUA.2003.12.004

Shalley, C. E., Zhou, J., & Oldham, G. R. (2004). The effects of personal and contextual characteristics on creativity: Where should we go from here? *Journal of Management*, *30*(6), 933–958. https://doi.org/10.1016/j.jm.2004.06.007

Shin, S. J., Kim, T. Y., Lee, J. Y., & Bian, L. (2012). Cognitive team diversity and individual team member creativity: A cross-level interaction. *Academy of Management Journal*, *55*(1), 197–212. https://doi.org/10.5465/amj.2010.0270

Simons, T. L., & Peterson, R. S. (2000). Task conflict and relationship conflict in top management teams: The pivotal role of intragroup trust. *Journal of Applied Psychology*, *85*(1), 102–111. https://doi.org/10.1037/0021-9010.85.1.102

Somech, A., & Drach-Zahavy, A. (2013). Translating Team Creativity to Innovation Implementation: The Role of Team Composition and Climate for Innovation. *Journal of Management*, *39*(3), 684–708. https://doi.org/10.1177/0149206310394187

Stachl, C., Au, Q., Schoedel, R., Gosling, S. D., Harari, G. M., Buschek, D., Völkel, S. T., Schuwerk, T., Oldemeier, M., Ullmann, T., Hussmann, H., Bischl, B., & Bühner, M. (2020). Predicting personality from patterns of behavior collected with smartphones. *Proceedings of the National Academy of Sciences of the United States of America*, *117*(30), 17680–17687. https://doi.org/10.1073/PNAS.1920484117/SUPPL_FILE/PNAS.1920484117.SAPP.PDF

Taggar, S. (2002). INDIVIDUAL CREATIVITY AND GROUP ABILITY TO UTILIZE INDIVIDUAL CREATIVE RESOURCES: A MULTILEVEL MODEL. *Academy of Management Journal*, *45*(2), 315–330.

Taylor, A., & Greve, H. R. (2006). *SUPERMAN OR THE FANTASTIC FOUR? KNOWLEDGE COMBINATION AND EXPERIENCE IN INNOVATIVE TEAMS*.

Tidwell, L. C., & Walther, J. B. (2002). Computer-Mediated Communication Effects on Disclosure, Impressions, and Interpersonal EvaluationsGetting to Know One Another a Bit at a Time. *Human Communication Research*, *28*(3), 317–348. https://doi.org/10.1111/J.1468-2958.2002.TB00811.X

Tønnessen, Ø., Dhir, A., & Flåten, B. T. (2021). Digital knowledge sharing and creative performance: Work from home during the COVID-19 pandemic. *Technological Forecasting and Social Change*, *170*, 120866. https://doi.org/10.1016/J.TECHFORE.2021.120866

Troje, N. F. (2023). Zoom disrupts eye contact behaviour: problems and solutions. *Trends in Cognitive Sciences*, *27*(5), 417–419. https://doi.org/10.1016/j.tics.2023.02.004

Tseng, H. W., & Yeh, H. Te. (2013). Team members' perceptions of online teamwork learning experiences and building teamwork trust: A qualitative study. *Computers & Education*, *63*, 1–9. https://doi.org/10.1016/J.COMPEDU.2012.11.013

Unsworth, K. (2001). Unpacking Creativity. In *Source: The Academy of Management Review* (Vol. 26, Issue 2). https://about.jstor.org/terms

Vashdi, D. R., Bamberger, P. A., & Erez, M. (2013). Can surgical teams ever learn? the role of coordination, complexity, and transitivity in action team learning. *Academy of Management Journal*, *56*(4), 945–971. https://doi.org/10.5465/amj.2010.0501

Walther, J. B. (1992). Interpersonal Effects in Computer-Mediated Interaction: A Relational Perspective. *Communication Research*, *19*(1), 52–90. https://doi.org/10.1177/009365092019001003

Webber, S. S. (2008). Development of Cognitive and Affective Trust in Teams. *Http://Dx.Doi.Org.Ru.Idm.Oclc.Org/10.1177/1046496408323569*, *39*(6), 746–769. https://doi.org/10.1177/1046496408323569

West, M. A., & Anderson, N. R. (1996). Innovation in top management teams. *Journal of Applied Psychology*, *81*(6), 680–693. https://doi.org/10.1037/0021-9010.81.6.680

Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). Toward a Theory of Organizational Creativity. In *Source: The Academy of Management Review* (Vol. 18, Issue 2). https://www.jstor.org/stable/258761?seq=1&cid=pdf-

Zaheer, A., McEvily, B., & Perrone, V. (1998). Does Trust Matter? Exploring the Effects of Interorganizational and Interpersonal Trust on Performance. *Organization Science*, *9*(2), 141–159. https://doi.org/10.1287/orsc.9.2.141

Zhou, J., & Hoever, I. J. (2014). Research on Workplace Creativity: A Review and Redirection. In *Annual Review of Organizational Psychology and Organizational Behavior* (Vol. 1, pp. 333–359). Annual Reviews Inc. https://doi.org/10.1146/annurev-orgpsych-031413-091226

Appendices

Appendix 1: Robustness check

Table 14

Robustness test PROCESS macro Affective trust

Creative performance variable	*Age*	*Gender*	*Education*	*Participant working situation*	*Nationality*	*Knowing other respondents*
Creative Fluency	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Unique Ideas	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Novelty Score	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Usefulness	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*No*

Note. Significance level <0,05

Table 15

Robustness test PROCESS macro Cognitive trust

Creative performance variable	*Age*	*Gender*	*Education*	*Participant working situation*	*Nationality*	*Knowing other respondents*
Creative Fluency	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Unique Ideas	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Novelty Score	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Usefulness	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

Note. Significance level <0,05

Table 16

Robustness test ANOVA analysis

Creative performance variable	*Age*	*Gender*	*Education*	*Participant working situation*	*Nationality*	*Knowing other respondents*
Creative Fluency	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Unique Ideas	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Novelty Score	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

Creative performance variable	*Age*	*Gender*	*Education*	*Participant working situation*	*Nationality*	*Knowing other respondents*
Usefulness	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Affective Trust	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Cognitive Trust	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

Note. Significance level <0,05

Appendix 2 : Meassurement Items

Table 17

Trust meassurement items

Variable	*Items*	*Question*
Affective Trust	*AFFCTV_TRST_1*	*I felt a strong emotional bond with my team members during the creative task.*
	AFFCTV_TRST_2	*I believe my team members genuinely cared about my well-being and success in the task.*
	AFFCTV_TRST_3	*I felt that my team members were empathetic and understanding of my challenges and needs during the creative task.*
	AFFCTV_TRST_4	*My team members and I shared a mutual sense of support and encouragement throughout the creative task.*
Cognitive Trust	*CGNTV_TRST_1*	*I was confident in my team members' competence and skills to effectively contribute to the creative task.*
	CGNTV_TRST_2	*I trusted my team members to consistently perform well and follow through on their commitments during the creative task.*
	CGNTV_TRST_3	*I felt that the information and ideas shared by my team members were reliable and credible.*
	CGNTV_TRST_4	*I believed my team members were capable of making sound judgments and decisions in the creative task.*
	*CGNTV_TRST_5_RC**	*I was uncertain about the reliability of the information and ideas shared by my team members during the creative task.*

*Note. *Reversed coded item. All items were statement items "Indicate to what degree you agree or disagree with the statements below" and could be answered on a 7-point Likert scale.*

Appendix 3: Levene's Test of Equality of Error Variances

Table 18

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
Average novelty	Based on Mean	2,401	1	32	,131
	Based on Median	2,163	1	32	,151
	Based on Median and with adjusted df	2,163	1	28,842	,152
	Based on trimmed mean	2,104	1	32	,157

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: Average novelty

b. Design: Intercept + Condition_L_mean

Table 19

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
Average Usefulness	Based on Mean	1,767	1	32	,193
	Based on Median	1,219	1	32	,278
	Based on Median and with adjusted df	1,219	1	28,323	,279
	Based on trimmed mean	1,666	1	32	,206

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: Average Usefulness

b. Design: Intercept + Condition_L_mean

Table 20

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
Creative fluency	Based on Mean	2,152	1	32	,152
	Based on Median	1,751	1	32	,195
	Based on Median and with adjusted df	1,751	1	31,719	,195
	Based on trimmed mean	2,066	1	32	,160

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: Creative fluency

b. Design: Intercept + Condition_L_mean

Table 21

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
Unique Ideas	Based on Mean	2,594	1	32	,117
	Based on Median	2,075	1	32	,159
	Based on Median and with adjusted df	2,075	1	31,991	,159
	Based on trimmed mean	2,438	1	32	,128

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: Unique Ideas

b. Design: Intercept + Condition_L_mean

Table 22

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
Cognitive Trust	Based on Mean	,248	1	32	,622
	Based on Median	,017	1	32	,897
	Based on Median and with adjusted df	,017	1	25,265	,897
	Based on trimmed mean	,145	1	32	,706

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: Cognitive Trust

b. Design: Intercept + Condition_L_mean

Table 23

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
Affective Trust	Based on Mean	,939	1	32	,340
	Based on Median	,938	1	32	,340
	Based on Median and with adjusted df	,938	1	30,941	,340
	Based on trimmed mean	1,002	1	32	,324

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: Affective Trust

b. Design: Intercept + Condition_L_mean

Appendix 4: Significance of PROCESS macro for Cognitive and Affective trust

Table 24

PROCESS Macro overall model significance for Affective Trust

Y variable	*R*	*R^2*	*MSE*	*F*	*df1*	*df2*	*p*
Creative fluency	*.45*	*.23*	*150.78*	*4.71*	*2*	*31*	*.02*
Unique ideas	*.55*	*.30*	*26.85*	*6.78*	*2*	*31*	*.00*
Novelty	*.63*	*.40*	*.31*	*10.29*	*2*	*31*	*.00*
Usefulness	*.46*	*.22*	*.10*	*4.25*	*2*	*31*	*.02*

Note. X variable = Condtion Group

Table 25

PROCESS Macro overall model significance for Cognitive Trust

Y variable	*R*	*R^2*	*MSE*	*F*	*df1*	*df2*	*p*
Creative fluency	*.59*	*.35*	*127.62*	*8.*	*2*	*31*	*.02*
Unique ideas	*.63*	*.40*	*23.29*	*10.19*	*2*	*31*	*.00*
Novelty	*.62*	*.38*	*.31*	*9.55*	*2*	*31*	*.00*
Usefulness	*.49*	*.24*	*.09*	*4.99*	*2*	*31*	*.01*

Note. X variable = Condtion Group

Appendix 5: Experimental scripts

Introduction

Hi, thank you for joining our online experiment. During the next hour, you will engage in two creative tasks. Before we dive into the tasks, let's cover a few essential points to ensure a smooth and enjoyable experience.

The purpose of this experiment is to better understand creativity in a virtual environment. We aim to provide a fun and engaging experience, allowing you to contribute valuable data to our study.

First, we would like to emphasize once again that this entire experiment is and will remain completely anonymous. After the results have been processed, all stored personal data will be deleted. The final data processing will not lead to your individual results being traceable. Second, this meeting will be recorded so that we can use and potentially review the data later. These recordings, like other personal data points, will be deleted after the data has been analysed.

In a moment, the tasks will be given. We appreciate your participation and hope you enjoy the challenges ahead. Remember, the primary goal is to have fun and embrace your creativity during these tasks!

Moon task

Welcome to the NASA Exercise: Survival on the Moon. In this scenario, you are a member of a space crew that has encountered mechanical difficulties and landed 200 miles away from the rendezvous point with the mother ship. Your task is to rank the 15 items left intact and undamaged after landing, in terms of their importance for your crew to reach the rendezvous point.

You will have 3 minutes to complete the rankorder.

Here are the items that you will be ranking:

1. Box of matches
2. Food concentrate
3. 15 meters of nylon rope
4. Parachute silk
5. Portable heating unit
6. Two .45 calibre pistols
7. One case of dehydrated Pet milk
8. Two 45kg. tanks of oxygen
9. Stellar map
10. Life raft
11. Magnetic compass
12. 19 Liters of water
13. Signal flares
14. First aid kit, including injection needles
15. Solar-powered FM receiver-transmitter

You will mark the number 1 by the most important item, the number 2 by the second most important, and so on through number 15 for the least important. The lower your score, the better your chance of survival.

Correct ranking:

1. "2 hundred-pound tanks of oxygen" - critical for survival and breathing during the journey
2. "5 gallons of water" - essential for hydration during the 200-mile journey
3. "Stellar map (of the moon's constellation)" - necessary for navigation and finding the right direction
4. "Food concentrate" - critical for maintaining energy levels and avoiding starvation
5. "Solar-powered FM receiver transmitter" - useful for communication in case of an emergency
6. "50 feet of nylon rope" - versatile item that can be used for various purposes, such as creating a shelter or securing items
7. "First aid kit containing injection needles" - necessary for treating injuries or illnesses that may arise during the journey
8. "Parachute silk" - useful for creating a shelter or protecting the crew from the elements
9. "Life raft" - essential for a water emergency
10. "Signal flares" - useful for attracting attention in case of an emergency
11. "Two .45 calibre pistols" - useful for self-defence against animals or other dangers that may arise
12. "1 case dehydrated Pet milk" - a source of nutrition in case other food sources are not available
13. "Portable heating unit" - useful for keeping the crew warm in cold weather conditions
14. "Magnetic compass" - useful for navigation in case the stellar map is unavailable or not usable
15. "Box of matches" - least critical item, only useful for starting a fire with limited use in a survival situation.

Scoring: For each item, mark the number of points that your score differs from the NASA ranking, then add up all the points. **Disregard plus or minus differences**. The lower the total, the better your score.

0 - 25 excellent
26 - 32 good
33 - 45 average
46 - 55 fair
56 - 70 poor -- suggests use of Earth-bound logic
71 - 112 very poor – you're one of the casualties of the space program!

Instructions experimental task

In this next part, you will be brainstorming for ideas on how to improve a product. The scenario is as follows:

A furniture company called ITEA is looking to improve the design of their desk chair. They would like you to come up with as many and as creative ideas as possible. You do not have to come up with a completely new design, but rather think of ways to improve a traditional desk chair as you all know it.

Instructions assignment logistics to be used in non-anonymity groups
In a few moments, you will be able to access a shared document through a link that is sent in the Zoom chat. This document will have three separate columns where each of you can write down the ideas you have. Please make sure to enter your name above the list of your ideas. As you write down ideas, feel free to discuss these with each other and write down any new ideas that may follow throughout the session. You will have a total of 20 minutes to come up with ideas for new features of the desk chair.

Instructions assignment logistics to be used in anonymity groups
In a few moments, each of you will be able to access a document through a link that is sent via direct message in Zoom. In this document, you will be able to write down all of the ideas you have throughout the brainstorming session. You do not have to enter your name anywhere, and your team members will not be able to see what you write down. You are, however, more than welcome to discuss the ideas you have with each other and write down any new ideas that may follow throughout the session. You will have a total of 20 minutes to come up with ideas for new features of the desk chair.

Introductie

Hallo, bedankt voor het deelnemen aan ons online experiment. Gedurende het komende uur zal je deelnemen aan twee creatieve taken. Voordat we aan de taken beginnen, gaan we een paar essentiële punten doornemen om een soepele en plezierige ervaring te garanderen.

Het doel van dit experiment is om creativiteit in een virtuele omgeving beter te begrijpen. We streven ernaar om een leuke en interessante ervaring te bieden, zodat je waardevolle inzichten kan bijdragen aan ons onderzoek.

Ten eerste willen we nogmaals benadrukken dat dit hele experiment anoniem is en anoniem zal blijven. Nadat de resultaten zijn verwerkt, worden alle opgeslagen persoonlijke gegevens verwijderd. De uiteindelijke gegevensverwerking zal er niet toe leiden dat individuele resultaten traceerbaar zijn. Ten tweede zal deze bijeenkomst worden opgenomen, zodat we later de gegevens kunnen gebruiken en eventueel bekijken. Deze opnames, net als andere persoonlijke gegevens, zullen worden verwijderd nadat de gegevens zijn geanalyseerd.

We stellen uw deelname op prijs en hopen dat u geniet van de uitdagingen die voor u liggen. Onthoud, het belangrijkste doel is om plezier te hebben en uw creativiteit te omarmen tijdens deze taken!

Moontask

Welkom bij de NASA-oefening: Overleven op de Maan. In dit scenario zijn jullie lid van een ruimte bemanning die te maken heeft met mechanische problemen en daardoor op 320 kilometer afstand van het ontmoetingspunt met het moederschip is geland. Jullie taak is om de 15 items die na de landing intact en onbeschadigd zijn gebleven, te rangschikken op basis van hun belang voor je bemanning om het ontmoetingspunt te bereiken.

Dit zijn de items die je zult rangschikken:

1. Doos lucifers
2. Voedselconcentraat
3. 15 meter nylon touw
4. Parachutestof
5. Draagbare verwarmingseenheid
6. Twee .45 kaliber pistolen
7. Eén doos met gedehydrateerde Pet-melk
8. Twee 45 kilo zuurstoftanks
9. Stellaire kaart
10. Reddingsvlot
11. Magnetisch kompas
12. 19 liter water
13. Signaalvlammen
14. Eerstehulpset, inclusief injectienaalden
15. Zonne-energie aangedreven FM-ontvanger-zender

Markeer nummer 1 bij het belangrijkste item, nummer 2 bij het op één na belangrijkste, enzovoort tot en met nummer 15 voor het minst belangrijke. Hoe lager je score, hoe beter je overlevingskansen.

1. "2 45kg zuurstoftanks" - cruciaal voor overleving en ademhaling tijdens de reis
2. "19 liter water" - essentieel voor hydratatie tijdens de 320kml reis
3. "Stellaire kaart (van de maanconstellatie)" - noodzakelijk voor navigatie en het vinden van de juiste richting
4. "Voedselconcentraat" - cruciaal voor het behouden van energieniveaus en het voorkomen van uithongering
5. "Zonne-energie aangedreven FM-ontvanger-zender" - nuttig voor communicatie in geval van nood
6. "15 meter nylon touw" - veelzijdig item dat voor verschillende doeleinden kan worden gebruikt, zoals het creëren van een schuilplaats of het vastzetten van items
7. "Eerstehulpset met injectienaalden" - noodzakelijk voor het behandelen van verwondingen of ziekten die tijdens de reis kunnen ontstaan
8. "Parachutestof" - nuttig voor het creëren van een schuilplaats of het beschermen van de bemanning tegen de elementen
9. "Reddingsvlot" - essentieel bij een waterongeval

10. "Signaalvlammen" - nuttig voor het trekken van aandacht in geval van nood
11. "Twee .45 kaliber pistolen" - nuttig voor zelfverdediging tegen dieren of andere gevaren die kunnen ontstaan
12. "1 doos gedehydrateerde Pet-melk" - een bron van voeding voor het geval andere voedselbronnen niet beschikbaar zijn
13. "Draagbare verwarmingseenheid" - nuttig om de bemanning warm te houden in koude weersomstandigheden
14. "Magnetisch kompas" - nuttig voor navigatie als de stellaire kaart niet beschikbaar of onbruikbaar is
15. "Doos lucifers" - minst kritieke item, alleen nuttig voor het aansteken van een vuur met beperkt gebruik in een overlevingssituatie.

Scoren: Markeer voor elk item het aantal punten dat uw score afwijkt van de NASA rangschikking en tel vervolgens alle punten op. **Laat plus of min verschillen buiten beschouwing**. Hoe lager het totaal, hoe beter uw score.

0 - 25 excellent
26 - 32 good
33 - 45 average
46 - 55 fair
56 - 70 poor -- suggests use of Earth-bound logic
71 - 112 very poor – you're one of the casualties of the space program!

Experimentele opdracht

In het volgende gedeelte gaan jullie brainstormen voor ideeën om een product te verbeteren. Hier volgt het scenario:

Een meubelmerk genaamd ITEA is bezig om het ontwerp van hun bureaustoel te verbeteren. Ze vragen aan jullie om zo veel en zo creatief mogelijke ideeën te bedenken. Jullie hoeven niet een compleet nieuwe bureaustoel te ontwerpen, maar focus op het verbeteren van de welbekende traditionele bureaustoel.

Instructies opdracht niet anoniem
Over enkele ogenblikken krijgen jullie in de Zoom chat een link doorgestuurd die toegang geeft tot een gedeeld document. In dit document staan 3 aparte kolommen waar jullie elk je eigen ideeën in kunnen schrijven. Zorg ervoor dat je je naam bovenaan de kolom met je eigen ideeën zet. Terwijl jullie de ideeën opschrijven, mogen jullie uiteraard de ideeën bespreken en alle nieuwe ideeën die hieruit voortvloeien ook noteren. Jullie hebben in totaal 20 minuten om ideeën te bedenken voor nieuwe eigenschappen van de bureaustoel.

Instructies opdracht anoniem
Over enkele ogenblikken ontvangen jullie in de Zoom chat allemaal een eigen link die toegang geeft tot een document. In dit document kun je alle ideeën noteren die gedurende de sessie in je opkomen. Je hoeft nergens je naam te vermelden in het document en je teamgenoten zien niet wat je opschrijft. Maar jullie mogen uiteraard de ideeën bespreken en alle nieuwe ideeën die hieruit voortvloeien ook noteren. Jullie hebben in totaal 20 minuten om ideeën te bedenken voor nieuwe eigenschappen van de bureaustoel.

Appendix 6: Consent form respondents

INFORMATION AND CONSENT FORM

You are invited to participate in a research project about creativity in virtual teams. This research project is being conducted by Luc Quaedackers, Marieke Rutten, and Zachos Evrenoglou from the Nijmegen School of Management of Radboud University.
The procedure involves participating in an online experiment in which you will be asked to engage in two creative tasks, followed by filling out an online survey. The session in total will take no longer than 1 hour. The experiment will be recorded.

Confidentiality of the research data
The research data will be made anonymous and safely stored according to the research data management guidelines of Radboud University and conform to the General Data Protection Regulation. As soon as possible, any personal data will be deleted, but in any case no later than six months after data collection. The researchers involved in this study, will use the research data for academic publications and presentations. The anonymized research data may become available in the context of Open Science so that other researchers can refer to and reuse it. For research integrity purposes, the anonymized data will be accessible to the academic community for a period of at least 10 years.

Voluntary participation
Your participation in this research is voluntary. This means that you can withdraw your participation and consent at any time during the data collection period, without giving a reason. Even up to six weeks after participating you can have your research data/contact data removed, by sending a request to luc.quaedackers@ru.nl, marieke.rutten@ru.nl, or zachos.evrenoglou@ru.nl.

More information
If you would like more information about this research study, now or in the future, please contact any of the priorly mentioned researchers.

If you have any complaints about this research, please contact the researcher *or*
contact the confidential Advisors Academic Integrity via email: vertrouwenspersonen@ru.nl
or
contact the Committee Scientific Integrity of Radboud University. The committee's secretary is mr. M. Steenbergen, (m.steenbergen@bjz.ru.nl or 024 3611578) Executive and Legal Affairs.

More information on the Committee Scientific Integrity can be found here:
https://www.ru.nl/english/research/other-research/academic-integrity/

Consent
By enrolling yourself for a timeslot in the Datumprikker, you confirm that:
• you have taken note of and you understand this information
• you voluntarily agree to participate
• you are at least 18 years of age

If you do not wish to participate in the research study, please decline participation by not enrolling for an experiment time slot in the Datumprikker.