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IDENTIFICATION WITH VIRTUAL TEAMS

Marko Hakonen

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Helsinki University of Technology
Department of Industrial Engineering and Management
P.O. Box 5500
FIN-02015 TKK, Finland
Tel. + 358-9-470 22846
Fax + 358-9-470 23665
internet <http://tuta.tkk.fi/>

© Marko Hakonen
marko.hakonen@tkk.fi

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Abstract			
<p>Virtual teams, that is groups of people striving toward a common goal, dispersed across many locations, and communicating with each other predominantly via information and communication technology have become increasingly common forms of organizing work. Globalization, the need to be near customers and the rapid development of technology have enabled and driven this development. The number of studies on virtual teams is increasing but many phenomena are still understudied, especially in real-life settings.</p> <p>In this dissertation I have chosen to investigate the dynamics of social identification with virtual teams. Identification has often been put forward as a major success factor for virtual teams because it has been claimed to provide a sense of belonging despite the relative lack of face-to-face interaction. In order to shed more light on identification in this organizational context I have concentrated on the concepts of perceived justice and interpersonal trust and theories that link identification with them. I have also studied many relevant structural variables which are typical in virtual teams.</p> <p>I studied real-life virtual teams in all the four original articles of this dissertation. The data consisted of subsamples from two questionnaires; altogether 42 virtual teams and 302 team members were included. The cross-sectional data were analyzed quantitatively.</p> <p>The findings gave strong support to the importance of perceived justice, especially perceived procedural justice in the development of shared virtual team identity. Moreover, identity was found to be a strong motivational force which mediated the effects of justice perceptions on outcome variables. Such structural factors as the lack of face-to-face interaction and geographical dispersion were found to create uncertainty within virtual teams and moderate the relationship between procedural justice and identification. The fewer face-to-face meetings there were and the higher the geographical dispersion, the stronger the uncertainty which, in turn, forced team members to increase their search of identity cues from procedural justice judgments. Finally, it was found that both strong identification and high levels of trust are needed at the same time to predict virtual team effectiveness.</p>			
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<p>Tiivistelmä</p> <p>Virtuaalitiimit eli ryhmät ihmisiä, jotka työskentelevät yhteisen päämäärän eteen hajautuneina moneen paikkaan ja viestien keskenään pääasiallisesti tieto- ja kommunikaatioteknologisin välinein, ovat yleistyneet laajasti työn organisoinnin uutena muotona. Tätä kehitystä ovat edistäneet ja sen ovat mahdollistaneet globalisaatio, yritysten tarve olla lähellä asiakkaitaan ja teknologinen kehitys. Tutkimustietoa virtuaalitiimeistä kasautuu jatkuvasti, mutta monet ilmiöt ovat edelleen varsin puutteellisesti tutkittuja erityisesti todellisesta työelämästä saaduilla aineistoilla.</p> <p>Tässä väitöskirjassa olen tutkinut sosiaalisen identifikaation eli samastumisen dynamiikkaa virtuaalitiimeissä. Ryhmän jaettua identifikaatiota pidetään yleisesti keskeisenä virtuaalitiimien menestystekijänä, koska se luo yhteenkuuluvuuden tunnetta, vaikka perinteisiä tapaamisia on vähän. Valottaessani identifikaation syntyä ja seurauksia olen keskittynyt erityisesti koetun oikeudenmukaisuuden ja luottamuksen käsitteisiin sekä teorioihin, jotka linkittävät nämä identifikaatioon. Olen tutkinut myös useiden virtuaalitiimeille tyypillisten rakennetekijöiden merkitystä tässä kontekstissa.</p> <p>Tämän väitöskirjan pohjana olevissa neljässä artikkelissa olen tutkinut todellisen työelämän virtuaalitiimejä kvantitatiivisesti poikkileikkausasetelmissä. Artikkelien aineistot koostuvat kahden kyselyn datan osista aineistonkeruun eri vaiheissa. Kaikkiaan tutkittiin 42 virtuaalitiimiä ja niiden 302 jäsentä.</p> <p>Tulokset antavat vahvaa tukea erityisesti menettelytapojen koetun oikeudenmukaisuuden oletetulle merkitykselle sosiaalisen, ryhmässä jaetun identifikaation synnyssä. Identifikaation havaittiin olevan vahva motivaatiotekijä, joka toimi välittäjänä oikeudenmukaisuuden vaikutuksille tiimityössä. Rakennetekijöistä erityisesti kasvokkaistapaamisten puute ja maantieteellinen hajautuneisuus synnyttivät epävarmuutta tiimeissä, mikä puolestaan johti menettelytapojen koetun oikeudenmukaisuuden tärkeyden korostumiseen identifikaation lähteenä. Lisäksi havaittiin, että virtuaalitiimien tehokkuuden edellytys on samanaikainen vahva identifioituminen tiimiin ja korkea luottamus tiimin jäsenten välillä.</p>	
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Helsinki, January 2010

Marko Hakonen

List of Publications

The dissertation consists of an overall summary and the following original articles:

- I. Hakonen, M. & Koivisto, S. (2008). Antecedents of identity in virtual teams. *Nordic Organization Studies*, 2/08, 54-73.
- II. Hakonen, M. & Lipponen, J. (2007). Antecedents and consequences of identification with virtual teams: Structural characteristics and justice concerns. *The Journal of E-working*, 1, 137-153.
- III. Hakonen, M. & Lipponen, J. (2008). Procedural justice and identification with virtual teams: The moderating role of face-to-face meetings and geographical dispersion. *Social Justice Research*, 21, 164-178.
- IV. Hakonen, M. & Lipponen, J. (2009). It takes two to tango: The close interplay between trust and identification in predicting virtual team effectiveness. *The Journal of eWorking*, 3, 17-32.

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- APPENDIX I:** ANTECEDENTS OF IDENTITY IN VIRTUAL TEAMS
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- APPENDIX IV:** IT TAKES TWO TO TANGO: THE CLOSE INTERPLAY BETWEEN TRUST AND IDENTIFICATION IN PREDICTING VIRTUAL TEAM EFFECTIVENESS

1. Introduction

During the past 15 years, globalization, the need for flexibility, and the opportunities provided by information and communication technology (ICT) have paved the way for the proliferation of new organizational forms, such as virtual teams (e.g., Vartiainen, 2006). A virtual team (VT) is often described as a group of people striving toward a common goal, dispersed across many locations, and communicating with each other predominantly via information and communication technology (e.g., Axtell, Fleck, & Turner, 2004). Moreover, the need of organizations to let their experts or sub-teams of them work near customers around the globe are often mentioned as the major driving force behind the increased use of VTs in working life (Vartiainen, 2006). The literature on VTs has been growing rapidly, but as recent reviews argue (Hertel, Geister, & Konradt, 2005; Martins, Gibson, & Maynard, 2004), there is still amazingly little empirical research, especially on real-life teams. Hence, this new organizational form provides a fresh context for theory testing and building.

I have made the concept of identification, that is, the sense of belonging to a group, the central focus of investigation in my dissertation. Many authors have stressed that the formation of a shared team identity is crucial for virtual teams because it provides a sense of belonging despite the relative lack of face-to-face interaction (Fiol & O'Connor, 2005; Mortensen & Hinds, 2001; Wiesenfeld, Raghuram, & Garud, 1999). Even though Martins et al. (2004) claim that identification is among those group processes that have been relatively often studied, Fiol and O'Connor (2005) stress that these studies are far from exhaustive. Therefore, there is certainly potential for further enlarging knowledge and understanding of identification with VTs.

I have selected the other key concepts in this dissertation, that is, perceived justice and interpersonal trust, from among the plethora of possible constructs which might shed light on identification with VTs on the basis of two criteria. First, I have striven for theoretical coherence in selecting the variables for the studies. Second, I have focused on the constructs in the virtual context which are arguably proximal to that of identification. These arguments are refined in Section 3.

A concept that the two major reviews (Hertel et al., 2005; Martins et al., 2004) fail even to list as a topic of current or further VT research is perceived justice. Furthermore, to my knowledge there has been only one study of justice perceptions in VTs (Kurland & Egan, 1999) before the articles presented in this dissertation. This is rather surprising given the fact that perceived justice has been found to be an important factor influencing various work outcomes, such as organizational commitment, extra-role behaviors, turnover intentions, stress, health and unit-level performance (see Greenberg & Colquitt, 2005). Furthermore, the theoretical treatment of perceived fairness in this dissertation links it closely to identification. Hence, it is high time to study how justice and identification interplay in this new organizational form.

Trust has been claimed to be important in VTs because direct control is impeded due to distance. Numerous authors have suggested that control must be at least partially substituted by trust in VTs (e.g., Aubert & Kelsey, 2003; Jarvenpaa & Leidner, 1999; Tyler, 2003). Moreover, it has often been stated that trust is a key success factor and the “glue” that binds VTs together (e.g., Nemiro, 2000). Trust is also closely related to identification and justice. In fact, it sometimes overlaps, especially the concept of perceived justice (Lewicki, Wiethof, & Tomlinson, 2005).

The articles presented in the appendices deal also with many other relevant variables, such as extra-role behaviors, effectiveness and many structural variables. The reasoning behind their selection and the main storyline of the original articles is described in Section 5 (Results).

1.1 Aim, research strategy and research questions

My main aim in preparing this dissertation has been to shed new light on identification with VTs in four studies. I have tried to do this by focusing carefully on a limited number of presumably relevant variables in each study and by scrutinizing their interplay with and relationships to identification. My approach could be called social psychology of organizations (see Haslam, 2004). I have brought social psychological theories which have been commonly applied to other organizational settings to the

realm of VTs. Here my inspiration stems from the conclusion of Martins et al. (2004), who emphasize that VTs are essentially teams and that researchers should “*draw on theoretical foundations ... utilized in prior research on teams*” (p. 823). I have also tried to respond to the challenge of those scholars to seek out what is new and unique to VTs by focusing on variables and on moderations (see Martins et al., 2004) that might reveal some unanticipated associations. The method in all four articles is quantitative analysis of cross-sectional survey data.

Each of the original articles answers one of the following general research questions:

- RQI How are justice variables and contextually relevant structural variables related to identification with VTs? (Article 1 in Appendix I)
- RQII Is the social identity mediation hypothesis derived from the group engagement model of justice transferable to VTs and what is the role of task interdependence? (Article 2 in Appendix II)
- RQIII How does the number of face-to-face meetings of a team and its geographical dispersion moderate the relationship between procedural justice and identification? (Article 3 in Appendix III)
- RQIV How do trust and identification interplay in predicting VT effectiveness? (Article 4 in Appendix IV)

Hereinafter I refer to the original articles following their order in the Appendices. The article presented in Appendix I is referred to as Article 1 and so forth. The structure of this dissertation overview is as follows: I start with a discussion on VT prevalence and definitions (Section 2). In Section 3 the three most central concepts in this dissertation, namely identification, justice and trust are explained in detail. This is followed by a description of data and methods (Section 4) with special attention to matters omitted from the original articles due to limited space. The results section (Section 5) is dedicated to a summary of the hypotheses and results of each original article. Finally, the general discussion in Section 6 begins with a summary of the main results, proposing answers to the respective research questions and outlining the main contributions. The rest of that section is dedicated to a critical discussion of the

research, pointing out further directions for research and discussing the limitations of this dissertation before making some concluding comments.

2. Virtual teams and virtuality

VT researchers have studied many VT relevant variables. Some of them are better covered than others, but very few of them, if any, can be said to have reached the level of robust academic understanding (Hertel et al., 2005; Martins et al., 2004). Martins et al. (2004) note in their review that often neglected variables include, for instance, diversity, team size, monitoring and knowledge management. The better studied constructs include technology, cohesion and member satisfaction. However, overall, the field of academic VT research is still extremely fragmented.

As noted above, virtual teams have become an increasingly common way of organizing work. Gibson and Gibbs (2006) present an estimate based on a Gartner Group study from the year 2002 according to which *“more than 60 per cent of professional employees work in teams characterized by virtuality”* (p. 451). Hertel et al. (2005) refer to a German survey which suggests that about 40 per cent of business managers have worked in a VT. Considering the fact that these figures are not fully up to date, it is reasonable to argue that VTs have such an importance in modern working life that their empirical study is clearly justified. Furthermore, rigorous investigation of VTs from the viewpoint of organizational psychology (or any other discipline) has the potential to disclose novel insights.

What then are VTs and virtuality? One of the basic debates in the literature concerns the proper definition of VT and virtuality (Gibson & Gibbs, 2006). According to recent reviews (Hertel et al., 2005; Martins et al., 2004), it is a common notion that virtuality is a matter of degree. Indeed, there are more and less virtual teams, and I also share the view that virtuality should be seen as a continuum rather than as an absolute state.

In the debate on accurate definition, different authors specify different attributes of VTs as definitional (Martins et al., 2004). It is rather clear that for a VT to be a team it

should consist of more than one person collaborating to achieve a common goal (e.g., Hertel et al., 2005). Most authors propose (e.g., Bosch-Sijtsema, 2003; Hertel et al., 2005; Maznevski and Chudoba, 2000) that for a team to be virtual at least one of its members must work in a different location from the others. This is a minimal condition for geographical dispersion which Gibson and Gibbs (2006) specify as one definitional characteristic of VTs in their recent article. Moreover, VTs are often characterized by the fact that members communicate with each other mainly through ICT (e.g., Axtell et al., 2004). Gibson and Gibbs (2006) call this dimension “electronic dependence”. This dimension can also be viewed in the way I have adopted in this dissertation: the stronger the electronic dependence the lower the number of a VT’s face-to-face meetings. This operationalization can be argued to be better than counting electronic interactions in placing teams along a co-located-virtual continuum, because some empirical evidence suggests (e.g., Griffith and Neale, 2001) that co-located teams may use as much or even more ICT in their communication than members of VTs. Many authors also include other features, such as crossing temporal, cultural, and organizational boundaries or dynamic structure, in their definitions of VTs (see Gibson & Gibbs, 2006, for review). Another fruitful way to view these different features of VTs is to consider them as components of contextual complexity (Vartiainen, 2006). Each feature forms a continuum from non-existence to maximal. The further any of the components is placed along a continuum, for instance geographical dispersion, the harder it is for a VT to cope with that issue.

Except in Article 1 I do not take a stance in the ongoing debate on what features or attributes of VTs are definitional or what constitutes the core of virtuality. I have called the interesting and obviously typical features of VTs structural variables.

Finally, it has been noted that the word virtual is linguistically problematic due to its connotation of something that does not really exist. Consequently, many scholars have used other terms, like distributed teams or workgroups (see e.g., Hinds & Kiesler, 2002). Nevertheless, I use the term VT throughout this dissertation because it was used in the titles of all the four original articles.

3. Identification, justice and trust – the key constructs of this dissertation

In this section I will clarify and open up the major theoretical constructs of this study in order to help the reader to orient to the central theories on the basis of which I have developed the central arguments of this dissertation beyond the limited space of the articles. First, I introduce the social identity approach since it is central to all the four articles. Second, I shed some light on the social psychological research tradition on perceived justice because it is another focal point in the empirical studies presented in this dissertation. Furthermore, the theories of perceived justice I have used are deeply rooted in the social identity approach – a point that brings out my particular concern for theoretical coherence. Third, I take a brief glance at the concept of trust and its study in VTs. Other concepts with lesser importance in this dissertation will be briefly introduced in the Results section.

3.1 The social identity approach

The concept of social identity and the social identity approach (SIA) are the cornerstones of this dissertation. As noted in all the articles the SIA provides a theoretical framework for the relationship between the individual and the group. Specifically, it consists of two distinct theories: the original social identity theory (SIT; e.g., Tajfel & Turner, 1979), and the more recent self-categorization theory (SCT; e.g., Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Despite certain differences, both theories share the same fundamental assumption that individuals define themselves in terms of their social group memberships and that this group-defined self-perception produces distinctive effects on social behavior and inter-group relations (Hogg & Abrams, 1988). This means that the more an individual conceives of him or herself in terms of membership of a group, or, in other words, identifies with the group, the more his or her attitudes and behavior are governed by this group membership (Hogg & Abrams, 1988).

In a broader social psychological discourse the origins of the SIT can be traced to endeavors to challenge the limits of the traditional individualistic tradition in social

psychology (e.g., Tajfel & Turner, 1979). This traditional approach has gained dominance since the early days of social psychology in explaining group and collective phenomena (Haslam, 2004). The basic premise of this vein of thinking is that group processes are to be explained in terms of the traits, needs, skills and abilities of individuals. An interesting adherent of this approach was Taylor with his principles of scientific management (1911; ref. Haslam, 2004). Taylor argued that workers' potential for laziness will be emphasized in groups. Hence, the keys to effective organization and management are the selection of the most skilled individuals and the organization of work into small units so as to inhibit the formation of ineffective groups. The list of corresponding examples in social and organizational psychology is long and impressive (see e.g., Haslam, 2004).

Tajfel and his colleagues started to investigate group processes from a different point of view, namely consideration of how group memberships affect the behavior and the self-definition of the individual members (Haslam, 2004, Tajfel & Turner, 1979). They were able to demonstrate that a random distribution of individuals into groups produced, for instance, in-group favoritism even when no realistic conflict between the groups was present. These minimal group studies led to the conclusion that very minimal social cues of belonging to a group can have meaning for individuals to such an extent that it affects their attitudes and behavior. This social categorization ("I am a member of group X") led to positively valued social identity as a group member. Consequently, Tajfel (1974) defined social identity as *"that part of an individual's self-concept which derives from his membership of a social group together with the emotional significance attached to that membership"* (p. 69). This link to self makes social identification a strong motivational force.

In spite of the basic distinction in SIT between personal and social or group level identification, the theory remained somewhat unclear as to cognitive processes that activate and make salient either personal or social identification, or something in between these two extremes (Haslam, 2004). SCT offers clarifying account of this matter (Tajfel & Turner, 1979; Turner et al., 1987). One of the key psychological processes outlined in SCT is depersonalization. This means the degree to which self is

merged with other group members. When people categorize themselves at the personal level, they are motivated to do things which promote their personal identity as individuals (e.g., personal advancement). When categorization and social identity are salient, it is associated with a motivation to do things which promote individuals' social identity as group members, for example, through cooperation and enhancement of group goals. The underlying cognitive principles of the self-categorization which determine the direction of categorization and consequent identification are well specified in SCT but not crucial for the purposes of this introduction (see Haslam, 2004; Turner et al., 1987).

Even though SIT and SCT were originally developed to explain inter-group relations and especially discrimination, the article by Ashforth and Mael (1989) brought the SIA to the realm of organizations. During the past 20 years the SIA has been applied in order to unravel many organizational psychological phenomena, such as leadership (e.g., Lipponen, Koivisto, & Olkkonen, 2005), organizational justice (e.g., Tyler & Blader, 2000) and organization citizenship behavior (e.g., Van Dick, Grojean, Christ, & Wieseke, 2006). The use of this approach has increased so dramatically that the SIA can be currently described as one of the main stream theories of organizational psychology (see e.g., Haslam, 2004). The meta-analyses reveal that social identification is correlated with a broad range of organizationally relevant and (often) positive attitudes and behaviors (Riketta, 2005). It should be noted here that the above-described original formulations of SIT and SCT were situational, emotional as well as cognitive, and dependent on social interaction (see Haslam, 2004; Tajfel & Turner, 1979). This is worth remembering, because in their article Ashforth and Mael (1989) distanced themselves from the original formulations and presented social identity as a purely cognitive construct. They defined organizational identification as *“the perception of oneness with or belonging to a group”* (p. 34).

In order to place and frame the SIA some distinctions are helpful. First, one should note that it is certainly not the only way to tackle identification and organizations. Perhaps the most influential and closest alternative stream of identity research in organizations is based on a more “sociological” formulation of the concept. Specifically, in their seminal

article Albert and Whetten (1985) consider identity to stem from organization, specifically from its central, distinctive and enduring characteristics. In this approach the organization and images formed of it are the building blocks of identification. The difference from the SIA is clear. The SIA focuses on social identity, that is on psychological processes occurring within individuals in groups whereas the organizational identity approach clearly gives precedence to organizations and the processes and discourses within and outside them. Second, even though in this dissertation the terms identity and identification are used interchangeably, from the viewpoint of other streams of identity research this would be misleading. Identity can be viewed as a state whereas identification can be seen as a process (see Ashforth, Harrison, & Corley, 2008). Third, the concepts of organizational identity and organizational commitment are often mixed. This is understandable for many reasons. The most common definition of organizational commitment describes it as “*the relative strength of an individual’s identification with and involvement in a particular organization*” (Mowday, Steers, & Porter, 1979: 226). However, commitment is a positive attitude towards an organization (or team) and lacks the reference to self-definition which identification has when it is treated in terms of the SIA (Ashforth et al., 2008). Still, the strikingly similar patterns of correlation with other variables for both commitment and identification justifies some suspicion as to the fundamental differences between these two constructs.

Why then use the SIA in this dissertation? The reasons are threefold, the first and second having been mentioned above. The SIA provides a coherent theoretical lens to look at multiple organizationally relevant phenomena and research has shown identification to be strongly associated to important positive outcomes at different levels (group, organization). Moreover, the SIA, is – at least to me – compelling because it provides a coherent (meta)theory and succeeds in linking group-level phenomena to individual psychological processes without giving either of them ontological priority. The third reason is that the importance of VT identification for the success of the team is widely recognized in the literature even though empirical evidence of its relations to other concepts is not yet very well covered (Fiol & O’Connor, 2005). This is a source of potential novelty.

This last point deserves some further clarification. Many VT researchers emphasize and agree that identification is especially important in virtual settings because it provides a sense of belonging despite the relative lack of face-to-face interaction (Fiol & O'Connor, 2005; Gibson & Cohen, 2003; Hinds & Kiesler, 2002). However, Fiol and O'Connor (2005) conclude that due to the limited number of empirical studies “*we know very little about the interrelationships among individual, group and situational factors in the development of identification in virtual teams*” (p. 20). This does not mean that there are no relevant and important studies. Mortensen and Hinds (2001) found that shared team identity was associated with less conflict in new product development teams but that the level of identification was the same in co-located and distributed teams. Moreover, Wiesenfeld, Raghuram and Garud (1999) found in their seminal study that virtual (or rather remote) workers built their identification on electronic communication to a greater extent than their less virtual counterparts. They also found that the frequency of face-to-face communication had no main effect on identification. Recently, Sivunen (2006) found that VT leaders used four tactics to enhance VT members identification through computer-mediated communication. Furthermore, Bartel, Wrzesniewski and Wiesenfeld (2008) found in a field study of a large technology firm that recently hired remote workers had problems in identifying with their organization largely because they were not familiar with other employees and had to rely on electronic communication. The last two studies reveal some contradictions: Sivunen (2006) found that electronic dependence constituted no real impediment to identification whereas the results of the Bartel et al. (2008) study suggested the opposite to be true.

3.2 Organizational justice

Here justice refers to a long research tradition within social psychology studying what persons perceive to be fair or unfair and how they react to this. This tradition started from studies in legal settings but has recently been applied rather extensively to the organizational context (Colquitt, Greenberg, & Zapata-Phelan, 2005). The term organizational justice simply refers to applying the theories of justice research to organizations.

Organizational justice literature generally distinguishes between three types of justice (Greenberg & Cropanzano, 2001). *Distributive justice* refers to fairness perceptions of an outcome of any organizational resource allocation (Deutsch, 1985). *Procedural justice* means the perceived fairness of formal decision-making procedures and principles (Lind & Tyler, 1988) or, in other words, the quality of decision making (Tyler & Blader, 2000). *Interactional justice*, in turn, refers to dignity, politeness, and respect, which are communicated informally during decision-making or other interpersonal encounters (Bies & Moag, 1986), that is the quality of interpersonal treatment (Tyler & Blader, 2000). Recently some justice scholars have divided interactional justice into two sub-concepts. (Greenberg, 1993). These are interpersonal justice, which refers to treatment by supervisors or colleagues, and informational justice, which covers essentially the quality of the explanations of a person who is responsible of any decision (see e.g., Colquitt et al., 2005).

In the original articles of this dissertation we concentrate especially on procedural justice. The historical origins of most conceptualizations and operationalizations of procedural justice can be traced to the justice rules developed by Leventhal (1980). According to Leventhal (1980) people use six rules when they judge the fairness of decision-making procedures. The rules highlight the importance of accuracy of information, correctability, bias-suppression, consistency, representativeness and ethicality in the decision-making process.

After many years of research, it is now well-acknowledged that employees' perceptions of organizational justice are critical factors influencing various important work outcomes, such as organizational commitment, job satisfaction, organizational citizenship behavior and turnover intentions (see Cohen-Charash & Spector, 2001 and Colquitt, Conlon, Wesson, Porter, & Ng, 2001, for reviews). Given these important consequences of perceived justice, researchers have been trying to explain why people care about justice. For the effects of distributive justice, the dominant explanation has focused on the positive economic consequences that fair outcomes have (Folger & Cropanzano, 1998). That is, fair outcomes are valued because they are closely related to favorable outcomes. In early research, this instrumentally based explanation was also

offered for the procedural justice effects. According to this self-interest model of procedural justice, fair procedures are valued because they ultimately lead to favorable outcomes (Lind & Tyler, 1988, Colquitt et al., 2005).

In contrast to the self-interest model an alternative explanatory framework was provided by so called relational theories of fairness. An early example of these theories is the group-value model of justice (Lind & Tyler, 1988), which emphasizes identity-relevant motivations behind the concern with fair procedures. The model suggests that procedural justice matters because it conveys identity relevant information to group members. A more recent development based on same vein of reasoning is the group engagement model (GEM) developed by Tyler and Blader (2003). They argue, as in the group-value model, that justice perceptions should affect identification given the positive social-identity-relevant information that justice communicates to individuals. More specifically, justice communicates to individuals that they are respected members within their group, and that they can be proud of their group membership. Furthermore, through its link to these feelings of respect and pride, it should be further related to increased identification with the group (Tyler & Blader, 2003). This relationship develops because people are more highly motivated to merge their identity with a group when the group has high status (pride), when they feel they have status in the group (respect). Pride and respect engender identification with the group in people's motivated attempts to develop and maintain a positive social identity (Tyler & Blader, 2003). A central suggestion of GEM is the so-called "social identity mediation hypothesis" (see also Colquitt et al., 2005; Blader & Tyler, 2005). It proposes that identification conveyed by procedural fairness in the group mediates the relationship of procedural justice perceptions and positive organizational outcomes such as extra-role behaviors. In Article 2 we specifically test the applicability of this mediation hypothesis to VTs.

The same question put forward about identity can be asked about justice. Why study it here? Again my answer is threefold. The first and second parts I have hopefully demonstrated above. Justice and especially the relational models of it that are used here are firmly anchored to the construct of social identity – the key concept of all the articles in this dissertation. Moreover, like identity, perceived procedural justice has

been shown to have many important effects in the groups beyond identity. Finally, justice is clearly understudied in the context of VTs and might be a source of novel insights. This last point is expanded below.

To my knowledge, only Kurland and Egan (1999) studied fairness in virtual settings before the original articles of this dissertation. Their pioneering work investigated how telecommuting and structural factors of organization such as outcome-based performance evaluation, formality of communication, and job formalization were related to the justice perceptions of telecommuters. Among other things, they found that telecommuting and informal communication were positively related to procedural justice. They suggest that these results were partly attributable to active supervisory communication and decision justification, especially via e-mail. Telecommuting and telework are synonyms referring to a flexible individual work arrangement in which employees spend some of their working time outside their conventional workplace (Nilles, 1994). Telework, unlike VTs, does not presuppose teamwork toward a common goal. Thus, Kurland and Egan's (1999) study might not fully inform us about the potentially special group-level dynamics of virtual teamwork. The same consideration may limit the applicability of the results of the identification studies of remote workers by Wiesenfeld et al. (1999) and Bartel et al. (2008) to VTs (see Section 3.1).

3.3 Trust

In this dissertation (Article 4) I have investigated trust within VTs (interpersonal trust) from the social psychological perspective. In line with Boon and Holmes (1991) I defined trust as a psychological state involving confident positive expectations about another's motives with respect to oneself in situations which entail risk.

Trust in organizations has been a topic of growing interest to researchers (e.g., Kramer & Tyler, 1996). Generally, most authors seem to agree that trust is beneficial for organizations (Dirks & Ferrin, 2001). Several studies have demonstrated that trust has multiple positive outcomes in organizations ranging from increased commitment to organizational citizenship behaviours (see e.g., Dirks & Ferrin, 2002). According to

Bijlsma and Koopman (2003), it is also commonly agreed that trust is positively related to cooperation. It has been noted that trust becomes more important and even partially replaces traditional mechanisms of control in new virtual work settings (Tyler, 2003). Direct control is strongly impeded due to distance, but coordination and cooperation are indispensable in VTs for the team to achieve its shared goal.

Consequently, trust has been one of the more studied constructs for VT researchers (e.g., Aubert & Kelsey, 2003; Zolin, Hinds, Fruchter, & Levitt, 2004). In their seminal study of VTs comprised of students from different countries, Jarvenpaa and Leidner (1999) found that, among other things, proactive, predictable communication and social cues in computer-mediated communication were keys to high interpersonal trust within the teams. They suggest that trust in virtual settings is swift and fragile. Meyerson, Weick and Kramer (1996), who developed the concept of swift trust, suggested that swift trust develops depersonally. If the common task requires trust, but the parties do not have time to become acquainted with each other, trust is built on role-based interaction and prototypical categorizations.

3.4 Links between identity, justice and trust

Taken together, insofar as earlier research in virtual and other settings is not severely challenged, the constructs of perceived justice and interpersonal trust should be closely linked to social identification with VTs. First, GEM states that especially procedural justice is a building block of identity. Second, since both trust and identification are claimed to be crucial for VT success, it is reasonable to assume that they are somehow intertwined. Therefore, scrutiny of the interplay of VT identification with justice and trust was made the central concern of this dissertation.

Going beyond the VT context, the meta-analyses on identity (Riketta, 2005) and on organizational justice (Cohen-Charash & Spector, 2001; Colquitt et al., 2001) do not inform us about interconnections between identity and procedural justice. However, some empirical studies which apply similar conceptualizations as I have used in this dissertation give a clue on the strength of the links between these two constructs.

Studies by Blader and Tyler (2009) and Lipponen, Olkkonen and Moilanen (2004) report correlations between procedural justice and identification which are around .45 level, that is rather high. Furthermore, meta-analyses and studies (e.g., Blader & Tyler, 2009; Colquitt et al., 2001) report correlations for the identification-extra-role behaviors link that range between .15 to .39 and show that social identity mediates the effects of procedural justice especially on extra-role behaviors. The studies on the relationships between identification and trust as well as between justice and trust are more rare but as Lewicki, Wiethoff and Tomlinson (2005) note, researchers have treated justice and trust often as almost overlapping constructs. Hence, these two constructs are very closely linked. In fact, a comparison of some procedural justice and trust scales reveals that they have sometimes been operationalized amazingly similarly (see e.g., Tyler, 2003 and Tyler & Blader, 2000).

Even though the key constructs of this study seem to be closely linked, the virtual context might affect the way people perceive justice, create identification and build trust. One of the fundamental contextual factors which distinguishes VTs from traditional teams is the way cues about others attitudes, intentions and behavior are transmitted. In VTs the cues might be harder to find and at least more ambiguous because they are electronically mediated. Even though one would accept the idea that in the long run people adapt to the electronic communication media (see Axtell et al., 2004) it might still be that, for example, formation of shared identity is harder, building trust takes more time and justice is perceived differently in VTs than in traditional face-to-face teams. The question whether or not the phenomena and relations found in traditional teams do persist in VTs is one general point of interest in this dissertation.

4. Methods

In this section I will summarize and explain the different datasets which were used in the four articles. The first subsection gives some further background information on the data as compared to the articles. The subsection on measures sheds light on the key measures and specifically on the arguments behind their targeting. The interested reader can look at the data and measures in further detail in the original articles.

4.1 Data and procedures

The data used in the articles was gathered by means of two large questionnaires: Virtual Team Questionnaires 1 (VTQ1) and 2 (VTQ2). They were developed for the research interests of many researchers in our Virtual and Mobile Work Research Unit and I have used only a small fraction of the variables available. VTQ1 had some similarities with VTQ2 but the differences were rather remarkable and I was able to use both data sources only in Article 3. VTQ 1 was sent to 14 teams during the years 2004 and 2005, and 230 VT members returned acceptable responses, a response rate of 59.1%. VTQ2 was sent to 31 VTs during the years 2005, 2006 and 2007, and we got 211 acceptable responses, a response rate of 71.5%. All the respondents in both datasets were specialists conducting non-routine tasks.

The basic procedure for both questionnaires and for all VTs was fundamentally similar. The respondent teams were selected in collaboration with the contact person in each company, and with the agreement of the team leaders. The minimal conditions for selection were: (a) the teams had more than one member collaborating to achieve a common goal, and (b) at least one of the team members or subgroups of them were located in different towns. In addition, it was ensured that the respondents communicated mainly via ICT (i.e., not mainly face-to-face). The team leaders were first sent a background data sheet asking for the e-mails of all the VT members, their gender, primary geographical location and nationality. This information was used when such variables as team size or the number of geographical locations were coded to the raw data. The reasoning was that the objective state of affairs affects all the team members even if not everyone responded. For instance, if a team had eight members in three locations and one of them working alone in one location failed to respond and I was interested in the effects of geographical dispersion, the count from the questionnaire would lead me to code the team erroneously as having two locations whereas the team had to cope in reality with the actual three locations.

Finally, the respondents received individual e-mails introducing the study and giving a web address through which they could confidentially complete the questionnaire. In the e-mail and in the questionnaire the respondents were reminded that they should answer all the questions with regard to their named VT. It was stressed that even though the term “team” was consistently used, they should think about the specific VT mentioned in the e-mail and on the questionnaire cover page while answering.

Article 1. In this study we use a sub-sample of VTQ1 data since the certain groups failed to meet some of the critical requirements of VTs outlined above. Three groups were dropped from this study’s data because they consisted of a network of three industrial partners and had in total about 200 members. Therefore, one could hardly call them teams. The sub-sample used here consisted of 154 respondents from 11 teams working in three Finnish based IT companies. In total, 91 acceptable questionnaires were used, a response rate of 59.1 percent. Respondents were predominantly male (67.8%), with an average age of 34.6 years ($SD = 8.2$). Their mean team tenure was 12.9 months ($SD = 9.7$). We used individual responses and did not aggregate the data to team level due to small number of teams.

Article 2. The data for this study was from the early phases of VTQ2 data collection. By that time the questionnaires had been sent to 172 members of 14 VTs in seven Finnish-based companies. These companies represented different lines of business, but the majority of the data was gathered from the members of VTs in multinational IT companies (9 teams). Other areas of business included were banking, services and the metal industry. 102 acceptable questionnaires were returned, a response rate of 59.3%. The respondents were predominantly male (71.2%), with an average age of 38.5 years ($SD = 8.1$). Their mean team tenure was 24.6 ($SD = 20.5$) months. This data was also analyzed at the individual level due to the small number of teams.

Article 3. At the time this study was being finalized the data gathering had ended and we were able to complement the final VTQ2 data (31 teams) with eight teams from VTQ1. We had to exclude three more teams which had responded to VTQ1 because they had also responded to the VTQ2 later on. The teams represented 13 Finnish-based

organizations and mainly the IT industry but also such business areas as banking, services, the public sector and the metal industry. We received a total of 293 acceptable questionnaires, a response rate of 69.0%. More than half of the respondents were male (58.8%), and the average age was 39.3 years ($SD = 8.8$). Average team tenure was 22.3 ($SD = 30.6$) months. Because we were interested in team-level measurement and used such clearly team-level constructs as objective geographical distribution and the number of face-to-face meetings of the team, we aggregated the data to VT level. It could also be argued that in our study procedural justice should be treated as a team-level construct because we specifically asked for fairness perceptions of the whole VT.

Article 4. In this study we used the whole VTQ2 data. Unfortunately, trust was measured so differently in VTQ1 that we could not utilize that data. Therefore, we used the members of 31 VTs working in ten Finnish-based organizations. The organizations were in the same areas of business as with the data of Article 3. 211 acceptable questionnaires were returned, a response rate of 71.5%. Again, a slight majority of the respondents were male (56.4%), and the average age was 40.4 years ($SD = 8.7$). Average team tenure was 25.9 ($SD = 34.6$) months. Again, because we were interested in team level measurement and used such team level constructs as trust within the whole team and perceived team effectiveness, we aggregated the data to VT level.

4.2 Measures

The key point about all the measures used in both questionnaires is that they were targeted intentionally to team level due to my personal interest and that of other developers of the questionnaires. We wanted to measure the degree to which the VT members identified with their team (see Appendix IV, Article 4, p. 32, for items). Similarly, the items measuring procedural justice were targeted to assess the quality of decision-making in the whole VT. Additional reasons for this targeting were that the respondents were specialist, non-routine employees who were probably all making important decisions and that it may have been hard to detect in e-communication who was the original or final decision maker. The procedural justice items used in Articles 1, 2 and 3 were the following:

When decisions are made in our team...

1. they are based on accurate information.
2. they can be corrected afterwards, if they are found to be poor.
3. everyone tries to suppress personal biases.
4. decisions are consistent over persons and over time.
5. all those affected by the decision are heard.

We consistently used these five items based on Leventhal (1980) but in Article 2 we broadened the operationalization by adding three items designed to assess the quality of treatment in line with reasoning of Tyler and Blader (2000) on formal and informal justice. As with the procedural justice measure, we targeted the trust measure to assess interpersonal trust within the whole VT and measured team not individual effectiveness (see Appendix IV, Article 4, p. 32, for items). This interest and the consequent targeting of the measures is a strong argument for aggregating the data to team level. Unfortunately, this was possible only for Articles 3 and 4 as explained above.

5. Results

In this Section I will describe and summarize the logic and key results of each of the four articles.

5.1 Article 1: Structural and justice antecedents of identification

In Article 1 we started to disentangle the identity dynamics of VTs by testing the main effects of three justice perceptions and four structural factors on identification with VTs. The research question here was: How are justice variables and contextually relevant structural variables related to identification with VTs (i.e., RQ I)?

From this relatively small data we were able to empirically distinguish two forms of fairness, namely procedural and interactional justice. Drawing on previous results and meta-analyses (Cohen-Charash & Spector, 2001 and Colquitt, Conlon, Wesson, Porter, & Ng, 2001, Tyler & Blader, 2000) and on the group-value model of justice of justice presented earlier (see Section 3.2.; Lind & Tyler, 1988) we hypothesized that both

procedural and interactional justice are positively associated to identification with the VTs.

For this article we selected four structural variables that could have relevance in distributed settings. The four variables were: virtuality of the team, size of the team, cultural diversity of the team and the tenure of the team members. Here we named the number of face-to-face (FTF) meetings as virtuality but, as discussed above (Section 2), the choice of this term was slightly misleading. The theoretical reasoning on the relationship between identification and all the structural variables was essentially similar. High virtuality (i.e., low number of FTF meetings), large team size and high cultural diversity should, as predicted by the SIA, decrease the salience of VTs as objects of self-categorization and consequently impede identification with them. The reverse should be true for long team tenure (see Section 3.1; Fiol & O'Connor, 2005; Haslam, 2004; Turner et al., 1987). Consequently, we suggested that virtuality, team size and cultural diversity should be negatively whereas team tenure should be positively related to identification with the VT.

The results gave strong support for both justice-identification hypotheses. These results were in line with the assumptions of the group-value model of organizational justice (Lind & Tyler, 1988) and suggest that both the quality of decision-making and the quality of interaction do, indeed, convey identity relevant information to VT members. By contrast, none of the hypothesized associations between structural variables and identification gained support. All the relationships were non-significant. However, it would be too early to conclude that the structural variables under scrutiny in Article 1 are not related to identification. It might be that the relationships are not as straightforward as we anticipated in Article 1. Furthermore, the small sample size may have prevented some relationships from becoming statistically significant. The key finding of this article was that both procedural and interactional justice perceptions are crucial in identification with VTs.

5.2 Article 2: Testing the mediation hypothesis of the group engagement model in virtual teams

Article 2 is an extension and continuation of Article 1 with a different dataset and it specifically concentrates on testing the social identity mediation hypothesis of the group engagement model (GEM; Tyler & Blader, 2003) presented in Section 3.2., thus addressing research question II. The hypothesis states that identification should mediate the relationship between procedural justice and outcome variables, especially extra-role behaviors. We defined extra-role behavior as behavior which benefits the team and/or is intended to benefit the team, which is discretionary, and which goes beyond the existing role expectations (see van Dune, Cummings, & McLean Parks, 1995).

In order to add novel aspects to the hypothesis we argued that the same mediation model could be applicable also to distributive justice. This argument is also supported by a study of De Cremer (2002), which showed that equity perceptions (which are usually and also here used to assess distributive justice) are strongly related to self-esteem and acceptance, concepts closely linked to respect, pride, and identification.

Moreover we added two structural variables to the model. First, with the same logic as in Article 1 we tested the role of the number of FTF meetings of the team in the model. Second, we tested the effects of task interdependence. Hertel, Konradt and Orlikowski (2004) identified task interdependence as a key management practice of VTs. The reasoning behind this is that the more the tasks of VT members are coupled with each other, the stronger are the demands for team members to coordinate, communicate, and cooperate. Thus, by structuring the task in an interdependent manner the management can foster collaboration within the team. This enhanced collaboration could be reflected in extra-role behaviors. When we complemented this reasoning with SCT premises (Hogg & Terry, 2001) we anticipated that the mediation hypothesis might apply also to these structural variables. The coordination needs created by strong task interdependence help VT members to perceive their VT as a salient social category with which they can identify and identification with a VT could be regarded as a powerful motivational force, which may also serve as a mediator between the structural factors and extra-role behaviors.

We found support for the mediation hypothesis for procedural justice and task interdependence. However, the results suggested that neither distributive justice perceptions nor the number of FTF meetings of the team had any association with VT identification or with extra-role behaviors. This study gave further indication that procedural justice matters in VTs. In line with Article 1 the number of FTF meetings had neither main nor mediated effects on the variables studied here. Finally, contrary to our expectations, distributive justice perceptions were neither related to identification nor to extra-role behaviors. One possible explanation for this may be that in this particular context the team members had limited power to allocate rewards and resources. Therefore, distributive justice might have had less significance for the VT members than procedural justice.

5.3 Article 3: How do face-to-face meetings and geographical dispersion moderate the relationship between procedural justice and identification?

The title of this Section is essentially research question III (see Section 1.1). In this study we wanted to take a deeper and different look at the effects of two structural variables with obvious relevance in VT. Articles 1 and 2 seemed to show that the number of FTF meetings of a VT was not related to any of the variables studied. Another structural variable which characterizes VTs but was not tested in the previous articles of this dissertation is the degree of geographical dispersion – here operationalized simply as the number of locations the team members work in (as reported by their team leaders). We took the theoretically and empirically well supported relationship between procedural justice and VT identification here for granted and concentrated on the moderating effects of the two above-mentioned structural variables.

Moreover we decided to control for team size (and check the result of Article 1) in our analyses because it has been found to be negatively related to group identification (e.g., Lipponen, Helkama, Olkkonen, & Jusslin, 2005). The results did indeed support this anticipated association.

More importantly, our two moderation hypotheses gained support. The hypotheses and results were at first glance rather counterintuitive. We anticipated and found that the fewer FTF meetings there were and the larger the geographical dispersion of the VT the stronger was the relationship between procedural justice and identification. The theoretical reasoning behind these hypotheses was based on the uncertainty management model of procedural justice (e.g., Van den Bos and Lind, 2002). According to this model people become especially sensitive to fairness perceptions under highly uncertain conditions. We adapted the uncertainty management model to VTs and got support for the idea that VT members became especially sensitive and responsive toward the quality of decision making when the frequency of face-to-face meetings was low and when geographical dispersion was high, that is when uncertainty was high. The essential finding of this article was that the virtual context contains structural elements that may profoundly shape the way that some basic group processes such as perceptions of procedural justice and group identification are related to each other.

5.4 Article 4: The interplay of trust and identification in predicting virtual team effectiveness

In Article 4 we aimed at answering research question IV and we focused on yet another variable commonly claimed to be crucial for VT success, namely trust within VTs (e.g., Jarvenpaa & Leidner, 1999). Again we omitted the investigation of main effects of trust and identification on perceived effectiveness, which was defined here as perceived task performance and coordination (see Cohen & Bailey, 1997). This choice was essentially based on rather weak evidence that either identification (see e.g., Riketta, 2005) or trust (see Dirks & Ferrin, 2001) would have main effects on team-level effectiveness. In fact, Dirks and Ferrin (2001) stress that trust should moderate the relationship between motivational constructs and group performance. Identification with a group (here a VT) is a strong motivational force which may provide the drive for group-serving behaviors, while trust helps to facilitate such behaviors because in high-trust conditions a person believes that the others are also willing to cooperate and promote the group goals. On the other hand, based on the social identity approach (e.g., Haslam, 2004) and previous research we considered that it is reasonable to expect that group identification may also

moderate the relationship between trust and (here) VT effectiveness. Even if trust would create willingness to co-operate we expected that team members might coordinate their work to accomplish group goals better when they identify strongly with their VT. In other words we theorized that in high-trust, low-identification condition the team members have a general propensity to co-operate but they may lack motivation to enact their good intentions. In the opposite condition there might be strong motivation to help the team (extra-role behaviors) but in the worst case this might not be directed towards the team's business goals. Furthermore, we controlled for team size and found again that it is negatively related to identification (as in Article 3).

The results were actually stronger than we originally expected because we did not anticipate that the effects of trust and identification on effectiveness would necessarily totally disappear at the low levels of these moderator variables. Nevertheless, this seemed to be the case for both identification and trust in our sample. These results were important if we consider the discussion on the presumed role of trust and identification as VT success factors (e.g., Aubert & Kelsey, 2003; Fiol & O'Connor, 2005). Our results indicated that these two constructs are indeed essential for high VT effectiveness. Specifically, our results provide a novel insight into the interplay of trust and identity in predicting VT effectiveness, as it seemed that that neither high-trust nor high-identification alone is sufficient in producing effectiveness – both are needed simultaneously.

6. Discussion

6.1 Summary

The main findings of this dissertation consistently stress the importance of procedural justice in the formation of VT identity. Identification with the VT was found to be crucial in producing favorable outcomes for VTs even though the effects were complex especially in the cases of identification, trust and effectiveness. Similar complexity was found to pertain to the structural variables: moderations not main effects were significant and important.

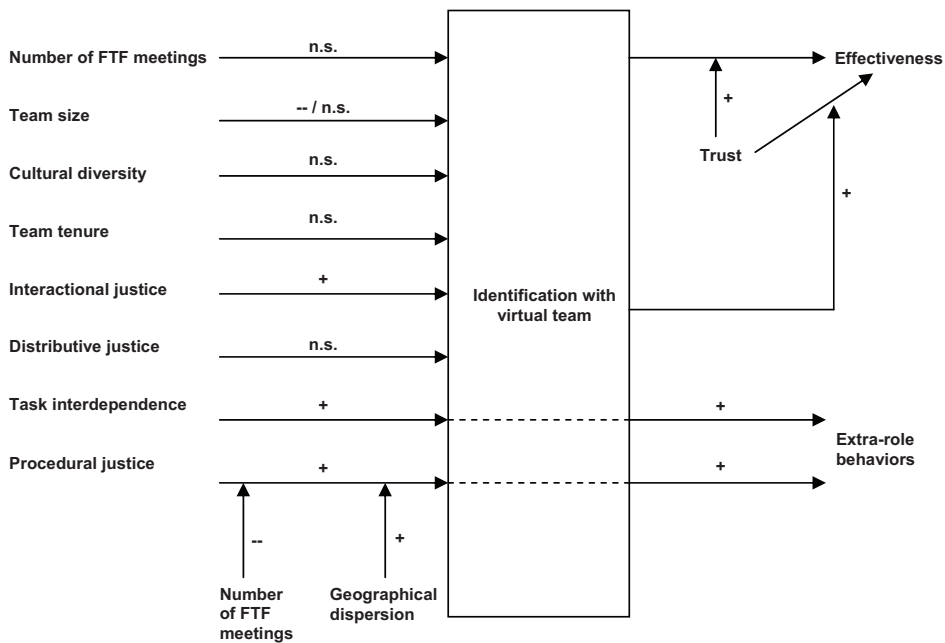


Figure 1. Summary of the results of this dissertation.

+ = positive relationship; -- = negative relationship; n.s. = non-significant relationship; the dotted line stands for full mediation

Figure 1 illustrates and summarizes the all the results presented in the original articles. Below I will present the four research questions, answers to them based on the major findings in each article and the main contributions of the respective findings.

RQ1: How are justice variables and contextually relevant structural variables related to identification with VTs? (Article 1 in Appendix I)

Main findings: Both procedural justice and interactional justice were positively related to identification whereas it seemed that none of the structural variables were associated with identification.

Main contributions: Justice perceptions are, indeed, as important antecedents of identification in VTs as they are in other settings. Justice perceptions convey identity relevant information also in the virtual context (e.g., Tyler & Blader, 2000; 2003). Furthermore, the results suggest that the relationship between structural variables and identification is not straightforward.

RQ2: Is the social identity mediation hypothesis derived from the group engagement model of justice transferable to VTs and what is the role of task interdependence? (Article 2 in Appendix II)

Main findings: The hypothesis gained support also in VTs regarding procedural justice. That is, the relationship between procedural justice and extra-role behaviors was fully mediated by identification. The same mediation model applied also to task interdependence.

Main contributions: The hypothesis derived from GEM (Tyler & Blader, 2003) was transferable to VTs, which supports the applicability of GEM in this new context. Moreover, the importance of task interdependence in VTs was confirmed (Hertel et al., 2004) but its relationship to extra-role behaviors was elaborated. This, in turn, supports reasoning on the mediating role of identification (Tyler & Blader, 2003).

RQ3: How does the number of face-to-face (FTF) meetings of the team and its geographical dispersion moderate the relationship between procedural justice and identification? (Article 3 in Appendix III)

Main findings: The fewer FTF meetings there were and the more the teams were geographically dispersed the stronger was the association between procedural justice and identification.

Main contributions: A large number of FTF meetings of the team and its high geographical dispersion seemed to be features which are typical of VTs and which are sources of uncertainty. Hence, as the uncertainty model of justice predicts, the VT members became more sensitive to procedural justice and sought cues from it in their identity formation in the high-uncertainty condition (Van den Bos & Lind, 2002). The uncertainty management model of justice was applicable to VTs in which the cues are mainly electronically mediated. To my knowledge this was the first test of these uncertainty sources.

**RQ4: How do trust and identification interplay in predicting VT effectiveness?
(Article 4 in Appendix IV)**

Main findings: The relationship between identification and effectiveness is strong only in the high-trust condition, while in the low-trust condition the association disappears. The same applies to the reverse moderation: only in the high-identification condition does the link between trust and effectiveness exist and it is strong.

Main contributions: Both high levels of identification and high trust within the VT are needed simultaneously to predict VT effectiveness. Trust as a moderator finding supported the reasoning of Dirks and Ferrin (2001). Moreover, our SIA based reasoning on the moderator status of identification gained support. In other words, trust provides seeds for cooperation but identification is needed to target that to behaviors which produce team-level effectiveness. To my knowledge this was the first test of these interaction effects.

These studies have a clear academic novelty at least in three ways. First, theories from other contexts were tested in VTs and most of them were found to be applicable also in this new context. Second, the effects of structural variables typical of VTs were incorporated into the set-ups of the studies in order to find VT-specific effects. Arguably, such specific effects were found (Article 3) and they were anchored to existing theories. Interestingly, the results suggest that the virtual specific structural variables (e.g., number of face-to-face meeting and geographical dispersion) do not have main effects on identification and other studied variables – their importance is

revealed in moderation effects. In other words, the virtual context sets conditions to the relationships between the key variables studied here. Third, the reasoning based on the SIA and trust research gained support and insights were gained into the interplay of identity, trust and effectiveness (Article 4). Theoretically, the results were also in line with recent studies by Blader and Tyler (2009) which gave strong support to the usability of GEM in work settings and further highlight the role of social identity in mediating the effects of justice. Altogether, the findings of the four studies did shed new light on identification with VTs, the main aim of this dissertation.

Arguably, the results of this dissertation inform identification and justice research more generally. SIT was grounded on Tajfel's minimal group studies which showed that minimal social cues of belonging to a group can have meaning for individuals to such an extent that it affects their attitudes and behavior (see Tajfel & Turner, 1979). It can be argued that VTs are certain kind of modern minimal groups because the communication is mainly electronically mediated and social cues have to be largely found from this sometimes minimalistic source. The fact that correlations between procedural justice, identification and extra-role behaviors are at similar level in the samples from VTs (this dissertation) as in samples from traditional teams (see Section 3.4) suggests that effects of justice and identification are, indeed, very strong and persistent over different and even intuitively unlikely contexts. This, in turn, points a way for further research to study other boundary conditions for identity and justice dynamics. For instance, do the SIA based hypotheses get support in virtual worlds (i.e., 3D collaboration platforms)?

In terms of VT research I dare to claim that I have followed the requirements which Martins et al. (2004) set for VT researchers and which I mentioned in Section 1. In this dissertation I have drawn on the robust theoretical foundations of previous team research, considered not only main effects but also moderating and mediating effects of different variables and, arguably, found some VT-specific relationships. The question whether these are necessary or sufficient criteria of good VT research remains to be discussed.

6.2 Some critical considerations and future directions

Identity. In the studies presented in this dissertation I have used the definition of identification by Asforth and Mael (1989). As discussed briefly in Section 3.1, when Asforth and Mael (1989) formulated this definition they distanced themselves from Tajfel's (1974) original definition, especially from Tajfel's view of social identity as an emotional as well as cognitive, situational and interactional process. For almost 20 years the majority of scholars using the SIA have used identification to refer to a merely cognitive construct in the vein of Asforth and Mael's (1989) seminal article. Those in other streams of identity research, such as the proponents of the organizational identity approach, have criticized this formulation and have stressed that identification is an interactional process (see e.g., Sivunen, 2006). However, only recently even the proponents of the mainstream SIA have started to argue for broadening the identity construct. This has taken place in interesting attempts to integrate the different streams of identity research. Cornelissen, Haslam and Balmer (2007) distinguish between social identity (as applied in this dissertation), organizational identity and corporate identity. I introduced the organizational identity approach and its emphasis on internally and externally negotiated identities earlier (Section 3.1). Corporate identity, for its part, is closer to organizational identity than social identity but treats the identity construct even more symbolically than organizational identity. It views, for example, materials and artefacts as embodiments of identity. Cornelissen et al. (2007) made their article to be a manifest for cross-fertilization of these three veins of identity research. Ashforth et al. (2008) push identity scholars in a similar direction even though they have a slightly different starting point. They too favor broadening the scope of identity construct through integration of other identity research streams. Moreover, identity researchers are also ushered out of laboratories because in the field we "*are more likely to capture something more fundamental*" (Ashforth et al., 2008: 332). Finally, the sometimes blurry distinction between identification and commitment is questioned and identification is proposed to be fundamentally a situated process. It might be that the future directions of identity research depend on researchers willingness to expand their horizons.

These new openings can be seen to partially draw social identity research towards its origins (Tajfel & Turner, 1979) in terms of stressing the emotional, situational, interactional and process nature of identity and identification. The articles of this dissertation provide rather a snapshot view of identification simply because the data is cross-sectional and does not allow the scrutiny of identification as a process. That does not, however, mean that I would consider social identity as a purely cognitive construct. I have situated it within a new organizational form, that is VTs. Moreover, I find it hard to believe that social identity would have any motivational power if it did not have emotional significance to individuals, as Tajfel (1974) pointed out. Furthermore, I welcome the emergent attempts at cross-fertilization in identity research but I have stuck to the SIA in this dissertation in order to stay focused.

Justice. Another important pursuit of this dissertation is the measurement and investigation of most variables, especially justice, at VT-level. In justice research this is not very common because usually justice perceptions are considered to be individual ones (Li & Cropanzano, 2009) and very often the quality of leaders' decision-making is the focus of studies (Van Knippenberg & De Cremer, 2008). However, the concept of justice climate might be used to argue for my choice of level. I have discussed my choice in Section 4.2 in terms of practical reasons: The specialists constituting the VT probably make many important decisions themselves and the leader is not always at the center. Moreover, the origins of any decision may be harder to trace in a virtual and e-communication dependent context than in co-located settings. Specifically, the concept of intra-unit justice climate can be used to support the team-level measurement of justice (Li & Cropanzano, 2009). It refers to the quality of decision-making and treatment in a team. Li and Cropanzano (2009) note that it has been shown to predict work attitudes and behaviors. Another argument for consistent use of team-level constructs comes from the social identity literature. For example, the findings of Riketta and Van Dick (2005) support the so-called "identity matching principle" (see also Ashforth et al., 2008). The principle states that a certain focus or level of identification has stronger correlations with variables at this same level than with variables at other levels. For instance, VT-level identification should be more associated to VT-level justice judgments than the justice judgments of the team-leader (an individual).

Unfortunately, the small sample sizes allowed us to aggregate the data to VT-level only in Articles 3 and 4.

Trust. In Article 4 we followed Boon and Holmes (1991) and defined trust as a psychological state. The definition, in turn, was reflected in the measure we used (see Appendix IV, Article 4, p. 32, for items). This definition and operationalization, underlining the attitudinal nature of trust, would certainly be criticized by those trust researchers who emphasize that trust is a behavioral intention and that the attitudes preceding this kind of trust should be called trustworthiness (see e.g., Mayer, Davis & Schoorman, 1995). If I were to start the data collection now, I would certainly choose a more fine-grained conceptualization and measure.

Virtual team research. Identification and trust have been studied to some extent in VTs, whereas justice was for some peculiar reason almost totally neglected before this dissertation. A point of interest here is that there is some notable variance on what is meant by identification and trust in VT studies. Wiesenfeld et al. (1999) talk about organizational identification but measure it with Mael and Ashforth (1992) scale, which stems from the social identity research tradition. Mortensen and Hinds (2001) and Bartel et al. (2007) seem to conceptualize and measure identification consistently in terms of the social identity tradition, whereas in Sivunen's (2006) qualitative study the conceptualization of identification stresses it as a communicative process. The situation in trust research on VTs is similar. Aubert and Kelsey (2003) and Zolin et al. (2004) use consistently the Mayer et al. (1995) conceptualization and measure of trust. Still, in their seminal qualitative study Jarvenpaa and Leidner (1999) discuss several views of trust but end up arguing that their results are best explained by the concept of swift trust (see Section 3.3; Meyerson et al., 1996). Furthermore, Geister, Konradt and Hertel (2006) conceptualize trust to be one dimension of a motivational construct. These partial inconsistencies hinder the comparability of research results. The strength of this dissertation is that the same SIA based conceptualization and measure of identification have been used in all four articles. As noted above, unfortunately, the same can not be said in the case of trust. Nevertheless, future VT research clearly needs more conceptual clarity.

Limitations. This dissertation has many limitations worth mentioning. In the articles we have used only cross-sectional methodology, which does not lend itself to the inference of causality. Still, in many instances I have used causal terms, such as predictor and antecedent, for the sake of simplicity. Longitudinal (or laboratory) settings should be used in order to determine the causal order of the studied attitudinal variables. Moreover, all key attitudinal variables used in this dissertation were based on self-reports and, therefore, the results are vulnerable to common method variance. However, the aggregation, when possible, of the self-report measures to the VT-level and the use of team-level data reduced the likelihood that response biases would explain our findings (Ambrose and Schminke, 2003). The fact that in Articles 3 and 4 we concentrated on statistical interactions and that these were significant, gave us good reason to believe that our results are not merely artificial products of common method variance (Ambrose and Schminke, 2003; Evans, 1985). Furthermore, identification could be considered to be a process (Tajfel, 1974; Ashforth et al., 2008) and cross-sectional methodology captures only one moment of it. Therefore, longitudinal settings would be beneficial in promoting a more reliable and deeper understanding of identification with VTs (see Sivunen, 2006). Finally, small samples forced us to study a rather limited number of variables and prevented the preferred aggregation of the data to team level in Articles 1 and 2.

The above methodological limitations underline the importance of longitudinal set-ups and the use of multiple data sources. However, these rather common arguments might be seen as carrying a quantitative bias. Do three snapshots from same population constitute a thorough view of the identification process? Obviously, we should appreciate also the importance of qualitative research. It is useful to recall, for instance, that Jarvenpaa and Leidner's (1999) seminal study of trust in VTs was based on longitudinal qualitative data. Moreover, since we are interested in disclosing potentially unique phenomena in a relatively new and understudied environment, the starting point might rather be ethnographic-type of investigation than surveys. How can we develop valid quantitative measures and ground them on potentially context-specific theoretical formulations (see Martins et al., 2004) if we do as I have done and keep on using measures developed for other environments? These considerations might be critical for

future research into VTs if we really do consider VTs to be qualitatively different from traditional work teams. This is yet another fundamental question and much depends on what stance researchers take on that in the future. My stance here follows the thinking of Vartiainen (2006), who strives to identify structural features common to VTs that can be presumed to make the context more complex than in co-located teams. In this dissertation, the use of such features as geographical dispersion and lack of FTF meetings seemed to produce in some cases counterintuitive but at best VT-specific results (Article 3).

6.3 Conclusion

Despite the above-mentioned limitations and considerations this dissertation has contributed to identity research in VTs. Moreover, it has answered the call for more research in real working-life situations. Perhaps most importantly, the studies suggested strongly that justice perceptions and especially procedural justice do matter for identification with VTs. Procedural justice was consistently found to be closely and positively related to identification and it is indeed an important source of identity relevant information in VTs. Moreover, the uncertainty produced by lack of FTF meetings and geographical dispersion in VTs made team members highly sensitive to procedural fairness. Identification with the VT, in turn, was found to provide the motivational force that mediated the effects of procedural justice on the extra-role behaviors of VT members. Finally, strong VT identification combined with a high level of interpersonal trust was found to be the key to VT effectiveness. Theoretically, the social identity approach and related group engagement model of justice proved their applicability to virtual settings. However, further studies are needed to substantiate and elaborate the findings and arguments put forward in this dissertation.

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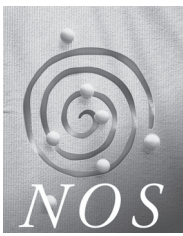
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APPENDIX I

ARTICLE 1

Hakonen, M. & Koivisto, S. (2008). Antecedents of identity in virtual teams. *Nordic Organization Studies*, 2/08, 54-73.

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Antecedents of Identity in Virtual Teams



MARKO HAKONEN AND SATU KOIVISTO

Keywords: virtual teams, identification, organizational justice, structure

INTRODUCTION

The need of organizations to let their experts or sub-teams of experts work near customers around the globe, and information and communication technology (ICT) enabling teamwork from a distance, are often mentioned as the major drivers behind the increased use of virtual teams (VTs) in working life (Vartiainen, 2006). The literature on VTs has been rapidly accumulating but as recent reviews argue (Hertel, Geister, & Konradt, 2005; Martins, Gibson, & Maynard, 2004) surprisingly little empirical research has been carried out, especially in real-life teams. Hence, this new organizational form provides a fresh context for theory testing and building.

Many authors in the virtual team literature point out that shared VT identity is crucial for VT success because it provides a sense of belonging despite the relative lack of face-to-face interaction (Gibson & Cohen, 2003; Hinds & Kiesler, 2002; Lipnack & Stamps, 2000). However, most VTs usually consist of sub-groups or individuals working in different locations, and the members of distributed groups have also many other affiliations. Besides the VT membership they are members of local work groups, networks, line and matrix organizations and the whole company (e.g., Hinds & Kiesler, 2002). In practice, this often means that building a shared VT identity across distributed sub-groups and individuals is one major challenge for VTs (e.g., Wiesenfeld, Raghuram, & Garud, 1999). In this article we concentrate on VT-level identification.

Few empirical studies on identification with VTs (Fiol & O'Connor, 2005) have been undertaken. The existing research (e.g., Bouas & Arrow, 1996; Mortensen & Hinds, 2001; Wiesenfeld et al., 1999) is, however, promising.

For instance, Wiesenfeld et al. (1999) suggest that identification is important since it enhances, for example, cooperation. Furthermore, Mortensen and Hinds (2001) found that shared team identity was associated with less conflict in new product development teams but that the level of identification was the same in co-located and distributed teams. The latter finding could be interpreted to suggest that identity dynamics are rather similar in co-located and virtual teams. We contribute to these lines of research by examining how identification with VTs is related to such structural factors as the degree of virtuality, team size, cultural diversity within the team and team tenure. In addition, we test how organizational justice variables interact with identification. In co-located settings there is growing evidence that organizational justice, that is, perceived fairness of decision making and interpersonal treatment, are strongly linked to identification (Lind & Tyler, 1988). To our knowledge especially the latter form of justice judgments has not been studied in the context of VTs.

In this article we study the antecedents of identification from the perspective of social identity approach (Tajfel & Turner, 1979). Among others, Fiol and O'Connor (2005) have demonstrated the potential fruitfulness of the social identity approach also in VT research. They state that prior research on identification with VTs is too focused on VT characteristics and on the communication technology used. We will incorporate previous literature and empirical findings on group identification (e.g., Tajfel & Turner, 1979) and organizational justice based on social identity approach (Lind & Tyler, 1988) into the research on VTs. In general, our approach and theories as applied in this study are deeply rooted in the social psychology of organizations.

Social identity approach

The social identity approach provides a theoretical framework for the relationship between individual and group. Specifically, it consists of two distinct theories: the original social identity theory (e.g., Tajfel & Turner, 1979), and the more recent self-categorization theory (Turner, Hogg, Oakes, Reicher & Wetherell, 1987). Despite certain differences, both theories share the same fundamental assumption that individuals define themselves in terms of their social group memberships and that group-defined self-perception produces distinctive effects on social behavior and inter-group relations (Hogg & Abrams, 1988; Turner, 1999). This means that the more an individual conceives of him or herself in terms of membership in a group or, in other words, identifies with the group, the more his or her attitudes and behavior are governed by this group membership (Hogg & Abrams, 1988; Van Knippenberg & van Schie, 2000).

This social psychological theorizing differs from other more sociological approaches to identity. Perhaps the most influential alternative stream of re-

search on organizational identity is grounded in the work of Dutton, Dukerich, and Harquail (1994). This approach mainly concentrates on organizational level of the identity concept and underlines the importance of construed organizational images. The main difference between these two approaches can be seen in focus: whereas the social identity approach concentrates on the dynamics of individuals in a group (e.g., VT) the more sociological theorizing underlines the discourses regarding identity within and outside organizations (e.g., Rometsch & van Rekom, 2006).

During the past five years, social identity principles have been increasingly applied to the study of organizational psychological processes (e.g., Haslam, 2001; Hogg & Terry, 2001). In this context, organizational or team membership is understood to reflect on the self-concept in the same way that other social memberships do (Ashforth & Mael, 1989; Hogg & Terry, 2001). Thus, organizational identification is defined as “*the perception of oneness with or belonging to a group*” (Ashforth & Mael, 1989, p. 34). Moreover, it is suggested that this group-based self-conception leads to activities that are congruent with this identity.

According to the self-categorization theory (Turner et al., 1987), different levels of self-definition (e.g., self as individual or self as group member) should be related to distinct sets of needs or motivators. When people categorize themselves at the personal level, they should be motivated to do things that promote their personal identity as individuals (e.g., personal advancement). When categorization and social identity are salient, they should be associated with motivation to do things that promote individuals’ social identity as group members, for example, through cooperation and enhancement of group goals. Accordingly, empirical studies have shown that group identification is linked to various important outcomes, such as high levels of extra-role behaviors (e.g., Tyler & Blader, 2000; 2001; see Riketta, 2005, for a review). As noted above, in this study we concentrate on identification with a special kind of group, a VT.

Structural antecedents

The number of potential structural antecedents of identification with VTs is, naturally, extensive. In this article we have chosen to study four structural variables based on a coherence criterion: we strive for theoretical coherence. In other words, we selected such structural variables that can theoretically be plausibly related to identification using the social identity principles. Apart from that, adding large amounts of variables in statistical analysis with a small sample ($N = 91$) is generally considered to be problematic and limits our selection.

Virtuality

In VT literature one of the elementary debates concerns the definition of a VT. According to recent reviews of the literature (Hertel et al., 2005; Martins et al., 2004), it is a common notion that virtuality is a matter of degree. Indeed, there are more and less virtual teams, and we also share the view that virtuality should be seen as a continuum rather than as an absolute state. In addition, different authors identify different aspects of VTs as definitional. It seems rather clear that for a VT to be a team it should consist of a relatively small number of people (more than one person) trying to achieve a common goal (e.g., Hertel et al., 2005; Lipnack & Stamps, 2000). Regarding the virtuality of a team we highlight two points. Firstly, we agree with most authors (e.g., Bosch-Sijtsema, 2003; Duarte & Snyder, 1999; Hertel et al., 2005) that for a team to be virtual at least one of its members must work in a different location from others. Secondly, we take the stance (see e.g., Fiol & O'Connor, 2005; Kirkman, Rosen, Tesluk, & Gibson, 2004, for similar views) that the number of face-to-face meetings is the second definitional feature of virtuality. Many authors also include other features like crossing temporal, cultural, and organizational boundaries (e.g., Lipnack & Stamps, 2000) in their definitions of a VT, but we consider these non-definitional tendencies, potentially causing contextual complexity to VTs (Vartiainen, 2006). Similarly, the use of technology is usually an important feature of VTs, but as some authors have found (e.g., Griffith & Neale, 2001), co-located teams may use as much technology in their communication as VTs do. Thus, we treat the use of technology as a contextual complexity feature, but not as a definitional attribute of VTs.

From the social identity viewpoint the degree of virtuality is related to social category salience (Turner, 1987; Hogg & Terry, 2000). We tend to form social categories more easily from the groups which we meet often. Therefore, it seems plausible that the higher the virtuality, the lower the category salience. Salient group categories, in turn, facilitate group members' identification with the group (Fiol & O'Connor, 2005). Since we use the number of face-to-face meetings as an indicator of virtuality, we hypothesize as follows:

H1: The higher the virtuality of the VT (i.e., the lower the number of face-to-face meetings), the lower the identification with it.

Team size

Traditionally, team size has been perceived as detrimental to group performance (Haslam, 2001). However, there are indications that the effects of team size may be different in VTs as compared with co-located teams, and that these differences may be due to task type and technology used (Martins et al., 2004). In the social identity approach, the size of a group has been viewed as

a determinant of group identification (e.g., Haslam, 2001). According to this theoretical approach, it is plausible to argue that the larger the team is, the harder it is to perceive it as a salient social category, and consequently to identify with it. This follows from Brewer's (1991, 1993) proposition that people aim at gaining optimal distinctiveness, that is, balancing individual distinctiveness with the need for social category memberships. Identification with large groups is supposed to form a threat to identity as it implies identification with a large number of people. Identification with smaller groups, on the other hand, is considered to be safer, as these kinds of groups provide a sufficient level of distinctiveness and at the same time fulfill the need for inclusiveness. Other arguments also support the assumption that large team size relates negatively to group identification. One could, for example, expect that distance between individuals and sub-groups, a key feature in VTs, further impedes identification with the whole VT. Recent research in other settings also suggests that people identify more with face-to-face groups than with larger entities (Lipponen, Helkama, & Olkkonen, 2005; van Knippenberg & van Schie, 2000). Thus, our hypothesis is:

H2: The larger the size of the VT, the lower the identification with it.

Cultural diversity

The results of the effects of cultural and other types of diversity are extremely mixed (Williams & O'Reilly, 1998). Cultural diversity might increase team performance, since different viewpoints enrich the expression of novel ideas and thus increase effectiveness. However, the restricted communication might increase misunderstandings and conflicts between team members from different cultural backgrounds (Hertel et al., 2005). One should note that high identification does not equal good performance or few conflicts even though it is probably related to them. Hence, the above reasoning might not be relevant for this study. For example, Mortensen and Hinds (2002) form two contradictory hypotheses regarding boundary agreement in VTs. On the one hand they suggest that the "out of sight, out of mind" problem makes VT members ignore their remote colleagues. On the other hand they consider that especially in multinational VTs, cultural diversity may increase the novelty and consequently the salience of remote individuals and sub-groups. In their study the latter hypothesis was supported, but it is important to note that they also found that boundary agreement is not related to identification.

From the social identity viewpoint, cultural diversity is a natural faultline along which social categories and consequent identifications are formed (e.g., Jehn, Northcraft, & Neale, 1999). The theory suggests that people are more likely to identify with a group the more similar they are to the group. This as-

sumption is explained by the idea that group identification is based on the categorization of self as similar to the others in the same category (Turner et al., 1987). Thus, it is argued that cultural diversity relates negatively to group identification, and we hypothesize as follows:

H3: The higher the cultural diversity in the VT, the lower the identification with it.

Team tenure

The effects of team tenure, that is the length of time a person has worked in a VT, have not been extensively studied in the VT literature. For example, the recent reviews of VT literature do not discuss the effects of team tenure (Hertel et al., 2005; Martins et al., 2004). However, Mortensen and Hinds (2002) found that team tenure was positively related to boundary agreement in VTs. They explain the finding by suggesting that long team tenure leads to repeated interactions which, in turn, increase shared understanding. Nevertheless, as noted above, they found that boundary agreement and identification are not related.

In his meta-analysis of organizational identification literature Riketta (2005), however, found 25 studies which consistently report moderate positive correlations between tenure and identification. As above, it is natural to explain this trend with the notion that the longer time a person has interacted with the team, the more salient that team becomes as a social category and the easier it is to identify with it. We see no reason why this could not apply to virtual as well as to co-located settings. Accordingly, our fourth hypothesis is:

H4: The longer the team tenure of a VT member, the stronger his/her identification with that VT.

Justice and identification

Here justice refers to a long research tradition within social psychology studying what persons perceive to be fair or unfair and how they react to this. This tradition started with studies in legal settings, but has recently been applied rather extensively to an organizational context (Colquitt, Greenberg, & Zapata-Phelan, 2005). The term organizational justice simply refers to applying the theories and research streams of this kind of social justice research to organizations.

Organizational justice literature generally distinguishes between three types of justice (Greenberg & Cropanzano, 2001). *Distributive justice* refers to fairness perceptions of an outcome of any organizational resource allocation (Deutsch, 1985). *Procedural justice* means the perceived fairness of formal decision-making procedures and principles (Lind & Tyler, 1988) or, in other

words, quality of decision-making (Tyler & Blader, 2000). *Interactional justice*, in turn, refers to dignity, politeness and respect, which are communicated informally during decision-making or other interpersonal encounters (Bies & Moag, 1986), that is, the quality of interpersonal treatment (Tyler & Blader, 2000). Here we study how the two latter forms of justice, procedural and interactional, are related to identification with VTs.

After many years of research, it is now generally acknowledged that employees' perceptions of organizational justice are critical factors influencing various important work outcomes, such as organizational commitment, job satisfaction, organizational citizenship behavior and turnover intentions (see Cohen-Charash & Spector, 2001 and Colquitt, Conlon, Wesson, Porter, & Ng, 2001, for recent reviews). Given these important consequences of perceived justice, researchers have been trying to explain why people care about justice. For the effects of distributive justice, the dominant explanation has focused on the positive economic consequences that fair outcomes have (Folger & Cropanzano, 1998). That is, fair outcomes are valued because they are closely related to favorable outcomes. In early research, this instrumentally based explanation was also offered for the procedural justice effects. According to the self-interest model of procedural justice, fair procedures are valued because they ultimately lead to favorable outcomes (Lind & Tyler, 1988).

An alternative explanation is provided by the group-value model (Lind & Tyler, 1988; Tyler & Lind, 1992; Tyler, DeGoey, & Smith, 1996), which emphasizes identity-relevant motivations behind the concern with fair procedures. The model suggests that procedural justice matters because it communicates information to group members about the quality of their relationship with authority figures and other group members. In particular, fair procedures and treatment indicate a positive, respected position within the group and promote pride in group membership. It is suggested that these feelings of respect and pride, in turn, are related to group identification and other, positive group-related attitudes and behavior (e.g., extra-role behaviors and cooperation; Tyler et al., 1996).

A growing body of empirical studies in co-located settings has supported the claim that procedural and interactional justice are related to identification (Tyler & Blader, 2000; 2001). In addition, recent meta-analyses show that procedural and interactional justice have significant correlations with affective commitment, a concept closely related to identification (Cohen-Charash & Spector, 2001; Colquitt et al., 2001). Taking the above theories and empirical findings together, we hypothesize as follows:

H5: Perceptions of procedural justice are positively related to identification with the VT.

H6: Perceptions of interactional justice are positively related to identification with the VT.

METHODS

Procedure and respondents

This study was carried out by means of cross-sectional survey methodology. The data were gathered with a web-based questionnaire during the years 2004 and 2005 from five companies participating in research projects carried out by the authors' university department. The questionnaires were sent to the members of the eleven VTs participating in Finnish-based multinational IT companies. All the VTs consisted of specialists conducting non-routine tasks. The work of the teams could be characterized as research and development, and it was generally project-based.

The respondent teams were selected in collaboration with the contact person in each company and in agreement with the team leaders. The minimum conditions for selection were the major definitional features of VTs presented above, that is, that the groups had more than one member trying to achieve a common goal, and that the team members or subgroups of them were located in different towns (actually in different countries in this sample). Moreover, the respondents communicated mainly via ICT (i.e., not face-to-face).

In this study we use a sub-sample of a larger dataset ($N = 230$), since the other groups failed to meet some of the critical definitional criteria. For example, one group was dropped from this study since it had over 200 members, which hardly formed a single team. In the sub-sample used here 154 respondents received individual e-mails with an introduction to the study and a web address through which they could fill in the questionnaire confidentially. In the e-mail and in the questionnaire the respondents were prompted to answer all the questions relating to their named VT. It was stressed that even though in the items the term "team" was consistently used, the respondents should think about their VT named in the e-mail and in the questionnaire cover page when answering. In total 91 acceptable questionnaires were returned, a response rate of 59.1 percent. Respondents were predominantly male (67.8 %), with an average age of 34.6 years ($SD = 8.2$). Their mean team tenure was 12.9 ($SD = 9.7$) months and they represented 21 nationalities altogether. We used individual responses and did not aggregate the data to team level due to our small sample.

Measures

Virtuality. We followed Kirkman et al. (2004) in assessing virtuality simply by measuring the number of face-to-face meetings. The less often there are face-to-face meetings, the more virtual the team is. Because the number of both formal and informal team meetings was covered in the questionnaire, the re-

sponses were added together and averaged to create a measure of virtuality. The response scale in both questions was: never (1), less than monthly (2), monthly (3), weekly (4) and daily (5).

Team size. The VT leaders provided us with a list of team members' names, nationalities and contact information. We coded the actual team sizes to each individual response.

Cultural diversity. As we did with the team size, based on the information gathered from respondent VT leaders, we coded the objective number of different nationalities of each team to the individual responses.

Team tenure. The time (in months) a VT member had worked for the VT was asked with a single open-ended question and coded to the data.

Procedural justice. Employees' perceptions of procedural justice were measured with five items derived from previous scales by Moorman (1991) and Tyler and Blader (2000). The five items reflect the aspects of fair procedures suggested by Leventhal (1980): accuracy of information, correctability, bias-suppression, consistency and representativeness in the decision-making process. The response scale ranged from (1) "strongly disagree" to (5) "strongly agree". The response focus was aimed at team level by starting each question with, "When decisions are made in our team...". The claims after the focus-creating lead tapped the procedural aspects outlined above (e.g., "... they are based on accurate information"). The Cronbach's alpha for the scale was 0.71.

Interactional justice. Moorman's (1991) measure was used as the basis for the construction of the interactional justice scale. As Colquitt et al. (2001) note, Moorman's scale has some conceptual incoherence since it includes items that measure bias-suppression and representativeness (or voice), which are usually considered procedural issues. We omitted the overlapping items and added one item measuring respect, a central part of the definition of interactional justice (Bies, 2001; Bies & Moag, 1986). Again, the team level was highlighted by the use of a common lead: "In our team...". The items tapped the quality of treatment (e.g., "...everyone is treated with respect"). The response scale was same as that for the procedural justice measure. The four-item scale achieved quite good internal consistency ($\alpha = 0.86$).

To test the empirical distinctiveness of the two justice dimensions, an explorative factor analysis (maximum likelihood extraction) with oblimin rotation was conducted. The factor analysis yielded two components (eigenvalue of factor 1 = 4.08; component 2 = 1.6; variance explained by component 1 = 45.3 %; component 2 = 17.5 %) which accounted for 62.8 percent of the total variance. All the procedural justice items loaded on the first component and all the interactional justice items on the second component. There were no cross-loadings above 0.40.

Team identification. Identification with VT was measured with a modified version of an organizational identification scale developed by Mael and Ash-

forth (1992). One original item regarding public opinions was not used since VTs seldom achieve the same level of public recognition as organizations do. In addition, the questions were modified to assess the team level identification (e.g., “When I talk about this team, I usually say ‘we’ rather than ‘they’”). The response scale was similar to that for the justice items. The Cronbach’s alpha for this five-item scale was 0.84.

RESULTS

The descriptive statistics and correlations between our variables are presented in Table 1. Interestingly, only the justice variables correlated significantly with VT identification. Virtuality and team size were negatively related to identification, but the correlations remained non-significant.

Table 1 Descriptive statistics and Pearson correlations among the variables (N = 91)

Variables	M	SD	1	2	3	4	5	6
1 Virtuality ^a	2.49	1.10						
2 Team size	18.92	11.03	0.21*					
3 Cultural diversity	6.07	1.74	-0.05	0.21*				
4 Team tenure (months)	12.93	9.66	-0.10	-0.30**	0.05			
5 Procedural justice	3.35	0.67	-0.15	-0.25*	0.14	0.24*		
6 Interactional justice	4.08	0.81	-0.30**	-0.39***	0.09	0.21*	0.47***	
7 Identification	3.77	0.89	-0.04	-0.12	0.04	0.04	0.44***	0.48***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, two tailed.

^a The number of face-to-face meetings; the higher the number of face-to-face meetings, the lower the virtuality.

To test our hypotheses we regressed both the structural variables and the justice variables on identification with VT. The results are shown in Table 2. Contrary to our hypotheses, virtuality, team size, cultural diversity and team tenure were not related to identification. However, both procedural and interactional justice perceptions were strongly related to identification with VT ($\beta = 0.30$, $p < 0.01$ and $\beta = 0.41$, $p < 0.001$ respectively). In order to investigate the relative importance of structural and justice variables, we entered them into analysis in two steps. The structural variables accounted for 2 % of

the variance of identification, and adding the justice variables significantly increased the amount of variance explained ($R^2 = 0.31, p < 0.001$; $R^2_{change} = 0.29, p < 0.001$).

Table 2 Hierarchical regressions predicting identification with VT (N = 91)

	Identification	
	Step 1 β	Step 2 β
Structural variables		
Virtuality ^a	0.02	0.10
Team size	-0.15	0.06
Cultural diversity	0.07	-0.04
Team tenure (in months)	0.00	-0.09
Justice variables		
Procedural justice		0.30**
Interactional justice		0.41***
R^2	0.02	0.31***
R^2_{change}		0.29***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, two tailed.

^a The number of face-to-face meetings; the higher the number of face-to-face meetings, the lower the virtuality.

We also tested whether the structural variables would interact with each other and thus have a moderating effect on identification as suggested by some VT researchers (e.g., Fiol & O'Connor, 2005; Kirkman et al., 2004). These tests were carried out by adding the interaction terms one at a time to the equations in which the independent variables were regressed on identification. None of the tested interactions turned out to be significant.

DISCUSSION

Our finding, according to which the virtuality, or to be exact, the number of face-to-face meetings, of the VT was not related to identification, is at first

glance rather surprising. It seems to contradict our assumption that virtuality blurs VT-level social category salience and hence impedes identity formation with VT. However, in their seminal study, Wiesenfeld et al. (1999) found that face-to-face communication had neither a main nor a moderating effect on identification. Instead, they found that electronic communication is the critical means of creating and sustaining identification with the organization, especially for highly virtual employees. Their interpretation was that electronic communication may make differences between virtual workers less salient. When comparing the results of these two studies, it should be kept in mind that Wiesenfeld et al. (1999) studied teleworkers whereas we studied members of VTs. Their results may not be generalizable to dynamic teamwork. On the other hand, our results may be due to the somewhat simplistic operationalization of virtuality. Hertel et al. (2005) suggest, for example, the relative amount of face-to-face communication and mediated communication, and the average distance between team members, as potential measures of virtuality (see also Kirkman & Mathieu, 2005). In sum, researchers should not abandon the social category salience explanation of the effects of virtuality based solely on the results of this study.

Similarly, the finding that team size is not related to identification contradicts our expectations. This is not very surprising since Kirkman et al. (2004) did not find a relationship between team size and their outcome variables, namely process improvement and customer satisfaction. However, one should note that the outcome variables in these two studies were rather different in nature. Moreover, it has been noted that team size affects VTs differently than it does face-to-face teams (see Martins et al., 2004, for a review). Here technology and task type may affect the dynamics of VTs. Unfortunately, we were able to control neither for the specific information and communication technology used nor for the task type. For example, Hertel, Konradt, and Orlikowski (2004) found that task interdependence is crucial for VT performance. The more the tasks of VT members were coupled with each other, the stronger were the demands for team members to coordinate, communicate and cooperate. The coordination and communication needs might also be related to VT identification since the VT could become more salient when the team members interact frequently. However, in VTs generally, members might predominantly interact (via electronic media) with only one or few colleagues at a time, and thus their relations might remain more interpersonal than social regardless of team size. Moreover, it might be that other factors than size per se (Brewer, 1991; 1993) might be more influential in the formation of distinctive social categories in VTs. For instance, Polzer, Crisp, Jarvenpaa, and Kim (2006) found that the geographical faultlines and the homogeneity of subgroups of VTs made categorizations salient and subsequently reduced inter-group trust. Thus, regardless of team size, the whole

VT could remain a blurred social category, with which a member might find it hard to identify. These possibilities call for further research.

The mixed findings on diversity effects in the literature (e.g., Jehn et al., 1999; Williams & O'Reilly, 1998) make it easier to understand our findings on cultural diversity. The different elements of social category diversity effects, like the increased social category salience due to novelty effects of the diversity or restricted communication possibilities weakening the salience of the VT, may override each other (Mortensen & Hinds, 2002). In addition, our measure of cultural diversity was rather simplified, and it is possible that it did not capture the diversity as well as more complex indices (e.g., Mortensen & Hinds, 2001).

The independence of team tenure and identification is more overwhelming than the fall of the previous three hypotheses regarding structural variables and VT identity. The result might be due to the rather extreme degree of virtuality of our sample. In global virtual teams even the long tenure might not pave the way for social category salience and identification. Another possible explanation might be that in real life VTs (note that in our data no organizational boundaries were crossed) the members might know each other in varying degrees when entering the VT, and thus the team tenure is not related to familiarity. Since familiarity with other members was not measured, we cannot refute the possibility that it could have fully explained the social category salience or at least mediated the relationship between team tenure and identification.

In sum, the structural variables did not seem to have hypothesized effects of VT identification. This does not, however, diminish the plausibility of social category salience explanations per se. It just emphasizes the importance of clear operationalizations and the need for further research on the interplay of different structural characteristics in VTs.

This study gave a strong indication that procedural and interactional justice are important in VTs. Procedural and interactional justice were strongly positively related to identification with VTs. These results were in line with assumptions of the group-value model of organizational justice (Lind & Tyler, 1988), and suggest that both the quality of decision making and the quality of interaction do, indeed, convey identity-relevant information to VT members. This occurs in spite of the intuition that information about decision making and fair treatment would be more difficult to gather in virtual settings. In virtual contexts, these cues are mostly available in electronically mediated communication between the VT members. In fact, one could speculate that in VTs, decision-making principles and interpersonal treatment are often communicated via e-mail or other electronic means, which leaves permanent written documents for later use. These documents could, in principle, be more accurate and sustaining than verbal communication in co-located

settings. Thus, if decision making and positive social cues were properly communicated and restored in VTs, members of virtual teams might, in fact, receive clearer cues about the fairness of decision-making procedures and fairness of interpersonal treatment than their co-located counterparts.

As mentioned earlier, identification is often seen as a key success factor in VTs (e.g., Fiol & O'Connor, 2005). Hence, our results suggest that procedural and interactional justice – constructs understudied in the VT literature – might be very important factors for VT success.

Limitations and further research

There are some limitations in this study that are worth mentioning. The problems in operationalizing virtuality and cultural diversity are discussed above. In general, we also had to face the nature of the questionnaire: many research interests, limited length of the questionnaire sent to busy respondents, and technical limitations of the on-line survey software all affected the research setting. Many interesting variables could not be studied, and the contextual information of the VTs was rather limited. Furthermore, even though we have used terms like antecedent, consequence, explanation and effect in the title and some parts of our article for the sake of simplicity, we can not, naturally, infer causality from the present cross-sectional study. Longitudinal studies of VTs might overcome this problem. Moreover, the use of self-report measures alone naturally places the reliability and validity of the findings at risk due to common method variance. This was partially tackled by using objective, team-level data (team size and cultural diversity). Since quantitative field research on VTs is rather rare and has been called for (Hertel et al., 2005), our study helps to fill this gap. However, our small sample forced us to keep our analyses at individual level and prevented us from doing group-level analysis (e.g., Liao & Rupp, 2005). The small sample size may also have prevented some relations, like the effect of team size on identification, from becoming statistically significant. Moreover, the small and rather selective sample of Finnish-based organizations and VTs in the ICT sector doing research and development work limits the generalizability of present results to the studied context. Larger samples and other research approaches are needed to inform us in more detail on the dynamics related to identification with VTs.

Conclusion

Taken as a whole, the results of the present study suggest that VT researchers might want to explore identification and justice in VTs in more detail, especially insofar as arguments and findings of the value of VT-level identity to VT success are not seriously challenged. This work has started (e.g., Mortensen & Hinds, 2001; 2002), but field studies are still rather rare (Hertel

et al., 2005; Martins et al., 2004). Moreover, the wider application of the social identity approach is certainly a worthwhile subject for further VT research (Fiol & O'Connor, 2005). Our main finding was that justice matters in forming and sustaining shared identity with VTs. Since procedural justice is largely about the perceived quality of decision making, it seems that transparency in important decisions is crucial to identity formation in VTs. Transparency enables the VT members to perceive how the decisions are made and justified, and probably reduces suspicions of unfairness. Furthermore, because VT members interact mainly via technology, the quality of treatment (i.e., interactional justice) is usually manifested in electronic communication. Therefore, our results suggest that VT members should be extremely sensitive in their electronic interactions. However, further research on team structure, justice and identification is urgently needed in order to elaborate our findings and to obtain more robust results.

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ABSTRACT

The importance of virtual team (VT) identification for the success of the team is widely recognized in literature. However, the antecedents of identification in virtual teams have remained understudied thus far. This study aims at filling this gap by examining how identification with VTs is related to structural factors such as the degree of virtuality, team size, cultural diversity and team tenure, and to organizational justice. It is hypothesized that organizational justice and team tenure are positively related to identification, whereas the degree of virtuality, team size and cultural diversity have a negative relationship with identification. These hypotheses were tested on a sample of 91 virtual team members. The results revealed that, as predicted, organizational justice had a strong positive relation to virtual team identification. However, contrary to the expectations, the structural factors were not related to identification. The results and their implications are discussed in terms of virtual team literature.

Marko Hakonen, M.Soc.Sc., is a researcher at the Laboratory of Work Psychology and Leadership at Helsinki University of Technology, Finland. He is finalizing his PhD on identity, justice perceptions and trust in virtual teams.

Satu Koivisto, M.Soc.Sc. and PhD student, is a researcher at the Laboratory of Work Psychology and Leadership at Helsinki University of Technology, Finland. Her main fields of interest are group dynamics, leadership and identification in virtual and mobile teams.

APPENDIX II

ARTICLE 2

Hakonen, M. & Lipponen, J. (2007). Antecedents and consequences of identification with virtual teams: Structural characteristics and justice concerns. *The Journal of E-working*, 1, 137-153.

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Antecedents and consequences of identification with virtual teams: Structural characteristics and justice concerns

Marko Hakonen

Helsinki University of Technology
Finland

Jukka Lipponen

University of Helsinki
Finland

Abstract

This research examined the antecedents and consequences of identification with virtual teams. Specifically, we hypothesized that two structural characteristics (number of face-to-face meetings and task interdependence) and perceived quality of interaction (procedural and distributive justice) would be positively related to identification with the virtual team. A further hypothesis was that team identification would have a positive relationship to extra-role behaviors towards the virtual team. The results from our study, based on a sample of 102 employees of Finnish-based companies, gave partial support for these hypotheses. We found that task interdependence and procedural justice were positively related to team identification. Moreover, team identification mediated the relationship between task interdependence and extra-role behaviors and the relationship between procedural justice and extra-role behaviors as we predicted. We discuss our findings in terms of research on virtual teams, social identity, and organizational justice.

Keywords: Virtual teams, social identification, organizational justice, extra-role behaviors

1. Introduction

Literature about virtual teams (VTs) has been rapidly accumulating during the past decade. However, there is still amazingly little empirical research about VTs in real working-life situations, as two recent reviews of the research area have highlighted

(Hertel, Geister, & Konradt, 2005; Martins, Gilson, & Maynard, 2004). Furthermore, previous studies on VTs have mainly used qualitative methodology and there is a clear need for quantitative research conducted in field settings (Hertel et al., 2005). The aim of this paper is to partially fill this gap by presenting survey results and their quantitative analysis from real VTs. Moreover, our aim is to incorporate previous literature on social identification (e.g., Tajfel & Turner, 1979) and organizational justice (e.g., Lind & Tyler, 1988) into the research on VTs.

Most VTs usually consist of sub-groups or individuals working in different locations, and the members of distributed groups also have many other affiliations. Besides the VT membership they are members of local work groups, networks, line and matrix organizations and the whole company (e.g., Hinds & Kiesler, 2002). In practice, this often means that creating cooperation between distributed sub-groups and individuals is one major challenge for VTs. Building cooperation between the members of VTs may also be much more challenging than in traditional teams, purely because of the nature of VTs: out of sight is easily out of mind (e.g., Gibson & Cohen, 2003; Brown, 1988).

Many authors in the VT literature point out that the shared VT identity is crucial for VT success because it provides a sense of belonging, despite the relative lack of face-to-face interaction (Gibson & Cohen, 2003; Hinds & Kiesler, 2002; Lipnack & Stamps, 2000). However, there are few empirical studies on identification with VTs (Fiol & O'Connor, 2005). The existing research (e.g., Bouas & Arrow, 1996; Wiesenfeld, Raghuram, & Garud, 1999) is promising. For instance, Wiesenfeld et al. (1999) studied separate virtual workers rather than virtual teams. Still, their results suggest that identification is important since it enhanced, for example, cooperation.

In this paper we study the interplay of identification and related variables from the perspective of social identity approach (Tajfel & Turner, 1979). Among others, Fiol and O'Connor (2005) have demonstrated the potential fruitfulness of the social identity approach also in VT research. They state that prior research on identification with VTs is too focused on VT characteristics and on the communication technology used. We contribute to this line of research by examining how identification with a VT is related to such structural factors as the number of face-to-face (FTF) meetings and task interdependence. In addition, we test how organizational justice variables interplay with identification. Some organizational justice researchers argue that identification mediates the relationship between perceived justice and cooperative or extra-role behaviors (Tyler & Blader, 2000; Blader & Tyler, 2005). Organizational justice has been understudied in the VT literature (see Hakonen and Lipponen, *in press* and Kurland and Egan, 1999, for exceptions) and our purpose is to examine whether similar effects can be found in VTs as have been found in co-located settings. Finally, we bring the central element of cooperation, called here extra-role behaviors, as our main dependent variable. In doing this, we examine some solutions to the above-mentioned challenge of collaboration in VTs.

2. Theoretical framework

Virtual teams

In the VT literature, one of the elementary debates concerns the definition of a VT. The recent reviews of VT literature (Hertel et al., 2005, Martins et al., 2004) concur in the notion that virtuality is a matter of degree. Indeed, there are more and less virtual teams and we also share the view that virtuality should be seen as a continuum rather than as an absolute state. In addition, different authors name different aspects of VTs as definitional. It seems rather clear that, for a VT to be a team, it should consist of more than one person collaborating towards a common goal (e.g., Hertel et al., 2005; Lipnack & Stamps, 2000). Very often virtual teams are characterized by the fact that members communicate with each other mainly via information and communication technology (Axtell et al., 2004; Gibson & Gibbs, 2006). This can be put in another way: lack of face-to-face meetings is typical feature of VTs. Usually it is also proposed (e.g., Bosch-Sijtsema, 2003; Duarte & Snyder, 1999; Hertel et al., 2005) that for a team to be virtual at least one of its members must work in a different location from the others. Furthermore, many authors also include other features, such as crossing temporal, cultural, and organizational boundaries in their definitions of VTs and virtuality (see Gibson & Gibbs, 2006, for review). We do not, however, take a stance in the ongoing debate of what attributes of VTs constitute the core of virtuality. We simply study the effects of one, obviously rather important (Axtell et al., 2004), feature of VTs: the number of face-to-face meetings (see Kirkman, Rosen, Tesluk, & Gibson, 2004, for similar use).

Social identity approach to virtual teams

The social identity approach provides a theoretical framework for the relationship between the individual and the group. Specifically, it consists of two distinct theories: the original social identity theory (e.g., Tajfel & Turner, 1979), and the more recent self-categorization theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Despite certain differences, both theories share the same fundamental assumption that individuals define themselves in terms of their social group memberships and that group-defined self-perception produces distinctive effects on social behavior and inter-group relations (Hogg & Abrams, 1988; Turner, 1999). This means that the more an individual conceives of him or herself in terms of membership of a group, or, in other words, identifies with the group, the more his or her attitudes and behavior are governed by this group membership (Hogg & Abrams, 1988; Van Knippenberg & van Schie, 2000).

During the past ten years, social identity principles have been increasingly applied to the study of organizational psychological processes (e.g., Haslam, 2001; Hogg & Terry, 2001). In this context, organizational or team membership is understood to reflect on the self-concept in the same way as other social memberships do (Ashforth & Mael, 1989; Hogg & Terry, 2001). Thus, organizational identification is often defined as “*the perception of oneness with or belonging to a group*” (Ashforth & Mael, 1989, p. 34).

Moreover, this group-based self-conception is proposed to lead to activities that are congruent with this identity.

According to the self-categorization theory (Turner et al., 1987) different levels of self-definition (e.g., self as individual or self as group member) should be related to a distinct set of needs or motivators. When people categorize themselves at a personal level, they should be motivated to do things which promote their personal identity as individuals (e.g., personal advancement and growth). When group-level categorization and social identity are salient, they should be associated with motivation to do things which promote the individuals' social identity as group members, for example, through cooperation and enhancement of group goals. Accordingly, empirical studies have shown that group identification is linked to various important outcomes, such as high levels of extra-role behaviors (e.g., Tyler & Blader, 2000; 2001; see Riketta, 2005, for a review). We define extra-role behavior as behavior which benefits the team and/or is intended to benefit the team, which is discretionary, and which goes beyond the existing role expectations (see van Dune, Cummings, & McLean Parks, 1995). Hence in VTs, the shared or superordinate VT-level identity could be one tentative answer to the obvious challenge of sub-group cooperation outlined above. Based on the argumentation presented above, our first hypothesis is:

H1: Identification with a VT is positively related to the team members' extra-role behaviors within the VT.

Structural characteristics – FTF meetings and task interdependence

From the social identity viewpoint, the number of FTF meetings is related to social category salience (Turner, 1987; Hogg & Terry, 2001). We tend to form social categories more easily to the groups which we meet often. Therefore, it seems plausible that the more there are FTF meetings, the higher the category salience. Salient group categories, in turn, facilitate group members' identification with the group (Fiol & O'Connor, 2005). Hence we hypothesize as follows:

H2: The number of face-to-face meeting in a VT is positively related to identification with the VT.

Task interdependence has been named even as a management practice of VTs (Hertel, Konradt, & Orlikowski, 2004). The reasoning behind the claim is appealing. The more the tasks of VT members are coupled with each other, the stronger are the demands for team members to coordinate, communicate, and cooperate. Thus, by structuring the task in an interdependent manner, the management can foster collaboration within the team (see also Bell & Kozlowski, 2002). In a field study of VTs, Hertel et al. (2004) found also empirical support for their hypothesis, according to which task interdependence was positively related to VT effectiveness. They found that during the start-up period of one year the hypothesized relationship was rather strong ($r = .49, p < .03$) but after that, the VTs having established their collaboration patterns, the relationship was no more

significant. The authors explain this effect by noting that, at the beginning of a group's life, keeping the tasks strongly interdependent helps the VT to build collaboration patterns, but it can cause process losses later on due to high transaction costs.

A complementary view to the above reasoning can be found from the social category salience effects that task interdependence may produce (Hogg & Terry, 2001). It is plausible to claim that the coordination needs created by strong task interdependence help VT members to perceive their VT as a salient social category with which they can identify. Taking a closer look at the hypotheses and findings of Hertel et al. (2004) we find that they expected and found motivational factors to (partially) mediate the relationship between structural factors (e.g., task interdependence) and outcomes (i.e., effectiveness). Similarly, the number of FTF meetings can be seen as a structural factor of VTs which is not necessarily directly related to behavioral outcomes but the effect is mediated by a motivational factor. As previously noted, based on social identity approach (Turner et al., 1987), identification with a VT could be regarded as a powerful motivational force, which may also serve as a mediator between the structural factors and extra-role behaviors. Therefore, we propose:

H3: Task interdependence is positively related to identification with the VT.

H4: Identification with a VT mediates both (a) the relationship between the number of FTF meetings and extra-role behaviors and (b) the relationship between task interdependence and extra-role behaviors.

Justice concerns

After many years of research, it is now well-acknowledged that employees' perceptions of organizational justice are critical factors influencing various important work outcomes, such as organizational commitment, job satisfaction, organizational citizenship behavior and turnover intentions (see Cohen-Charash & Spector, 2001 and Colquitt, Conlon, Wesson, Porter, & Ng, 2001, for recent reviews). These attitudes and behaviors have been found to be related to two aspects of organizational justice: (1) distributive justice - the perceived fairness of outcome distributions and (2) procedural justice - the perceived fairness of the decision-making procedures (Cropanzano & Greenberg, 1997). Given these important consequences of perceived justice, researchers have been trying to explain why people care about justice.

In order to explain the justice effects on extra-role behaviors and the mediating role of VT identification in that relationship we will use the group engagement model (GEM). The model is closely related to the social identity approach since it focuses on the identity implications of perceived fairness (Blader & Tyler, 2005). The propositions of how justice perceptions enhance cooperation were originally developed in the group-value model (Lind & Tyler, 1988) and in the relational model of authority (Tyler & Lind, 1992).

According to the GEM, the team members' identification is shaped by procedural justice perceptions (Tyler & Blader, 2000; 2001). The model suggests that procedural justice matters because it communicates information to group members about the quality of their relationship with authority and with other group members. In particular, fair procedures and treatment indicate a positive, respectful position within the group and promote pride in group membership. These feelings of respect and pride, in turn, are suggested to be related to group identification and other group-related attitudes and behavior. In other words, the proponents of the GEM claim that procedural justice perceptions in an organization create positive identification with that organization and that identification mediates the relationship between procedural justice judgments and cooperative behaviors towards the organization (e.g., Blader & Tyler, 2005). To our knowledge, GEM has not been previously tested in virtual settings.

GEM holds that it is primarily procedural fairness, in contrast to distributive fairness, that is related to identification. There is, however, reason to believe that distributive justice is also related to identification. Equity theory (e.g., Adams, 1963) assumes that an individual judges the fairness of his or her own or others' rewards based on an equity principle that dictates that persons with greater contributions should receive higher outcomes (Leventhal, 1980). In most previous studies (e.g., Cropanzano & Greenberg, 1997; Moorman, 1991), distributive justice has been operationalized based on the equity principle, because it is generally considered appropriate, especially in achievement-related contexts such as work-organizations. If outcomes are distributed in a way which is not in accordance with one's effort, it is very likely that this leads to feelings that one is not valued and respected by the group (see also De Cremer, 2002). This idea is also in line with Deutsch's (1985) argument that outcomes can have either economic or socio-emotional consequences. The argument is also supported by a study of De Cremer (2002), which showed that equity perceptions are strongly related to self-esteem and acceptance, concepts closely linked to respect, pride, and identification. In addition, recent meta-analyses show that distributive justice has significant correlations with affective commitment, a concept closely related to identification (Cohen-Charash & Spector, 2001; Colquitt et al., 2001).

Taken the above theories and empirical findings together we hypothesize as follows:

H5: Perceptions of procedural justice are positively related to identification with a VT.

H6: Perceptions of distributive justice are positively related to identification with a VT.

H7: Identification with a VT mediates (a) the relationship between procedural justice and extra-role behaviors and (b) the relationship between distributive justice and extra-role behaviors.

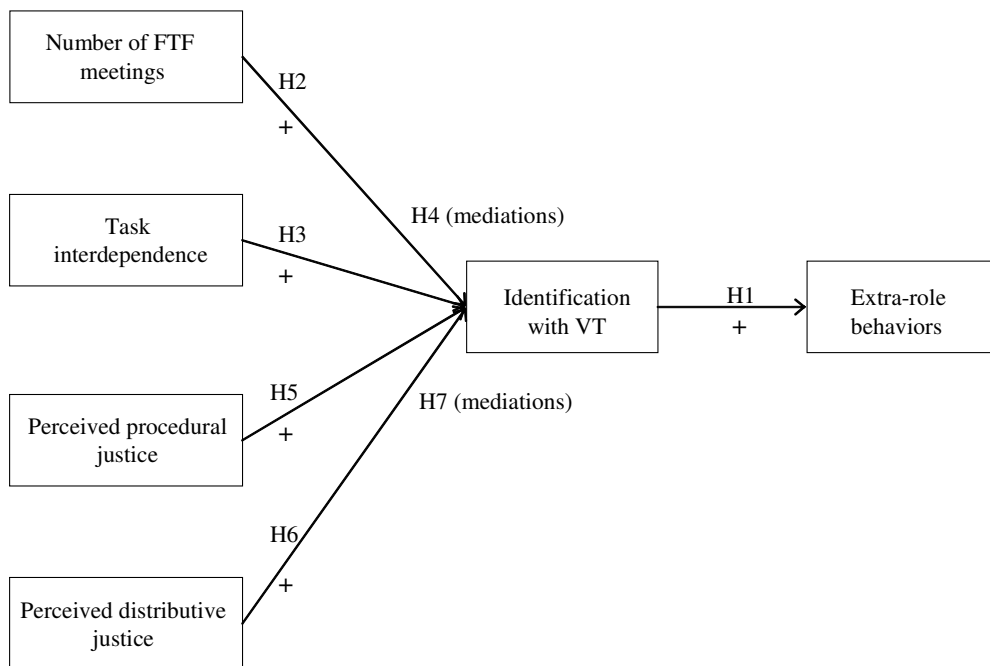


Figure 1. Summary of the hypotheses of this study

3. Methods

Procedure and respondents

The set-up of our study is based on a cross-sectional survey methodology. The data was gathered with a web-based questionnaire during the year 2005 from six companies participating in research projects carried out by the first author's university department. The questionnaires were sent to the members of the 14 VTs in the participating Finnish-based companies. These companies represented different lines of business, but the majority of the data was gathered from the members of VTs in multinational IT companies (9 teams). All of the VTs consisted of specialists conducting non-routine tasks. The respondent teams were selected in collaboration with the contact person in each company and following the agreement of the team leaders. The minimal conditions for selection were the following features of VTs: the teams had more than one member collaborating towards a common goal, (at least one of) the team members were located in different towns, and they communicated mainly via ICT (not FTF).

Altogether 172 respondents received individual e-mails with an introduction to the study and a web address, through which they could confidentially complete the questionnaire.

In the e-mail and in the questionnaire the respondents were prompted to answer all of the questions relating to their named VT. It was stressed that, even though in the items the term 'team' was consistently used, the respondents should think about their VT named in the e-mail and in the questionnaire cover page while answering. 102 acceptable questionnaires were returned, a response rate of 59.3%. Respondents were predominantly male (71.2%), with an average age of 38.5 years ($SD = 8.1$). Their mean team tenure was 24.6 ($SD = 20.5$) months and they represented altogether 14 nationalities. Team size ranged from 6 to 29 members ($M = 14.5$; it did not correlate significantly with any of the variables of our study).

Since the companies did not allow us access to the respondent VTs' full demographical data we could not test statistically whether there was response bias. Due to the small sample size (102 respondents from 14 teams) we were, unfortunately, not able to perform multilevel analyses. Consequently, the data is analyzed at individual level.

Measures

Number of FTF meetings. Since the numbers of both formal and informal team meetings were asked, the responses were summed and averaged to create the measure of number of FTF meetings. The response scale in each question was: never (1), less than monthly (2), monthly (3), weekly (4) and daily (5).

Task interdependence. The three-item measure developed by Campion, Medsker, and Higgs (1993) was used to assess the task interdependence (e.g., "My team cannot accomplish its tasks without information or materials from all the members in the team"). The response scale ranged from strongly disagree (1) to strongly agree (5). The measure reached moderate reliability ($alpha = .64$).

Distributive justice. Perceptions of distributive justice were measured with three items based upon Moorman's (1991) measure. The evaluations focused on the team level by sharing a common opening: "When resources and rewards are distributed in our team". The claims after the lead (e.g., "... I get a fair share considering the stresses and strains of my job") tapped the perceived equity of distributions from different angles.

Procedural justice. Employees' perceptions of procedural justice were measured with eight items derived from previous scales by Moorman (1991) and Tyler and Blader's (2000) procedural justice scale. The items reflect the three aspects of fair procedures and treatment suggested by the group value model: neutrality, trustworthiness, and status recognition, and they focus on both the quality of the team's decision-making procedures and the quality of treatment at the team level. The response focus was highlighted to be at the team level by opening all the questions with "When decisions are made in our team". The claims after the focus-creating lead tapped the procedural aspects outlined above (e.g., "... they are based on accurate information", or "... I am dealt with in a truthful manner"). In the distributive and procedural justice measures, the items were answered on a five-point scale ranging from strongly disagree (1) to strongly agree (5).

To test the empirical distinctiveness of the two justice dimensions, a principal-components analysis (PCA) with oblimin rotation was conducted. PCA yielded two components (Eigenvalue of component 1 = 5.39; component 2 = 2.0; variance explained by component 1 = 49.0%; component 2 = 18.3%) which accounted for 67.3% of the total variance. All of the procedural justice items loaded on the first component and all the distributive justice items on the second component. There were no cross-loadings above .35. The Cronbach's alpha for the distributive justice measure was .94 and for procedural justice .89.

Team identification. Identification with VT was measured using a modified version of the organizational identification scale developed by Mael and Ashforth (1992). One original item regarding public opinions was not used, since teams seldom attract the same publicity as organizations. In addition, the questions were modified to assess the team level identification (e.g., "When I talk about this team, I usually say 'we' rather than 'they'"). The response scale was similar to the justice items. The Cronbach's alpha for this five-item scale was .81.

Extra-role behaviors. To measure the extra-role behaviors, a scale developed and tested by Olkkonen and Lipponen (2006) was used. They used items from three existing scales (Smith, Organ & Near, 1983; O'Reilly & Chatman, 1986; Tyler & Blader, 2000) to develop their six-item measure (e.g., "I have volunteered to do tasks beyond my job description in order to help my team to succeed"). One item regarding information and innovation sharing ("I have shared information and innovations in my team even when I was not required to do so") was added to the scale, since the work in all the VTs of the sample was expert work and information-intensive. The measure covered helping and innovation dimensions of OCB (Moon, Van Dyne, & Wrobel, 2005). The scope of respondent's thinking was limited to the last month by a common question ("How often have you engaged in the following behaviors during last month?") before the items. The final seven items were answered in a five-point scale: never (1), seldom (2), sometimes (3), often (4), and very often (5). The reliability of the measure was good ($\alpha = .84$).

4. Results

The descriptive statistics and correlations between the studied variables are presented in Table 1. As can be seen, the respondents were relatively highly identified with the VT ($M = 3.90$). In addition, identification with the VT was strongly ($r = .41, p < .001$) related to extra-role behaviors within the VT, as we predicted (H1). Interestingly, none of the other variables had a significant correlation with extra-role behaviors.

Table 1. Descriptive statistics and Pearson correlations among the variables ($N = 102$)

Variables	M	SD	1	2	3	4	5
1 No. of FTF meetings	2.94	1.01					
2 Task interdependence	3.50	0.86	.08				
3 Distributive justice	3.51	1.05	-.04	.12			
4 Procedural justice	3.80	0.72	.04	.12	.40**		
5 Identification	3.90	0.75	-.05	.25*	.14	.40**	
6 Extra-role behaviors	3.67	0.77	.04	.11	.04	.07	.41**

* $p < .05$; ** $p < .001$; two-tailed

To test the main effect hypotheses, H2, H3, H5, and H6, we regressed identification with VT on both the structural variables and the justice variables. The results are shown in Table 2. In order to investigate the relative importance of structural and justice variables, we entered them into analysis in two steps. Our structural variables accounted 7% of the variance in identification, and adding the justice variables significantly increased the amount of variance explained ($R^2 = .22$, $p < .001$; $R^2_{change} = .15$, $p < .001$). Task interdependence (H3) and procedural justice (H5) were, in turn, positively related to identification ($\beta = .22$, $p < .05$ and $\beta = .40$, $p < .001$), just as we expected. Contrary to our hypothesis H2 and H6, the number of FTF meetings and distributive justice were not related to identification ($\beta = -.08$; $n.s.$ and $\beta = -.06$, $n.s.$).

Table 2. Hierarchical regressions predicting identification with VT ($N = 102$)

	Identification	
	Step 1 β	Step 2 β
Structural variables		
Number of FTF meetings	-.08	-.08
Task interdependence	.26*	.22*
Justice variables		
Distributive justice		-.06
Procedural justice		.40**
R^2	.07*	.22**
R^2_{change}		.15**

* $p < .05$; ** $p < .001$; two-tailed

We used hierarchical regression to test the mediation hypotheses H4 and H7 (Table 3). In the first step we entered the structural variables (the number of FTF meetings and task interdependence) and the two justice variables (distributive justice and procedural justice)

into the equation. In the second step, to test the mediation, identification was entered into the regression model. As can be seen from the Table 3, neither the structural nor justice variables had a main effect on extra-role behaviors. Rather, as we predicted, identification had a strong relationship with extra-role behaviors ($\beta = .46, p < .001$). Since the independent variables had no main effect on extra-role behaviors, their beta coefficients did not change significantly after the entry of the expected mediator. This pattern violates the classic third rule of the four-step mediation testing strategy, that is, the independent variables should be related to the dependent variable (Baron & Kenny, 1986). However, several subsequent authors (e.g., Kenny, Kashy, & Bolger, 1998; Shrout & Bolger, 2002) have suggested that the relationship between independent variables and the dependent variable is not a necessary condition for the mediation. The essential criteria for establishing mediation were met here (Kenny et al., 1998), since task interdependence and procedural justice (independent variables) were related to identification (mediator; see Table 2) and identification was related to extra-role behaviors (dependent variable; see Table 3). The mediation hypotheses regarding the number of FTF meetings (H4a) and distributive justice (H7b) were naturally rejected, because these variables were not related to identification.

Table 3. Hierarchical regression predicting extra-role behaviors ($N = 102$)

	Extra-role behaviors	
	Step 1 β	Step 2 β
Independent variables		
Number of FTF meetings	.03	.07
Task interdependence	.10	.00
Distributive justice	.01	.03
Procedural justice	.05	-.13
Mediator		
Identification		.46**
Totals		
R^2	.02	.19**
R^2_{change}		.17**

* $p < .05$; ** $p < .001$; two tailed

To substantiate the mediation findings we computed the Sobel's statistics for the two mediation paths. For the task interdependence – identification – extra-role behaviors path the Sobel's test value z was 2.01 ($p < .05$) and for the procedural justice – identification – extra-role behaviors path z was 3.02 ($p < .01$). Thus, the mediation hypotheses regarding these two paths (H4b and H7a) gained further support.

We also conducted some additional analyses in order to create more confidence on our findings. For example, as our data was gathered from 14 different teams we also controlled for teams in our analyses. Teams were added as dummy variables into regression models, and the results relating to the variables of our study were virtually identical to those presented in Tables 2 and 3.

5. Discussion

Our finding, according to which the number of face-to-face meetings of the VT, was not related to identification is, at first glance, rather surprising. It seems to contradict our assumption that rare meetings blur VT level social category salience and hence impedes identification formation with VT. In the light of current literature, we must note that our data sets us limitations in capturing the essential features of VTs. Even though the number of FTF meetings is obviously relevant in VTs, it certainly is not the only relevant attribute of such teams. Hertel et al. (2005) suggest, for example, the relative amount of face-to-face communication and mediated communication, and the average distance between team members, as key attributes of VTs. Furthermore, Gibson & Gibbs (2006) propose geographical dispersion, electronic dependence, structural dynamism, and national diversity to be associated with VTs or virtuality. Our measure might simply not have been sufficiently wide to capture the complex nature of VTs. Thus, it remains the task of further research to use more covering sets of variables that characterize VTs and study their effects on identification and extra-role behaviors.

Based on our results, it seems that task interdependence is an important factor in VTs. A practical implication of this is that it can be used as a management practice, forcing the remote sub-groups and individuals to coordinate their activities and to encourage them to cooperate effectively as suggested by Hertel et al. (2004). Our outcome variable was a self report of extra-role behaviors, whereas Hertel et al. (2004) used manager-rated effectiveness as their outcome measure. Still, the pattern between these two studies is interestingly similar. In both studies it was assumed, and found, that task interdependence has an mediated effect on behavioral outcomes and that the mediator is a motivational construct. Our approach highlights the importance of VT-level identity in shaping the cooperative behaviors, as suggested by earlier research on organizational identity (see e.g., Riketta, 2005, for a review). Hence our theorizing based on the social identity approach provides a complementary explanatory mechanism to the one suggested by Hertel et al. (2004). Unfortunately, we were not able to control the objective team age and its effects on task interdependence as Hertel et al. (2004) did.

This study gave a strong indication that procedural justice matters also in VTs. Procedural justice was positively related to identification with the VT, which, in turn, was strongly related to cooperative or extra-role behaviors. This result is in-line with assumptions of the group engagement model (GEM) of organizational justice (Tyler & Blader, 2000, 2001) and suggests that the perception of fair decision-making and the

perceived quality of interaction are important in VTs. Concretely, these results imply that leaders and members striving to make their VTs successful, should enhance fair and transparent decision-making procedures as well as respectful interpersonal treatment. Contrary to our expectations, distributive justice perceptions were neither related to identification, nor to extra-role behaviors. One possible explanation for this may be that we measured distributive justice at the team level and in this particular context the team members had limited power to allocate rewards and resources, especially when compared to the authorities that represent the whole organization (e.g., immediate supervisors in the traditional line organization). Thus, the relative importance of distributive justice perceptions in carrying identity-relevant information may therefore be much weaker.

As already noted above, we found that identification is an important factor in predicting behavioral outcomes in VTs, at least extra-role behaviors. In the light of the GEM, and the social identity approach more generally, our results suggest that similar identity dynamics appear in co-located and virtual settings. As Martins et al. (2004) state, VTs are primarily teams, and the researchers should try to find to what extent the results found in co-located teams apply also to VTs. Simultaneously, we should be cautious in expecting similar dynamics in all kinds of teams and try to map the new phenomena in VTs. Nevertheless, our study supports the applicability of the social identity approach also to VTs.

There are also some limitations in this study which are worth mentioning. The problems of using a single measure to characterize VTs are discussed above. Even though we have used the terms like antecedent, consequence, and effect in the title and some points of our article for the sake of simplicity, we naturally can not infer causality from the present cross-sectional study. Longitudinal studies of VTs could overcome this problem. In addition, the use of solely self-report measures naturally risks the reliability and validity of the findings (common method variance).

Since the quantitative field research of VTs is rather rare and has been called for (Hertel et al., 2005), our study helps in filling this gap. A look at the regression statistics shows that we were able to explain 22 per cent of the variance of identification and 19 per cent of the variance of extra-role behaviors. The figures are not necessarily impressive, but we strove for theoretical coherence and novelty, not for maximizing the explained variance. Our small sample forced us to keep our analyses at individual level and prevented us from performing group-level analysis (see e.g., Liao & Rupp, 2005). In addition, the small sample may have hidden some relationships, such as the one between task interdependence and extra-role behaviors, simply due to the lack of statistical power.

Taken together, the results of the present study suggest that VT researchers might want to explore identification with and justice within VTs in more detail. The wider application of the social identity approach is certainly worthwhile for further VT research. This work has begun (e.g., Mortensen & Hinds, 2001), but the field studies are still rare (Hertel et al., 2005; Martins et al., 2004). Moreover, in the previous literature on VTs the concept of trust is often mentioned and the relationship between trust and team success has been

rather frequently studied (e.g., Jarvenpaa & Leidner, 1999; Zolin, Hinds, Fruchter, & Levitt, 2004), but the nearby construct of justice has thus far been largely neglected. Therefore, one potential direction for future research would be to study the complex relationship between trust and justice in virtual settings.

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APPENDIX III

ARTICLE 3

Hakonen, M. & Lipponen, J. (2008). Procedural justice and identification with virtual teams: The moderating role of face-to-face meetings and geographical dispersion. *Social Justice Research*, 21, 164-178.

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Procedural Justice and Identification with Virtual Teams: The Moderating Role of Face-to-Face Meetings and Geographical Dispersion

Marko Hakonen · Jukka Lipponen

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Abstract We investigated the previously unstudied relationship between procedural justice and identification within virtual teams, with a particular focus on how two features of virtual teams, namely frequency of face-to-face meetings and geographical dispersion, moderate that relationship. We argue that these two variables are sources of uncertainty, which in turn makes virtual team members more sensitive to perceptions of procedural fairness as essential cues in the identification process. In this study, we used cross-sectional survey methodology and data aggregated to the team level ($N = 39$). As predicted, our results showed that the link between procedural justice and identification was stronger when there were few face-to-face meetings and when teams were highly dispersed.

Keywords Virtual teams · Procedural justice · Identification · Uncertainty

Introduction

During the past 15 years, globalization, the need for flexibility, and opportunities provided by information and communication technology (ICT) have paved the way for the proliferation of new organizational forms, such as virtual teams (VTs) (e.g., Lipnack & Stamps, 2000). A VT is often described as a group of people striving toward a common goal, dispersed in many locations, and communicating with each other predominantly via ICT (e.g., Axtell, Fleck, & Turner, 2004; see below for a detailed discussion about VT definitions). Despite the growing number of

M. Hakonen (✉) · J. Lipponen
Laboratory of Work Psychology and Leadership, Helsinki University of Technology,
P.O. Box 5500, TKK 02015, Finland
e-mail: marko.hakonen@tkk.fi

J. Lipponen
Department of Social Psychology, University of Helsinki, Helsinki, Finland

practitioner-oriented (e.g., Duarte & Snyder, 2006) and academic studies (e.g., Maznevski & Chudoba, 2000) of VTs, empirical studies of real-life VTs are still rather rare (Martins, Gilson, & Maynard, 2004).

Procedural justice refers to the perceived fairness of decision-making procedures (Leventhal, 1980). After many years of research, it is now acknowledged that employees' perceptions of procedural justice are critical factors influencing various important work outcomes, such as organizational identification (e.g., Blader & Tyler, 2005; Olkkonen & Lipponen, 2006; Tyler & Blader, 2000), defined as "the perception of oneness with or belonging to a group" (Ashforth & Mael, 1989, p. 34). Many authors writing on VTs, in turn, have pointed out that identification with the VT is crucial for its success because identification has been proposed to provide a sense of belonging despite the relative lack of face-to-face interaction in the virtual context (see Gibson & Cohen, 2003; Hinds & Kiesler, 2002). Yet, there are only a few studies on identification with VTs (Fiol & O'Connor, 2005), and this has been suggested to be a prominent theme in future research (Powell, Piccoli, & Ives, 2004). Moreover, there has been only one study on fairness in virtual settings (Kurland & Egan, 1999), and none at all on the relationship between fairness and identification in VTs. Our aim in the present paper is to start to fill the gaps outlined above.

Our study focuses on how procedural justice is related to identification in VTs. First, we take a glance at the VT literature and the ongoing debate concerning the definition of VT. Second, we summarize those studies that are most relevant to an understanding of fairness and identification processes in virtual settings. Third, we take a glance at the literature on organizational justice in order to elaborate on the theoretical explanation of the relationship between procedural justice and identification. Finally, we develop the argument about how and why such features of VTs as lack of face-to-face interaction and geographical dispersion may moderate the justice-identification relationship.

Virtual Teams and Virtuality

One of the basic debates in the literature concerns the proper definitions of the VT and virtuality (Gibson & Gibbs, 2006). According to recent reviews (Hertel, Geister, & Konradt, 2005; Martins et al., 2004), it is a common notion that virtuality is a matter of degree. Indeed, there are more and less VTs, and we also share the view that virtuality should be seen as a continuum rather than as an absolute state. To make the situation even more complex, different authors name different attributes of VTs as definitional (Martins et al., 2004). It seems rather clear that for a VT to be a team it should consist of more than one person collaborating to achieve a common goal (e.g., Hertel et al., 2005). Most authors propose (e.g., Bosch-Sijtsema, 2003; Hertel et al., 2005; Maznevski & Chudoba, 2000) that for a team to be virtual at least one of its members must work in a different location from the others. This is a minimal condition for geographical dispersion. Moreover, very often VTs are characterized by the fact that members communicate with each other mainly through information and communication technology (ICT; Axtell et al., 2004; Gibson & Gibbs, 2006). This can be put in another way: lack of face-to-face

meetings is a typical feature of VTs. The latter characterization makes a better distinction between (fully) co-located and VTs than the former because some empirical evidence suggests (e.g., Griffith & Neale, 2001) that co-located teams may use as much or even more ICT in their communication than members of VTs. Many authors also include other features, such as crossing temporal, cultural, and organizational boundaries, in their definitions of VTs and their virtuality (see Gibson & Gibbs, 2006, for review). We do not, however, take a stance in the ongoing debate of what features or attributes of VTs are definitional or what constitutes the core of virtuality. We simply study the effects of two, obviously rather elementary (Axtell et al., 2004), features of VTs: the frequency of face-to-face meetings of the members and the amount of geographical dispersion of the team or its sub-groups in different locations.

Studies on Justice and Identification in Virtual Settings

Previous studies on VTs have largely neglected the role of procedural justice. To our knowledge, only Kurland and Egan (1999) have studied fairness in virtual settings. Their pioneering work investigated how telecommuting and structural factors of the organization such as outcome-based performance evaluation, formality of communication, and job formalization were related to the justice perceptions of telecommuters. Among other things, they found that telecommuting and informal communication was positively related to procedural justice. They suggest that these results were partly attributable to active supervisory communication and decision justification, especially via e-mail. Telecommuting and telework are synonyms referring to a flexible, individual work arrangement in which employees spend some of their working time outside their conventional workplace (e.g., at home; Nilles, 1994). Telework, unlike VTs, does not presuppose teamwork toward a common goal. Thus, Kurland and Egan's (1999) study might not fully inform us about the potentially special group-level dynamics of virtual teamwork. Furthermore, since they neither measured identification nor studied the consequences of justice, their study does not shed light on the justice-identification link, the focus of our study.

Existing empirical research is not necessarily informative about whether or not there is something special in identification with VTs (Fiol & O'Connor, 2005). Despite the rather common claim that it is more difficult to identify with a VT than with a co-located team (e.g., Mannix, Griffith, & Neale, 2002), Mortensen and Hinds (2001) found no difference between the levels of identification of virtual and co-located team members. The low number of previous studies limits our knowledge about the interplay between different factors in the development of VT identification (Fiol & O'Connor, 2005). Moreover, the focus of previous studies has predominantly been limited to communication and communication technology. As Fiol and O'Connor (2005, p. 20) argue, "We know very little about the interrelationships among individual, group, and situational factors in the development of identification in VTs." Still, relevant research has been carried out. For instance, Wiesenfeld, Raghuram, and Garud (1999) found in a seminal study that

virtual workers built their identification on electronic communication to a greater extent than their less virtual counterparts. They also found that the frequency of face-to-face communication had no main effect on identification. Again, the potential problem here is that they studied teleworkers rather than VTs, and the results may thus not be generalizable to virtual teamwork.

Perceived Procedural Justice and Identification

Given the major consequences of perceived procedural justice found in previous studies (see Cohen-Charash & Spector, 2001; Colquitt, Greenberg, & Scott, 2005, for recent reviews), researchers have been trying to explain why people care about procedural justice. Following the lines of the group engagement model developed by Tyler and Blader (2003), we argue that justice perceptions should affect identification given the positive social-identity-relevant information that justice communicates to individuals. More specifically, justice communicates to individuals that they are respected members within their group, and that they can be proud of their group membership. Furthermore, through its link to these feelings of respect and pride, it should be further related to increased identification with the group (Tyler & Blader, 2003). This relationship develops because people are more highly motivated to merge their identity with a group when the group has high status (pride), and when they feel they have status in the group (respect). Pride and respect engender identification with the group in people's motivated attempts to develop and maintain a positive social identity (Tyler & Blader, 2003). On the basis of the group engagement model, it thus seems plausible that perceptions of justice should be positively associated with team identification. The empirical findings from co-located settings support the idea that there is a positive link between procedural justice and identification (Olkonen & Lipponen, 2006; Tyler & Blader, 2000, 2001).

However, as noted by Martins et al. (2004), for example, it would be unwise to assume that we would always find similar processes in co-located and VTs. Next, we will proceed to discuss how and why the two features of VTs, namely frequency of face-to-face meetings and geographical dispersion, could moderate the relationship between procedural justice and identification.

Uncertainty and Virtual Teams

According to the uncertainty management model (Van den Bos & Lind, 2002), people look for information about procedural justice to reduce uncertainty. Previous empirical research on this model has indeed revealed that perceived justice is especially important when people experience high levels of uncertainty (e.g., De Cremer & Sedikides, 2005; Van den Bos, Wilke, & Lind, 1998). This model, however, is relatively silent on the issue of which type of uncertainty is involved. That is, relevant research has manipulated different types of uncertainty (e.g., control, situational uncertainty, and fear of death) and, as such, it is not clear which one is more closely associated with responses to procedural information (De Cremer & Sedikides, 2005). Nevertheless, this basic argumentation of the uncertainty

management model (Van den Bos & Lind, 2002), combined with the central premises of the group engagement model (Tyler & Blader, 2000, 2003), could also be used to explain how the frequency of face-to-face meetings and geographical dispersion may moderate the relationship between procedural justice and identification with the VT.

As many authors point out, uncertainty and ambiguity are typical of VTs (e.g., Fiol & O'Connor, 2005; Kiesler & Cummings, 2002). Since in all VTs the members, or various subgroups, are dispersed and mainly interact via ICT, they have to rely on a limited number of cues about colleagues working at remote sites. Furthermore, these cues are often transmitted via ICT. We argue that, when VTs have low frequency of face-to-face meetings and/or when the VT is geographically highly dispersed, the uncertainty among the team members is higher than in VTs experiencing more direct face-to-face contacts and less dispersion.

Consequently, when uncertainty is high, VT members will rely more strongly on procedural fairness judgments as cues upon which to build their VT identity. In cases of more direct contacts and lower dispersion there should be other, more tangible cues that decrease the relative importance of perceived procedural fairness in the reduction of uncertainty. For instance, VT members have better chances of getting to know each other in traditional meetings, and they have fewer places to visit. In other words, insofar as low frequency of face-to-face meetings and/or high geographical dispersion can be seen as indicators of uncertainty, and perceived procedural justice as an important component in the identification construction process, it follows that the two features of VTs discussed above moderate the relationship between procedural justice and identification. Drawing on this argumentation we formulate two hypotheses as follows:

H1: The frequency of face-to-face meetings moderates the relationship between procedural justice and identification: the relationship is stronger when the frequency of face-to-face meetings is low than when it is high.

H2: The amount of geographical dispersion moderates the relationship between procedural justice and identification: the relationship is stronger when geographical dispersion is high than when it is low.

Method

Procedure and Respondents

The data for this study was gathered by means of a web-based questionnaire distributed to thirteen organizations during 2005, 2006, and 2007. The questionnaires were sent to the members of 39 VTs in 13 Finnish-based organizations, ranging from the social sector to the metal industry. Most of the data came from VTs in multinational companies (20 teams). All the VTs comprised specialists conducting non-routine tasks. The respondent teams were selected in collaboration with the contact person in each company, and with the agreement of the team leaders. The minimal conditions for selection were: (a) the teams had more than one

member collaborating to achieve a common goal, and (b) the team members or subgroups of them were located in different towns. In addition, we ensured that the respondents communicated mainly via ICT (i.e., not mainly face-to-face).

Consequently, 422 respondents received individual e-mails introducing the study and giving a web address through which they could confidentially complete the questionnaire. In the e-mail and in the questionnaire the respondents were reminded to answer all the questions with regard to their named VT. It was stressed that even though the term “team” was consistently used, they should think about the VT mentioned in the e-mail and on the questionnaire cover page while answering. A total of 293 acceptable questionnaires were returned, a response rate of 69.0%. A slight majority of the respondents were male (58.8%), with an average age of 39.3 years ($SD = 8.8$). Their average team tenure was 22.3 ($SD = 30.6$) months. The geographical distribution of the team members or their sub-groups ranged from two to 13 different towns ($M = 4.7$; $SD = 2.4$). More than two-thirds of our respondents spent more than half of their total working time in the particular VT they were asked about. VT membership was thus a relatively important part their working lives.

The mean size of teams was 10.5 employees ($SD = 7.3$). As group size has been found to be negatively related to both procedural justice (e.g., Colquitt, Noe, & Jackson, 2002) and group identification (e.g., Lipponen, Helkama, Olkkonen, & Juslin, 2005), we decided to control for size in our analyses.

Measures

Frequency of Face-to-Face Meetings

In line with Kirkman, Rosen, Tesluk, and Gibson (2004), information on the frequency of both formal face-to-face meetings (one item) and informal face-to-face meetings (one item) was requested in our questionnaire. The response scale for both items was: (1) never, (2) less than monthly, (3) monthly, (4) weekly, and (5) daily. Using these two items we created a measure of the frequency of face-to-face meetings. The two items correlated with each other ($r = .57$, $p < .001$), and the Cronbach's alpha was .70.

Geographical Dispersion

The geographical-dispersion figures were derived from information sheets provided to us by the team leaders. We simply counted the number of different locations (i.e., towns) in which the VT members or sub-groups of them worked. We used the objective location-dispersion figures of the whole team because they reflected the real geographical distribution better than the count of locations from the questionnaire responses. It was possible, for instance, that in a VT dispersed among seven locations only the members from three locations answered the questionnaire. Nevertheless, they were all affected by the factual structural feature of the team, i.e., by the total number of different locations (seven in the above example).

Perceived Procedural Justice

VT members' perceptions of procedural justice were measured by operationalizing the rules that, according to Leventhal (1980), people use when they judge the fairness of decision-making procedures. The scales developed by Moorman (1991) and Tyler and Blader (2000) were also used in developing the items. Our five items reflected the aspects of fair procedures suggested by Leventhal (1980): accuracy of information, correctability, bias-suppression, consistency, and representativeness in the decision-making process. Unlike in most previous studies, we deliberately did not focus solely on the decisions made by the team leader or supervisor (see Colquitt et al., 2002, for a discussion about team-level justice measures). Instead, we asked for fairness perceptions about all the decisions made in the team, and we did this for two reasons. Firstly, VTs are often described as 'lean' in terms of organizational form (e.g., Lipnack & Stamps, 2000). In other words, important decisions are probably also made by various team members and not only the leader. Secondly, because VTs are geographically distributed it may not always be clear who was the initial decision maker, although the decisions may have had a profound effect on the work of the VT members. In practice, the response focus on the team level was highlighted in that all the questions started with "When decisions are made in our team..." The five items after this focus-creating lead tapped the procedural aspects outlined above: "...they are based on accurate information"; "...they can be corrected afterwards if they are found to be poor"; "...everyone tries to suppress personal biases"; "...they are consistent over persons and over time"; and "...all those affected by the decision are heard." The items were answered on a five-point scale ranging from strongly disagree (1) to strongly agree (5). The Cronbach's alpha for the procedural justice measure was .77.

Identification

Identification with the VT was measured with a slightly modified version of the organizational identification scale developed by Mael and Ashforth (1992). One original item regarding public opinion was not used because teams seldom attract the same level of publicity as organizations. In addition, the questions were specifically targeted to assess team-level identification (not the whole organization; e.g., "When I talk about this *team*, I usually say 'we' rather than 'they'"). The response scale was the same as that for the justice items, and the Cronbach's alpha for this five-item scale was .82.

Aggregation to the Team Level

Because we were interested in the team-level measurement and used such clearly team-level constructs as objective geographical distribution and frequency of face-to-face meetings, we aggregated the data to the VT level. It could also be argued that in our study procedural justice should be treated as a team-level construct, because we specifically asked for perceptions of the whole VT. In line with the

recent psychological literature we used three different scores to assess the appropriateness of the aggregation of the individual-level measures to the team level. Firstly, we computed the r_{wg} statistics reflecting the inter-rater agreement and within-team consensus, as suggested by James, Demaree, and Wolf (1984). The mean r_{wg} scores for face-to-face communication were .61, for procedural justice .79, and for identification .81. Only the face-to-face communication failed to reach the conventionally acceptable level (.70). We also computed the ICC(1) statistics, i.e., the inter-rater reliability indices, and the ICC(2) values indicating the reliability of the group means (Chen & Bliese, 2002; Liao & Rupp, 2005). For our three individual-level measures, namely face-to-face meetings, procedural justice and identification, the ICC(1) values were .24, .25, and .04, and the ICC(2) values were .69, .71, and .26, respectively. The ICC(1) scores are acceptable when compared to many previous studies (e.g., Chen & Bliese, 2002; Simons & Robertson, 2003), although they indicate some variation across respondents within the VTs. Unlike the ICC(1) formula, the ICC(2) scores do not take into account the small number of respondents from each team ($M = 7.5$), and remain rather low. Another argument for aggregation, which is supported by Liao and Rupp (2005), is a theoretical one: most of our constructs are essentially team-level ones. Moreover, as noted by Chen and Bliese (2002), the low ICC(2) values may hinder the detection of existing relationships in aggregated data, meaning that we are not likely to find any relationships that are merely an artifact of the regression analysis—our main method of testing the hypotheses.

Results

In Table 1, we present the means, standard deviations, and correlations of the study variables at the individual level. It can be noted that most of the variables are more highly intercorrelated at the aggregate level (Table 2) than at the individual level, which is in line with previous studies (e.g., Simons & Roberson, 2003). Because we are interested in team-level analyses we concentrate on those results (Tables 2 and 3). In general, the VT members identified with their team relatively strongly ($M = 3.94$). Similarly, it seems that, on average, the fairness of the decision-making was rated as fairly good ($M = 3.58$). Face-to-face meetings did not correlate with geographical dispersion ($r = -.14$, n.s.), indicating that these two measures are independent of each other. Moreover, team size, our control variable, had an anticipated negative correlation with identification ($r = -.37$, $p < .05$), and this pattern remained largely the same in the subsequent regression analyses (Table 3). Finally, there was a significant correlation between procedural justice and identification ($r = .39$, $p < .01$), as could be expected from the reasoning based on the group-engagement model of procedural justice. This effect turned out to be marginally significant ($\beta = .24$, $p < .10$) when other variables were controlled for (Table 3, Step 2), because of our rather small sample size.

We followed the procedure recommended by Aiken and West (1991) in all the steps creating the interaction terms and in testing our two moderation hypotheses. We entered the interaction between procedural justice and face-to-face meetings

Table 1 Descriptive statistics and Pearson correlations among the variables at the individual level ($N = 293$)

Variables	<i>M</i>	SD	1	2	3	4
1. Team size	14.53	9.24				
2. Face-to-face meetings	2.80	1.04	.18**			
3. Geographical dispersion	5.26	2.74	.25**	-.04		
4. Procedural justice	3.49	0.73	-.28**	-.09	-.06	
5. Identification	3.88	0.76	-.17**	-.04	-.02	.40**

* $p < .05$; ** $p < .01$, one-tailed

Table 2 Descriptive statistics and Pearson correlations among the variables at the VT level ($N = 39$)

Variables	<i>M</i>	SD	1	2	3	4
1. Team size	10.54	7.25				
2. Face-to-face meetings	2.71	0.63	.17			
3. Geographical dispersion	4.69	2.42	.45**	-.14		
4. Procedural justice	3.58	0.40	-.41**	-.19	-.09	
5. Identification	3.94	0.31	-.37**	-.26	-.02	.39**

* $p < .05$; ** $p < .01$, one-tailed

Table 3 Hierarchical moderated regressions predicting identification with VTs ($N = 39$)

	Identification ^a			
	Step 1	Step 2	Step 3	Step 4
Control variable				
Team size	-.37*	-.30	-.47**	-.35*
Main effects				
Face-to-face meetings		-.15	-.16	-.09
Geographical dispersion		.11	.09	.27
Procedural justice (PJ)		.24	.12	.20
Moderators				
PJ × Face-to-face meetings			-.46**	
PJ × Geographical dispersion				.30*
R^2	.14	.24	.42	.31
Adjusted R^2	.12	.15	.33	.21

* $p < .05$; ** $p < .01$, one-tailed

^a The standardized regression coefficients are reported

into the equation in the third step (Table 3), after entering our control variable (Step 1) and testing for possible main effects (Step 2). As hypothesized (H1), the interaction term was negative and significant ($\beta = -.46$, $p < .01$). The interaction

between procedural justice and geographical dispersion was entered in the fourth step (Table 3), and it yielded a significant positive regression weight ($\beta = .30$, $p < .05$), as hypothesized (H2).

Simple slope analyses were conducted to confirm the regression results (Aiken & West, 1991). We calculated the conditional values for face-to-face meetings and geographical dispersion (one standard deviation above and below the mean). The analysis indicated that the relationship between perceived procedural justice and identification was significantly positive when there were few face-to-face meetings ($\beta = .72$, $p < .01$), but nonexistent when there were many ($\beta = -.10$, n.s.). The relationship between procedural justice and identification was not significant when the teams were dispersed in only a few locations ($\beta = .14$, n.s.), but it turned out to be strongly positive when they were geographically highly dispersed ($\beta = .58$, $p < .01$).

Discussion

The results of our study give support to our moderation hypotheses stating that the less there were face-to-face meetings or the greater the geographical dispersion of a VT, the stronger the relationship between procedural justice and identification with it. Our study was based on the group-engagement model (Tyler & Blader, 2003), according to which relational information is the starting point of the identification process. However, rare face-to-face meetings and dispersion in many locations may reduce traditional means of getting relational information and thereby causing a sense of uncertainty about a person's position in the group. According to the uncertainty management model of procedural justice (Van den Bos & Lind, 2002), in turn, people become especially sensitive to fairness perceptions under highly uncertain conditions. We adapted these basic premises of the two theories to VTs and got support for the idea that VT members become especially sensitive and responsive toward relational, within-group information such as the fairness of decision making when the frequency of face-to-face meetings is low and when geographical dispersion is high.

In this study, we found a significant positive correlation between perceived procedural fairness and identification. This relationship has been well established in other settings (e.g., Tyler & Blader, 2000, 2001), and is theoretically well grounded (Blader & Tyler, 2005). In other words, the VTs do not seem to differ from co-located teams in this respect. However, scrutiny of the interaction terms revealed that this effect existed only when the teams had low frequency of face-to-face meetings and when they were highly geographically dispersed. These two contextual features of VTs created special conditions for the relationship. We tackled this by applying the uncertainty model of procedural justice to our set-up and found it fruitful in explaining the contextual effects created by the lack of direct contacts and high dispersion.

In terms of the procedural justice literature, this study adds to the scarce research on how structure affects and moderates justice effects (Ambrose & Schminke, 2003; Schminke, Cropanzano, & Rupp, 2002). The role of structure has been largely

neglected, despite the work of pioneers such as Leventhal (1980) and Lind and Tyler (1988), who recognized the importance of context and contextual variables. We proposed two VT-specific contextual features and thus provided a new setting for studying the effects of structure. Since VTs are of growing importance in the organization of work, the study of their essential structural elements is also of societal relevance. We also continued, specified, and extended the work on justice and structure in virtual settings pioneered by Kurland and Egan (1999). First, we focused on virtual teamwork, and thus our results shed light on the interplay of justice and structure in this previously understudied virtual setting. Second, we concentrated on the moderating effects of VT-specific structural attributes on justice effects, which is yet another neglected area of inquiry.

Although not directly related to our main hypotheses, the rather high mean value of VT identification (Table 1) suggests that belonging to the VT is not problematic per se in a virtual environment. This is in line with findings that report no differences between identification in co-located and VTs (e.g., Mortensen & Hinds, 2001), but in both cases this contradicts the traditional assumption (e.g., Mannix et al., 2002) that identification is more difficult in virtual than in co-located settings. This matter is far from resolved, and drawing any robust conclusions based on current studies would be premature. Yet, they underline the need for more empirical study on identification with VTs.

The traditional assumption in research on VTs has been that face-to-face interaction is always superior to electronically or computer-mediated communication (CMC), a point neatly summarized by Kiesler and Cummings (2002). However, we found some evidence that the frequency of face-to-face meetings is not directly related to VT identification (Tables 2 and 3), suggesting indirectly that dependence on ICT in communication does not hinder identity formation in VTs, as the traditional reasoning would predict. This is, in fact, understandable in light of the social identity model of depersonalization effects (SIDE; Reicher, Spears, & Postmes, 1995; Postmes & Spears, 1998), which distinguishes between personal and group identity. According to this model, the anonymity and reduced interpersonal cues in CMC enhance group-based identity. Thus, the rather anonymous context of VTs, in which information about others is largely gathered via CMC, enhances group salience because individual differences are hard to detect (Lea, Spears, & Rogers, 2003). Therefore, SIDE would actually predict zero or even a negative relationship between the frequency of face-to-face meetings and VT identification.

The social identity model of depersonalization effects has also untangled other counter-intuitive and seemingly contradictory findings concerning CMC (e.g., Lea et al., 2003). For example, some studies report that the anonymity of CMC leads to liberating, anti-normative actions, while others report increased self-awareness and normative behavior (e.g., Lea, Spears, & De Groot, 2001). Given its relevance to VT research, the SIDE should be applied more to studies in virtual settings. However, researchers should exercise caution in making straightforward inferences from pure CMC studies to real life VTs, which seldom use solely mediated communication in their work. Still, especially in the early phases of a VT's life-cycle, the anonymity and depersonalization effects highlighted by the SIDE might be highly relevant.

Limitations and Future Directions

This study also has some limitations worth mentioning. We have used cross-sectional methodology that does not lend itself to the inference of causality. Moreover, most of our variables were based on self-reports and, therefore, it can be argued that our results may be vulnerable to common method variance. However, the aggregation of the self-report measures to the VT-level and the use of team-level data reduced the likelihood that response biases would explain our findings (Ambrose & Schminke, 2003). Additionally, the fact that we primarily studied statistical interactions, that these were significant, and that they occurred in opposite directions, gives us good reason to believe that our results are not merely artifacts caused by common method variance (Ambrose & Schminke, 2003; Evans, 1985). Identification could also be considered a process (Tajfel & Turner, 1979), and cross-sectional methodology captures only one moment of it. Therefore, longitudinal settings would be beneficial in promoting a more reliable and deeper understanding of identification with VTs.

We treated the two features of VTs as indicators of uncertainty, and it is, in principle, possible that certain other features of VTs may also be associated with high degrees of uncertainty. These include, for example, such attributes as diversity and the crossing of organizational or temporal boundaries (e.g., Gibson & Gibbs, 2006). It is possible that some of these features may be related only to certain forms of uncertainty (e.g., De Cremer & Sedikides, 2005). In future studies it would also be important to measure the various forms of uncertainty directly. Furthermore, the application of uncertainty reduction theory by Hogg (2004) in studying identification with VTs would be yet another interesting line of further research.

When there are few physical meetings and a team is dispersed into many locations, information on decision-making principles is mainly available in electronically mediated communication between the VT members. Under such conditions the decision-making principles are often communicated via e-mail or other electronic means, which leaves permanent written documents for later use. These documents could, in principle, be more accurate and sustaining than verbal communication. Thus, if decision-making procedures were properly communicated and restored in VTs, members of rarely meeting and highly dispersed teams might, in fact, receive clearer cues about the fairness of decision-making procedures than their counterparts who have to rely less on ICT. Given this, it seems quite clear that we need much more research on the potential differences between verbal and electronic means of communicating various forms of justice information, especially in long-term relationships.

The above reasoning is also in line with the findings of Jarvenpaa and Leidner (1999), according to which proactive electronic communication is one essential prerequisite of trust formation in fully VTs (i.e., teams whose members never meet). Trust is closely related to procedural justice and has often been considered its antecedent (Lewicki, Wiethof, & Tomlinson, 2005). The results of our study complement the trust and communication perspectives of VT research by explicitly introducing the concept of procedural justice and its relation to identification, a

variable rather unambiguously stated to be important in VTs (e.g., Fiol & O'Connor, 2005; Hinds & Kiesler, 2002; Martins et al., 2004).

Conclusion

Our study makes some further contributions to VT research beyond the ones mentioned above. There is still amazingly little empirical research on VTs in real working-life situations, as two recent reviews point out (Hertel et al., 2005; Martins et al., 2004). Moreover, previous studies have mainly used qualitative methodology, and there is a clear need for quantitative research conducted in field settings (Hertel et al., 2005). This study fills these gaps to some extent by presenting team-level, quantitative results from real VTs.

Recent reviews of VT research also conclude that VTs are essentially like other teams, but that the search for idiosyncrasies of VTs should continue (Hertel et al., 2005; Martins et al., 2004). Along these lines, perhaps our main contribution has been to show that the virtual context contains elements that may profoundly shape the way that some basic group processes such as perceptions of procedural justice and group identification are related to each other.

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APPENDIX IV

ARTICLE 4

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It takes two to tango: *The close interplay between trust and identification in predicting virtual team effectiveness*

Marko Hakonen

Jukka Lipponen

Helsinki University of Technology
Work Psychology and Leadership
Finland

Abstract

The purpose of this study was to examine how trust between the team-members and identification with the team are related to the effectiveness of virtual teams. The literature suggests that both trust and identification are crucial for success of virtual teams but there is a lack of empirical studies to substantiate this assumption. We hypothesized that the identification-effectiveness link should be stronger under high-trust than under low-trust conditions, and that the relationship between trust and effectiveness should be stronger when team members identify strongly with the team. In our study based on a cross-sectional survey methodology and data aggregated to team level ($N = 31$), we found clear support for our hypotheses.

Keywords: virtual teams, trust, identification, effectiveness

1. Introduction

Virtual teams have been a topic of growing interest to researchers and practitioners for over a decade (e.g., Lipnack & Stamps, 2000; Powell, Piccoli, & Ives, 2004). A virtual team (VT) is often described and defined here as a group of people striving toward a common goal, dispersed in many locations, and communicating with each other predominantly via information and communication technology (e.g., Axtell, Fleck, & Turner, 2004; see also Gibson & Gibbs, 2006 for detailed discussion on definitions of a VT). In fact, the opportunities provided by information and communication technology (ICT) have been a major force in the proliferation of VTs as an organizational form. Experts can work flexibly on their sites around the globe, near their customers, and travelling costs can be reduced (e.g., Martins, Gilson, & Maynard, 2004).

Because direct control is impeded due to distance, numerous authors have suggested that it must be at least partially substituted by trust in VTs (Aubert & Kelsey, 2003; Ishaya & Macaulay, 1999; Jarvenpaa & Leidner, 1999). Moreover, it has often been stated that trust is a key success factor and the “glue” that binds VTs together (e.g., Nemiro, 2000). Correspondingly, many authors have stressed that the formation of a shared team identity is crucial for virtual teams because it provides a sense of belonging despite the relative lack of face-to-face interaction (Fiol & O’Connor, 2005; Mortensen & Hinds, 2001; Wiesenfeld, Raghuram, & Garud, 1999). The claim that trust and shared group identity are the keys to the success of virtual organizations implies that these factors are positively related to VT effectiveness. However, to our knowledge, the interplay of these three concepts have not been studied before, even though all of them have gained VT researchers’ attention. In this study we start to disentangle these relationships using survey data from 31 virtual teams.

We use the theories from previous trust research (Dirks & Ferrin, 2001) and the social identity approach (Tajfel & Turner, 1979) to study the dynamics of trust, identity, and effectiveness in VTs. Applying these well developed and robust theories to explain the processes in a relatively new organizational form informs us whether or not the new context discloses novel relationships between the studied variables. Furthermore, given the growing interest in and importance of VTs in working life it is rather surprising that more or less artificial student samples dominate empirical studies, as recent reviews of VT literature point out (Hertel, Geister, & Konradt, 2005; Martins et al., 2004). This study contributes to fill this gap by studying real-life VTs.

We structure our theoretical development in the following manner. First, we explore the complex construct of trust in different settings. Second, we introduce the social identity approach and discuss how social identification has been studied in VTs. Third, we build on the seminal work of Dirks and Ferrin (2001) in order to develop argumentation for our first hypothesis: why trust could moderate the relationship between identification and effectiveness. Fourth, we build on the arguments derived from the social identity approach to build a complementary moderation hypothesis, namely why identification could moderate the trust-effectiveness relationship.

2. Theoretical framework

2.1 Trust

Trust has been studied from different viewpoints, including social psychology, philosophy, economics, and management research (Blomqvist, 1997). Hence, no consensus exists on the definition of trust. In most conceptualizations, trust is associated with risk taking, positive expectations and vulnerability (e.g., Mayer, Davis, & Shoorman, 1995). In this study we investigate trust within group (interpersonal trust) from the social psychological perspective. In line with Boon and Holmes (1991) we define trust as a psychological state involving confident positive expectations about another’s motives with respect to oneself in situations which entail risk.

Trust in organizations has been a topic of growing interest to researchers (Kramer & Tyler, 1996; Noteboom & Six, 2003). Generally, most authors seem to agree that trust is beneficial for organizations (Dirks & Ferrin, 2001). Several studies have demonstrated

that trust has multiple positive outcomes in organizations varying from increased commitment to organizational citizenship behaviours (Dirks & Ferrin, 2002). According to Bijlsma and Koopman (2003), it is also commonly agreed that trust is positively related to cooperation. It has been noted that trust becomes more important and even partially replaces traditional mechanisms of control in new, virtual work settings (Sabherwal, 1999; Tyler, 2003). Direct control is strongly impeded due to distance, but coordination and cooperation are indispensable in VTs for the team to achieve its shared goal.

Consequently, trust has been one of the key areas of interest for VT researchers (e.g., Aubert & Kelsey, 2003; Zolin, Hinds, Fruchter, & Levitt, 2004). In their seminal study of VTs comprised of students from different countries, Jarvenpaa and Leidner (1999) found that, among other things, proactive, predictable communication and social cues in computer-mediated communication were keys to high interpersonal trust within the teams. They suggest that trust in virtual settings is swift and fragile. Meyerson, Weick and Kramer (1996), who developed the concept of swift trust, suggested that swift trust develops depersonally. If the common task requires trust, but the parties do not have time to become acquainted with each other, trust is built on role-based interaction and prototypical categorizations. However, the enthusiasm for swift trust as a theoretical construct that could explain trust in VTs seems to have declined. This might be due to at least two issues. First, to our knowledge any clear quantifiable operationalizations of swift trust have not been developed. In fact, Jarvenpaa and Leidner (1999) used a traditional and personalized conceptualization to measure trust which, based on their qualitative studies, they claimed to be swift. Second, as in this study, in real life the members of VTs often do have time to build trust in a more personalized manner. Consequently, in later phases of virtual teamwork the construct of swift trust may not be able to capture the nature of interpersonal trust. These issues may have affected the current trust research in VTs which utilizes the conceptualizations of trust developed in traditional settings rather than suggesting that trust within VTs would be something qualitatively different from co-located teamwork (e.g., Aubert & Kelsey, 2003; Geister, Konradt, & Hertel, 2006).

Direct empirical tests of the relationship between trust and effectiveness in virtual settings are rather rare and the results are mixed. For instance, in their qualitative study of virtual student teams, Ishaya and Macaulay (1999) found that high-trust groups outperformed low-trust groups. Similarly, Geister et al. (2006) found that trust had a main effect on performance in student VTs. However, in their study, Aubert and Kelsey did not (2003) find support for their hypothesis that trust within a virtual team would be positively associated to effective performance. Thus, it seems clear that we need more research on how and under what conditions trust would be related to VT performance.

2.2 Identification

The social identity approach provides a theoretical framework for the relationship between an individual and a group. Specifically, it consists of two distinct theories: the original social identity theory (Tajfel & Turner, 1979) and the more recent self-categorization theory (Turner, Hogg, Oakes, Reichell, & Wetherell, 1987). Despite certain differences, both theories share the same fundamental assumption that individuals define themselves in terms of their social group memberships and that group-defined self-

perception produces distinctive effects on social behaviour and inter-group relations (Hogg & Abrams, 1988; Turner, 1999). This means that the more an individual conceives of him or herself in terms of membership in a group or, in other words, identifies with the group, the more his or her attitudes and behaviour are governed by this group membership (Hogg & Abrams, 1988; Van Knippenberg & Van Schie, 2000).

During the past ten years, social identity principles have been increasingly applied to the study of organizational psychological processes (Haslam, 2001; Hogg & Terry, 2000). In this context, organizational or team membership is understood to reflect on self-concept in the same way as other social memberships do (Ashforth & Mael, 1989; Hogg & Terry, 2000). Thus, organizational identification is defined as “the perception of oneness with or belonging to a group” (Ashforth & Mael, 1989, p.34). Moreover, this group-based self-conception is proposed to lead to activities that are congruent with this identity.

According to self-categorization theory (Turner et al., 1987), different levels of self-definition (e.g., self as an individual or self as a group member) should be related to a distinct set of needs or motivators. When people categorize themselves at the personal level, they should be motivated to do things that promote their personal identity as individuals (e.g., personal advancement). When social identity is salient, it should be associated with the motivation to do things that promote their social identity as group members, for example through the enhancement of group goals. Although in most previous studies work-group identification has been used as an individual level variable (Riketta, 2005; Ullrich, Wieseke, Christ, Schulze, & van Dick, 2007), recent findings by van Dick, Grojean, Christ and Wieseke (2006, study 3) indicate that the positive effects of identification on work-group functioning exist not only at an individual level, but also at higher levels of analysis. Van Dick et al. (2006), for example, found that identification and organizational citizenship behaviour (OCB) were positively related also in team-level analysis. Moreover, they suggested that this indicated that the dimensions of OCB that contribute to (group) performance are more than the sum of individual behaviours (see also Hardin, Fuller, & Valacich, 2006 on aggregate measures in the context of VTs).

Current empirical research is not necessarily informative about whether or not there is something special about identification with VTs (Fiol & O’Connor, 2005). Despite the rather common claim that it is more difficult to identify with a VT than with a co-located team, Mortensen and Hinds (2001) found no difference between the levels of identification of virtual and co-located team members. The limited number of previous studies limits our knowledge about the interplay between identification and other variables in VTs (Fiol & O’Connor, 2005). Moreover, the focus of previous studies has predominantly been on communication and communication technology. However, relevant research has been carried out. For instance, Wiesenfeld et al. (1999) found in a seminal study that virtual workers built their identification on electronic communication to a greater extent than their less virtual counterparts. Moreover, Mortensen and Hinds (2001) found that shared identity reduced conflict in distributed teams. Insofar as conflict can be seen as detrimental to effectiveness, this result may be interpreted as indirect evidence that VT-level identification increases effectiveness. However, to our knowledge there are no direct empirical tests of this relationship in VTs (either main or moderated effects). This is rather surprising considering the importance given to identification in the VT literature (e.g., Bartel, Wrzeniewski, & Wiesenfeld, 2007; Fiol & O’Connor, 2005;

Wiesenfeld et al., 1999) and the vast number of studies on VT performance (see e.g., Powell et al., 2004).

Although the concepts of trust and identification have both been frequently (and sometimes even interchangeably) used in VT literature, it is important to underline their conceptual distinctiveness. While interpersonal trust refers to a psychological state involving confident positive expectations about another group-member's motives in risk-taking situations, it lacks the crucial self-defining component of identification that refers to the psychological merging of self and a specific group. Consequently, it seems quite clear that trust and identification are independent constructs and it is also in practice possible that group members can be identified with the group without trusting other members. An interesting question then is whether VTs can really be effective if only one of these important conditions is fulfilled.

2.3 The interplay between trust and identification in predicting effectiveness

Dirks (1999) and Dirks and Ferrin (2001) have criticized the dominant model in trust research which suggests that trust has a direct (main) effect on attitudes and especially on group performance. The common theoretical rationale for the expected trust-effectiveness relationship has been that a high level of trust increases the probability of risk taking (e.g. cooperation without certainty of reciprocity), which in turn leads to a high level of effectiveness (Costa, 2003; Dirks, 1999). However, in their review of 40 years of trust research Dirks and Ferrin (2001) concluded that the empirical evidence especially regarding the assumed trust - group effectiveness relationship does not support the main effect model.

Dirks and Ferrin (2001) stress that trust may moderate the relationship between motivational constructs and group performance. This proposition is based on the theoretical idea that trust may have an indirect effect on group performance by providing an assessment tool of one's work partners' potential behaviour and on interpreting their past actions. In a high-trust condition a team member believes in others' willingness to reciprocate and cooperate but in the opposite condition the team members become cautious or even suspicious and avoid cooperation. In line with this idea, Dirks (1999) found that motivation had significant positive effects on group performance in the high-trust condition but no effect on performance in the low-trust condition. A similar proposition can be made concerning the link between identification and effectiveness. Identification with a group is a strong motivational force which may provide the drive for group-serving behaviours (e.g., enhancement of group goals), while trust helps to facilitate such behaviours because in high-trust conditions a person believes that the others are also willing to cooperate and promote the group goals. Moreover, Dirks and Ferrin (2001) suggest that the moderation model of trust could be especially applicable to virtual settings. In VTs, there are few cues about the motivations and behaviours of others, and trust may provide a lens through which action is interpreted and responded to. Drawing on the theoretical reasoning of Dirks and Ferrin (2001) we propose the following:

Hypothesis 1: Within VTs, the relationship between identification and effectiveness is moderated by trust: the more the team members trust each other, the stronger the relationship between identification and effectiveness.

Based on the social identity approach (e.g., Haslam, 2001) and previous research it is also reasonable to expect that group identification may moderate the relationship between various motivators and group effectiveness. For example, Terry and Hogg (1996) found that group norms were more strongly related to corresponding behavioural intentions if individuals were highly identified with a group. More recently, Lipponen, Bardi and Haapamäki (2008) have shown that certain personal values are more likely to promote group-enhancing value-congruent behaviour if employees identify with the work-group. As previously noted, trust can be considered a strong motivator in interpersonal cooperation, because team members are willing to take risks if they believe that others are going to reciprocate. However, interpersonal cooperation between group members may take various forms and be directed towards a variety of goals some of which may not necessarily be related to group goals. In other words, cooperation (as a result of trust) may not be directed towards the enhancement of group goals if group members are not simultaneously identified with the group. Based on the reasoning above we hypothesize the following:

Hypothesis 2: Within VTs, the relationship between trust and effectiveness is moderated by identification: the higher the identification with the VT, the stronger the relationship between trust and effectiveness.

3. Methods

3.1 Procedure and respondents

The data for this study were gathered with a web-based questionnaire from eleven organizations. The questionnaires were sent to the members of 31 VTs in the Finnish based organizations. The fields that the organizations represented ranged from the social sector to the metal industry but most of the data came from the members of VTs in multinational companies (20 teams). All the VTs consisted of specialists conducting non-routine tasks. The respondent teams were selected in collaboration with the contact person in each company, and with the agreement of the team leaders. The minimal conditions for selection were the major definitional features of VTs presented above, that is the teams had more than one member collaborating to achieve a common goal, the team members or subgroups of them were located in different towns, and the respondents communicated mainly via ICT.

In total, 295 respondents received individual e-mails with an introduction to the study and a web address through which they could confidentially complete the questionnaire. In the e-mail and in the questionnaire, the respondents were prompted to answer all the questions relating to their named VT. It was stressed that even though in the items the term “team” was consistently used, the respondents should think about their VT named in the e-mail and in the questionnaire cover page when answering. 211 acceptable questionnaires were returned, a response rate of 71.5%. A slight majority of the respondents were male (56.4%), with an average age of 40.4 years ($SD = 8.7$). Their average team tenure was 25.9 ($SD = 34.6$) months. The geographical distribution of the team members or their sub-groups ranged from 2 to 13 different towns ($M = 4.7$; $SD = 2.6$).

The mean size of teams was 9.5 employees ($SD = 6.2$). As group size has been

found to be negatively related to group identification (e.g., Lipponen, Helkama, Olkkonen, & Juslin, 2005) we decided to control for size in our analyses.

3.2 Measures

Trust. Trust was measured with a ten-item scale based on previous measures by Cummings and Bromiley (1996; e.g., “In my opinion, my team members are reliable”) and McAllister (1995; e.g., “My team members approach their job with professionalism and dedication”). All items were modified to assess trust within the team and they reflected integrity, benevolence, and ability dimensions, all suggested to be important in the literature (Mayer et al. 1995; see Appendix 1). The response scale ranged from (1) “strongly disagree” to (5) “strongly agree”. Cronbach’s alpha for this scale was .94.

Identification. Identification was measured with a modified version of the organizational identification scale developed by Mael and Ashforth (1992). The questions were modified to assess identification with the VT (e.g., “This team’s successes are my successes”; see Appendix 1). The response scale was identical to that for the trust items. The five-item scale achieved Cronbach’s alpha of .74.

Effectiveness. Researchers often assess effectiveness by measuring dimensions of performance or attitudes towards a group or an organization (Cohen & Bailey, 1997). Hence, in the absence of objective measures, we rely on perceived effectiveness. Here we assess and define effectiveness as perceived task performance and coordination. Perceived team effectiveness was assessed with a three-item measure adapted from Connolly, Jessup and Valacich (1990; e.g., “We are very effective in coordinating our work”; see Appendix 1). The response scale was the same as that for the trust measure. Cronbach’s alpha for this measure was .73

We also carried out confirmatory factor analysis by using the AMOS program (Arbuckle & Wothke, 1999) in order to ensure the empirical distinctiveness of the measures of our study. When the ten items that were assumed to measure trust, the five items for identification, and the three items for effectiveness were included in a three-factor solution, they showed a good fit (CFI = .93, RMSEA = .07, C.I. RMSEA .06 - .09) ($\chi^2(132, N = 211) = 282.6, p < .001$), and the inter-factor correlations ranged from .38 to .56. A one-factor model with the same items showed a rather poor fit (CFI = .78, RMSEA = .13, C.I. RMSEA .12 - .14) ($\chi^2(135, N = 211) = 618.7, p < .001$). Comparison of the confidence intervals of the RMSEA indices reveals that a three-factor model is superior.

3.3 Aggregation to team level

As we were interested in the team level measurement and used such team level constructs as trust in the team and perceived team effectiveness, we aggregated the data to the VT level. In recent psychological literature three indicators are usually used to assess the appropriateness of the aggregation of individual level measures to the team level. Firstly, the r_{wg} statistics reflecting inter-rater agreement and within-team consensus were computed as suggested by James, Demaree and Wolf (1984). The r_{wg} values for trust were .89, for identification .83, and for perceived effectiveness .78, all of which reached the conventionally acceptable level (.70). Moreover, we computed the ICC(1) statistics, that is the inter-rater reliability indices, and the ICC(2) values indicating the reliability of group means (Chen & Bliese, 2002; Liao & Rupp, 2005). For our three measures, namely

trust, identification, and perceived effectiveness, the ICC(1) values were .18, .15, and .12 and the ICC(2) values were .60, .23, and .48 respectively. The ICC(1) scores are acceptable when compared to many previous studies (e.g., Chen & Bliese, 2002; Simons & Robertson, 2003) although they indicate some variation across respondents within the VTs. Unlike the ICC(1) formula, the ICC(2) scores do not take into account the small number of actual respondents from each team ($M = 6.8$) and remained rather low. However, as noted by Chen and Bliese (2002), the low ICC(2) values may hinder the detection of existing relationships in the aggregated data, meaning that we are not likely to find any relationships which are merely an artifact of the regression analysis – our main method of testing the hypotheses.

4. Results

In Table 1 we present means, standard deviations and correlations of the studied variables at the individual level. Comparison of those figures to the team-level statistics (Table 2) reveals that the correlations are at about the same level at both levels of scrutiny. Since we are interested in team-level analyses we shall concentrate on those results from now on (Tables 2 and 3). As can be seen (Table 2), both trust and identification had rather high means, indicating that neither the building of trust nor the formation of identification are problematic in VTs. The zero-order correlations suggest that trust and identification were strongly correlated with perceived effectiveness ($r = .70, p < .001$ and $r = .54, p < .01$, respectively). Moreover, team size, our control variable, had a negative correlation with identification ($r = -.34, p < .10$) as expected.

Table 1. Descriptive statistics and Pearson correlations among the variables at the individual level ($N = 211$)

Variables	<i>M</i>	<i>SD</i>	1	2	3
1. Team size	12.60	7.49			
2. Trust	4.19	0.70	-.10		
3. Identification	3.92	0.72	-.16*	.42***	
4. Perceived effectiveness	3.45	0.75	.01	.50***	.31***

* $p < .05$, *** $p < .001$, two-tailed

Table 2. Descriptive statistics and Pearson correlations among the variables at the VT level ($N = 31$)

Variables	<i>M</i>	<i>SD</i>	1	2	3
1. Team size	9.52	6.27			
2. Trust	4.19	0.41	-.15		
3. Identification	3.96	0.33	-.34#	.40*	
4. Perceived effectiveness	3.45	0.44	-.03	.70***	.54**

$p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$, two-tailed

The results of the regression analyses are presented in Table 2. We regressed perceived effectiveness on trust and identification (Step 2) after entering our control variable (Step 1). Both trust (Step 2: $\beta = .58, p < .001$) and identification (Step 2: $\beta = .37, p < .05$) were positively related to perceived effectiveness. In the final step (Step 3), we added the interaction term to the equation in order to test the moderation hypotheses (H1 and H2). We followed the procedure recommended by Aiken and West (1991) while creating the interaction term and in testing our moderation hypotheses. The results gave initial support for both of our hypotheses: the interaction term was positive and significant as expected (Step 3: $\beta = .31, p < .05$).

Table 3. Hierarchical moderated regressions predicting perceived effectiveness ($N = 31$)

	Step1 ^a	Step 2 ^a	Step 3 ^a
Control variables			
Team size	-.03	.18	.16
Main effects			
Trust		.58***	.46**
Identification		.37*	.28*
Moderator			
Identification X Trust			.31*
Statistics			
R ²	.001	.606	.673

* $p < .05$; ** $p < .01$; *** $p < .001$; two-tailed; ^a Betas are reported

The interaction effects were further subjected to simple slope analyses using conditional values for trust calculated to be one standard deviation above and one standard deviation below the mean of the moderator (Aiken & West, 1991). As expected (H1), the analysis indicated that the relationship between identification and perceived effectiveness was strong and positive when the level of trust within the team was high ($\beta = .51, p < .01$), but nonexistent when it was low ($\beta = -.06, n.s.$). Also, our second moderation hypothesis (H2) gained support: the trust-effectiveness relationship was strongly positive when the team members identified strongly with their VT ($\beta = .73, p < .001$) but under low-identification condition there was no association ($\beta = .16, n.s.$).

5. Discussion

In this study we investigated the close interplay between trust and identification in predicting VT effectiveness. We expected that there would be reciprocal moderation between identification and trust in predicting effectiveness. In this respect the results were actually stronger than we originally expected because we did not anticipate that the effects of trust and identification would necessarily totally disappear at the low levels of these moderator variables. Nevertheless, this seemed to be the case for both identification and trust in this sample. These results were important if we consider the discussion on the presumed role of trust and identification as VT success factors (e.g., Aubert & Kelsey,

2003; Fiol & O'Connor, 2005). Our results indicated that these two constructs are indeed essential for high VT effectiveness.

Previous studies (e.g., Worchel et al., 1998; Van Dick et al., 2006) have shown that identification may be related to performance. Based on Dirks and Ferrin (2001) we predicted and found that the moderation model of trust would be applicable to virtual teams, in which the amount of contextual information is limited. To our knowledge this is the first study to show that the strength of the link between identification and performance indeed varies depending on the level of trust within a group. Thus, our study adds to the basic knowledge on identification-performance relations. The identification as a moderator result, in turn, indicated that the trust-effectiveness relationship only existed when VT members are strongly identified with their team. In other words, team members would coordinate their work to accomplish group goals only when they identify with the team. Although this result is in line with the social identity approach (e.g., Terry & Hogg, 1998) and some previous studies conducted in the work context (e.g., Lipponen et al., 2008), to our knowledge this is the first study showing that identification moderates the effects of trust. Taken together, these results provide a novel insight into the interplay of trust and identity in predicting VT effectiveness, as it seems that neither high-trust nor high-identification alone is sufficient in producing effectiveness – both are needed simultaneously.

5.1 Limitations and directions for future research

Cross-sectional surveys are vulnerable to common method variance. However, as noted above, analysis of aggregated, VT-level data, low ICC(2) values, and especially the finding of a statistically significant interaction term gives us reason to believe that the results are not merely due to response bias (Ambrose & Schminke, 2003; Chen & Bliese, 2002).

In this article we have used the terms performance and effectiveness interchangeably. This follows from our definition of perceived effectiveness as perceived task performance and coordination. However, other researchers have operationalized performance in various ways which are often tailored to suit student samples (e.g., Aubert & Kelsey, 2003; Geister et al., 2006). These differences might impede the comparison of our results with previous studies. Moreover, as objective measures were not available, we used self-reports of effectiveness. However, this potential weakness does not diminish our confidence in the main findings, because objective and subjective measures have often been found to correlate strongly with each other (e.g., Costa, 2003; Geister et al., 2006; Hardin et al., 2006; Smith & Barclay, 1997). Moreover, the measure of trust used in this study did not distinguish between different forms of trust (e.g., knowledge-based trust; see Lewicki & Bunker, 1996). Therefore, future research still faces challenges in disclosing the relative importance of various forms of trust in VTs.

Cross-sectional methodology does not lend itself to the inference of causality. In fact, it is possible and even probable that in real-life VTs causalities are not very straightforward, whereas trust, identification, and effectiveness form virtuous or vicious circles depending on different situations and contexts. It might well be that the early successes of a VT promote identification with and trust within a team, which in turn motivate the team members to work harder and more effectively toward their common goal. In order to investigate these complicated reciprocal causalities longitudinal studies

are needed.

Finally, one potential weakness of our study is related to the rather limited number of teams ($N = 31$) in our sample. It is often unfortunate but in practice unavoidable that we cannot obtain large number of observations when we are doing group-level studies. Although we did have slightly fewer teams than Collquitt, Noe and Jackson (2002) had (N ranged from 46 to 88), or West, Smith, Lu Feng and Lawthom (1998) had ($N = 46$), our number of observations is actually the same as in Ehrhart, Bliese and Thomas' (2006) study ($N = 31$). Nevertheless, it would, of course, be important to replicate our results with larger samples before making strong conclusions.

5.2 Practical implications

Our results indicated that optimal VT effectiveness requires both high trust and high identification. Hence, the practical question is: How does one facilitate these two complementary building blocks of effectiveness in VTs? The VT literature suggests that some communication practices enhance the formation and maintenance of interpersonal trust in VTs. The keys to facilitate trust include showing enthusiasm, proactive and predictable communication, and substantial and timely responses (see e.g., Jarvenpaa & Leidner, 1999). Rather similar behaviours have been noted to enhance identification with VTs, namely the establishment of protocol and procedures to ease the use of electronic media and frequent electronic communication (see e.g., Sivunen, 2006; Wiesenfeld et al., 1999). Since our study highlighted the importance of promoting both trust and identification simultaneously the practical suggestion from previous VT literature for VT members and leaders can be summarized as follows: support predictable electronic communication.

Another means of tackling trust and identification simultaneously stems from the realm of justice research. Procedural justice, in other words the perceived fairness and quality of decision-making procedures, has been shown to be closely linked to both constructs. Even though procedural fairness is understudied in VTs the recent study by Hakonen and Lipponen (2007) showed that fairness in decision-making is strongly linked to identification with VTs. In other work settings this link has been found to be rather robust (e.g., Blader & Tyler, 2005). Even though to our knowledge there is no research on the fairness-trust link in VTs these two constructs have been widely shown to be closely related to each other in other contexts (Lewicki, Wiethof, & Tomlinson, 2005), and there is no reason to believe that the same would not apply to VTs. These links have practical value because procedural justice can be easily translated from theory to practical guidelines for action. Procedural justice has been shown to grow from listening to those whom decisions affect, basing decisions on accurate information, giving opportunities for corrections, suppressing personal biases and being consistent in decision-making procedures (e.g., Leventhal, 1980). Furthermore, procedural fairness is reflected in respectful treatment and being polite and kind in interactions (here electronically mediated) related to the decision-making (Tyler & Blader, 2000). In sum, these means of promoting procedural justice in VTs should simultaneously enhance trust and identification and consequently the effectiveness of VTs.

5.3 Conclusion

In this study we found that trust within and identification with VTs are strongly related to perceived team effectiveness. It is noteworthy that trust and identification explained an extraordinarily high amount of the variance of perceived effectiveness, which indicates that the interplay of these variables is indeed important in VT success. Trust and identification clearly lubricate group processes, which lead to the enhanced coordination of tasks and to increased effort to achieve a common goal. Moreover, our study indicates that trust and identification are needed simultaneously in order to gain optimal VT effectiveness. Since similar studies have not to our knowledge been conducted in traditional teams, it is premature to say whether or not this conditional effect is unique to the virtual setting. In any case, our results cry for replication and elaboration and hopefully will inspire scholars to join their efforts to study the interplay of trust and identification in different contexts.

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Appendix 1

Trust items

1. I think that my team members tell the truth in negotiations.
2. I think that my team members meet their negotiated obligations to our team.
3. In my opinion, my team members are reliable.
4. I feel that my team members negotiate honestly with me.
5. I feel that my team members will keep their word.
6. I think that my team members do not mislead me.
7. I feel that my team members negotiate joint expectations fairly.
8. My team members approach their job with professionalism.
9. I see no reason to doubt my team members' competences.
10. I can rely on my team members not to make my job more difficult by careless work.

Identification items

1. When someone criticizes this team, it feels like a personal insult.
2. I am very interested in what others think about this team.
3. When I talk about this team, I usually say "we" rather than "they".
4. This team's successes are my successes.
5. When someone praises this team, it feels like a personal compliment.

Perceived effectiveness items

1. We are very effective in using the skills of different team members.
2. We are very effective at generating new ideas.
3. We are very effective at coordinating our work.

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