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The knowledge, skills, abilities, and other characteristics (KSAOs) needed to succeed in
virtual teamwork and in text-based computer-mediated communication

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Summary

Technological advancements and the globalization of work have led to the emergence and rise of virtual teamwork. This new form of collaboration is complex and challenging: The use of digital media for communication, the geographic distance among colleagues, and the cultural differences between individuals can pose challenges for collaboration that need to be handled competently by team members. Although many research efforts have been directed to the identification of the required knowledge, skills, abilities, and other characteristics (KSAOs) to succeed in virtual teamwork, a comprehensive model of virtual team KSAOs that integrates the available literature has not yet been developed. This is a notable gap in existing research and carries importance because personnel selection and development of virtual team members could profit immensely from such a model. Furthermore, a roadmap for future research could be provided to move the field of virtual team KSAOs forward.

Besides the need for the synthesis of past research, rigorous empirical tests are needed to examine the relevance of specific KSAOs. One class of KSAOs that could be of particular or even unique importance for virtual collaboration are the KSAOs needed to communicate competently via text-based digital media. Although computer-mediated (CM) communication is ubiquitous in virtual teamwork and beyond, the line of research evaluating KSAOs in the CM communication context is still in its infancy. It is neither clear how CM communication KSAOs relate to well-established face-to-face (FtF) communication KSAOs nor if they provide any advantage in terms of predictive validity to their FtF counterparts. It is vital to shed light on this issue to rule out the possibility that CM communication KSAOs are just “new wine in old wineskins”. If it turned out that CM communication KSAOs add something unique to the equation, this could inform human resource management and would provide future directions for research alike.

In the current dissertation, I realized three studies to address the outlined research gaps. Specifically, a review of the virtual team literature was conducted to integrate the

heterogeneous and scattered landscape of virtual team KSAOs into a comprehensive competency model (Study 1). Besides the theoretical review of the literature, the empirical part of my thesis was dedicated to the systematic examination of the relevance of CM communication KSAOs by using a three-step methodology: First, I examined the shared variance between FtF and CM communication KSAOs in order to find out if both forms of KSAOs can be discriminated (Study 2). Second, I compared the predictive validity of FtF and CM communication KSAOs for a variety of communication relevant outcome variables (Study 2). Third, I investigated if FtF and CM communication KSAOs are predicted differently by antecedental variables in the form of the Big Five personality dimensions as a final test of their distinctiveness (Study 3).

The results of the three studies add valuable knowledge to the virtual team KSAOs and communication competence literature. In the review article, an initial model of virtual team KSAOs was developed. In this model, challenges of virtual teamwork were aligned with specific KSAOs which proved to aid in competently handling the challenges identified in past studies. This model may give more guidance for personnel selection and training of virtual team members and illuminates important research gaps that need to be addressed in future research. The empirical studies highlighted that FtF and CM communication KSAOs are more different than they are similar. They shared only little to moderate variance, differed in their predictive validity for important communication outcomes, and were differentially predicted by personality variables. These results suggest that CM communication KSAOs could play an important role in today's digital interactions and deserve more attention in future virtual team studies.

Keywords: virtual teams; virtuality; knowledge, skills, abilities, and other characteristics (KSAOs); competencies; computer-mediated communication; face-to-face communication

Zusammenfassung

Technologischer Fortschritt und die Globalisierung der Arbeit haben zur Entstehung und zunehmenden Verbreitung virtueller Teamarbeit geführt. Diese neue Form der Zusammenarbeit ist komplex und herausfordernd: Die Verwendung digitaler Medien für die Kommunikation, die geografische Distanz zwischen Kollegen*innen und die kulturellen Unterschiede zwischen Individuen können Herausforderungen für die Zusammenarbeit darstellen, die kompetent von den Teammitgliedern bewältigt werden müssen. Obwohl bereits viele Forschungsbemühungen darauf gerichtet wurden, notwendige Kenntnisse, Fertigkeiten, Fähigkeiten und andere Charakteristiken (engl.: knowledge, skills, abilities, and other characteristics; KSAOs) zu identifizieren, die es braucht, um in virtuellen Teams erfolgreich zu sein, wurde bislang kein zusammenfassendes Modell virtueller Team KSAOs entwickelt, welches die verfügbare Literatur integriert. Dies ist eine gewichtige Lücke in der derzeitigen verfügbaren Forschung und ist von Relevanz, da Personalauswahl und -entwicklung virtueller Teammitglieder immens von einem solchen Modell profitieren könnten. Zudem könnte ein Fahrplan für zukünftige Forschung bereitgestellt werden, um das Feld virtueller Team KSAOs voranzubringen.

Neben der Notwendigkeit einer Integration bisheriger Forschung, werden rigorose empirische Tests benötigt, um die Relevanz spezifischer KSAOs zu untersuchen. Eine Klasse von KSAOs, welche von besonderer oder sogar einzigartiger Bedeutung für virtuelle Zusammenarbeit sein könnte, sind die KSAOs, die gebraucht werden, um kompetent mit Hilfe textbasierter digitaler Medien kommunizieren zu können. Obwohl computervermittelte (computer-mediated; CM) Kommunikation in virtuellen Teams und darüber hinaus allgegenwärtig ist, steht die Forschungslinie, die KSAOs in der CM Kommunikation evaluiert, noch in den Anfängen. Es ist weder geklärt, wie CM kommunikationsorientierte KSAOs in Beziehung stehen zu bereits etablierten KSAOs in der Kommunikation von Angesicht zu Angesicht (engl.: face-to-face; FtF) noch, ob diese in irgendeiner Art und Weise

Vorteile bezogen auf ihre prädiktive Validität zu ihrem FtF Pendant aufweisen. Es ist wichtig, Licht in diese Angelegenheit zu bringen, um die Möglichkeit auszuschließen, dass CM kommunikationsorientierte KSAOs nur „neuer Wein in alten Schläuchen“ sind. Wenn sich herausstellen sollte, dass CM kommunikationsorientierte KSAOs einen besonderen Beitrag leisten, könnte dies den Bereich des Personalwesens unterrichten und gleichsam zukünftige Forschungswege aufzeigen.

In der vorliegenden Dissertation habe ich drei Studien realisiert, um die aufgeführten Forschungslücken zu adressieren. Genauer gesagt wurde eine Übersichtsarbeit der Literatur zu virtuellen Teams angefertigt, um die heterogene und versprengte Landschaft virtueller Team KSAOs zu einem umfassenden Kompetenzmodell zu integrieren (Studie 1). Neben der theoretischen Literaturübersicht ist der empirische Teil meiner Arbeit der systematischen Untersuchung zur Relevanz von CM kommunikationsorientierten KSAOs gewidmet, wobei eine Methodologie bestehend aus drei wesentlichen Schritten zur Anwendung kam: Zunächst habe ich die gemeinsame Varianz zwischen FtF und CM kommunikationsorientierten KSAOs ergründet, um herauszufinden, ob beide Formen von KSAOs voneinander unterschieden werden können. Anschließend habe ich die prädiktive Validität von FtF und CM kommunikationsorientierten KSAOs für eine Vielzahl kommunikationsrelevanter Ergebnisvariablen verglichen (Studie 2). Abschließend habe ich untersucht, ob FtF und CM kommunikationsorientierte KSAOs anhand von Antezedenzien in Form der Big Five Persönlichkeitsdimensionen unterschiedlich vorhergesagt werden, was als ein finaler Test ihrer Unterschiedlichkeit fungierte (Studie 3).

Die Ergebnisse dieser drei Studien ergänzen die Literatur zu virtuellen Team KSAOs und zur Kommunikationskompetenz um wertvolles Wissen. Im Übersichtsartikel wurde ein initiales Modell virtueller Team KSAOs entwickelt. In diesem Modell wurden Herausforderungen virtueller Teamarbeit mit spezifischen KSAOs verbunden, die sich als hilfreich erwiesen haben, mit den in den Studien identifizierten Herausforderungen kompetent

umzugehen. Das Modell könnte im Bereich der Personalauswahl und in Bezug auf Trainings virtueller Teammitglieder eine Orientierungshilfe geben. Zudem verdeutlicht es wichtige Forschungslücken, die in künftiger Forschung adressiert werden sollten. Die empirischen Studien haben verdeutlicht, dass FtF und CM kommunikationsorientierte KSAOs sich mehr unterscheiden als ähneln. Sie teilten nur wenig bis mittelgradig Varianz, unterschieden sich in ihrer prädiktiven Validität für wichtige Ergebnisvariablen der Kommunikation und wurden unterschiedlich von Persönlichkeitsvariablen vorhergesagt. Diese Ergebnisse legen nahe, dass CM kommunikationsorientierte KSAOs eine wichtige Rolle in der heutigen digitalen Interaktion spielen könnten und mehr Aufmerksamkeit in zukünftigen Studien zu virtuellen Teams verdienen.

Schlagwörter: virtuelle Teams; Virtualität; Kenntnisse, Fertigkeiten, Fähigkeiten und andere Charakteristiken (KSAOs); Kompetenzen; computervermittelte Kommunikation; Kommunikation von Angesicht zu Angesicht

List of Abbreviations

BFI-10 – Big Five Inventory-10

BFI-K – Kurzversion des Big Five Inventory

CFA – confirmatory factor analysis

CFI – comparative fit index

CM – computer-mediated

CMC – computer-mediated-communication

CQS – cultural intelligence scale

CT-C(M-1) model – correlated-trait-correlated-method minus one model

FIML – full-information maximum-likelihood method

FtF – face-to-face

ICT – information communication technologies

ICTST – information and communication technologies succession theory

KSAOs – knowledge, skills, abilities, and other characteristics

ML – maximum likelihood

MLR – robust maximum likelihood

MST – theory of media synchronicity

NEO-FFI – NEO-Five Factor inventory

NEO-PI-R - revised NEO personality inventory

ODT – Organisational Discontinuity Theory

PRCA-24 – personal report of communication apprehension

RMSEA – root mean square error of approximation

RW – relative weight

SE – socioemotional

SEM – structural equation modeling

SRMR – standardized root mean square residual

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Chapter 5

Prelude

“When you’re working virtually, you are really flying blind. You are dependent on other people for keeping you up to date with what’s happening on their side. Because we’re without all the sensory cues in face-to-face communication, you really have to let people know what’s going on.” (comment made by a virtual team facilitator; Pauleen & Yoong, 2001, p. 197)

“We found that planning out a meeting poorly for a collocated team is OK; but in a virtual environment, team pre-planning is critical. Otherwise nothing gets done and bridge meetings are required to fill in the gaps” (comment made by a virtual team leader; Malhotra, Majchrzak, & Rosen, 2007, p. 64)

“There are connotations in e-mail. The way things are written, people may interpret them in incorrect manner. Especially going international, when there are different languages, different translations of words, and different meanings.” (comment made by a virtual team member; Nurmi, 2009, p. 132)

“I actually have a coworker started working remotely for a half a year and quit because he cannot justify the remote working structure. He enjoyed seeing people every day, going to an office every day, and that’s why he found another job which he can go to the office every day.” (comment made by a remote working virtual team member; Koehne, Shih, & Olson, 2012, p. 1262)

Chapter 1

Introduction

The ongoing trend of globalization and digitalization is one of the central topics of our time. The advancement of new technologies has changed the way we communicate and how we work. People are now given the possibility to communicate beyond face-to-face (FtF) by means of text-based digital media, videoconferencing, and other tools and applications that can be used from around the globe to interact. Recent media usage statistics outline the extent and rise of computer-mediated (CM) communication. For example, with over 3.7 billion email users in 2017 with a further estimated increase to 4 billion users in 2020, email is the most ubiquitous form of CM communication (The Radicati Group, 2017). Technological advancements have supported the emergence of new working forms such as telework and virtual teamwork that are growing in importance for organizations. This is reflected in recent surveys showing that 46% of global organizations use virtual teams as a working form (Minton-Eversole, 2012) and that many knowledge workers state that they frequently operate within dispersed teams (Ferrazzi, 2014). The large proliferation of virtual teamwork does not come without reason. Several advantages have been identified in pertinent literature including but not limited to reduced costs and travel time or the simplified recruitment of employees with specialized expertise (Bergiel, Bergiel, & Balsmeier, 2008). On the other hand, as was introduced in the prelude, several significant challenges can arise from aspects that are often inherent in virtual teamwork. Examples of these challenges comprise a possibly reduced feeling of nearness to geographically distanced team mates (Wilson, O'Leary, Metiu, & Jett, 2008), differences in language use, values, and beliefs held by individuals from different cultural backgrounds (Zimmermann, 2011) or communication problems due to missing visual and auditory cues in text-based digital interactions (Driskell, Radtke, & Salas, 2003). Not surprisingly, researchers have already started to uncover and evaluate information about the

knowledge, skills, abilities, and other characteristics (KSAOs¹) that virtual team members need to possess in order to handle this particular variety of challenges competently (e.g., Blackburn, Furst, & Rosen, 2003; Hertel et al., 2006). Consequently, research efforts of the past two decades have led to important insights regarding the necessary competencies. However, single studies from many different disciplines such as information systems and sciences (e.g., Wang & Haggerty, 2011), psychology (e.g., Axtell, Fleck, & Turner, 2004), and human-computer interaction (e.g., Olson & Olson, 2000) led to a heterogeneous landscape of rather disconnected findings. As a response to the need for integration, a significant part of my dissertation is dedicated to the synthezation of these past research findings regarding virtual team KSAOs into a comprehensive model by reviewing the available literature (Study 1). A review of virtual team KSAOs is important for both, research and practice:

First, personnel selection needs a comprehensive competency model of virtual team KSAOs which also considers findings with attention to the “when” and “why” of their importance. Such a model would allow for identification of individuals that fit into the virtual team context and therefore could help to increase person-job and person-group fit (Shin, 2004).

Second, as pointed out by Rosen, Furst, and Blackburn (2006) in their review of the virtual team training literature, “it may be that many organizations are reluctant to invest in virtual team training, because they have not yet found effective ways to deliver such training” (p. 243). Thus, a review of the virtual team KSAOs literature has potential to provide improved guidance for reshaping the integral contents of existing virtual team training

¹ The acronym “KSAOs” is defined as a very broad umbrella term that covers the variety of individual characteristics and competencies needed to succeed in a job (Campion et al., 2011; Morgeson, Reider, & Campion, 2005). Throughout my dissertation, I will refer to this term to embrace the various motivational, cognitive, behavioral, and personality aspects that drive the success in virtual teamwork, specifically, as has been done in prior studies (e.g., Hertel, Konradt, & Voss, 2006; Kirkman & Mathieu, 2005; Krumm & Hertel, 2013).

programs and could serve as a starting point for more tailored and more effective training initiatives.

Lastly, a thorough summary of virtual team KSAOs is vital to expose and shed light on existing knowledge gaps specifically regarding virtual team competencies. This approach would therefore help to provide a roadmap for future research.

A theory-driven identification of virtual team KSAOs is crucial, however the discussion benefits by also granting significant focus to the many mosaic pieces of the broader virtual team KSAOs model by conducting rigorous empirical tests of their relevance. From the many identified virtual team KSAOs, I focused the empirical part of my dissertation on the KSAOs needed to communicate competently via text-based digital media (Spitzberg, 2006). Many past studies have revealed that FtF communication KSAOs are vital for success in traditional teamwork and were therefore included in past generic competency models (e.g., Bartram, 2005; Stevens & Campion, 1994). With the development of modern times and the ongoing digitalization and globalization of work, many of today's personal and working interactions are conducted via text-based digital media (e.g., Byron, 2008; The Radicati Group, 2017). In fact, CM communication is at the heart of virtual teamwork (Gibson & Cohen, 2003; Marlow, Lacerenza, & Salas, 2017) and technology usage is included in all prominent definitions of virtual teams (Maynard, Gilson, Jones Young, & Vartiainen, 2017). Importantly, individuals can face many challenges when communicating via text-based media. For example, it might be difficult to build relationships and rapport through text-based media that lacks the many familiar cues of FtF communication (e.g., body language or voice; Daft & Lengel, 1986; Short, Williams, & Christie, 1976). It might also be challenging to communicate asynchronously over geographic distances due to the ambiguity and uncertainty that can accompany CM interactions (Panteli & Fineman, 2005). Due to the rise of CM communication and the outlined challenges, researchers have advocated for the assessment of CM specific communication KSAOs that should be of importance in the digital era (Bunz,

2003; Spitzberg, 2006; 2011). This stream of research is, however, in its infancy and it is not even clear if the proposed CM communication KSAOs can be readily distinguished from their well-established FtF counterparts (for initial empirical evidence, see Bubaš & Spitzberg, 2008; Hwang, 2011). Are KSAOs contextualized to the CM context just “new wine in old wineskins” or do they add something unique to the equation?

Answering this question is vital: Assessment centers currently put much weight on the FtF communication KSAOs of job applicants by drawing on group discussions, role-playing exercises, and oral presentations (Hoffman, Kennedy, LoPilato, Monahan, & Lance, 2015). Yet, a study by Hertel et al. (2006) found no significant relationship between FtF communications skills and virtual team performance (i.e., team level of analysis). If there exist marked differences between FtF and CM communication KSAOs, it might be possible that researchers find increased predictive validity for CM communication KSAOs under such virtual working conditions.

With the current state of research being unclear on this issue, selecting staff for virtual working environments based on FtF communication KSAOs might lead to a misfit between the selected person and the virtual work setting if the job is characterized by a high amount of CM interactions. Likewise, if there exist marked differences between FtF and CM communication KSAOs, it can happen that researchers who focus on FtF communication competencies in their virtual team studies might conclude that communication KSAOs are unimportant for virtual teamwork per se. To follow up on these issues, two empirical studies were realized (Studies 2 and 3) in which in-depth analyses of the similarities and differences between FtF and CM communication KSAOs are provided. Specifically, I examined their shared variance and potential differences in their predictive validity for a variety of outcomes relevant to communication (Study 2). To fully examine their similarities and differences, I did also investigate if antecedental variables in the form of personality traits relate differently to both forms of communication KSAOs (Study 3).

Following this brief introduction on the main topics of my thesis, I will first provide a definition of virtual teams and will give a summary of the controversy surrounding the construct of virtuality. After presenting past approaches to identify virtual team KSAOs and the shortcomings of the available body of research, I will delineate my own approach to address existing issues and will portray my ideas behind conducting Study 1 in greater detail. As the empirical part of my dissertation focuses on the KSAOs needed to communicate competently via text-based digital media, some further theoretical background is needed. To this end, the characteristics of text-based CM communication will be given to set the ground for a short introduction of the CM communication KSAOs model by Spitzberg (2006). After a summary of the scarce existing empirical knowledge base regarding the relevance of CM communication KSAOs, I will present my own systematic approach to shed light on this topic, thus introducing Studies 2 and 3. Following the in-depth presentation of the studies, the dissertation will close with brief summaries of the study's main findings, and a detailed discussion of the limitations as well as the research opportunities resulting from my thesis. Finally, I will integrate the findings and will end with concluding remarks.

Virtual Teams and the Construct of Virtuality

According to Hertel, Geister, and Konradt a virtual team consists of (a) two or more persons who (b) collaborate interactively to achieve common goals, while (c) at least one of the team members works at a different location, organization, or at a different time so that (d) communication and coordination is predominantly based on electronic communication media (email, fax, phone, video conference, etc.). (2005, p. 71)

The latter two aspects of the definition describe the contextual working conditions of virtual teams (e.g., the degree of geographic dispersion or the amount of technological reliance) and are commonly subsumed under the umbrella term “virtuality” (Maynard et al., 2017). Yet,

there is no consensus on the core aspects of the virtuality construct and the significance of each of these aspects for defining virtual teams (Hosseini, Zuo, Chileshe, & Baroudi, 2015; Maynard et al., 2017).

Some of the first studies on the topic chose a dichotomous view, contrasting FtF (also termed “traditional”) teams with virtual teams (e.g. Warkentin, Sayeed, & Hightower, 1997). This approach, while valuable for emphasizing differences in the way FtF and virtual teams operate, does not do justice to the contextual complexity of virtual teamwork: Whereas one team may rely heavily on a variety of technologies to communicate, another may use a very restricted range of media. Whereas one team may be widely geographically separated and crossing different time zones, another one may operate from different cities within the same country. In fact, most contemporary teams can be characterized as hybrid teams, operating under varying conditions of virtuality (Griffith, Sawyer, & Neale, 2003).

Accordingly, more recent research conceptualized virtuality as a continuous and multifaceted construct (Chudoba, Wynn, Lu, & Watson-Manheim, 2005; Gibson & Gibbs, 2006; Schweitzer & Duxbury, 2010). For example, Gibson and Gibbs (2006) measured the geographic dispersion, electronic dependence, national diversity, and the dynamic structural arrangements (i.e., amount of change of roles and memberships in a team) to study their impact on team innovation. As another example, Schweitzer and Duxbury (2010) assessed the amount of work conducted FtF, the geographical separation of the team members, and the proportion of members located at different places to study their effect on indicators of virtual team effectiveness. Although definitions of virtuality vary considerably, and even though there is still no agreement on the exact number of facets, operationalizations of team virtuality have typically included the amount and type of technology usage, the cultural diversity of team members, and the geographic distance among colleagues as core facets of virtual teamwork (for a summary see Maynard et al., 2017). The differentiation of virtuality facets is important, because each of them has been associated with specific challenges for virtual

teamwork: For instance, it can be challenging to match the available technology tools to the communication processes and collaborative tasks (Maruping & Agarwal, 2004). Virtual teamwork with culturally different individuals and their different values and working styles might be challenging as well (Nurmi, 2009). Finally, coordination complexity may increase over high geographic and temporal distance (O'Leary & Cummings, 2007).

A recent meta-analysis showed that higher levels of virtuality are on average associated with decreases in knowledge sharing, performance, and satisfaction with teamwork (Ortiz de Guinea, Webster, & Staples, 2012). However, as the authors point out, these detrimental effects decline or vanish in teams that work together for an extended amount of time. These findings suggest, that virtual teamwork poses initial challenges, but that some team members might enact on their KSAOs to overcome these obstacles. In fact, recently, researchers have called for more focus on the interaction of virtuality facets and individuals by illuminating how virtual team members perceive virtuality conditions and respond to specific virtuality related challenges (Watson-Manheim, Chudoba, & Crowston, 2012). Such insights could be vital to identify the KSAOs needed to mitigate possibly negative effects of virtuality facets on teamwork.

Past Approaches to Identify Virtual Team KSAOs

Past studies have relied on a variety of practices to drive the identification of virtual team KSAOs and the development of virtual team competency models (e.g., Blackburn et al., 2003; Hertel et al., 2006; Kokko, Vartiainen, & Lönnblad, 2007; Krumm & Hertel, 2013; Shin, 2004). The methodology used varies from purely theoretical work in the form of literature reviews (e.g., Krumm & Hertel, 2013; Shin, 2004) to combinations of theoretical and qualitative methods such as interviews with virtual team experts or leaders (e.g., Blackburn et al., 2003; Kokko et al., 2007) to combinations of theoretical and regression analytic approaches, whereby the identified virtual team KSAOs served as predictors of virtual team performance outcomes (e.g., Hertel et al., 2006). With the help of this

methodological diversity, a variety of competencies have been uncovered that are usually summarized in KSAO sets, lists, or so-called KSAO-clouds (i.e., a loose collection of competencies depicted in a cloud; c.f., Krumm & Hertel, 2013) that form the basis of the study-specific virtual team competency models. As a high-level summary, Krumm and Hertel (2013) compiled more than 50 different KSAOs that have been hypothesized to be of importance for virtual teamwork as identified in past studies.

Importantly, the existing lists, sets, and clouds of KSAOs give little guidance on “when” and “why” a particular KSAO should be of importance. They are not addressing the specific challenges that can result while working under different conditions of virtuality in a systematic way. This lack of specificity has supported the emergence of a rather heterogeneous landscape of virtual team KSAOs. As a first idea on how to address this issue, Krumm and Hertel (2013) explored challenges associated with the virtuality facet “technology usage” in order to derive virtual team KSAOs that could be helpful to respond to the specific demands of this facet, advocating for more research along this line. Identifying virtual team KSAOs that are specific to virtuality facets has much potential as it allows giving more detail to the when and why of their importance and provides information about the boundary conditions of the usefulness of the identified competencies. Furthermore, the virtuality construct and its constituting facets can serve as an organizing framework to integrate the scattered landscape of virtual team KSAOs holistically.

As a response to the outlined issues and the potential that lies in moving to a virtuality facet specific KSAOs model, I reviewed the theoretical and empirical literature on virtual teams and followed up on the ideas outlined by Krumm and Hertel (2013). At the core of this first study are three approaches to identify virtual team KSAOs (Schulze & Krumm, 2017): In a first step, I reviewed the existing body of virtual team competency frameworks in order to examine their overlap and to derive clusters of KSAOs. As a next step, I reviewed the literature on virtuality facets and their specific challenges. This second step acted as a

requirement analysis and served two purposes: For one, it allowed to inspect to what extent existing KSAO clusters address the challenges imposed by the work in a virtual team and where they fail to do so. For another, it provided an anchor for identifying KSAOs to meet these requirements, specifically, to fully account for the complexity of virtual teamwork in a third step. The study description and its results can be found in Chapter 2 of the dissertation.

Empirical Tests on the Relevance of Virtual Team KSAOs

The existing competency modeling approaches and resulting lists of KSAOs helped to summarize the current knowledge base and have stimulated further empirical research on the relevance of the identified virtual team KSAOs. Besides the already mentioned regression analytic approach that proved to be useful as a tool to shed light on the predictive validity of KSAOs (e.g., Hertel et al., 2006; Wang & Haggerty, 2011), another line of research has devoted its attention to the comparison of importance ratings regarding competencies in traditional and virtual teams (Krumm, Terwiel, & Hertel, 2013; Krumm, Kanthak, Hartmann, & Hertel, 2016). Krumm et al. (2013), as an example, asked members of cross-cultural virtual and cross-cultural traditional teams to rate the importance of several intercultural KSAOs for their work (i.e., cultural knowledge, working conscientiously, ambiguity and stress coping, and openness and perspective taking). It turned out that the cognitive, affective, and behaviorally oriented intercultural KSAOs clusters were all considered important for the work in both kinds of teams, but that working conscientiously was rated as being of significantly higher importance for individuals collaborating in cross-cultural virtual teams. This result points to the relevance of intercultural competencies in virtual teams broadly as well as to some specific requirements that are distinguishable from demands of traditionally working cross-cultural teams (Krumm et al., 2013).

Both delineated approaches give important insights into the practical relevance of KSAOs for virtual teamwork. That said, only little attention has been paid to KSAOs that have the potential to be of strong or even unique importance for virtual collaboration.

Specifically, Spitzberg (2006) formulated a model of text-based CM communication competence and introduced a variety of KSAOs that are appropriated to the CM communication context. These KSAOs could be of particular importance for virtual collaboration due to the often-high amount of CM communication that characterizes this form of work (Marlow et al., 2017; Maynard et al., 2017). The current focus of selection procedures (e.g., Hoffman et al., 2015) and virtual team KSAOs studies (Hertel et al., 2006) lies on traditional FtF communication competencies. To date, the similarities and differences between FtF and CM communication KSAOs have only been explored marginally in empirical studies (see Bubaš & Spitzberg, 2008; Hwang, 2011 for initial approaches), which is an important research gap: If it turned out that FtF and CM communication KSAOs share only little variance and differ in their predictive validity for significant outcomes, this would call for a stronger focus on CM communication KSAOs in future virtual team research and in the selection and development of virtual collaborators.

In what follows, I will give a theoretical overview of text-based CM communication and its specific characteristics to provide a basis for introducing the CM communication KSAOs model by Spitzberg (2006) and the two empirical studies that were realized to address this research gap.

Computer-Mediated and Face-to-Face Communication

As outlined before, technology use is one of the central determining characteristics of virtual teamwork (Marlow et al., 2017; Maynard et al., 2017). Generally, CM communication has been defined “as any human symbolic text-based interaction conducted or facilitated through digitally-based technologies” (Spitzberg, 2006, p. 630). Although other researchers have subsumed media such as videoconferencing or phone calls under the umbrella term of CM communication, too (e.g., Driskell et al., 2003), I will focus my investigations on text-based CM communication that does not provide characteristics such as audibility or visibility

since is one of the most widespread forms of mediated interaction (The Radicati Group, 2017).

Past studies in the realm of virtual collaboration (e.g., Driskell et al., 2003; Martins, Gilson, & Maynard, 2004) and several theories of CM communication (Daft & Lengel, 1986; Short et al., 1976) drew a rather pessimistic picture about the usefulness of text-based media for interpersonal communication. Situated in the cues-filtered-out perspective (Culnan & Markus, 1987), these studies and theories suggested that due to the non-existence of cues such as body gesture or eye contact CM communication would be void of socioemotional information and as a result would be less personal than FtF communication (for a summary, see Walther, 2011). In social presence theory, as one theoretical example, different media are hypothesized to vary in their capability to convey a sense of presence, a feeling of intimacy and immediacy, between communicators (Gunawardena, 1995; Short et al., 1976). As text-based CM communication is narrow in bandwidth due to missing audio and visual cues, this medium was thought of being less able to convey social presence (Rice & Love, 1987). As a result, Rice and Love (1987) stated in their early review about socioemotional content in CM communication that “if the social presence concept is accepted, CMC², because of its lack of audio or video cues, will be perceived as impersonal and lacking in sociability and normative reinforcement, so there will be less socioemotional (SE) content exchanged” (p. 88).

Over the last two decades, however, a shift in perspective has taken place. Whereas many past studies put a strong focus on the effects of the communication medium, detached from the individuals using the media (c.f., Spitzberg, 2006), many empirical articles highlight the role of the communicators for successful CM interactions (Ayoko, Konrad, & Boyle, 2012; Byron, 2008; Derks, Fischer, & Bos, 2007; Walther & Bazarova, 2008; Warkentin & Beranek, 1999). For example, Derks et al. (2007) reviewed the literature on the role of

² CMC is another abbreviation for computer-mediated communication.

emotion in CM communication and concluded that communicators can adapt their communication behavior to the restrictions of text-based media by using emoticons or by explicitly describing their emotions, which led them finish by writing that “CMC is crammed with emotions” (p. 781). As another example, Walther and Bazarova (2008) could show that individuals in CM communication groups, who had high communication skills, perceived a feeling of nearness to their interaction partners, even when using text-based media only. Finally, as early as 1999, Warkentin and Beranek provided a virtual team communication training as an attempt to overcome the drawbacks of electronic communication. Virtual team members were taught the challenges of CM communication and how to respond to channel restrictions by using, for example emoticons. Ultimately, the training resulted in increased levels of cohesiveness and satisfaction with group processes (Warkentin & Beranek, 1999).

The most recent literature highlights the specific adaptation strategies and the unique CM cues that are used by interactors to arrive at communicative goals via text-based media (Darics, 2012, 2013; Kalman & Gergle, 2014; Vandergriff, 2013). For instance, Darics (2012) examined the instant-messaging behaviors that virtual team members adopted to compensate for the channel restrictions of this text-based medium. A variety of signals were used by virtual team members such as non-lexical tokens (hm/uh/yep), typographic cues (emoticons, punctuation), or non-standard capitalization (repeated capital letters) that proved to have highly context dependent meanings (Darics, 2012).

Taken together, rather than being impoverished compared to FtF communication per se, text-based communication affords adaptation and the use of specific CM communication cues to enrich this at-first-glance-restricted communication channel. Such a view certainly puts more weight on the individuals using the media and points to CM specific KSAOs that might be of importance.

The CM Communication KSAOs Model by Spitzberg (2006)

As a response to the rising need for skillful CM interactions and the inattention that has been given to the social interactors, who use the communication tools, Spitzberg (2006) formulated a model of CM communication competence. At the heart of this model is the triad of CM communication motivation, knowledge, and skills. A metaphor given by Spitzberg describes the interplay of these constructs:

An actor needs to be motivated to give a good performance. Being motivated, however, is insufficient if the actor does not know the script which is to be enacted or the context in which the script is to be played out. Even motivation and knowledge are still insufficient unless actors have the acting skills requisite to translate their motivation and knowledge into competent action. (2006, p. 637)

According to this model, the motivation construct comprises of both avoidance (e.g., CM communication apprehension) and approach tendencies (e.g., positive attitudes towards and the willingness to use text-based media) toward CM communication and is therefore the empowering component of the model (Spitzberg, 2006). The knowledge construct is characterized by the familiarity and experience that an individual has gained with CM communication (e.g., familiarity with text-based communication). Finally, the skills construct comprises of attentiveness (e.g., signaling interest into CM communication interaction partners and being empathic), composure (e.g., being assertive and showing confidence in CM communication interactions), coordination (e.g., managing the give and take of CM communication interactions and skillful topic management), and expressiveness (e.g., being vivid and articulate in CM interactions). As a further assumption of this model, motivation, knowledge, and skills are positively related to each other and in turn are thought to be positively related to a variety of communication competence outcomes. Specifically, Spitzberg (2006, 2011; see also Keyton, 2015) hypothesized that CM communication motivation, knowledge, and skills contribute to perceptions of appropriateness (e.g., being a

non-offending and careful communicator), effectiveness (e.g., achieving goals and being effective in interactions), satisfaction (e.g., being pleased and feeling enjoyment in conversations), clarity (e.g., being accurate in interactions and getting ideas across), and attractiveness (e.g., being able to get others to form positive impressions of oneself).

Importantly, the CM communication competence model has originated from Spitzberg's far earlier introduced communication competence model for FtF interactions that has been extensively researched (Spitzberg, 1991; Spitzberg & Cupach, 1984; Spitzberg & Hecht, 1984). Spitzberg himself presumed that

FtF and CMC interaction are more similar than they are different. Both can be explained by the same general model components, and, in most cases, the components of this model require only minor adaptation to the particular technological features of the context. (2006, p. 652)

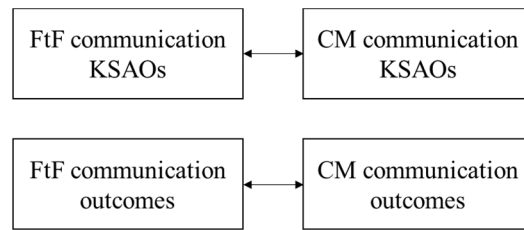
Therefore, the CM communication KSAOs model consists of the very same motivation, knowledge, and skills constructs as the FtF counterpart, but is appropriated to the text-based CM communication context. Although the KSAOs are labeled the same, they seem to be differentially expressed from one context to the other, which is in accordance with the portrayed research that focuses on the translation of FtF non- and paraverbal communication cues into the realm of CM communication (e.g., Darics, 2012). Some key questions arise given these theoretical statements: To what extent do FtF and CM communication KSAOs interrelate? Is it even necessary to differentiate between these KSAOs?

There are some studies available that shed light on the interrelationship of FtF and CM communication KSAOs (e.g., Bubaš & Spitzberg, 2008; Hwang, 2011). These studies show that the KSAOs share only little to moderate variance which might be indicative of them being distinct constructs. Noteworthy, rather than assessing the very same KSAOs contextualized to either the FtF or the CM communication context (as suggested by Spitzberg's communication KSAOs models), different assessment instruments were applied

to measure the KSAOs in each context. Thus, it remains unclear if low intercorrelations are driven by the influence of the communication context or simply occurred due to the application of different measurement instruments. Furthermore, predictive validity of CM communication KSAOs for theoretically important outcomes (e.g., media usage frequency or perceptions of appropriateness and effectiveness) has been only sparsely examined (but see Chua & Chua, 2017; Ross, Orr, Sisic, Arseneault, Simmering, & Orr, 2009; Spitzberg, 2011) and if so, seldom contrasted against the predictive validity of FtF communication KSAOs (for an exception, see Bubaš & Spitzberg, 2008).

To examine these matters further, I conducted an empirical study (Study 2; Schulze, Schultze, West, & Krumm, 2017) in which I assessed self- and peer-reports of both FtF and CM communication KSAOs and outcomes in line with Spitzberg's theoretical frameworks (1983; 2006). Importantly, all constructs were assessed with identically worded items but different context tags that referred to either the FtF or the CM communication context (see Spitzberg, 2006 and Schulze, Schultze, et al., 2017 Appendix, for the items that were used for adaptation). This design allowed to examine the convergence of FtF and CM communication KSAOs and the non-shared variance between the constructs. As a further step, I compared the predictive validity of FtF and CM communication KSAOs regarding context specific communication outcomes such as the perceived effectiveness and appropriateness in FtF and CM interactions. Thus, this study addressed the need to investigate the discriminant and predictive validity of CM communication KSAOs by contrasting them to their FtF counterparts. A simplified depiction of the conducted analyses is portrayed in Figure 1. Further details of the study design and the results can be found in Chapter 3 of this dissertation.

Study 2 – Convergence of FtF and CM communication KSAOs and outcomes



Study 2 – Predictive validity of FtF and CM communication KSAOs

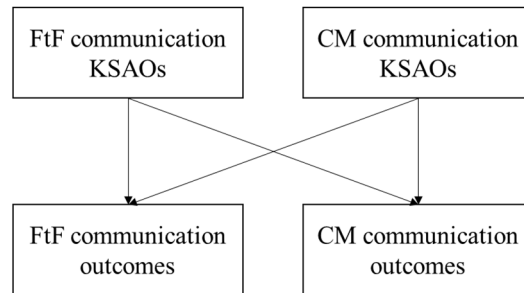


Figure 1. Simplified summary of research approaches to study the relevance of CM communication KSAOs (Study 2)

Antecedents of Communication KSAOs

Even stronger empirical support for the distinctiveness of FtF and CM communication KSAOs would be evidenced if both kinds of KSAOs would be predicted differently by antecedental variables. In the realm of FtF communication, personality variables such as openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (Eysenck & Eysenck, 1963; McCrae & Costa, 1999) were frequently considered as such antecedental variables (e.g., Akert & Panter, 1988; Bakx, Van der Sanden, & Vermetten., 2002; Blume, Dreher, & Baldwin, 2010; Hullman, Planisek, McNally, & Rubin, 2010). For example, Akert and Panter (1988) examined the relationship of the personality trait extraversion with the skill to interpret nonverbal communication cues. Drawing on the work of Eysenck and Eysenck (1963), who characterized individuals with high scores on extraversion as sociable, Akert and Panter (1988) hypothesized that such individuals would

have increased opportunity to develop communication abilities. In line with this assumption, extraversion was positively associated with the accuracy to decode nonverbal communication cues (Akert & Panter, 1988). Although a link between personality and communication KSAOs is well-established in the realm of FtF communication, personality associations with CM communication KSAOs have only recently started to be explored and the results are not consistent: Whereas personality traits in the form of the Big Five personality dimensions were almost unrelated to CM communication KSAOs in one study (Ross et al, 2009), another one revealed many significant associations (Chua & Chua, 2017).

There are some theoretical arguments available on why personality may predict FtF and CM communication KSAOs differently. The person-situation interaction perspective posits that both a person's characteristics and the situation/context as well as their interaction drive behavior (Mischel, 1973, 2009). An individual that shows conscientious behavior at work might act less thoroughly at home. One way to put more context into the assessment of personality is to add context tags to personality items (e.g., "I am talkative *at work*") (Schmit, Ryan, Stierwalt, & Powell, 1995). Past studies have shown that framing participants to a context that is conceptually related to an outcome of interest, can have a positive influence on the predictive validity of the personality traits for that very outcome (e.g., framing the responses of participants to a work context if work performance is the outcome to be predicted; Shaffer & Postlethwaite, 2012). Researchers have also investigated using this method, if and how ratings of personality dimensions might differ in "offline" and "online" contexts (Blumer & Döring, 2012; Stritzke, Nguyen, & Durkin, 2004; for a summary see Yang, Quan-Haase, Nevin, & Chen, 2017). Mean scores on non-contextualized and online questionnaires of the Big Five personality dimensions (Blumer & Döring, 2012) and of the construct of shyness (Stritzke et al., 2004) showed a difference between the "offline" and the "online" version. The studies give rise to the assumption that non-contextualized personality questionnaires without any context tag ("I am talkative") may provide an implicit FtF framing

and thus could relate stronger to FtF compared to CM communication KSAOs. Furthermore, the above-mentioned studies highlight the potential to increase predictive validity of personality variables for CM communication KSAOs if the items are augmented with a context tag that frames individuals to the CM context. Importantly, I am not aware of any prior research that considered both FtF and CM communication KSAOs as well as personality variables in one and the same study.

To gain deeper insights into the associations of personality traits with FtF and CM communication KSAOs, a third study was realized (Schulze, Zagorscak, West, & Krumm, 2017). By assessing a non-contextualized personality questionnaire of the Big Five personality dimensions and a CM specific version that was augmented by CM context tags, the design allowed to further systematically examine the relevance of contextualization in both personality and communication KSAOs research. The details regarding this study can be found in Chapter 4 of this thesis and a simplified depiction of the analysis is portrayed in Figure 2 below.

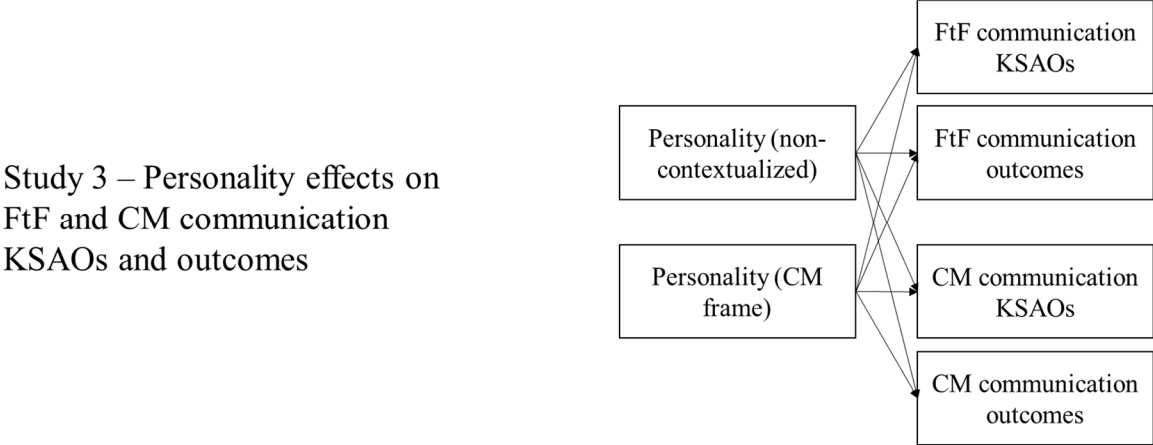


Figure 2. Simplified summary of the research approach to further examine context effects in personality and communication KSAOs research (Study 3)

Interim Conclusion

Over the past decades, important insights have been gained from acknowledging the complexity of the new working context of teams and from studying the differences between FtF and CM communication. Examining the main effects of virtuality facets on teamwork and the impact of media devices on communication and collaboration set the starting point for further exploration of the causes and the variability of their effects. One of the many influential variables that seem to be important to consider are the individuals and their KSAOs that help to handle the many challenges imposed by the globalization and digitalization of work.

As a response to the growing need to identify such KSAOs and to empirically test their relevance, three studies were conceptualized and executed. In the preceding sections, I gave an overview of the available literature, open research questions, and my ideas behind conducting the three studies to move research in the field of virtual team and CM communication KSAOs forward. The concrete results of these endeavors are portrayed in the following chapters.

Chapter 2

The “virtual team player”:

A review and initial model of knowledge, skills, abilities, and other characteristics for virtual
collaboration

Aus Gründen des Nutzungsrechts sind die Seiten 23-52 in der Online-Version nicht enthalten.
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Chapter 3

The knowledge, skills, abilities, and other characteristics required for face-to-face versus computer-mediated communication: Similar or distinct constructs?

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Chapter 4

Mind the context - The relevance of personality
for face-to-face and computer-mediated communication

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Mind the Context – The Relevance of Personality for Face-to-Face and Computer-Mediated Communication

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Abstract

Over the past few decades, a plethora of research has examined the link between personality and face-to-face (FtF) communication knowledge, skills, abilities, and other characteristics (KSAOs). However, with the rise of digital media, text-based computer-mediated (CM) forms of communication have gained increasing importance. In Study 1 ($n = 454$), an online panel study, we assessed the broad Big Five personality dimensions and investigated their relationships to FtF and CM communication KSAOs. Path models revealed that these personality dimensions, mostly extraversion and neuroticism, explained more variance in FtF as compared to CM communication KSAOs. Study 2 ($n = 173$) addressed the same questions in a laboratory context. The pattern of results was similar to Study 1. Additionally, a frame-of-reference personality test with a CM framing explained more variance in CM than in FtF communication KSAOs. These results point to the importance of considering context effects in communication and personality research.

Key words: Computer-mediated-communication, face-to-face communication, communication competence, communication apprehension, personality, communication skills, KSAO

Mind the Context - The Relevance of Personality for Face-to-face and Computer-mediated Communication

Research on communication has a long history across multiple disciplines (Berger & Calabrese, 1975; Keyton et al., 2013; Rimm-Kaufman & Pianta, 2005). This emphasis stems from the ubiquity of communication in human interaction and the importance of skillful communication for a variety of job-related outcomes such as job performance and success in teamwork (Hertel, Konradt, & Voss, 2006; Schulze & Krumm, 2017). A large body of research has focused on the question of what knowledge, skills, abilities, and other characteristics (KSAOs¹) define competent communication (e.g., Rubin & Martin, 1994; Spitzberg, 1983; Wiemann & Backlund, 1980). This research has shed light on the antecedents and the consequences of competent *face-to-face* (FtF) communication (e.g., Bakx, Van der Sanden, & Vermetten, 2002; Blume, Dreher, & Baldwin, 2010; Hullman, Planisek, McNally, & Rubin, 2010; MacIntyre, 1994; McCroskey, Heisel, & Richmond, 2001; Spitzberg, 1983; Spitzberg, 1988).

Times are changing. Since the rise of digital media, interactions are increasingly performed using text-based computer-mediated (CM) communication, e.g., via email, chat, or forums. For example, with over 2.5 billion email users in 2014, email was the most ubiquitous form of CM communication (Radicati, 2014). Acknowledging the new context in which communication is now taking place, researchers have started to explore the KSAOs required for CM communication (e.g., Chua & Chua, 2017; Ross et al., 2009; Spitzberg, 2006). There is a small, but growing body of evidence that FtF and CM communication KSAOs are more different than similar (Brown, Fuller, & Vician, 2004; Bubaš & Spitzberg, 2008; Hwang, 2011; Schulze, Schultze, West, & Krumm, 2017), but systematic research that includes a

¹ We use the term KSAOs as an umbrella term for communication skills and communication competence. We prefer this broader term since it more adequately reflects the communication model used in this research, which is not restricted to skills but also includes other characteristics such as motivation or knowledge.

broad range of KSAOs from both contexts is missing. In particular, no study has yet examined whether explanatory variables (e.g., in the form of antecedents such as personality traits) relate differently to FtF and CM communication KSAOs.

The question about the similarities or differences of FtF and CM communication KSAOs is of great importance for both scientific and practical reasons. First, if communication KSAOs in a CM context are just “old wine in new bottles”, there would be no need to adapt (i.e., contextualize) KSAOs to the specific context in future studies. Researchers could just rely on well-established FtF communication KSAO assessments, regardless of the mode of communication under investigation. Second, new theorizing about CM communication KSAOs serve little purpose, because of the close resemblance of FtF and CM communication KSAOs. Third, organizations and business would not need to consider the environment (FtF vs. CM) when selecting or training management or employees to interact with others. Instead, the traditional FtF communication experience would serve as a good proxy for assessing future communication performance in CM environments (e.g., virtual teams).

In the current article, we systematically address a specific and not yet examined aspect of the (dis)similarity of FtF and CM communication KSAOs. That is, we include well-established antecedents of FtF communication KSAOs, i.e., broad personality dimensions (e.g., Hullman et al., 2010; McCroskey et al., 2001), and examine whether personality has similar relationships to KSAOs in FtF and CM communication. To our knowledge, previous research has not yet simultaneously included personality dimensions, communication KSAOs, and outcomes *from both contexts* (FtF and CM) in a single study. To date, the relationship between broad dimensions of personality and communication KSAOs have been explored either within the FtF (e.g., McCroskey et al., 2001) *or* the CM communication context (e.g., Chua & Chua, 2017; Ross et al., 2009). While it is widely agreed that the relationship between personality and observed or reported behavior is prone to situational influences

(Mischel, 2009), the different contexts of the existing studies make it difficult to compare results *across* studies. Therefore, the relationships of personality to FtF as compared to CM communication remains an open question. Hence, a cross-contextual analysis of the differential contribution of personality to communication KSAOs within one study is needed. The current paper does just that by contrasting the predictive validity of the broad Big Five personality traits for communication KSAOs and outcomes across the FtF and CM contexts.

Context Effects in Communication Research

Several theories can be brought to bear on the similarities and differences between FtF and CM communication contexts (for an overview see Walther, 2011). Classical cues-filtered-out theories such as media richness theory (Daft & Lengel, 1986) and social presence theory (Short, Williams, & Christie, 1976) define text-based CM communication as maximally different from FtF communication in terms of richness and presence. According to media richness theory, FtF communication provides a higher degree of media richness compared to CM communication, because it allows for the use of multiple cues (e.g., body language, tone of voice) immediate feedback as well as a high degree of natural language (Daft & Lengel, 1986; Walther, 2011). In the same vein, social presence theory also argues that FtF communication provides a higher capacity for transmitting nonverbal communication cues, which in turn increases social presence between communicators, a feeling of involvement and presence of other social interactors (Short et al., 1976; Walther, 1992). Thus, both theories highlight the lack of communication cues in CM interactions which should result in lower perceived richness (media richness theory) and less perceived social presence (social presence theory) compared to FtF communication (Daft & Lengel, 1986; Short et al., 1976).

Other approaches, however, have challenged this view. Social information processing theory (Walther, 1992) and electronic propinquity theory (Korzenny, 1978; Walther & Bazarova, 2008), as two examples, argue that with time and increasing skills, the same interaction quality can be accomplished in FtF and CM communication. According to these

theoretical viewpoints, individuals adapt their communication behavior and find ways to overcome the restrictions imposed by CM communication (Derks, Fischer, & Bos, 2008). As examples, expressiveness can be shown by relying on emoticons or explicitly stating emotions in a written message (Derks et al., 2008). Assertiveness can be shown by using nonstandard punctuation (e.g., multiple exclamation marks, Vandergriff, 2013) or capital letters (Darics, 2012). In sum, these latter two theories argue that communication in CM contexts can be as personal as communication in FtF contexts, but they also recognize that communication strategies and behavior need to be adapted in significant ways.

One of the most established communication competence models, Spitzberg's communication KSAO model (1983, 1988; see also Spitzberg & Cupach, 1984), originally developed in the context of FtF communication, also presents a view similar to the latter two theories. According to this framework, competent communication requires motivation (e.g., presence of approach motives, absence of avoidance motives), knowledge (e.g., familiarity and experience with communication), and skills (e.g., attentiveness, expressiveness, and composure) on the side of the communicators. These variables, in turn, are hypothesized to influence communication outcomes such as satisfaction with communication, and effectiveness and appropriateness of interactions (e.g., Keyton, 2015). With the advent of text-based CM communication, Spitzberg re-introduced these model components to the CM environment presuming that

FtF and CMC interaction are more similar than they are different. Both can be explained by the same general model components, and, in most cases, the components of this model require only minor adaptation to the particular technological features of the context. (2006, p. 652)

Thus, the CM communication model consists of the same KSAOs as the original one.

Empirical investigations have shown that KSAOs in FtF and CM communication have only low to moderate correlations (Brown et al., 2004; Bubaš & Spitzberg, 2008; Hwang,

2011; Schulze et al., 2017). For example, Schulze et al. (2017) gathered reports on communication KSAOs and outcomes in line with Spitzberg's competence model across the FtF and CM contexts. There was only small to moderate shared variance between identical KSAOs assessed in the FtF and CM contexts. As an example, the KSAO to show empathy and interest in communication partners (i.e., attentiveness; Spitzberg, 2006) correlated only $r = .38$ between contexts. Brown et al. (2004) investigated the interrelationship of oral and CM communication apprehensions. Whereas oral communication apprehension has been defined as "a broadly based anxiety related to oral communication" (McCroskey, 1970, p. 270), CM communication apprehension is "an individual's level of fear or apprehension associated with actual or anticipated use of information technology to communicate with others" (Brown et al., 2004, p. 83). FtF (oral) and CM communication apprehension shared only little variance in the study by Brown et al. (2004) ($r = .33$). Hwang (2011) examined the prediction of CM communication skills by FtF communication skills, finding a moderate regression weight of $\beta = .29$. In sum, these results consistently support the view that communication KSAOs and outcomes share only little to moderate variance across FtF and (text-based) CM communication contexts.

Personality in FtF and CM Contexts

Personality researchers have long recognized that the situational contexts are important determinants of cross-situational consistency in behavior (Mischel, 2009). Individuals who are highly conscientious at work might be less so at home, thus showing different behaviors in different contexts. So, it is widely agreed that situation/context characteristics together with person characteristics, and person \times situation interaction influence behavior (Mischel, 1973).

One approach for examining context effects in personality assessment is to use a specific contextual frame-of-reference in personality questionnaires (Schmit, Ryan, Stierwalt, & Powell, 1995). A contextual frame-of-reference can be provided by adding context tags that

focus on a specific situational domain (e.g., “at work”, “at school”; Lievens, De Corte, & Schollaert, 2008) to the original personality questionnaire items (e.g., “I am talkative”). Meta-analytic evidence (Shaffer & Postlethwaite, 2012) has shown that contextualized personality inventories showed higher criterion-related validity than their original generic counterpart when the context tag (e.g., “at work”) closely mirrored the conceptual domain of the outcome (employee performance). The increase in criterion-related validity is attributed to both (a) the reduction of between-person variability (i.e., different persons use different frames-of-references when responding to items) and (b) the reduction of within-person inconsistency in item responding (i.e., the individual alters her/his internal frame-of-reference while responding). The conceptual situational match between the chosen context tag and the outcome variables is crucial (Lievens et al., 2008). For example, Lievens et al. (2008) showed that it is not only important to provide the same context framing for all participants, but to also match the frame-of-reference conceptually to the criterion (i.e., “at school” context tag rather than “at work” context tag for predicting grade point average).

Several researchers have extended this line of research to the online domain. Specifically, they have used context tags to explore differences in personality dimension scores in offline and online contexts (for a summary of this research see Yang, Quan-Haase, Nevin, & Chen, 2017). For example, Blumer and Döring (2012) compared the mean values of the original NEO-Five Factor Inventory (NEO-FFI; Borkenau & Ostendorf, 1993; Costa & McCrae, 1992) with a version of the questionnaire that was augmented by the context tag “on the computer or internet”. Comparisons of the mean values of the Big Five personality variables showed material differences between both questionnaires. Specifically, the means of the Big Five personality dimensions of the internet-version were lower compared to the means of the original version. Likewise, Stritzke, Nguyen, & Durkin (2004) investigated the personality construct “shyness” in a FtF (offline) and in a CM (online) condition by adding the context tag “online” to each original shyness item (e.g., “I am socially somewhat awkward

online.”). Mean comparisons showed that individuals classified as shy on the original (offline) shyness questionnaire (the revised Cheek and Buss shyness scale; Cheek, 1983) exhibited substantially lower shyness levels on the online version of the very same questionnaire. Finally, Nevin (2015) examined if psychopathy is differentially expressed online. For this purpose, Nevin (2015) compared mean values on an offline psychopathy questionnaire (adapted from the primary and secondary psychopathy scales by Levenson, Kiehl, & Fitzpatrick, 1995) with a “cyber-psychopathy” version of the scales that related the items to the online and internet context. Again, mean differences were observed between offline and online psychopathy questionnaires (Nevin, 2015). The results of these studies suggest that classic personality questionnaires may capture the offline and FtF situated personality more readily. Moreover, ratings of personality dimensions in FtF (offline) contexts are different from ratings of personality dimensions in CM contexts.

Personality Predicting Communication KSAOs

The existing literature points to numerous relationships between broad personality variables and FtF interpersonal communication KSAOs (e.g., Akert & Panter, 1988; Bakx et al., 2002; Blume et al., 2010; Hullman et al., 2010; MacIntyre, 1994; McCroskey et al., 2001; Sims, 2017). Overall, the general finding in this research is that extraversion, agreeableness, conscientiousness, and openness to experience have positive relationships, whereas neuroticism has negative relationships with a variety of communication KSAOs. Bakx et al. (2002) assessed self-perceived communication KSAOs (i.e., structuring a conversation, showing empathy, starting a conversation, being assertive, and grilling) and found mostly significant positive correlations with personality variables, including emotional stability (the opposite of neuroticism). Hullman et al. (2010) assessed 10 dimensions of interpersonal communication competence (e.g., expressiveness, assertiveness, empathy, among others) and found a variety of significant positive associations with several personality traits, also including emotional stability. Blume et al. (2010) examined the influence of extraversion and

emotional stability on communication apprehension, finding that both personality variables were associated with lower communication apprehension.

Far less is known about the relationship between personality and CM communication KSAOs. Ross et al. (2009) found that personality variables did not significantly relate to most CM communication KSAOs. In contrast, Chua and Chua (2017) found many meaningful associations between personality and communication KSAOs in a path model. Extraversion was positively related to all measured CM communication KSAOs (i.e., motivation, knowledge, and skills) and conscientiousness was positively related to CM knowledge and skills. Openness and neuroticism both had a negative relationship with CM communication skills, but a positive relationship with CM communication motivation. Finally, agreeableness showed no significant influence on any of the CM communication KSAOs (Chua & Chua, 2017). Given that the available evidence is sparse and inconsistent, few conclusions can be reached about the relationship of broad personality traits and CM communication KSAOs (and CM communication outcomes).

The Present Study and Hypotheses

Given the research reviewed above, we conclude that the relationship between broad personality traits and communication KSAOs differs between FtF and CM contexts. Bringing together these two streams of FtF and CM research in a single study is a logical next step that has not been undertaken in prior research. Based on the prior research, we offer two main research hypotheses. Comparing the relatively clear picture about personality traits predicting FtF communication KSAOs as well as outcomes on the one hand with the rather inconclusive results for personality traits predicting CM communication KSAOs and outcomes on the other hand, we posit:

Broad personality traits when assessed with a non-contextualized personality questionnaire will relate more strongly to FtF than to CM communication KSAOs and outcomes (Hypothesis 1).

Further, rather than assuming that broad personality traits are less important for CM communication KSAOs per se, we hypothesize that contextualization of personality questionnaires (i.e., adding CM context tags to personality questionnaire items) will increase the explained variance in CM communication KSAOs. Specifically, we assume that the predictive validity of personality for communication KSAOs and outcomes will be similar across the two contexts (FtF and CM) when using context tags that match the context of assessment of the communication KSAOs, thereby increasing the conceptual overlap.

The predictive validity of a traditional (non-contextualized) personality questionnaire for FtF communication KSAOs and outcomes is similar to the predictive validity of a CM-contextualized personality questionnaire for CM communication KSAOs and outcomes (Hypothesis 2).

Two studies were conducted to evaluate these hypotheses. The first study investigated the relationship of a traditional personality questionnaire (i.e., non-contextualized) on FtF and CM communication KSAOs and outcomes (cf. Hypothesis 1) with data obtained from an online panel. Study 2 replicated Study 1 using a different item pool in a laboratory setting. Study 2 also compared the use of non-contextualized and CM-contextualized personality questionnaires as predictors of FtF and CM communication KSAOs and outcomes (Hypothesis 2).

Study 1

Method

Sample characteristics. Sample participants were recruited during summer 2015 via an online-panel provider. The data were part of a larger survey and have not been reported in any prior publication (the other parts of the survey data have been reported in Schulze et al., 2017). Survey data were gathered from an initial sample of $n = 698$ respondents. Of these, 362 completed all of the personality and communication KSAO measurement instruments (i.e., complete cases). Of the $n = 336$ participants with incomplete data, an additional 96

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respondents completed all personality items and additionally at least one full measurement battery consisting of motivation, knowledge, skills, and outcomes for either the FtF or the CM communication context. Thus, there were a total of 458 potentially usable cases for data analysis.

Using procedures recommended by Meade and Craig (2012), the potentially usable cases were screened for irregular or careless responding. Mahalanobis distance (i.e., detection of multivariate outliers) and longstring variables (i.e., maximum number of identical consecutive responses on a page) were computed. Three cases were excluded as almost no variance appeared in their data (i.e., with rare exceptions, the same response was given throughout the instruments). A fourth case identified with little variance also included a comment by the respondent that s/he did not pay attention to item responding. The final sample size therefore equaled to $n = 454$ individuals. Two additional datasets were generated for sensitivity analysis: One of the additional datasets comprised of completers only² and the other additional dataset consisted of participants, who were not flagged as potentially careless responders³.

The mean age of the participants was 47.43 ($SD = 14.04$). More women (60%) than men participated in the study; two individuals indicated “other” as their gender. The modal highest educational achievement was university degree (31%), followed by a degree from universities of applied sciences (19%). The other half of participants indicated secondary school completion (39%), vocational training completion (11%), or primary school completion (< 1%) as their highest educational degree. Upon completion of the survey,

² Sensitivity analyses were conducted by re-specifying path models with the completers only. The results did not show any notable difference. Details are available upon request from the first author.

³ Additional individuals with the highest 5% Mahalanobis distances and participants who had a longstring variable more than three standard deviations above the mean were deleted from the full sample in a separate dataset. Sensitivity analyses probing the potential effects of these outliers did not materially affect conclusions of the results of the main analyses reported above. Details are available upon request from the first author

participants received feedback about their personality test scores and their communication KSAO test scores.

Assessment instruments and procedure. We assessed demographic variables, general media usage, personality, FtF communication KSAOs, CM communication KSAOs, and three types of communication apprehension (in this sequence) for each participant. Three additional questionnaires and some single items were administered, which are not considered in the present study. To avoid serial effects, questionnaires for assessing FtF and CM communication variables were given in counterbalanced order.

Participants reported their age, gender, education, and their general media usage as measured by the communication competence questionnaire in Spitzberg (2006). The general media usage scale was answered on a five-point Likert scale ranging from “1 = not at all true” to “5 = very true”.

To assess broad personality dimensions, we administered a 10-item short version of the Big Five inventory (BFI-10), in which each personality factor was measured with two items (Rammstedt & John, 2007). Participants again responded on a five-point Likert scale ranging from “1 = not at all true” to “5 = very true”.

Communication KSAOs were assessed as recommended by Spitzberg (2006) and included the skills attentiveness, expressiveness, and composure (see Appendix A for sample items). In line with Spitzberg’s model, we also included the communication constructs of motivation and knowledge. We used questionnaire items provided by Spitzberg (2006) if the item content could be contextualized to both the FtF and the CM communication context. Context tags relating to the FtF or the CM context were added to each item mirroring approaches used in prior research (e.g., Bakke, 2010; Schulze et al., 2017; Scott & Timmerman, 2005; Stritzke et al., 2004; see Appendix A for example items of each contextualized construct). In order to balance approach and avoidance tendencies of the motivation component, we also included questionnaire items specifically measuring the

avoidance tendencies of motivation, i.e., in form of FtF and CM communication apprehensions. These items were adapted from the Personal Report of Communication Apprehension (PRCA-24; McCroskey, Beatty, Kearney, & Plax, 1985)⁴. As before, existing items were either framed with FtF or CM contexts (see Appendix A). We also assessed writing apprehension (i.e., anxiety about the writing process itself, e.g., writing an essay or writing ideas down), for which we used the questionnaire by Daly and Miller (1975)⁵. Participants responded to all of the items adapted from the Spitzberg (2006) and McCroskey et al. (1985) questionnaires on a five-point Likert scale ranging from “1 = not at all true” to “5 = very true”, and to the Daly and Miller (1975) instrument from “1 = strongly disagree” to “5 = strongly agree”.

Communication outcomes were also assessed according to Spitzberg (2006). Specifically, perceived appropriateness, effectiveness, satisfaction, attractiveness, and clarity of communication in FtF and CM contexts were measured. A five-point Likert scale ranging from “1 = not at all true” to “5 = very true” was used.

Analysis strategy. A multistep procedure was used to answer the first research hypothesis. At first, manifest variable path analyses (Kline, 2011; Stage, Carter, & Nora, 2004) were conducted in order to inspect the explained variance (R^2) in communication KSAOs and outcomes using the Big Five traits as predictor variables. Four separate path analyses were established (see Figure 1): Two of the models focused on the Big Five traits as predictors of FtF and CM communication KSAOs and additionally writing apprehension as a non-interactional variable in both models. Each of the models consisted of motivation, apprehension, knowledge, attentiveness, expressiveness, and composure in either the FtF or the CM condition and additionally the writing apprehension construct as criteria. The other

⁴ Whereas the FtF communication apprehension 24-item questionnaire included 6 items about oral presentation apprehension, these items could not be translated to the CM communication questionnaire. Thus, the FtF version consists of 24 items, whereas the CM version consists of 18 items

⁵ The items 4, 5, 6, 18, 21, and 22 of the original scale were dropped because they are focused on classroom writing (Daly & Miller, 1975)

two models included the Big Five traits as predictors of the FtF and CM communication outcomes and additionally general media usage as a CM specific variable in both models. Similar to the prior model, each of the models consisted of attractiveness, appropriateness, effectiveness, satisfaction, and clarity in either the FtF or the CM condition and additionally the general media usage construct as criterion. Thus, all four models each consisted of five independent variables (BIG-5 personality traits) and seven (KSAOs) or six (communication outcomes) dependent variables⁶. Based on these models, the explained variance in each endogenous variable was inspected and compared across contexts (to examine Hypothesis 1). The R-Statistics program (version 3.4.1; R Core Team, 2017) and the R-package lavaan were utilized to fit the models (version 0.5.23.1097; Rosseel, 2012). The full-information-maximum-likelihood method (FIML; Graham, 2009) was used to include individuals with partially missing questionnaire data in these analyses. The robust maximum likelihood estimator (MLR) in lavaan was chosen to address non-normality in the data (West, Finch, & Curran, 1995).

To compare the importance of each of the Big Five personality traits for communication KSAOs and outcomes, we additionally used relative weight analysis (LeBreton & Tonidandel, 2008; Tonidandel, LeBreton, & Johnson, 2009). The use of traditional indices (e.g., standardized regression coefficients) to examine predictor importance is not optimal in the case of multiple correlated predictor variables (Tonidandel et al., 2009). In contrast, relative weight analysis assesses the relative contribution of each Big Five trait to the overall R^2 within a multiple regression framework, providing relative effect sizes for each predictor. Because the criterion variables were correlated with each other as well as with the predictor variables, we conducted multivariate relative weight analysis (LeBreton & Tonidandel, 2008). Mirroring our path analyses, four multivariate relative weight analyses

⁶ Given the high degree of model complexity and the limited sample sizes, we refrained from fitting one model to all endogenous variables.

were conducted with personality variables as predictors and the FtF and CM communication KSAOs as well as the outcomes as the criterion space.⁷ Significance of weights was tested with bootstrapped confidence intervals (bias corrected accelerated method of bootstrapping as suggested by Tonidandel et al., 2009; $k = 50,000$ replications; $\alpha = .05$). We reiterated the analysis four times and inspected the consistency of the confidence intervals. If a confidence interval consistently included (or not included) zero over the four iterations, the weight was deemed non-significant (or significant). If there was inconsistency in the results across the four iterations, the weight was deemed non-significant.

We followed up on the results of our multivariate relative weight analysis with univariate relative weight analyses (Tonidandel et al., 2009), in which we treated each FtF and CM construct as a single criterion. This approach was taken to identify potential variability in the relative effect sizes of the personality variables. Rather than focusing on each individual result, which would be prone to multiple testing problems, the overall pattern of results was inspected by averaging relative weights across traits within each communication context⁸, separated by KSAOs and outcomes. Furthermore, the median and the range of the univariate raw relative weights were computed. For executing both the multivariate and univariate analyses, we used R code from the RWA Web tool as described in Tonidandel and LeBreton (2015).

Results

Descriptive statistics (number of items, means, standard deviations, coefficient alpha per scale) are given in Table 1.

Path analyses. Results of the four manifest path analyses are portrayed in Table 2. As can be seen, the total variance explained for each of the communication KSAOs was on

⁷ To avoid confounding the overall effect sizes, we included only constructs that were available for both the FtF and the CM context. This decision contrasts with the path analysis in which general media usage and writing apprehension were included.

⁸ Again, writing apprehension and general media usage were not considered when averaging relative weights as these constructs were not available for both FtF and CM communication contexts.

average higher in the FtF than in the CM communication context. The amount of total explained variance ranged from 20 to 45% in the FtF context compared to 2 to 15% in the CM context. Likewise, the Big Five personality dimensions explained on average a higher amount of total variance in FtF communication outcomes than in CM communication outcomes, with R^2 s ranging from .12 to .30 (FtF) and from .03 to .10 (CM). The only exception was the outcome variable appropriateness, $R^2 = .12$ for FtF and $R^2 = .10$ for CM.⁹ Taken together, these results support Hypothesis 1.

Relative weight analyses. Results of the multivariate and univariate relative weight analyses are summarized in Tables 3 and 4. The multivariate relative weight analyses reinforced insights gained from the path analyses. The Big Five Personality traits explained a higher amount of variance in the FtF compared to the CM outcomes as indicated by a higher P^2_{YX} (multivariate analogue to R^2 ; see Azen & Budescu, 2006). This result was true for both communication KSAOs and outcomes. The majority of the explained variance could be attributed to extraversion and neuroticism which exerted a stronger effect on communication KSAOs and outcomes in the FtF condition compared to the CM condition.

Univariate relative weight analyses were then conducted to gain deeper insights into the variability of relative effect sizes regarding individual criteria. As expected, extraversion and neuroticism showed the highest mean and median raw relative weight values, which underscores their importance across criteria. One exception was the FtF communication outcome appropriateness. Here, agreeableness turned out to be the most important predictor (resulting in the maximum raw relative weight of about .07, see Table 4). In the CM context, the pattern of results was less clear. Relative effect sizes were on average much lower compared to the FtF condition. Openness to experience showed its highest raw relative weight

⁹ The Big Five personality traits were relatively poor predictors of general media usage (4% explained variance), whereas they explained approximately 21% of variance in writing apprehension, a construct not specific to any communication context.

in the prediction of CM expressiveness (raw relative weight .07) and was also the strongest predictor of CM knowledge, CM attentiveness, and CM composure (all raw relative weights .04). The significant multivariate relative weight of agreeableness in the CM condition was mostly attributable to its raw relative weight of .04 in predicting CM appropriateness.

Discussion

Study 1 addressed the question of whether the broad Big Five personality dimensions relate differently to FtF and CM communication KSAOs and outcomes. Manifest path analyses revealed that this was indeed the case. On average, the measured Big Five personality variables explained a higher amount of variance in FtF communication KSAOs compared to their CM communication counterparts. Specifically, relative weight analyses showed that extraversion and neuroticism were most predictive of FtF communication KSAOs and outcomes.

We acknowledge the important limitation that the 10-item personality questionnaire used in Study 1 only captured the Big Five dimensions narrowly. Related to this, some internal consistency coefficients were low (see Table 1) as would be expected given the relationship between scale length and coefficient alpha (see e.g., West & Finch, 1997). As the short scale length may have influenced the main results, a replication with longer measures of the Big Five personality traits was conducted in Study 2. A second potential limitation of Study 1 lies in the online assessment of each of the personality and KSAO constructs, which may have provided an unwanted form of contextualization. Hence, Study 2 also aimed at replicating the Study 1 results in a proctored environment.

Generally, the Study 1 results lend initial support to the notion that FtF and CM communication KSAOs and outcomes are more different than they are similar. Rather than assuming that personality variables are less predictive of CM communication KSAOs per se, we hypothesized that proper contextualization of the personality assessment would increase

its predictive validity. Therefore, Study 2 also included a personality questionnaire with a CM frame-of-reference.

Study 2

Method

Sample characteristics. Participants were invited to a laboratory to complete several questionnaires on a computer in a proctored laboratory environment in summer 2017. From the $n = 183$ participants, complete data were obtained for $n = 177$. Six individuals did not complete the assessment. As in Study 1, all participants who provided data for at least all of the non-contextualized personality items and additionally one (FtF or CM) full communication KSAO assessment yielded potentially usable data for analysis ($n = 180$). Three individuals were deleted who had incomplete data.

We again used Meade and Craig's (2012) methods to identify careless responders. These methods resulted in the identification of seven potential careless responders who additionally stated that their data should not be used for further analyses. The final sample size was $n = 173$ individuals. Again, a separate dataset was saved for sensitivity analysis that comprised only of participants not flagged as potentially careless responders.¹⁰ We did not conduct a completer-only dataset; only data from three individuals were partially missing in the final dataset.

The mean age of the participants was 35.83 ($SD = 16.76$). Again, more women (53%) than men participated. The university degree was the modal highest educational degree (39%). Compared to the Study 1 sample, there was a lower percentage of both graduates from universities of applied sciences (7%) and individuals who completed vocational training (8%).

¹⁰ Sensitivity analyses were conducted by repeating the structural equation analyses with the non-careless responder sample only. The results did not show any material difference from those of the full dataset. Two of the CM context structural equation models produced robust CFI values of .885 and .877. Closer inspection of local fit revealed that one knowledge and one expressiveness item had low loadings on their respective factors. As a further check, both items were excluded from both contexts, which resulted in acceptable fit (minimum robust CFI = .912) but did not alter the main results. Details are available upon request from the first author.

The remainder of the participants reported completion of secondary school (42%), completion of primary school (2%) or no qualification (2%). As in Study 1, feedback to the participants on their personality traits and KSAOs was provided as an incentive for a complete participation.

Assessment instruments and procedure. The assessment instruments closely mirrored those used in Study 1 with four exceptions: 1) communication KSAOs and outcomes were assessed with fewer items (item reduction based on an ant colony optimization algorithm as implemented in the R statistics package “stuart”; Schultze, 2017; see below) ; 2) communication outcomes attractiveness and clarity¹¹ were not included in the questionnaire to reduce respondent burden; 3) Big Five personality dimensions were assessed with additional items to increase reliability and breadth of content (BFI-K; Rammstedt & John, 2005); 4) a personality questionnaire with a CM frame-of-reference was included. The sequence of administration mirrored the one in Study 1. The CM contextualized personality questionnaire was included at the end of the assessment instruments. The FtF and CM contextualized sets of items were again given in a counterbalanced order.

Ant colony optimization. We sought to complement analyses of manifest variables (Study 1) with analyses on the level of latent variables in Study 2 (Cole & Preacher, 2014; Kline, 2011). To enable us to specify structural equation models with well-defined measurement models in Study 2, we pruned the item pool administered in Study 1 with ant colony optimization (e.g., Dorigo & Stützle, 2010) as implemented in the R-package “stuart” (version 0.6.1; Schultze, 2017)). Communication KSAOs and outcomes were pruned in accordance with the underlying theoretical frameworks (i.e., Daly & Miller, 1975; McCroskey et al., 1985; Spitzberg, 2006). The scales were pruned by optimizing using CFI, RMSEA, and

¹¹ The outcomes effectiveness and appropriateness are at the core of communication competence models (Spitzberg, 1988) and were therefore retained. Furthermore, we wanted to include a self-referential outcome (i.e., satisfaction with own communication)

SRMR (West, Taylor, & Wu, 2012) as criteria. In addition, the approximation to the manifest correlations of the full item scales was used as a pruning criterion¹².

To ensure well defined measurement models, three separate models were established and pruned with the help of ant colony optimization. One model included motivation, knowledge, and the three skills in both the FtF and CM contexts (10-factor model), one model included the three types of apprehensions (3-factor model), and one model comprised of the five communication outcome variables in both the FtF and CM contexts (10-factor model). The five items of the general media usage scale were not pruned and not included in the models. Importantly, each communication context was treated as a method in the pruning algorithm to ensure that the final pruned scales were comprised of the exact same items across both contexts¹³. The pruning process resulted in communication KSAO and outcome scales with acceptable fit statistics within each of the proposed models in Study 1. Specifically, the pruned 10-factor KSAO model exhibited a robust CFI = .939, robust RMSEA = .052, and SRMR = .045. The pruned 3-factor apprehensions model resulted in a robust CFI = .996, robust RMSEA = .019, and SRMR = .029. The reduced 10-factor outcome model resulted in a robust CFI = .959, robust RMSEA = .044, and a SRMR = .041. Finally, an additional model that also included the five items of the general media usage scale along the FtF and CM communication outcomes also fitted the data well, with robust CFI of .960, robust RMSEA of .039, and a SRMR = .041. This reduced item pool was deemed to be adequate for usage in Study 2.

Contextualization of the personality questionnaire. The context tag “in written exchanges via digital media” was added to the item-stem of the BFI-K items measuring the Big Five personality traits. To cite two examples, the item “I tend to criticize others” was

¹² The pruning function is available upon request from the first author.

¹³ One exception to this rule was the construct of FtF and CM communication apprehension. Here, the pruned FtF communication apprehension scale comprised of 1 item more than the CM counterpart to capture the public speaking content that was not transferable to the CM domain.

reformulated to “I tend to criticize others in my written exchanges via digital media”. The item “I am more of the silent type, reserved” was rewritten as “I am more of the silent type, reserved in my written exchanges via digital media”. Items with context tags were inspected and pre-tested by three independent researchers. Specifically, an initial pool of possible context tags was established and discussed with regard to applicability. Iteratively, consensus was reached on the above described tag as the augmented items maintained meaning in the CM context.

Analysis strategy. The analysis strategy closely followed the strategy used in Study 1. First, confirmatory factor analysis (CFA) was conducted using FIML and the MLR estimator to examine if the measurement structure of the new item pool closely paralleled that of Study 1. Four structural equation models with measurement models for all communication KSAOs and outcomes were specified. These structural equation models mirrored the structure of the manifest path models tested in Study 1 (see Figure 1). Personality variables were included as composite scores¹⁴ corrected for unreliability using coefficient alpha (see Brown, 2015; Cole & Preacher, 2014). Additionally, four structural equation models were specified using the CM contextualized personality variables as predictors of the same communication criteria as before (paralleling the models with non-contextualized personality variables as predictors). The explained variance in the dependent variables was inspected to probe Hypothesis 2. Paralleling Study 1, the multivariate and univariate relative weight analyses were computed at the manifest scale level and univariate raw relative weights of the individual predictors (i.e., personality variables) were averaged across all conducted multiple regressions with KSAOs and outcomes as the dependent variables for both FtF and CM contexts separately. This

¹⁴ A long known problem of personality research is that the measurement models of broad personality variables (Big Five) do not satisfy common CFA fit criteria (see Vassend & Skrondal, 1997) – we therefore refrained from fitting a measurement model for personality. Nevertheless, we accounted for possible measurement error by taking reliability estimates into account.

procedure was repeated with the Big Five personality test scores obtained from the contextualized (CM) version as predictors.

Results

Descriptive statistics (number of items, means, standard deviations, coefficient alpha) are again given in Table 1.

CFA and structural equation models. The three CFAs that were specified to test the factorial validity of the FtF and CM communication KSAOs and outcomes showed acceptable fit for all three specified models in Study 2 (lowest robust CFI = .913; highest robust RMSEA = .078; highest SRMR = .071). Given the acceptable fit statistics for the measurement models, the structural equation models were fitted to the data. All eight specified structural equation models exhibited acceptable fit (lowest robust CFI = .908; highest robust RMSEA = .060; highest SRMR = .064). The results of these models regarding the explained variance in communication KSAOs are summarized in Table 2. As can be seen from this table, the insights from Study 1 were replicated in this independent sample. Hypothesis 1, that FtF communication KSAOs and outcomes would be better predicted by the non-contextualized personality variables than the CM counterparts, was supported. The correction for measurement error in Study 2 led to somewhat higher R^2 values compared to those obtained in Study 1.

Four additional structural equation models focused on the CM contextualized measures of the Big Five personality variables. These analyses showed that the overall explained variance in communication KSAOs was on average higher in the CM communication context than in the traditional context which maps more onto FtF communication. The explained variance ranged from 14 to 59% in the CM context and from 8 to 17% in the traditional context. The five CM contextualized personality variables each explained a higher amount of variance in CM communication outcomes than in the FtF communication outcomes, R^2 s ranged from .09 to .31 (FtF) and from .29 to .37 (CM).

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Although the CM framed personality variables led to an increase in predictive validity for CM communication KSAOs and outcomes, it did not reach the level of predictive validity of the traditional (non-contextualized) personality questionnaire for FtF communication KSAOs and outcomes in each and every case. For example, the explained variance in CM motivation (14%) or CM satisfaction (30%) using CM personality variables as predictors still lacked behind the explained variance in FtF motivation (44%) and FtF satisfaction (55%) using the non-contextualized personality variables as the independent variables. Thus, these results partially support Hypothesis 2.

Relative weight analyses. Tables 3 and 4 show the results obtained from the multivariate and univariate relative weight analyses in Study 2. The overall results closely mirrored the findings from Study 1. The offline personality variables showed a higher P^2_{YX} for the FtF criterion space compared to the CM criterion space, albeit with a smaller difference regarding the KSAOs compared to Study 1 (P^2_{YX} of .13 in the FtF condition compared to .09 in the CM condition). With respect to individual predictors, the Big Five personality variables showed approximately the same prediction pattern for the communication KSAOs as in Study 1. Conscientiousness showed a substantial and significant multivariate relative weight, although the outcome models are not fully comparable to Study 1 because attractiveness and clarity were not assessed.

The univariate relative weight analyses were again inspected. In the FtF condition, most of the key results of Study 1 were replicated. Extraversion and neuroticism remained important predictors for most KSAOs; however, agreeableness was once again the best predictor of appropriateness. In contrast to Study 1, conscientiousness in Study 2 was an important predictor of some FtF communication KSAOs and outcomes. Regarding the prediction of CM KSAOs and outcomes, a clear picture did not emerge. In contrast to Study 1, openness to experience did not replicate as the most important predictor of a variety of CM communication KSAOs. Extraversion and neuroticism gained in importance as predictors, as

is indicated by their higher mean raw relative weight. As in Study 1, agreeableness was the most important predictor of CM appropriateness.

Concerning the predictive validity of CM contextualized Big Five personality variables, the multivariate and univariate relative weight analyses supported the findings from the structural equation models. CM personality variables were important predictors of the CM criterion space, but less so of the corresponding FtF measures. This result was reflected in substantially higher P^2_{YX} values in the CM compared to the FtF models. Most of the explained variance could be attributed to CM extraversion and CM neuroticism, which was also supported by the univariate analyses. These results support the interpretation that Big Five personality variables can be important predictors of CM communication KSAOs if properly contextualized. Although the mean relative effect sizes increased when predicting CM communication KSAOs and outcomes using CM contextualized personality variables, the effect sizes were smaller than those obtained by predicting FtF communication KSAOs and outcomes with traditional, non-contextualized personality variables. Although the multivariate relative weights of CM personality in predicting CM outcomes were descriptively higher than the FtF counterparts, weights obtained for CM personality did not reach statistical significance.

Discussion

Two main findings emerged from Study 2. First, results reported in Study 1 were largely replicated in a proctored laboratory environment and with a more reliable inventory of the broad Big Five personality traits. Once again, results supported the notion that FtF and CM communication KSAOs are distinct constructs. Furthermore, the results highlighted that traditional BIG-5 personality questionnaires seem to be particularly useful in predicting FtF communication KSAOs and outcomes but were less useful in predicting their text-based CM communication counterparts.

Second, we obtained results mostly supportive of the hypothesis that adding a CM frame-of-reference to personality questionnaires can increase the amount of explained variance in CM communication KSAOs and outcomes, at least for some of the KSAOs. Moreover, this framing reduced the difference observed for non-contextualized personality questionnaires in predicting FtF vs. CM communication KSAOs and outcomes. Therefore, our results also suggest that traditional personality questionnaires contain an implicit FtF framing.

General Discussion

In this article, we presented two studies that focused on the influence of personality variables on a variety of FtF and CM contextualized communication KSAOs as included in a prominent communication KSAO model (Spitzberg, 1983; 1988; 2006). This was done to further explore the nomological network of text-based CM communication KSAOs and outcomes. Such analyses are important to further clarify the similarities and differences between FtF and CM communication KSAOs. We based our hypotheses on theories from the realm of CM communication (Walther, 2011), on empirical studies focusing on the relationship of FtF and CM communication KSAOs (Brown et al., 2004; Bubaš & Spitzberg, 2008; Hwang, 2011; Schulze et al., 2017), and on literature on the person–situation–interaction in digital environments (Yang et al., 2017). We hypothesized that the broad Big Five personality variables relate differently to constructs from both contexts. The existing literature suggested that variables assessed with a classic personality inventory would be important predictors of FtF, but less so of text-based CM communication KSAOs. Thus, in Study 1 broad Big Five personality traits as derived from a classic personality questionnaire were used as predictors of FtF and CM communication KSAOs and outcomes. A follow-up study was conducted to replicate findings from Study 1 and in order to investigate context effects in the assessment of broad personality dimensions. To do so, in Study 2 context tags

were included for each personality item that added specific reference to text-based CM interactions.

The first important conclusion that can be drawn from both studies is that personality variables derived from classic personality inventories are indeed important predictors of FtF communication KSAOs, but less so of text-based CM communication KSAOs. The contextualized communication KSAOs not only share little variance with each other (c.f., Brown et al, 2004; Schulze et al., 2017), but they are also predicted differentially by the Big Five personality variables. This result underscores the notion that communication KSAOs from FtF and CM contexts are distinct. Rather than being “old wine in new bottles”, text-based CM communication KSAOs should be viewed as being distinctly different from their FtF counterparts. It is therefore vital that researchers acknowledge the contextual features of their studies and tailor their communication measures to the particular contexts under investigation.

The second important contribution is that, if properly contextualized, the Big Five personality variables can be important predictors of CM communication KSAOs. Of note, in Study 2 the CM contextualized personality traits showed the opposite pattern of prediction as compared to personality traits assessed with a traditional Big Five personality inventory: The variance explained in CM communication KSAOs by the CM specific personality traits was higher than their generic counterparts. Personality assessment should map onto the CM communication context if the goal is to predict CM communication KSAOs. This finding is in line with recent developments in research on the relationship of personality and work performance. Here, personality variables contextualized to the work context showed considerably higher predictive validities for work performance than their generic counterparts (c.f., Shaffer & Postlethwaite, 2012). The primary message from these results is that matching the context in the assessment of communication *and* in the assessment of personality is

important. The secondary message is that non-contextualized personality inventories appear to contain an implicit FtF framing.

Our third theoretical contribution is the identification of the most important individual predictors of communication KSAOs using relative weight analyses. Given that a diverse set of communication KSAOs was assessed, the current study underscores the importance of extraversion and neuroticism as predictors of communication KSAOs. Both multivariate and univariate relative weight analyses showed that nearly all of the multivariate and mean univariate relative effect sizes of extraversion and neuroticism were larger than the weights obtained from the remaining personality variables. Another consistent finding was that agreeableness was the most important predictor of appropriateness. These findings emerged with both non-contextualized and CM contextualized personality variables as predictors, pointing to their cross-contextual relevance.

In addition to these theoretical contributions, a number of potentially fruitful practical implications for personnel selection and training arise. With regard to personnel selection, requirement analyses should also incorporate information on the specific communication environments in which future employees would need to interact. Assessment centers currently focus on the performance of applicants in FtF interactions (e.g., Blume et al., 2010). Given our results, it seems unlikely that information gained from such exercises would readily translate to working environments characterized by a high degree of digital interaction. Consistent with this argument, Hertel et al. (2006) found no meaningful correlation between traditional assessments of communication skills (i.e., team level average) and supervisor rated virtual team effectiveness. Additional support for assessing CM specific communication KSAOs in selection procedures is provided by Fuller, Vician, and Brown (2016) who showed that CM communication apprehension was associated with lower perceived performance in virtual student teams, further highlighting the value of context-based assessment.

Context tailored training programs could be another promising avenue for future research. Communication KSAOs might be more accessible to change than broad personality traits. Training interventions could focus on communication KSAOs specifically designed to match a particular CM context. For example, interventions that provide knowledge on how to show expressiveness or assertiveness via text-based CM and how to translate such knowledge into manifest behavior should be helpful in improving digital communication competence. A good starting point for the development of such training interventions would be the newer literature on non-verbal communication in written interactions and on the diversity in meanings CM cues can have in different communication contexts (e.g., Darics, 2012; Vandergriff, 2013).

Limitations and Future Research

Besides the theoretical and practical contributions, there are several important limitations that we consider below that should be addressed in future research.

First, this study was based on self-reported *perceived* communication KSAOs and outcomes. This approach is limited in two ways. First, the use of a common method might have influenced the results found in this study as only self-reported data were collected. We tried to reduce possible method biases by following guidelines proposed by Conway and Lance (2010). According to these authors, construct validity evidence provides a way to reduce the possibility of strong method bias. In the present study, we provided evidence of the factor structure of the measures in Study 2, indications of convergent and discriminant validity of the FtF and CM communication KSAO measures, and a deeper understanding of the nomological network of both FtF and CM communication KSAOs. All of these types of evidence help reduce the possibility of strong common method bias (Conway & Lance, 2010). At the same time, we want to stress the importance of extending the study design to other methods besides the self-report in order to examine the consistency of the findings across methods. Second, *perceived* communication competence has been criticized for not being an

accurate indicator of actual competence (McCroskey & McCroskey, 1988). In the present study, our focus was on perceptions of FtF and CM communication KSAOs and on their relationship with personality variables rather than on their association with actual communication performance. Nevertheless, much knowledge could be gained from collecting more objective indicators of communication KSAOs. For example, future studies could focus on chat protocols and FtF video assessments, using expert judges to assess communication KSAOs in both conditions. This, in turn, would allow for the examination of the cross-contextual convergence of the KSAOs in more objective ways and also for the examination of their predictive validity for actual performance.

Second, although we carefully constructed the item tag for the CM context, we cannot rule out the possibility that not every adapted personality item functioned in an optimal manner. Some items might be prone to difficulties in interpretation. Our preliminary item metric analysis did not reveal problems and our debriefing interviews with participants in Study 2 did not elicit negative feedback about the items. Nonetheless, additional scale development work is needed. For example, systematized thinking aloud techniques could be used to explore the thoughts and feelings associated with contextualized items in more depth in order to explore the contents that participants are thinking of when responding to such items. Additionally, different context tags and their influence on predictive validity should be inspected.

Third, although Study 2 incorporated a larger 21-item personality inventory, which covered a broader content than the 10-item version used in Study 1, this assessment instrument still lacks the content breadth inherent in larger personality questionnaires. For example, the popular hierarchical NEO framework by Costa and McCrae (1992) consists of 6 facets for each broad trait that can be measured with 240 items in total (NEO-PI-R). Clearly, a more detailed analysis of the broader and more specific aspects of personality that are important for the prediction of communication KSAOs would be of value. Such an approach

would allow for an examination of assessments of facets of personality that have been shown in a meta-analysis (Judge, Rodell, Klinger, Simon, & Crawford, 2013) to add the prediction and theoretical understanding of personality and work performance. Identifying the specific aspects of personality that drive the prediction of communication KSAOs could further illuminate this understudied field of research.

Last, as Spitzberg (2006) noted in his primer on CM communication competence, other aspects of the context (e.g., the communicators' relationship) influences perceptions of communication competence besides the communication medium. In the present study, our focus was the comparison of FtF and CM communication KSAOs, without controlling for other contextual variables. For example, it would be interesting in how far CM expressivity with coworkers converges with CM expressivity with managers. Similarly, in the current study, e-mail, chat, and forums were all subsumed under the umbrella term "text-based CM communication". Yet, these media devices differ in several aspects, including their transmission and processing capabilities (Dennis, Fuller, & Valacich, 2008). Future studies of convergence of the KSAOs should be examined across diverse CM contexts. This research would help to identify the needed contextual specificity in KSAOs measurement to optimize their prediction by personality traits.

Conclusion

In this article, two studies were presented in which the Big Five personality traits were used to predict FtF and CM communication criteria. Personality traits assessed using a classic personality inventory were important predictors of FtF but were much less predictive of CM communication KSAOs. In contrast, a CM contextualized assessment of the same personality traits showed the opposite prediction pattern. Our results highlighted the distinctiveness of FtF and CM communication KSAOs and point to the importance of considering context effects in communication and personality research alike.

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Table 1

Descriptive Statistics of Personality Variables and Communication KSAOs and Outcomes

Domain	Variables	Study 1				Study 2			
		I	M	SD	<i>a</i>	I	M	SD	<i>a</i>
Personality (non-contextualized)	Openness	2	3.74	0.85	.50	5	3.98	0.68	.73
	Conscientiousness	2	3.57	0.78	.43	4	3.69	0.75	.71
	Extraversion	2	3.14	0.99	.77	4	3.41	0.89	.81
	Agreeableness	2	3.11	0.73	.21	4	3.10	0.77	.64
	Neuroticism	2	2.81	0.95	.67	4	2.87	0.89	.77
Personality (CM framing)	Openness	-. ^a	-. ^a	-. ^a	-. ^a	5	3.29	0.74	.72
	Conscientiousness	-. ^a	-. ^a	-. ^a	-. ^a	4	3.53	0.66	.58
	Extraversion	-. ^a	-. ^a	-. ^a	-. ^a	4	3.31	0.76	.77
	Agreeableness	-. ^a	-. ^a	-. ^a	-. ^a	4	3.24	0.72	.66
	Neuroticism	-. ^a	-. ^a	-. ^a	-. ^a	4	2.31	0.76	.74
FtF communication KSAOs	Motivation	5	4.12	0.80	.90	3	4.30	0.82	.92
	Apprehension	24	2.54	0.85	.97	4	2.34	1.01	.89
	Knowledge	4	3.99	0.79	.87	3	3.80	0.81	.78
	Attentiveness	3	4.37	0.58	.75	3	4.45	0.55	.71
	Expressiveness	4	3.89	0.72	.81	3	3.84	0.87	.83
	Composure	6	3.80	0.73	.90	3	3.71	0.80	.80
CM communication KSAOs	Motivation	5	3.80	0.72	.82	3	3.32	0.83	.82
	Apprehension	18	2.57	0.76	.95	3	2.18	1.01	.90
	Knowledge	4	4.00	0.66	.80	3	3.67	0.63	.54
	Attentiveness	3	3.93	0.69	.76	3	3.91	0.71	.69
	Expressiveness	4	3.58	0.73	.72	3	3.58	0.81	.61
	Composure	6	3.71	0.63	.87	3	3.64	0.64	.70
FtF communication outcomes	Writing apprehension - ^c	20	2.29	0.70	.93	4	2.62	0.94	.80
	Attractiveness	4	3.51	0.76	.89	-. ^b	-. ^b	-. ^b	-. ^b
	Appropriateness	4	3.95	0.64	.75	3	4.16	0.68	.69
	Effectiveness	4	3.59	0.67	.90	3	3.65	0.64	.82
	Satisfaction	4	3.88	0.86	.93	3	3.90	0.86	.92
	Clarity	4	3.89	0.68	.89	-. ^b	-. ^b	-. ^b	-. ^b
CM communication outcomes	Attractiveness	4	3.21	0.65	.84	-. ^b	-. ^b	-. ^b	-. ^b
	Appropriateness	4	4.27	0.61	.78	3	4.21	0.71	.76
	Effectiveness	4	3.59	0.62	.88	3	3.54	0.67	.84
	Satisfaction	4	3.70	0.72	.87	3	3.79	0.71	.89
	Clarity	4	3.88	0.59	.84	-. ^b	-. ^b	-. ^b	-. ^b
	General media usage - ^c	5	3.26	0.98	.85	5	3.44	0.88	.81

Note. ^a not included in Study 1; ^b not included in Study 2; ^c both writing apprehension and general media usage have no FtF counterpart; FtF = face-to-face, CM = computer-mediated, KSAOs = knowledge, skills, abilities, and other characteristics, I = number of items, *a* = coefficient alpha (unstandardized)

Table 2

Results from Path Analyses (Study 1) and Structural Equation Models (Study 2) with Personality (Non-Contextualized and CM Framing) as Predictor of KSAOs and Outcomes

	Study 1	Study 2	
	<i>R</i> ² explained by the BIG-5 personality traits (non-contextualized)	<i>R</i> ² explained by the BIG-5 personality traits (non-contextualized)	<i>R</i> ² explained by the BIG-5 personality traits (CM framing)
FtF communication KSAOs			
Motivation	.44	.44	.08
Apprehension	.45	.48	.13
Knowledge	.38	.60	.12
Attentiveness	.20	.35	.08
Expressiveness	.33	.57	.14
Composure	.37	.57	.17
CM communication KSAOs			
Motivation	.02	.03	.14
Apprehension	.15	.24	.48
Knowledge	.06	.29	.50
Attentiveness	.10	.18	.35
Expressiveness	.12	.23	.57
Composure	.10	.32	.59
Writing Apprehension ^{-b}	.20 (.21)	.32 (.32)	.30 (.29)
FtF communication outcomes			
Attractiveness	.39	^{-a}	^{-a}
Appropriateness	.12	.38	.31
Effectiveness	.30	.38	.09
Satisfaction	.40	.55	.17
Clarity	.29	^{-a}	^{-a}
CM communication outcomes			
Attractiveness	.10	^{-a}	^{-a}
Appropriateness	.10	.26	.37
Effectiveness	.05	.21	.29
Satisfaction	.03	.06	.33
Clarity	.08	^{-a}	^{-a}
General Media Usage ^{-b}	.04 (.04)	.15 (.15)	.21 (.21)

Note. ^a not included in Study 2; ^b writing apprehension (KSAOs) and general media usage (outcomes) were included in both FtF and CM models. Parentheses show the results from the corresponding CM model; FtF = face-to-face, CM = computer-mediated, KSAOs = knowledge, skills, abilities, and other characteristics

Table 3

Multivariate Relative Weight Analyses with Personality (Non-Contextualized and CM Framing) as Predictor of KSAOs and Outcomes

Model	Results	Study 1					Study 2									
		BIG-5 personality traits (non-contextualized)					BIG-5 personality traits (non-contextualized)					BIG-5 personality traits (CM framing)				
		O	C	E	A	N	O	C	E	A	N	O	C	E	A	N
<i>FtF communication KSAOs</i>	P ² _{YX}	.128					.134					.045				
	RW	.011	.010	<u>.052</u>	.007	<u>.047</u>	.010	.019	<u>.055</u>	.011	<u>.039</u>	.003	.006	.003	.015	.018
	Rescaled RW (%)	8.8	8.2	40.3	5.7	36.9	7.4	14.0	40.8	8.2	29.5	5.7	13.6	6.2	34.2	40.2
<i>CM communication KSAOs</i>	P ² _{YX}	.070					.092					.147				
	RW	<u>.015</u>	.006	<u>.015</u>	.009	<u>.024</u>	.019	.012	.025	.008	<u>.029</u>	<u>.024</u>	.018	<u>.048</u>	.008	<u>.050</u>
	Rescaled RW (%)	21.7	8.7	21.0	13.6	35.2	20.6	12.7	26.8	8.6	31.3	16.1	11.9	32.7	5.3	34.0
<i>FtF communication outcomes</i>	P ² _{YX}	.138					.205					.084				
	RW	.009	.009	<u>.064</u>	<u>.023</u>	<u>.032</u>	.005	<u>.048</u>	<u>.068</u>	<u>.036</u>	<u>.048</u>	.004	.015	.005	.034	.004
	Rescaled RW (%)	6.7	6.8	46.6	16.5	23.4	2.7	23.6	32.9	17.6	23.2	4.6	17.8	6.0	40.5	31.1
<i>CM communication outcomes</i>	P ² _{YX}	.053					.106					.180				
	RW	.009	.008	<u>.014</u>	<u>.012</u>	<u>.011</u>	.008	.025	.008	<u>.044</u>	.022	.016	.024	.035	.061	.044
	Rescaled RW (%)	16.4	15.7	25.5	22.3	20.2	7.3	23.1	7.5	41.3	20.8	9.1	13.1	19.4	34.1	24.3

Note. RW are multivariate relative weights and equal in sum (within rounding error) to the P²_{YX} that is a multivariate analogue of R² (Azen & Budescu, 2006); Rescaled RWs show percentage of the explained variance over the criterion space attributable to the individual personality variables (and will sum to 100% within rounding error); significant multivariate relative weights are bold and underlined; in Study 2, outcomes did not include attractiveness and clarity; due to missing data, *n* varies between *n* = 367 to 433 (Study 1) and *n* = 170 to 173 (Study 2) per analysis; FtF = face-to-face, CM = computer-mediated, KSAOs = knowledge, skills, abilities, and other characteristics, O = Openness, C = Conscientiousness, E = Extraversion, A = Agreeableness, N = Neuroticism

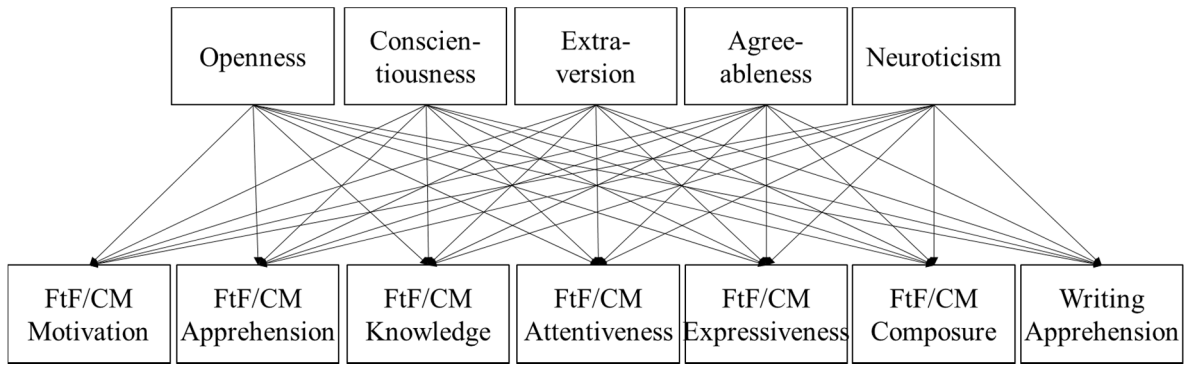
PERSONALITY AND COMMUNICATION

Table 4

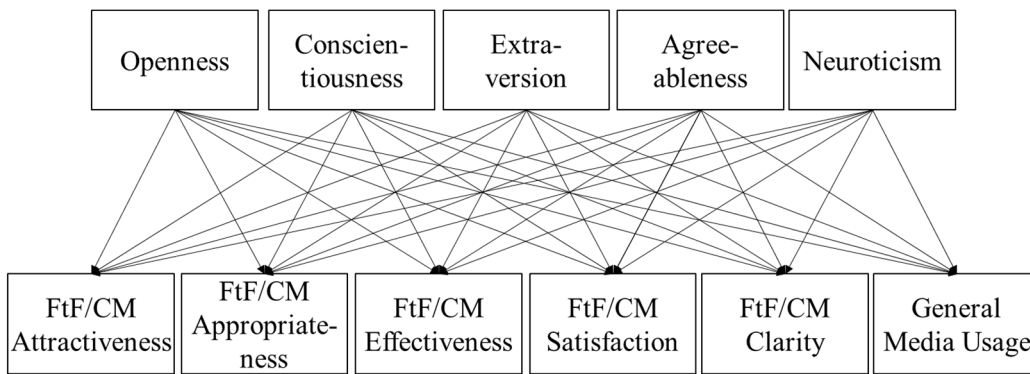
Univariate Relative Weight Analyses with Personality (Non-Contextualized and CM Framing) as Predictor of KSAOs and Outcomes

Model	Results	Study 1					Study 2									
		BIG-5 personality traits (non-contextualized)					BIG-5 personality traits (non-contextualized)					BIG-5 personality traits (CM framing)				
		O	C	E	A	N	O	C	E	A	N	O	C	E	A	N
<i>FtF communication KSAOs</i>	Mean RW	.02	.02	.18	.01	.13	.01	.05	.19	.01	.10	.00	.02	.00	.01	.03
	Median RW	.01	.02	.19	.00	.13	.01	.05	.19	.01	.11	.00	.02	.00	.00	.04
	Range RW	.01-.05	.01-.03	.09-.26	.00-.01	.05-.27	.00-.04	.03-.08	.11-.27	.00-.01	.02-.17	.00-.01	.01-.02	.00-.01	.00-.02	.00-.05
<i>CM communication KSAOs</i>	Mean RW	.03	.01	.02	.01	.02	.02	.01	.04	.01	.04	.04	.04	.10	.01	.07
	Median RW	.04	.00	.02	.01	.01	.02	.01	.04	.00	.03	.04	.03	.09	.00	.06
	Range RW	.00-.07	.00-.03	.00-.04	.00-.01	.00-.08	.00-.05	.00-.02	.00-.07	.00-.03	.00-.11	.01-.11	.01-.06	.05-.19	.00-.02	.00-.21
<i>FtF communication outcomes</i>	Mean RW	.01	.02	.14	.03	.10	.01	.08	.10	.04	.08	.01	.02	.00	.03	.04
	Median RW	.02	.02	.13	.02	.12	.01	.08	.11	.01	.09	.01	.02	.00	.00	.04
	Range RW	.00-.03	.00-.04	.00-.24	.00-.07	.02-.13	.00-.01	.06-.09	.01-.20	.00-.10	.01-.13	.00-.01	.02-.03	.00-.01	.00-.10	.02-.06
<i>CM communication outcomes</i>	Mean RW	.02	.01	.02	.01	.01	.01	.03	.01	.04	.03	.02	.04	.04	.06	.07
	Median RW	.02	.01	.01	.00	.00	.00	.02	.00	.01	.02	.02	.03	.04	.01	.09
	Range RW	.01-.02	.00-.03	.00-.06	.00-.04	.00-.03	.00-.02	.01-.06	.00-.02	.00-.10	.00-.06	.00-.04	.03-.04	.03-.05	.00-.17	.01-.10

Note: RW are univariate relative weights; in Study 2, outcomes did not include attractiveness and clarity; due to missing data, *n* varies between *n* = 367 to 434 (Study 1) and *n* = 170 to 173 (Study 2) per analysis; FtF = face-to-face, CM = computer-mediated, KSAOs = knowledge, skills, abilities, and other characteristics, O = Openness, C = Conscientiousness, E = Extraversion, A = Agreeableness, N = Neuroticism



Personality as predictor of communication KSAOs



Personality as predictor of communication outcomes

Figure 1. Influence of personality on FtF and CM communication KSAOs (upper part) and outcomes (lower part). Please note that 1) a separate model was established for FtF and CM communication KSAOs and outcomes, 2) depicted are path analysis models, whereas in Study 2 latent variables with measurement models were also established, 3) clarity and attractiveness were not assessed in Study 2; FtF = face-to-face, CM = computer-mediated, KSAOs = knowledge, skills, abilities, and other characteristics

Appendix

Items adapted from Spitzberg, 2006; McCroskey et al., 1985; Rammstedt and John, 2005

KSAOs	FtF / offline Context	CM (text-based digital media) context
Motivation	I am very motivated to communicate with others face-to-face	I am very motivated to communicate with others via digital media
Apprehension	I am afraid to speak up in conversations from face-to-face	I am afraid to speak up in conversations via digital media
Knowledge	I am very familiar with how to communicate face-to-face	I am very familiar with how to communicate via digital media
Attentiveness	I show concern for and interest in the person I am communicating with face-to-face	I show concern for and interest in the person I am communicating with via digital media
Expressiveness	I am expressive in my face-to-face conversations	I am expressive in my conversations via digital media
Composure	My face-to-face statements are formulated in a confident style	My messages via digital media are formulated in a confident style
Outcomes	FtF	CM (text-based digital media)
Appropriateness	I pay as much attention to the WAY I say things as WHAT I say from face-to-face	I pay as much attention to the WAY I write things via digital media as WHAT I write via digital media
Effectiveness	I consistently achieve my goals in face-to-face interactions	I consistently achieve my goals in interactions via digital media
Clarity	My face-to-face comments are accurate and clear	My comments via digital media are accurate and clear
Satisfaction	I am generally pleased with my face-to-face interactions	I am generally pleased with my interactions via digital media
Attractiveness	If I can engage someone in a face-to-face conversation, I can usually get them to like me	If I can engage someone in a conversation via digital media, I can usually get them to like me
Media Usage	-	I am a heavy user of digital media for communication
Personality	Non-contextualized	CM (text-based digital media)
Extraversion	I am more of the silent type, reserved	I am more of the silent type, reserved in my written exchanges via digital media
Agreeableness	I tend to criticize others	I tend to criticize others in my written exchanges via digital media
Conscientiousness	I am easy-going, tend to idleness	I am easy-going, tend to idleness in my written exchanges via digital media
Neuroticism	I get easily nervous and uncertain	I get easily nervous and uncertain in my written exchanges via digital media
Openness	I have little artistic interest	I have little artistic interest in my written exchanges via digital media

Note: Participants were constantly reminded to think of digital media as any form of text-based communication media such as email, chat, forum, SMS, instant messaging

Chapter 5

General Discussion

In the following discussion I will first provide a brief summary of the major research findings and will then discuss the limitations and research opportunities resulting from the theoretical (Study 1) and empirical work (Studies 2 and 3) separately. Rather than reiterating the limitations and future direction sections of the articles, I want to introduce additional aspects not considered in detail so far. This study-specific view will be complemented by an overarching perspective to integrate the findings and a final conclusion.

Study 1

Summary. Due to the many challenges that globalization and digitalization pose for teamwork, there is a growing need to identify the KSAOs that team members require in order to succeed in the multitude of new work environments. A review of the literature on virtual teams was conducted to follow up on this demand and resulted in an initial model of virtual team KSAOs (Schulze & Krumm, 2017). The model as presented in Study 1 serves as a first step towards a more contextualized identification of relevant KSAOs. Specifically, the review revealed that virtuality facets (i.e., technology use, geographic dispersion, cultural differences) and related challenges (e.g., coordination problems, miscommunication) can serve as an organizing framework to drive the identification of virtual team KSAOs, which proved to be helpful to integrate the heterogeneous landscape of existing competencies and to provide more detail on the *when* and *why* of their importance. For each of the three considered virtuality facets, a specific triad of motivation, knowledge, and skills could be identified that are helpful to meet the demands imposed by the different working contexts of virtual teams. The model can serve as a supporting tool for personnel selection processes as well as a guide for training initiatives. For instance, managers could identify the virtuality conditions of a team in order to anticipate the challenges that are likely to play a role in such a specific virtual team working context. The model may then guide the identification of the particular KSAOs that a future team member should possess in order to handle these potential obstacles

competently. Likewise, existing training programs to improve specific classes of KSAOs may be optimized and applied to train virtual team members to the needed competence level. Lam (2016), for example, developed a media synchronicity theory training that provides knowledge on how capabilities of media and communication processes might be optimally matched in teams (for the theory's background, see Dennis, Fuller, & Valacich, 2008), which might be one way to improve technology facet related KSAOs. Finally, the model may also guide research efforts aimed at investigating interactions between KSAOs and virtuality facets empirically. Specifically, researchers could measure the degree of multiple virtuality facets in teams, virtuality specific KSAOs, and emergent states (e.g., trust in the team) as well as virtual team performance outcomes. This would allow researchers to examine the mutual interplay of virtuality facets and KSAOs in influencing team mediators and outcomes.

With a growing knowledge base of literature on virtual teams, new insights will be gained that will validate or highlight the need for adaptation of the proposed relationships in the virtual team KSAOs model. Recent research further underlines the relevance of constructs such as cultural intelligence (Li, Rau, Li, & Maedche, 2017) and CM communication apprehension (Fuller, Vician, & Brown, 2016) for virtual teamwork and thus provide further support for the assumptions implied by the model. Besides the growing knowledge base on important individual characteristics for virtual teamwork, technological advancements might also further leverage working conditions for virtual teams and could lead to changes in the model's relationships or the importance of particular KSAOs for virtual teamwork. In their article "The Digital Workforce and the Workplace of the Future", Colbert, Yee, and George (2016) hypothesize that virtual reality systems and three-dimensional virtual environments will grow in importance and might improve presence perceptions in virtual teams. It is difficult to predict how such tools will impact the work in virtual teams, but it highlights the need to constantly monitor changes and update the proposed model based on technological developments and new empirical insights.

Limitations and research opportunities. In what follows, I want to point to three limitations of my review which have not been previously discussed in detail but bear the potential for important new insights. A first limitation of my review that deserves more notice lies in the fact that the focus was on the individual-level of analysis without considering the composition of a team as a whole. While it is a typical way to first define KSAOs at the individual-level (see Hertel et al., 2006), team compositional aspects should not be neglected as they might have important consequences for team functioning. As Bell and Brown (2015) point out, a team-staffing perspective that is focused on the individual-level only might be incomplete as it neglects that the predictive validity of KSAOs might also be dependent on the KSAOs that the other team members bring into the equation. As several researchers have argued (Hollenbeck, DeRue, & Guzzo, 2004; Zaccaro & DiRosa, 2012) it must not always be the most effective strategy to just select team members scoring highest on all considered KSAOs, but to also mind team composition aspects. Typical team-level composition measures are mean score aggregates of the individual KSAOs, variance in individual scores, and minimum as well as maximum scores of individual KSAOs within a team (Barrick, Stewart, Neubert, & Mount, 1998; Hertel et al., 2006; Turel & Zhang, 2010). A study by Turel and Zhang (2010) suggests that virtual team composition does indeed matter. Specifically, the authors assessed within-team conscientiousness heterogeneity and extraversion variability in 62 self-managed asynchronously working virtual teams and examined the impact of both within-team heterogeneity coefficients on performance. Whereas variability in conscientiousness exerted a negative main effect on team performance, within-team extraversion heterogeneity mitigated this effect, which points to an interaction between both variability coefficients (Turel & Zhang, 2010). There is a need for further research along the lines of this study which besides personality variables also takes into consideration team composition measurements of motivation, knowledge, and skills (for initial approaches, see Hertel et al., 2006 and Li et al., 2017). I want to illustrate the value of such an approach by

referring to a case specifically concerned with CM communication apprehension (e.g., Brown, Fuller, & Vician, 2004). In a study by Scott and Timmerman (2005), the authors examined the effect of CM communication apprehension (here broader defined as the fear of computer-based interaction) on technology use at the workplace. CM communication apprehension exhibited a moderate negative correlation with the use of text-based communication media and conferencing tools for group-work. As a conclusion, the authors stated that “message senders should consider whether their apprehension may be constraining their communication options” (Scott & Timmerman, 2005, p. 715). Given this finding, it would be of value to examine team composition measures of CM communication apprehension in virtual teams. For example, it could be worthwhile to investigate to what extent the maximum individual score of CM communication apprehension within a team may influence the use of virtual tools and communication practices among team members. Given the importance of an adequate process-technology fit in virtual teams (Dennis et al, 2008), particularly high CM communication apprehension of even one of the team members may seriously impede effective virtual team communication. Examining such propositions in more detail would provide knowledge on which KSAOs might be compensated for by other team members and which characteristics might be indispensable. It is important to notice here that it would be reasonable to expect team composition aspects to have an interaction with virtuality facets as well. If a team relies heavily on media such as videoconferencing and meets FtF regularly, the effect of maximum scores of (text-based) CM communication apprehension might be less of importance, because the teamwork in question is not characterized by a high amount of text-based CM interactions. Although research in the domain of virtual team leadership has started to examine interaction effects between team composition and the virtuality construct (Hoch & Dulebohn, 2017), I have not found an example of a study which specially focused on such interactions in detail in virtual team KSAOs literature.

The second limitation of my review lies in the rather static view on virtuality – KSAOs interactions that I held in the review. I would like to discuss this limitation in detail. While the input-mediator-output model (Ilgen, Hollenbeck, Johnson, & Jundt, 2005) was a very useful framework to organize the virtuality facets and related KSAOs as input variables in the model, it is also important to recognize that virtuality conditions can change while working in a virtual team (e.g., a new team member starts to work at a different time zone, a member with lacking language fluency and different cultural background joins the team or a new media tool is introduced to teamwork) and can be perceived as problematic at one point in time, but not at another (Watson-Manheim et al., 2012). It is this very temporal dynamism in working conditions which holds much promise for findings of a study which would examine when team members perceive certain dynamically fluctuating virtuality conditions as problematic and how the individuals enact on their KSAOs to handle such varying working conditions and the perceived problems. Recently, researchers introduced the so called organisational discontinuity theory (ODT) into virtual team research which provides a more dynamic perspective on these interactions (Crowston, Specht, Hoover, Chudoba, & Watson-Manheim, 2015; Watson-Manheim et al., 2012). Three concepts are central to ODT, namely “boundaries”, “discontinuities”, and “continuities” (c.f., Watson-Manheim et al., 2012). Boundaries are another term for virtuality facets and describe the contextual working conditions of a team such as working across temporal dispersion. Watson-Manheim et al. (2012) clearly distinguish between the existence of a boundary and the effects that the boundary can exert. According to the authors, boundaries are not problematic per se, but have potential to lead to the experience of a discontinuity that “is created at a boundary when an individual perceives a change in information and communication flows that requires conscious effort and attention to handle” (Watson-Manheim et al., 2012, p. 36). When a discontinuity is perceived by individuals, a boundary may become problematic and can cause challenges for virtual teamwork that must be resolved. Crowston et al. (2015) give a

simplified example that portrays the interplay between boundaries and discontinuities. Specifically, if virtual team members would need to operate across high temporal dispersion (i.e., a boundary) this working condition could be initially perceived as problematic. For example, meeting times might not be adjusted appropriately to the time zone differences, causing information breaks and thus the perception of discontinuity (Crowston et al., 2015). At this point, the third concept deemed “continuities” comes into play. The perceived discontinuities while working over the temporal dispersion could lead the individuals of a team to address this issue by scheduling more thoroughly and by considering each individual’s time zone characteristics. Such adaptation processes have been termed “continuities” that are developed to overcome the perceived breaks in information and communication flow (Watson-Manheim et al., 2012). Even if such continuities would have been developed and would have helped to overcome the problems perceived at the boundary, this does not mean that the boundary will never be experienced as problematic again. For instance, if a new team member from another time zone is introduced to the existing team, this could again cause perceptions of discontinuity and the need for the formation of new continuities (Crowston et al., 2015).

Given this theoretical background, I argue that ODT could be an important and powerful theoretical framework to advance virtual team KSAOs research. According to Campion et al. (2011) the descriptive label of a KSAO (e.g. time management skills) must also be accompanied by a detailed description of the concrete observable actions which are indicative for the underlying KSAO (e.g., skilful scheduling of meetings). By drawing on the concepts of boundaries, discontinuities, and continuities, researchers could gain a much deeper insight into the behavioural indicators that underlie virtual team KSAOs. Diary study methodology (Ohly, Sonnentag, Niessen, & Zapf, 2010) seems to be particularly useful in this regard. Diaries can capture the everyday experiences of virtual team members and could give viable information on the dynamics of boundaries (i.e., how often do the working conditions

of a virtual team change), the perceptions of discontinuities (i.e., under which conditions do virtual team members perceive a change in information and communication flow at a boundary that needs to be addressed), and the construction of continuities (i.e., which behaviours helped to address the discontinuity successfully). For one, insights gained from such an approach would help to examine the “anatomy of a competency” (Campion et al., 2011, p. 239) in more detail, because the behavioural indicators that led to successful virtual teamwork can be examined on a regular (e.g., daily) basis. For another, KSAOs assessments could be advanced substantially. For instance, situational judgement tests (Weekley & Ployhart, 2013) for measuring virtual team KSAOs could be constructed that would benefit considerably from the closer examination of concrete behaviours that led to the overcoming of discontinuities. A last promising research avenue lies in the validation of current concepts of virtual team KSAOs. For instance, individuals with high time management skills should perceive discontinuities at the temporal boundary less frequently (e.g., through anticipation of potential problems; Watson-Manheim et al., 2012). It is also possible that such individuals may show more often effective behaviours to address perceived breaks in information and communication flows at the boundary of temporal dispersion, that is, develop continuities more easily. Such an approach could therefore be helpful to validate existing competency models for virtual teamwork as the one outlined in my own review.

The final limitation of the review concerns the relatively isolated focus on individual virtuality characteristics to identify virtual team KSAOs. Although the empirical knowledge base is very scarce, a stronger focus on interactions between multiple virtuality facets and their constituting characteristics could serve as a basis for hypothesis generation about the relevance of KSAOs under very specific working conditions. Figure 1 provides an overview of virtuality facets and their constituting characteristics as conceptualized in prominent theoretical frameworks (O’Leary & Cummings, 2007; Hall, 1976; Kirkman & Mathieu, 2005). Please note that only a selection of the most relevant constituting elements are depicted

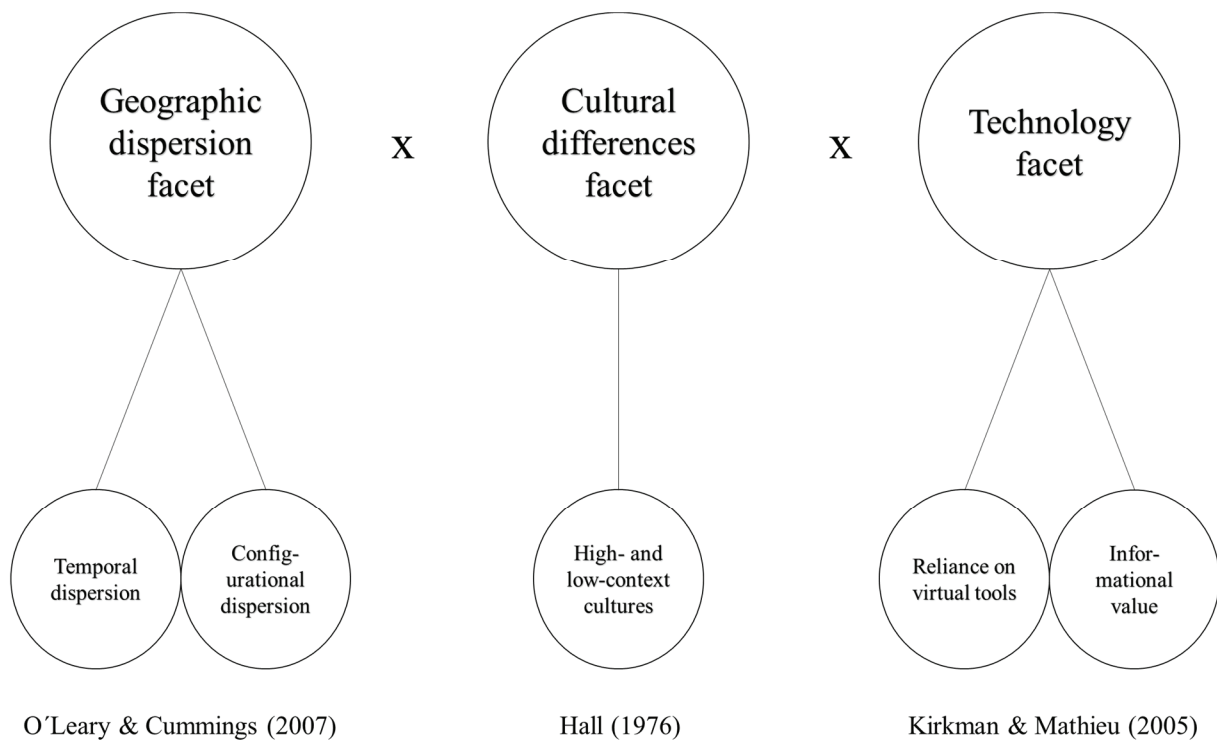


Figure 1. Possible interactions between virtuality facets and selected aspects as derived from different theoretical frameworks

in the diagram and addressed in the following discussion but are laid out so as to allow analysis and other future studies to easily expand upon by adding further characteristics from the underlying frameworks. Two examples will be given on how interactions of virtuality aspects may stimulate further research about the importance of KSAOs under even more specific virtual team working conditions.

The first example focuses on within-facet interactions of temporal dispersion (i.e., extent of overlapping work hours) and configurational dispersion (i.e., the number of working sites that team members are spread and the number of team members at each location) that are lower order characteristics of the geographic dispersion facet (O'Leary & Cummings, 2007). According to O'Leary and Cummings (2007), a higher number of working sites from which

team members need to collaborate could increase the coordination complexity of virtual team activities due to the many dependencies that need to be managed over multiple locations. The coordination demands that emerge across multiple working sites could even be higher if team members would need to interact across high temporal dispersion. This highly complex teamwork setting could increase the importance of virtual team KSAOs such as time management or CM coordination skills immensely. A further aspect of the configurational dispersion of teams regards the concrete number of individuals working at each location (O'Leary & Cummings, 2007). Although many different configurations are possible dependent on the total amount of team members, it is not uncommon that most team members work at one site as the core team, whereas some other individuals operate as isolates from peripheral locations (Koehne et al., 2012; O'Leary & Cummings, 2007). If isolates in the team would need to work in a different time zone with high non-overlapping working hours with the other virtual team members, such a work setting may require very high self-management skills and remote work motivation due to the low visibility, awareness, and evaluation of work contributions by the core site of team members (Koehne et al., 2012; O'Leary & Cummings, 2007).

The second example portrays a complex interplay of all three virtuality facets and multiple characteristics. Only recently, researchers have started to hypothesize how characteristics of the cultural differences facet may interact with characteristics of the technology facet in virtual teams (Gibson, Huang, Kirkman, & Shapiro, 2014; Kramer, Shuffler, & Feitosa, 2017). Among the many propositions made regarding possible interaction effects, Kramer et al. (2017) stated that virtual teams comprised of individuals from high-context cultures (Hall, 1976) might prefer a low reliance on virtual tools and media with high informational value for collaboration (Kirkman & Mathieu, 2005). The high- and low-context cultural facet introduced by Hall (1976) suggests that individuals vary in their use of indirect communication and contextualization during communication, with individuals from higher-

context cultures relying more on implicit communication (e.g., nonverbal communication cues) than individuals from low-context cultures (see also Kayan, Fussell, & Setlock, 2006; Korac-Kakabadse, Kouzmin, Korac-Kakabadse, & Savery, 2001; Kim, Pan, & Park, 1998; Kramer et al., 2017). According to Kramer et al. (2017), a preference for media high in informational value by individuals from high-context cultures may result from the availability of the many cue systems and possibilities for indirect communication that these modes offer for interaction (Dennis et al., 2008; Kirkman & Mathieu, 2005). A similar view is held by Gibson et al. (2014) who stated that

leaner media, such as email or other text-based forms, may be more problematic for those from higher-context cultures because so much of the meaning in communication is derived from the nonverbal aspects, which are typically absent in these leaner forms. (p. 233)

If this proposition was true but a high-context virtual team would be constrained to communicate with media lower in informational value such as email (e.g., due to high temporal dispersion between team colleagues), this may require very high CM communication KSAOs in order to enrich the text-based interactions between team members with the needed contextual and social information.

I want to stress that there are critics of the concept of low- and high-context cultures and other cultural differences frameworks (e.g., the facets of national culture by Hofstede, 1984), who highlighted the scarcity of empirical evidence that support the assumed average differences in cultural facets between nations or the concepts themselves (Cardon, 2008; Kittler, Rygl, & Mackinnon, 2011; McSweeney, 2002) and the fallacy of inferring from country-level cultural values on the values of a specific individual from that country (Kramer et al., 2017). Despite this important concern, it could be worthwhile to empirically test interactive effects between the cultural differences and technology facets as this could lead to

a refinement of the cultural knowledge that individuals need to possess while working in virtual teams characterized by cultural diversity.

As a high-level summary of this discussion, the conducted literature review was an important and purposeful first step focused on establishing a more contextualized identification of virtual team KSAOs. Despite the value of the virtual team KSAOs model for research and practice, a number of limitations were identified and discussed in detail: The sole focus on the individual-level of analysis when identifying virtual team KSAOs, the static view on the virtuality – KSAOs interactions, and the rather isolated focus on individual virtuality facets are all important limitations of the conducted review of the virtual team KSAOs literature. At the same time, I outlined how the limitations provide a roadmap for future research. Specifically, I advocate for a multilevel perspective on virtual team KSAOs that integrates the individual- and team-level of analysis (Mathieu, Tannenbaum, Donsbach, & Alliger, 2014), for the use of diary studies (Ohly et al., 2010) to give justice to the temporal dynamics of virtual teamwork and to examine more closely the concrete behaviours that underlie specific competencies, and for a more systematic investigation of the interactive effects between multiple virtuality facets, their constituting characteristics, and virtual team KSAOs.

Studies 2 and 3

Summary. Besides the theoretical review of the virtual team KSAOs literature, I focused the empirical part of the dissertation on the KSAOs needed to communicate competently via text-based digital media (Spitzberg, 2006). Although CM communication is widespread (The Radicati Group, 2017) and can pose many challenges for interactors (Driskell et al., 2003), research in the field of CM communication KSAOs is still in its infancy (Bunz & Montez, 2015). Only few studies have devoted attention to the relationship of FtF and CM communication KSAOs (Bubaš & Spitzberg, 2008; Hwang, 2011). As a first

step to move research in this field forward, two empirical studies were realized that provided in-depth analyses of the similarities and differences between FtF and CM communication KSAOs as conceptualized in the communication competence frameworks by Spitzberg (1983, 2006).

In the first of the two studies, self- and peer reports of FtF and CM communication KSAOs and outcomes were collected (Schulze, Schultze, et al., 2017). Correlated trait–correlated method minus one models (CT-C(M-1); Eid, 2000) were established to examine the convergence of FtF and CM communication KSAOs and outcomes. Furthermore, communication KSAOs were modeled as predictors of communication outcomes in a context-congruent (e.g., CM communication KSAOs as predictors of CM communication outcomes) and in a context-incongruent condition (e.g., CM communication KSAOs as predictors of FtF communication outcomes) using structural equation modeling (Kline, 2011). The findings revealed that most of the KSAOs and outcomes showed only low to moderate convergence between the two contexts. In addition, context-congruent predictions resulted in higher explained variance in communication outcome variables than in the context-incongruent condition. These findings were consistent across both self- and peer reports. The results lend support to the hypothesis that FtF and CM communication KSAOs should not be treated as a single common dimension. Furthermore, the results suggest that the predictive validity of FtF and CM communication KSAOs can be maximized if they contextually match the outcome variables under investigation.

In the second empirical study, two samples were recruited (one via an online panel provider and the other in a laboratory setting) to test the hypothesis that broad Big Five personality dimensions relate stronger to FtF than to CM communication KSAOs and outcomes (Schulze, Zagorscak, et al., 2017). Manifest variable path models (sample one) and latent structural equation models (sample two) (Kline, 2011) were fitted to the data to examine the explained variance in FtF and CM communication constructs by treating the Big

Five personality dimensions as predictor variables. Additionally, multivariate and univariate relative weight analyses (LeBreton & Tonidandel, 2008) were used to gain a deeper understanding of the relative importance of specific personality traits for predicting FtF and CM communication KSAOs and outcomes. The results revealed that the Big Five personality dimensions indeed explained more variance in FtF contextualized communication constructs than in their CM communication counterparts, whereby extraversion and neuroticism showed the highest multivariate and univariate relative weights across the criteria. This was true for both the online panel and the laboratory sample. As a further important design aspect of the second sample, a personality questionnaire with a CM framing was administered by adding CM context tags to the original scale items. This was done to investigate if a conceptual match of personality variables and CM communication KSAOs and outcomes would result in increased predictive validity of the personality dimensions (i.e., frame-of-reference effect; Schmit, et al., 1995). Drawing on the same analysis strategy as before, the results provided initial evidence for this hypothesis.

Taken together, the findings of the two empirical studies support the notion that CM communication KSAOs are far from being “old wine in new wineskins”. They do also highlight a complex interplay of personality and communication variables. Specifically, contextualization of both personality dimensions and communication KSAOs seems to be key to optimizing predictive validity.

Limitations and Research Opportunities. Several limitations and research opportunities will be discussed in detail. The first limitation regards the non-consideration of even more contextualized measures of FtF and CM communication KSAOs in both studies. Articles by Spitzberg (1991) as well as Cupach and Spitzberg (1983) underline the necessity to further explore the contextual specificity in communication KSAOs items that is needed to increase their predictive validity for specific outcome variables (e.g., by adding conversational partners to the item stem or the environment in that interactions take place):

Spitzberg (1991) examined the predictive validity of context-independent FtF communication KSAOs (e.g., “I usually feel nervous in conversations“, Spitzberg, 1991, p. 23) and context-specific variants (e.g., “S/he was versatile in the conversation“, Spitzberg, 1991, p. 23) for self- and peer-rated perceptions of effectiveness, appropriateness, confirmation, and satisfaction after real dyadic communication encounters. Individuals were invited to participate in a study about conversational communication and formed dyads to communicate with each other for 10 minutes. The context-independent communication KSAOs were administered shortly before the conversation and focused on self-reported tendencies to act or believe in certain ways. The context-specific questionnaires were administered after the dyadic interaction and related to self- and other perceptions of competence and the communication outcomes in the specific conversation. It turned out that only the context-specific KSAOs were predictive of self- and peer-reported communication outcomes that referred to the specific communication episode. This result questions the predictive validity of dispositional measures for context-specific communication outcomes (Spitzberg, 1991; see also Cupach & Spitzberg, 1983 for a similar argument). Whereas the empirical studies presented in this dissertation underline the necessity to differentiate between FtF and CM communication KSAOs, it is less clear to what extent these KSAOs are predictive of outcomes with a higher contextual specificity than the criteria assessed in Study 2 and 3 (i.e., broad measures of communication outcomes such as effectiveness or appropriateness in FtF and CM contexts). The studies by Spitzberg (1991) and Cupach and Spitzberg (1983) suggest that items need more contextualization if the outcomes become more specific, for example by adding context tags that relate to a specific communication partner or a specific communication environment (e.g., the virtual team working context) in addition to the communication medium of interaction (e.g., FtF versus CM). Similarly, more research is needed to investigate the predictive validity of contextualized communication KSAOs for outcomes that are not directly related to communication (c.f., Keyton, 2015), but that are more

distal to communication processes and with a specific focus on virtual teamwork (e.g., trust perceptions in virtual teams; Jarvenpaa & Leidner, 1999).

Importantly, there exist remarkable parallels between the findings of Spitzberg (1991) and insights gained from the personality – work performance (and academic performance) relationship literature (e.g., Schmit et al., 1995; Shaffer & Postlethwaite, 2012). Non-contextualized dispositional measures of personality variables showed only unsatisfactory predictive validity for work performance as a context-specific outcome in early meta-analyses and reviews on this topic (Guion & Gottier, 1965; Schmitt, Gooding, Noe, & Kirsch, 1984). Schmitt et al. (1984) even concluded that “personality tests have low validity” (p. 420). However, more recent findings highlight the importance of contextualization of personality questionnaires to increase their predictive validity for context-specific outcomes, for example by augmenting the scales with context tags (e.g., “at work”; Schmit et al., 1995; Shaffer & Postlethwaite, 2012). In a recent meta-analysis, Shaffer and Postlethwaite (2012) showed that contextualized personality questionnaires (i.e., contextualized to the work context) showed higher predictive validity for work performance than non-contextualized personality measures (e.g., Lievens, De Corte, & Schollaert, 2008; Schmit et al., 1995). There is evidence that two sources of variability may diminish predictive validity of non-contextualized personality variables: For one, different people may adopt different frames of reference when responding to non-contextualized personality questionnaires, because they are open to interpretation (between-person variability in frames of reference; Bing, Whanger, Davison, & VanHook, 2004; Lievens et al., 2008). Some individuals might refer to their behavior at work, whereas others might think of their behavior at home, which might be quite different. If groups of individuals would choose frames of reference that are not conceptually related to the specific outcome, this may decrease the predictive validity of the non-contextualized personality traits for that very outcome (e.g., some people use an internal “at-home” frame of reference but work performance is the criterion of interest) (Lievens et al., 2008). For another, some

individuals may vary their internal frame of reference while responding (e.g., the very same individual varies between, for example “at home” and “at work” frames of reference during administration), which lowers the reliability and validity of the traits (within-person inconsistency in frames of reference). Lievens et al. (2008) showed that contextualized personality items reduced both sources of variability. Importantly, an increase in predictive validity did only result when the chosen contextualization matched the outcome of interest conceptually (i.e., use of “at school” instead of “at work” context tags to predict grade point average as an indicator for academic performance).

It is reasonable to assume, that the implications of these findings can be generalized to communication KSAOs research. The relative lack of predictive validity of non-contextualized communication KSAOs for more context-specific outcomes might be in part due to the high between-person variability and within-person inconsistency that result from responding to non-contextualized communication KSAOs items. Approaches that use non-contextualized items to assess KSAOs might underperform in predicting context-specific outcomes due to an unspecified frame of reference. Figure 2 illustrates this assumption with an example. Given the importance of trust in virtual teams and communication for the establishment of trust perceptions (e.g., Jarvenpaa & Leidner, 1999), it might be valuable to investigate the relationship of communication KSAOs (i.e., expressiveness) and trust perceptions in virtual teams in future studies. The upper part of Figure 2 depicts differences in frames of reference adopted by two groups³ of individuals while responding to non-contextualized expressiveness items (e.g., “I am expressive in my conversations”). Some of the individuals might think of their expressiveness in interactions with family members when responding to the expressiveness items and would therefore be represented by the “communication with family members” latent variable (see Lievens et al., 2008 for an

³ This is a simplified case as various other frames of reference could be imagined by individuals.

analogous example in the personality research literature). Another group, however, may think of their expressiveness in interactions with the virtual team colleagues, which would introduce between-person variability. If expressiveness in the family context has no relevance for the

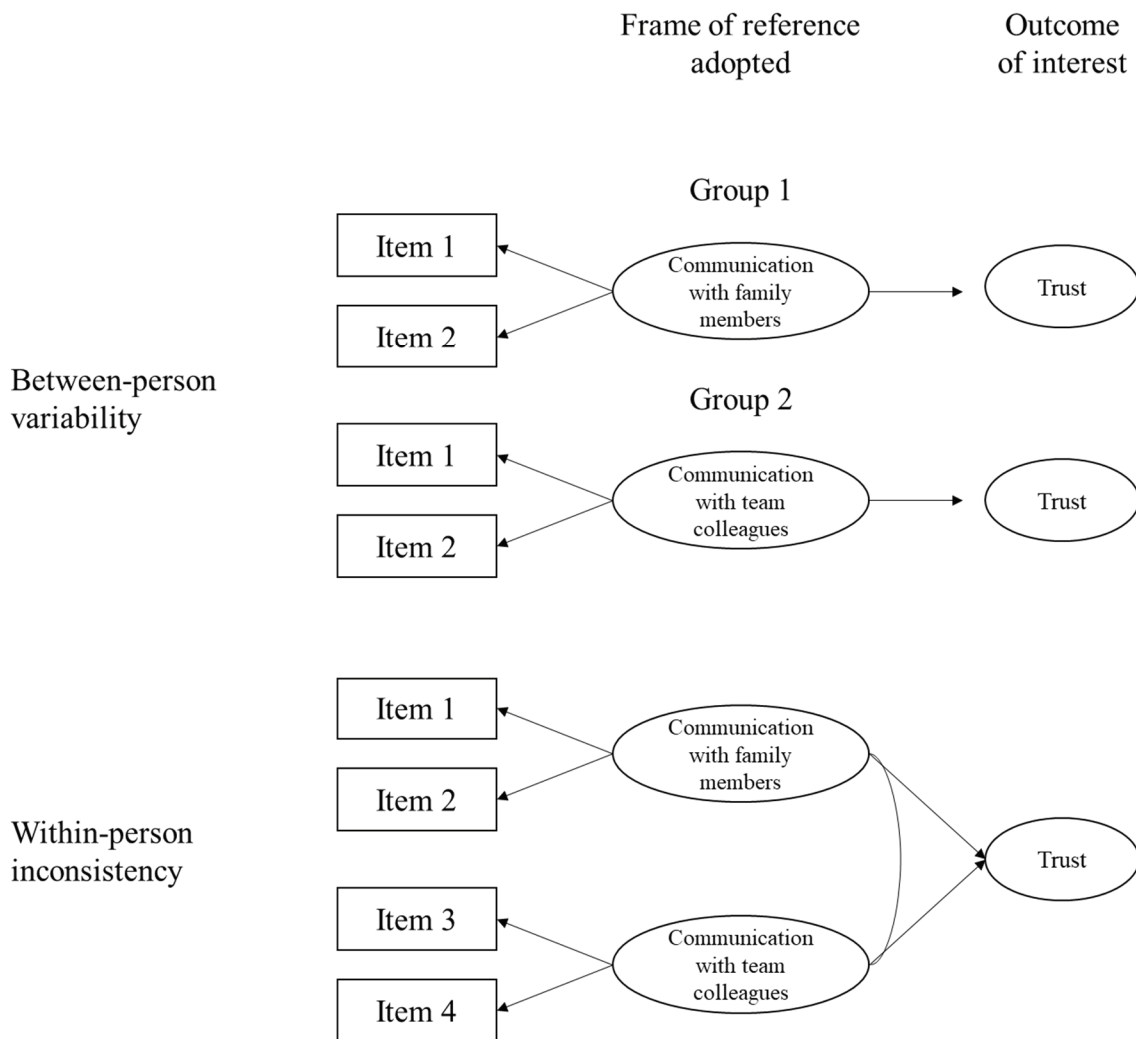


Figure 2. Upper part: Between-person variability in responding to non-contextualized communication KSAOs items. Lower part: Within-person inconsistency in responding to non-contextualized communication KSAOs items. Adapted from "A closer look at the frame-of-reference effect in personality scale scores and validity," by F. Lievens, W. De Corte, & E. Schollaert, 2008, *Journal of Applied Psychology*, 93(2), p. 268-279. Copyright 2008 by the American Psychological Association.

trust perceptions of virtual team members (i.e., lack of conceptual overlap), this between-person variability would lower the predictive validity of the non-contextualized communication expressiveness scale. The lower part of Figure 2 shows an example of within-person inconsistency in item interpretation. Lack of context could lead individual participants to alter their frame of reference while responding to the communication KSAOs items. For example, one half of the items could be interpreted with reference to expressiveness in interactions with family members and the other half with reference to the expressiveness in communication with the team colleagues, which ultimately would introduce within-person inconsistency and lower reliability of the trait (Lievens et al., 2008).

Instead of relying on non-contextualized communication KSAOs, context tags could be added to the communication KSAOs items in an attempt to reduce between-person variability as well as within-person inconsistency in item responding and to increase the conceptual overlap with the outcome of interest. The two empirical studies of this dissertation highlighted that it is important to differentiate between FtF and CM communication KSAOs. Depending on the working conditions of the virtual teams, a high degree of contextualization might be necessary to increase predictive validity of the communication measures for trust perceptions. For example, expressiveness items could be constructed that frame participants to both the virtual team colleagues and to the dominant mode of communication: “I am expressive in my conversations with my virtual team colleagues via text-based digital media”. It could also be insightful to include items that refer to expressiveness in FtF interactions in order to examine differences in predictive validity between medium specific expressiveness scales (i.e., FtF versus CM) for virtual team trust perceptions. Such an approach would also allow to examine interaction effects between communication KSAOs (i.e., expressiveness in FtF and CM interactions with the virtual team colleagues) and aspects of technology use (i.e., amount of FtF communication and amount of text-based CM communication in the virtual team). The CT-C(M-1) model (Eid, 2000; Eid, Lischetzke, Nussbeck, & Trierweiler, 2003)

used in Study 2 may be a useful tool to further examine the convergence of differentially contextualized communication KSAOs by setting non-contextualization as the reference context. Scales augmented with more specific context tags could then be contrasted against the reference context and consistency as well as method specificity coefficients be inspected. As a first step, future research could examine if non-contextualized communication KSAOs (“I am expressive in my conversations“) show indeed higher convergence with FtF than with CM variants of the same KSAOs (i.e., provide an implicit FtF framing). Likewise, it could be investigated to what extent KSAOs with specific media tags (e.g., email, chat) converge with each other. This would allow to estimate if a broad context tag as used in the two empirical studies (i.e., communication via text-based digital media) provides enough contextual specificity to predict relevant outcomes or if media specific context tags are needed to optimize predictive validity. Certainly, this might also be dependent on the contextual specificity of the outcome under investigation. The quantitative analyses should be complemented by qualitative methods such as interviews or the think-aloud technique (van Someren, Barnard, & Sandberg, 1994). Specifically, participants could read out single items from non-contextualized communication KSAOs questionnaires and tell an interviewer their thoughts while responding to the items. Such an approach would help to uncover if individuals indeed frame non-contextualized items with different contexts and if so how many different context-domains are imagined. Furthermore, the technique could help to examine if contextualized communication KSAOs items frame individuals to the desired context.

The second limitation of the two studies regards the sole reliance on self- and peer reports of perceived FtF and CM communication KSAOs to judge the distinctiveness of the constructs. Although this approach gave valuable initial insights into their interrelationship, more objective measures and controlled settings are needed to fully support the assumption of their dissimilarity. As a first idea on how to address this issue, a laboratory study could be realized. Cupach and Spitzberg (1983) instructed student dyads to reach consensus in a

problem-solving communication task (i.e., hypothetical ranking and selection of high school instructors for a job position) that took about 15 minutes to complete. A similar task could be constructed that must be applied in a FtF and in a text-based (chat) CM condition. Participants would need to communicate in both conditions which would require constructing two parallel problem-solving communication tasks. If the chat conversations would take place from different rooms of a building, a fictive partner exchange could be simulated to rule out habituation effects between communication partners. Based on video assessments of the FtF situation and chat protocols of the CM interactions, multiple external judges could use these sources of information to rate the attentiveness, composure, coordination, and expressiveness of the individuals in the FtF and CM condition. Additionally, self- and other-referential reports of communication KSAOs and outcomes could be assessed by the interaction partners after each completed communication task with reference to this specific interaction. Finally, self-reported dispositional measures of FtF and CM communication KSAOs could be assessed before the start of the conversations. Ultimately, this setting would allow to examine differences in predictive validity between dispositional and situation-specific measures of communication KSAOs as well as convergence of FtF and CM communication KSAOs before and after real communication encounters based on multiple informants.

Another research opportunity is to identify the concrete CM communication cues that individuals rely on to judge CM communication attentiveness, composure, coordination, and expressiveness in interactions. It is important to move from the rather abstract item content of the CM communication KSAOs (e.g., “She/he is expressive in her/his conversations via digital media”) to a more fine-grained analysis on the subtle behavioral cues that drive the impressions of these KSAOs. Without knowledge about such subtleties, it would be almost impossible to develop communication trainings that aim for improving text-based CM communication skills. Additionally, judgements of communication KSAOs may be significantly improved and be more reliable if observers could rely on more concrete

behavioral anchors for their ratings. As an initial step, a review of the CM communication literature could be conducted to identify the many existing CM communication cues and their context-dependent functions (see for example Darics, 2012, 2013; Kalman & Gergle, 2014; Vandergriff, 2013; Woerner, Yates, & Orlikowski, 2007). Figure 3 provides an initial graphical representation of some of the FtF and CM communication cues that exist and that might serve as indicators for the broad communication KSAOs. Based on the review of the literature, this figure could be extended by further cues and their hypothesized relationship to CM communication KSAOs. In a follow up step, experimental studies could be realized to examine how the identified CM communication cues might shape impressions of CM communication KSAOs. As a methodological example from the CM communication

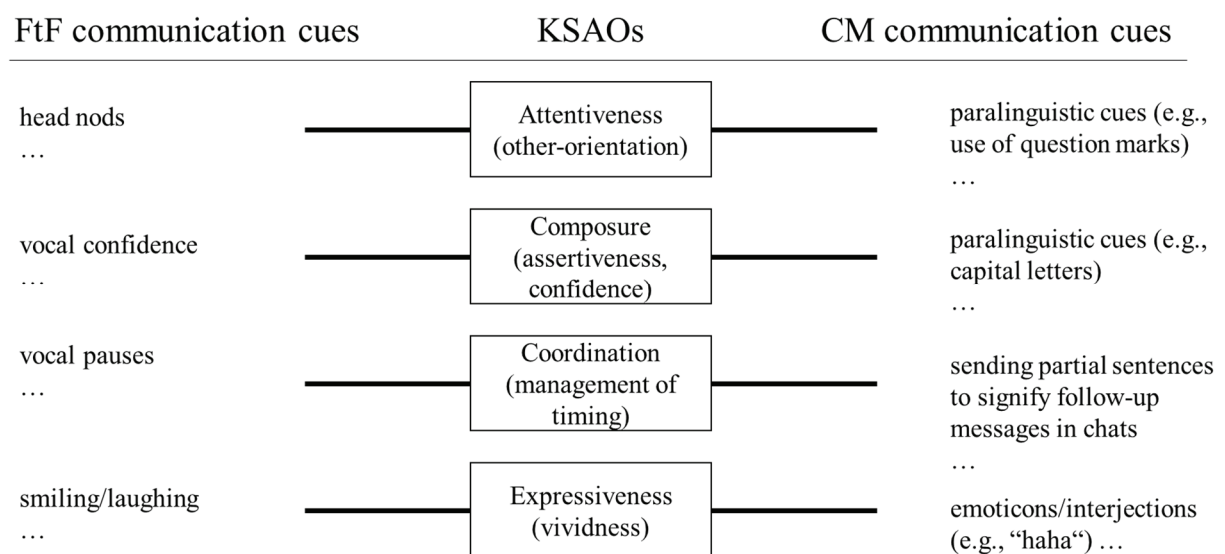


Figure 3. FtF and CM communication cues as indicators for attentiveness, composure, coordination, and expressiveness (FtF communication cues derived from Spitzberg, 2015, p. 255; CM communication cues derived from Darics, 2012; Woerner et al., 2007; hypothetical assignment of CM communication cues to KSAOs was carried out by the author of the dissertation)

literature, Houghton, Upadhyay, and Klin (2018) investigated how the exchange of only one subtle cue in a fictive chat conversation between two persons, a sentence-final period, may impact the interpretation of the conversation by readers of the text excerpt. To this end, the authors constructed multiple short text-messages between two interaction partners, whereby one conversation partner invited the other one for an activity. A single-text response to this invitation by the other person ended either with- or without a punctuation (e.g., “no” versus “no.“). Individuals were instructed to read a series of the excerpts on cell-phone screens and to rate their impression of the response (e.g., negativity of the response) on a likert-scale. This methodology allowed to examine how a subtle cue like a period may shape impressions of the chat conversations by readers (Houghton et al., 2018). In a similar vein, chat or email conversations could be developed that either include specific CM communication cues or not. Communication KSAOs items could then be presented to readers of the excerpts in order to measure how perceptions of communication KSAOs vary as a function of cue use. Such experiments would allow to examine the relationship of CM communication cues and CM communication KSAOs in a more controlled way. The experiments could be further extended by focusing on conversations in specific communication environments, for example a virtual team working context. A work-related chat conversation could be constructed, and CM communication cues varied over several conditions. Readers (for example, virtual team members/leaders/managers) of the conversations could then provide judgements of, for example the appropriateness or clarity of responses in a particular communication setting. Such an approach would be viable to construct training programs that not only provide knowledge on the CM communication cues that exist and their different functions, but also on a cue’s perceived appropriateness and clarity in different communication situations. An important limitation of the fictive chat conversations is that readers are not actively involved in the exchange (Houghton et al., 2018). Judgements may be quite different in real communication encounters, which could raise questions about the external validity of such

experiments. Besides this important limitation, fictive text-exchanges may serve as a useful tool to explore the role of CM communication cues in the formation of CM communication KSAOs perceptions under different conditions.

Taken together, the two empirical studies of this dissertation provided in-depth analyses of the similarities and differences between FtF and CM communication KSAOs and highlighted the importance of considering the mode of communication in the assessment of the constructs. Many new research opportunities resulting from the two studies were described in detail. Specifically, I advocate for a closer examination of the frame-of-reference effect in communication KSAOs research and for laboratory experiments that allow to examine convergence of FtF and CM communication KSAOs after real communication interactions. Finally, I emphasized the need to identify the concrete CM communication cues that drive impressions of CM communication KSAOs with the help of fictive chat conversations in experimental settings.

Integration of Findings and the Overall Conclusion

In the current dissertation, three articles were presented that focused on the KSAOs needed to succeed in virtual teamwork and text-based digital interactions. In the first of the three studies, a review article, a comprehensive model of virtual team KSAOs was developed that may guide personnel selection and development of future employees and that provided a roadmap for prospective research. In the two empirical articles, a multistep methodology was used to examine the similarities and differences of FtF and CM communication KSAOs. The results highlighted the need to consider the mode of communication in the assessment of the KSAOs and to not treat them as a single common construct.

The findings of the dissertation have revealed that CM communication KSAOs deserve further attention in future virtual team studies. Due to the pertinence of communication for virtual team functioning (Marlow et al., 2017), it seems to be a fruitful

research avenue to further explore the communication related KSAOs and their relevance for virtual teamwork. The CM communication motivation, knowledge, and skills of virtual team members could serve as important predictors for various mediators (e.g., trust; Jarvenpaa & Leidner, 1999) and performance outcomes of virtual collaboration. As detailed in the general discussion, it is important to identify the optimal degree of contextual specificity in communication KSAOs assessment in order to align them conceptually to the team criteria of interest. Likewise, more research is needed regarding the observable CM communication cues that drive perceptions of the KSAOs by interactors and the communication practices that are perceived as appropriate and effective by virtual team members. Such insights would be vital to develop CM communication trainings that may help virtual collaborators to succeed in their digital interactions. Of importance is also the measurement of the team virtuality conditions (e.g., reliance on FtF and CM communication) in addition to the communication KSAOs assessment in order to study their joint interactions. Finally, it must be observed that further virtuality facets exist, each of them posing significant challenges for virtual teamwork. As the review article and the general discussion of this dissertation highlighted, it will need immense research efforts in order to increase our knowledge on how to address these various challenges, to construct and adapt new KSAOs measurement instruments, and to conduct complex empirical studies (i.e., multimethod, multilevel, and multioccasion approaches) to move virtual team KSAOs research forward.

To sum it up, the dissertation makes several important contributions to the existing literature: First, the review article provides the hitherto most comprehensive summary of virtual team KSAOs available. Second, the three-step methodology applied in the empirical studies provided in-depth knowledge about the similarities and differences of FtF and CM communication KSAOs which has been unavailable to date. And third, the general discussion delineated a number of fruitful research avenues to further increase our knowledge about the

KSAOs needed to succeed in virtual teamwork and in text-based computer-mediated communication.

As an overall conclusion of the dissertation, the studies revealed that context matters in virtual team and communication KSAOs research. Rather than focusing on main effects of virtuality facets, technologies, or individual characteristics, future studies should target interaction effects between contexts and the individuals who are operating in them.

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Journal Articles

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