Master Thesis

Virtual teams and the case of emergent leadership: an exploratory study

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ABSTRACT

Objectives: This study is taking a closer look into a popular and a relatively new type of team-based groups, namely virtual teams and their power dynamics. Normally created without any designated leaders, the process of leadership emergence within such virtual setting, especially with reference to the emotional, personality and communication abilities of the individuals, remains unclear. Therefore, the purpose of this study is to examine some of the emotional and personality characteristics associated with the emergent leaders' figure in virtual team settings and to build a pattern revealing their importance throughout the leadership emergence process.

Method: The research design consisted of three main components aiming at revealing the true nature of emergent leaders in virtual settings. A one hour online discussion, an anonymous questionnaire and DANVA 2 performance-based test were the three elements which the participants had to fulfill in order to provide the needed data. The following step was a thorough text analysis of the extracted bodies of text, which was done by utilizing the innovative analytical tools IBM Watson Personality Insights and LIWC dictionary.

Results: The findings show that emergent leaders of small virtual teams tend to be more assertive, talkative and prone to create and maintain successful affective relationship with the others. Most probably they would not distinct themselves in terms of status and at the same time, tend to demonstrate more informal and personal thinking style. On top of that, they appear to be able to detect emotional nuances and to successfully manage them, benefiting from the knowledge gained during their extensive working experience.

Implications: Through the combination of various sources of data and some innovative analytical tools, this exploratory study managed to reveal a pattern proposing a mix of skills and factors essential in the process of leadership emergence in small virtual teams. Emergent leaders in virtual settings appeared to benefit mostly from traits like assertiveness, affiliation, talkativeness, emotion detection (in reference to EI) and working experience. In relation to the extracted results, the concept of Emotional Competence was also introduced and recommendations for further examination of the importance and contribution of the emotional intelligence and emotional competence concepts, with regards to the given context, were made. In addition to that, the present study found the variables extraversion and analytical thinking to have limited contribution to the emergence of the leaders in such working environments, compared to the other examined measures.

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1. Introduction

Globalization, flatter organizational structures and the extensive use of computer-mediated communication (CMC), have had a strong impact on the working processes of many companies. Consequently, the latter have encountered various factors transforming the nature of their team-based professional groups. These factors have indicated new work challenges for such entities, like doing business and distributing responsibilities across physical boundaries, different time zones and organizational contexts. As a result of the changing business environment the foundation of a new type of team-based groups, namely virtual teams, has been set and has widely emerged ever since.

Virtual teams consist of people fulfilling common organizational tasks, aiming at realizing the same final goals and collaborating via computer-mediated communication across time, geographical and organizational boundaries (Zigurs, 2003; Wakefield, Leidner, & Garrison, 2008). In-depth research has shown that 'virtual teams', as a method of group work, have been used in almost every possible working field for the past few years. As a result, occupations like manufacturing (Maznevski & Chudoba, 2000), education (Hardin, Fuller, & Davison, 2007), software development, medicine and many more have widely been incorporating virtual team structures in the everyday work of their employees. These group formations have been acknowledged to contribute to the better and more effective working processes and final outcomes of their organization.

However, it has been proven that some challenges such as decision-making and conflict management are deeply rooted in the virtual teams as well. Team leadership is considered among one of these main issues. Concurrently, team leadership is perceived as an essential factor in the process of mitigating the abovementioned challenges, as well as enhancing teams' effectiveness and work performance (Dulebohn & Hoch, 2017). Various academic studies highlight that team leadership is of great importance, especially when it comes to problem-solving and successful task fulfillment in such virtual work environments (Pierce & Hansen, 2008; Malhotra, Majchrzak, & Rosen, 2007).

A common occurrence in virtual teams is to be created without any formally appointed leaders. Virtual teams benefit from the shared-leadership model (Conger & Pearce, 2003; Pearce, 2004), meaning that various individuals could emerge as informal group leaders and later on switch their roles, depending on their task or other factors such as some external influence (Lipnack & Stamps, 2000). No limitation of the number of leaders, emerging in virtual teams has been set; therefore, it is common more than one person to embrace the role of virtual team-leader over time (Wickham & Walter, 2009).

Scholars have stated that despite the shared-leadership setting of virtual teams, individual leadership traits are of great importance for the creation of power dynamics within the group (Conger & Pearce, 2003; Pearce, Alavi & Yoo, 2004). In relation to that, it has been argued that leadership emergence and the personality characteristics of the individuals also have a significant relation (Balthazard, Warren & Waldman, 2009; Anderson & Kildufee, 2009). The personality dimensions, most commonly examined regarding leadership emergence, are Extraversion and Conscientiousness. It has also been implied that Emotional Competences (EC) are highly relevant in the process of envisioning emergent leaders (Wolff, Pescosolido,

& Druskat 2002). A number of academic papers suggest that emotion recognition, and in this sense Emotional Intelligence (EI), can be of great help with task-coordination and therefore, supporting the leadership role in the group. The reason for that is because it is a common practice for individuals to express information related to the team's task with the help of emotional hints (Schwarz, 1990; Ambady, Elfenbein & Polzer, 2007). Those hints could also reveal some valuable social data about the individuals' preferences and behavior (Van Kleef, 2009; Côté & Hideg, 2011). Hence, suggesting that people with high ability to recognize emotions are more likely to identify task-related problems emerging at a team level, as well as situational requirements, and ultimately to act more productively (Rubin, Munz & Bommer, 2005; Brotheridge, 2006). However, these statements raise the following questions: which concept has a more significant role in the process of leadership emergence in virtual settings? Is emotional competence, which is usually reflecting the current business environment and social experience of the participants, more relevant? Alternatively is EI, as an innate skill, more important when it comes to leadership in virtual teams? Scholars suggest that EI is at the core of emotional competence and that there is interdependence between the two, when it comes to working performance; however, no in-depth research of the topic, when it comes to power dynamics in virtual settings has been made. In fact, analysis of these concepts along with other factors, such as personality traits and communication behavior of the individuals, could make the process of detection of leadership emergence in group virtual settings more exhaustive and consistent.

Referring to the research question "What are the communication traits, emotional and personality characteristics associated with the emergent leadership figure in virtual teams?", this study aims to reveal a pattern proposing a mix of skills and factors essential for the process of leadership emergence in such virtual settings. Throughout the research, various innovative technologies were utilized to measure variables ranging from some of the participants' communication and personality traits, to their emotional abilities. With regards to the latter measure, differentiation between the concepts of Emotional Intelligence and Emotional Competence was made, suggesting the prevailing importance of the second one, for the leadership emergence process. In turn, this revelation supports Daniel Goleman's (1998) statement that EI alone could not affect the leadership skills and overall performance of individuals. Some additional suggestions with regards to future research, facilitating the better understanding of the power dynamics in small virtual groups were proposed as well.

2. Theoretical Framework

Emergent leaders are defined as people who have considerable authority over the other group members, even though they may have not been assigned with prior formal leadership function (Schneider & Goktepe, 1983). Emergent leadership could be described as a within-group individual leadership phenomenon. It is characterized with the informal self-designation of individuals as team-leaders, without being given any previous formal authority. The process of leadership emergence has been part of and examined in different contexts. It could appear in self-managing teams (Manz & Sims, 1987), traditional organizational

working environment (Judge & Piccolo, 2004), small groups (Taggar & Neubert, 2004), etc. Even though quite different, all the previously listed contexts have "leadership" as a common factor essential for their success and positive performance. In fact, many researchers have found that central for a team's success is, indeed, its effective leadership (Kirkman & Rosen, 1999; Wageman, 2001).

Leadership could be defined and measured in various ways (Hogan, Curphy & Hogan, 1994). When it comes to leadership emergence, the team members' perception of individual's leadership role and traits, despite having limited knowledge of this person, is central. In this research, leaders would be conceptualized as people who inspire social interaction among participants of online communities and easily persuade them into reaching a common decision or solution to a problem. Based on the social research performed by Hollander (1961), leaders could be defined by their ability to affect people's behavior and attitude towards the same goal. As a complement to that, Turner (1991) has stated that they should also have the ability to influence and direct not only separate individuals, but a whole group or a team. In both cases, leaders could be defined by their followers and more specifically, they can emerge from their capability to attract and trigger a reaction from them.

Leadership influence reach and emergence in computer-mediated collaboration are reliant on both the message content and communication behavior (Huffaker, 2010), reflecting the individuals' personality traits and skills. That is why in this research special attention was paid to different components of both communication behavior and content. In addition, the participants' emotional abilities were also considered as facilitating the formation of the leadership figure and its emergence (Wolff, Pescosolido, & Druskat 2002). Following a recommendation made by Mayer et al. (2008), EI was differentiated from any personality trait and skill, as it is a different concept. That is why, apart from variables related to the communication behavior and personality characteristics of the participants, differentiation and special attention was paid to the concepts of emotional intelligence and emotional competence as well. Figure 1 shows all of the examined variables grouped accordingly.
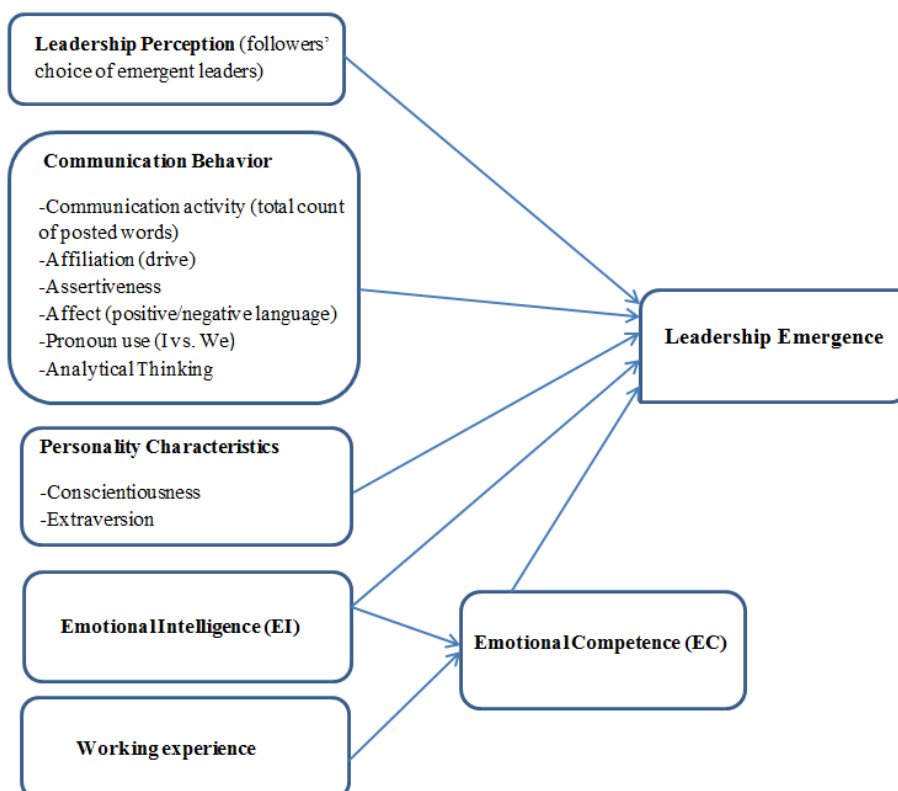

Fig. 1: Groups of emotional, communication and personality characteristics examined in the study

2.1.   Communication behavior and leadership emergence

Emergent leaders in virtual settings could be characterized as individuals possessing high ability to influence their team members via utilizing various traits, previously defined by scholars working in the social psychology and communication fields (Huffaker, 2010). These traits could include some aspects of the communication behavior of the individuals, as well as content and emotional valence of their messages. The following study examined the contribution and importance of six such attributes associated with leadership emergence processes in virtual settings.

1) Level of sociability and sense of togetherness shown by participants was examined during the group discussion. Common practice for people is to use sociability in group context for two reasons: one, to receive more information and two, to successfully build intra-group relationships (Rice, 1987). In addition, it has been proven that when extensively engaging in a certain conversation, one has better chances to influence the recipients of his/her message, hence, extend his/her reach (Weimann, 1994). According to some scholars spending time to provoke other team members' participation is a typical feature of successful online teams, and it results in fostering a sense of social identity within the community (Koh, Kim, Butler & Bock, 2007). Not only that, but according to Leshed, Hancock, Cosley, McLeod, and Gay (2007) small group members are perceived by their teammates as more project-oriented and involved if they use a greater amount of words. Supporting these statements, several other studies present the idea that in computer-mediated communication, team members usually distinguish leaders based on the volume of communication they generate (Yoo & Alavi, 2004, Sudweeks & Simoff, 2005, Misiolek & Heckman, 2005). Therefore, an important factor in detecting emergent leadership traits among the participants of this study, was the volume of the text (total word count) generated by each of them.

2) The text's language intensity, as another technique for creating more influencing message content was analyzed as well. Academics note that general emotional cues appear to be an effective persuasive tool. It has been proven that constructing a message in a more positive or negative way will grab the attention of the recipients and thus, have a stronger influence on them (Smith & Petty, 1996). When it comes to online computer-mediated communication, it is considered that sending more emotionally positive messages will result in stronger sense of community within the team and will also facilitate more continuous participation (Joyce & Kraut, 2006). Contrary to that, negative emotional affect will culminate in negative feedback and hostile interaction.

3) The choice of powerful and powerless language by the participants, also affects the perception of the other members of the conversation (Ng & Bradac, 1993). Powerful language uses more assertive words like "always", "never", "sure", etc., and lacks in powerless cues like hesitations, tag questions, etc. Number of researchers argued that compared to powerless language, the powerful one is more influential and the individuals using it tend to be more persuasive (Burrell & Koper, 1998). Therefore, participants who are posting more assertive

and confident messages were considered as the ones possessing greater leadership skills and potential.

4) The individual's choice of pronoun use, as another indicator of the relationships amongst the participants that could be revealed through their language expression, was also taken into account. It has been suggested that pronouns disclose how the participants refer to the other individuals internally and externally to the group. It has been stated that individuals coming from a higher rank tend to speak more often and openly share comments that involve other people. Contrasting this view, individuals with a lower status would usually be more uncertain and self-focused (Tausczik & Pennebaker, 2010). In other words, first-person plural pronouns could be a predictor of higher rank, while more extensive use of first-person singular pronouns could be detected in low-status speech (Kacewicz, Pennebaker, Davis, Jeon, & Graesser, 2009).

5) McClelland (1987) suggested that one of the leaders' motives, suitable for effective leadership, is the need for affiliation. This affiliation drive leads to the desire to establish and maintain successful personal relationships with the other people around you. People having a rather low need of affiliation could be characterized as socially distant individuals that would remain more objective in terms of discipline and tasks delegation. According to Sorrentino (1973) individuals who possess high drives for achievement and affiliation are more prone to demonstrate leadership behavior. As a complement to that, Field and Sorrentino (1986) also proposed that emergent leaders tend to possess high affiliation-oriented and success-oriented motivation.

6) The analytical thinking skills of individuals, usually related to their cognitive abilities are considered necessary for one to be an effective leader (Kirkpatrick & Locke, 1991). Lord and Hall (1992) stated that when a leader has higher cognitive abilities he/she would be able to better process information in controlled and analytical way, essential for the successful organizational decision making. However, according to Litizinger and Schaefer (1986), a balance between a leaders' analytical logic and their intuitiveness and spontaneity should be found. It has been proven that emergent leaders tend to generate more ideas and be more creative and confident in expressing their opinion (Morris & Hackman, 1969). Building on these rather not unanimous statements regarding analytical thinking and its role in the leadership emergence of individuals, further investigation in that direction could clarify its importance to the emergence of leadership figures in virtual work settings.

2.2. Personality traits and leadership emergence

In the process of detecting leadership traits, this research relied on two personality characteristics, namely conscientiousness and extraversion, both, part of the Five-Factor Model of Personality. Morris and Maisto (2002) described personality as one-of-a-kind variety of feelings, thoughts and behavior of people that remains the same over time and in

different situations. In addition, some analysts have declared that personality has direct impact on the performance and attitude of individuals at their work place (Wong & Law, 2002; Cameli & Jozman, 2006). Over the years scholars have put a special emphasize on the relation between personality traits and leadership emergence (Balthazard, Warren & Waldman, 2009; Anderson & Kildufee, 2009). Therefore, further exploring in this direction facilitated the extraction of more detailed and conclusive results.

1) Conscientiousness is associated with the extent to which an individual is prone to be punctual, organized, goal-oriented and reliable. This trait is proven to be the only one of the Five-Factor Model, to predict without any exception, how well a person will perform at his professional affairs (Barrick & Mount, 1991). Common for highly conscientious people is to work hard towards achieving their goals and to possess clear sense of direction (McCrae & Costa, 1992a, 1992b). Conscientious individuals are usually referred to as systematic, self-disciplined and prone to act obediently (Erdheim, Wang & Zickar, 2006). Their focus and wide knowledge of the task assigned to the team are considered as the main factors of why conscientious individuals emerge as leaders (Taggar, Hackett & Saha, 1999). As a matter of fact, according to Taggar, Hackett & Saha, (1999, 2006) between extraversion and conscientiousness the latter has a stronger relationship with leadership emergence. As a complement to these findings Balthazard, Warren & Waldman, (2009) have also stated that there is a positive relation between the phenomenon of emergent leadership and the virtual teammates' level of conscientiousness. In conclusion, conscientious individuals are considered to be greatly motivated and goal-oriented; thus, it is more likely for them to emerge as team leaders, and to successfully execute the functions of the given role.

2) The second personality characteristic, considered strongly related to leadership emergence, is extraversion. Teng (2008) describes highly extraverted people as more talkative, sociable, outgoing and taking pleasure in social interaction. Individuals possessing high level of the extraversion trait tend to have more friends, enjoy attending various public events and adjust better to changes in their personal and professional lives. The reason for the latter is mainly because they actively request feedback and additional information from their social circles and, as a result, build more effective relationships which further facilitate the process of adjustment (Wanberg & Kammeyer-Mueller, 2003). In addition, it was suggested that this personality trait is characterized by positive emotionality (Watson & Clark, 1997). This positive attitude and emotional expressiveness makes extraverts appear more confident and forceful. Thus, it is likely for these individuals to promote respect among team members and boost their confidence as well. Consequently, it is common for extraverts to acquire leadership roles and be perceived as leaders over time (Gardner & Avolio, 1998). It is likely for extraverted individuals to be intrigued by team work (Kristof-Brown, Barrick & Stevens, 2005) and also to provoke engaging discussion within the group (Taggar, 2002). According to Simoff and Sudweeks (2005), emergent leaders appear according to the needs of the team and through indicating early leadership signs like early interaction and frequent communication, exchanging quality messages, promoting the feeling of confidence among the other participants in the conversation.

2.3.   Leadership emergence and the concepts of EI and EC

In recent years, emotional intelligence (EI) has brought up a lot of attention in various fields like social sciences, organizational behavior, etc. As a result the academic world has been managing a number of different, some even controversial, definitions of the concept. However, the essential premises behind the term, Emotional Intelligence, have appeared as rather simple. According to Cherniss (2010) EI is established on three main hypotheses. First, emotions are significant part of people's daily life. Second, people may possess different ability to detect, manage and use emotions. Third, the various abilities of emotion detection and management may affect the adaptation of individuals in different situations including the workplace. In order to fully picture EI, further interpretations are needed: one of the more widely-known definitions given by Mayer and Salovey (1997) states that EI is one's ability to detect and express various emotions, understand and persuade with emotions and manage and regulate emotions, both personal and those of others. Similarly, EI has been characterized as the internal ability of individuals to accurately approach, understand and manage not only their own emotions but also those of the people around them (George, 2000). Furthermore, Daniel Goleman (2006) implied that emotions which are out-of-control can cause a cognitively smart person to act in a non-intelligent way.

Various studies have hypothesized that people's inner attributes are indirectly associated with positive leadership results (DeRue, Nahrgang, Wellman, & Humphrey, 2011). According to George (2000), leadership is an emotionally charged process; therefore, the assumption, that effective leadership is strongly related to emotional intelligence, high team-work capacity and positive personal interaction has been made in a number of academic papers (Côté, Lopes, Salovey, & Miners, 2010). In addition, EI has been considered one of the building blocks of positive group performance since it could greatly influence the development of work relationships in group work settings (Ashton-James & Ashkanasy, 2006). It has also been suggested that emotionally intelligent team-members would be more inclined to identify task-related problems and particular requirements related to them. As a result, it would be expected of these individuals to execute more productive courses of action (Rubin, Munz & Bommer, 2005; Brotheridge, 2006).

However, there are a few other research papers suggesting that emotional intelligence could have significant influence over general performance, only if it is moderated by emotional competence (Goleman, 1998; Abraham, 2004; Vaida & Opre, 2014). It has been proposed that emotional competence has an essential role in leadership, explaining that leaders' social awkwardness could decrease the performance of entire teams or even organizations (Goleman, 2006). Differentiation between the two concepts of EI and EC has been made by clarifying that the latter is a set of habits, deeply rooted in EI and, also, leading to outstanding work performance. Furthermore, emotional competences were defined as "learned" skills which development is strongly dependent on the individuals' levels of EI (Wakeman, 2006). It has also been clarified that being highly emotionally intelligent is not always an inevitable prerequisite of high EC (Goleman, 1998; Vaida & Opre, 2014).

In terms of cultivation of emotional intelligence skills, some scholars believe that EI could increases with the age of the person. Mayer and Salovey (1997) suggested that people can

improve EI skills as a consequence of going through various emotionally significant events. Goleman (1998) also supported the statement that the levels of EI are not permanent throughout our entire lives and insisted that emotional intelligence could be learned and grow over time, especially with the growing maturity of the people. He introduced the idea that emotional competences could also be developed with the right emotionally saturated professional and personal experiences; the idea was also supported by Boyatzis et al. (2002) and Wang, Young, Wilhite and Marczyk (2011). That is why a variable related to the working experience of the participants was also examined in this research. The latter measure was considered only in terms of EI and EC development overtime.

3. Methodology

Research Design

The following study had two main objectives: 1) to identify the skills and characteristics that emergent leaders of small virtual teams have in common; 2) to measure the emotion recognition ability of the participants, along with their working experience, suggesting the prevailing importance of either EI or EC among the designated leaders. Scholars have suggested that despite its main role in individuals' social interplay, emotion recognition, alone, will not be able to fully justify their behavior (Nowicki & Duke, 2001): therefore shifting the main concern from "if" people can identify emotional information, to "how" will they use it (Elfenbein, Marsh, & Ambady, 2002). Furthermore, scholars have defined emergent leaders not solely by the ability to identify team-members' emotional and task-related difficulties, but also by their predisposition to properly respond to such attitude (Zaccaro et al., 1991). That is why additional analysis, aiming at revealing the communicational behavior of the participants and their personality characteristics was conducted in order to support the detection process of emergent leadership and to make the interpretation of encountered tendencies more conclusive.

The following study draws its results upon the combination of three components:

1) The first component of the method design was a discussion, during which the participants were asked to consider a common problem in an online group chat. Before the beginning, the participants were divided into three groups of four people. For the fulfillment of the goal, the students were asked to interact in a Skype group chat, communicating only through means of text messaging. The main topic of the discussion revolved around how the imaginary city of Twentesbrook should distribute a 9 million grant among four pre-determined problematic alternatives (safety, healthcare, public transport, water governance). Four unique case scenarios were distributed among the members of each team. These case scenarios were explaining the common problem among the team members and their special role in it. Before the beginning of the experiment, it was clarified that the students should do their best in order to win as great amount of money as possible for the alternative suggested by their case

description. Further discussion on the different case scenarios was not allowed. The participants had 60 minutes to come up with a final, well-substantiated decision in order the task to be considered as successfully fulfilled. In the end, the final decisions of the teams were unanimous.

The main goal of this group task was to uncover the participants' communication behavior that was truly revealing their leadership nature and skills. Furthermore, through generating big bodies of text, during the discussion, some of the team members' personality traits were also able to be analyzed; therefore, additional information regarding the students' leadership behavior was obtained.

2) The second component was focused on the participants' insights from the group discussion. Through fulfilling a questionnaire, all of the 12 individuals were asked to reflect on each other's contribution and rank all teammates based on that. The desired outcome of this component was for the individuals to evaluate the leadership behavior and potential of their teammates and rank them accordingly. Scores ranging from 1 to 4 were given, with 1 being the highest possible and 4 the lowest one. The students were allowed to point themselves out as leaders as well, depending on their personal opinion. At the end, participants from each of the three groups who, according to the majority, emerged as leaders during the group discussion were appointed as perceived leaders of their virtual team.

3) A performance-based test, evaluating each participant's ability to detect four basic emotions (happiness, sadness, fear and angriness) and therefore indirectly evaluate their emotional intelligence levels, was the third and last component. For the purpose of this research the DANVA 2 test was utilized. DANVA 2 is a performance-based test that requires the participants to identify emotions expressed in a number of recordings and photographs of professional actors. To have a better perception of the participants' ability to detect emotions, they have completed both groups of audio and visual components, presented by adult encoders. Each group consisted of 24 audio and 24 visual elements, meaning that in order to extract more precise results, each participant answered 48 emotion-related, performance-based questions. At the end the results were presented in the number of errors made by each individual. It was accepted that the higher the number, the lower his/her ability to detect emotional nuances.

Participants

The target population for this research consisted of currently enrolled bachelor and master students of the University of Twente. During the experiment they were required to work with the communication platform Skype, therefore the possession of such or a willingness to work with it, were also considered as valid participation requirements. The participants' sample size was N=12 of which three groups of four people were divided during the experiments. The age of the individuals was ranging between 22-30 and the male/female ratio was 3:1. All of the three experimental groups were multinational and most of the participants were coming from different professional backgrounds and experiences.

Sampling Procedure

Due to the nature of this research and also due to some practicalities, convenience sampling was used as a sampling technique in this research. Eligible candidates had to fulfill two requirements, namely to be enrolled as full-time students at University of Twente and to be able to work with the communication application Skype (both willing to work and to have the needed hardware to install it). Before the beginning of the experiment all of the participants received an information sheet providing a brief explanation of the research, experiment procedure and their rights; no information, regarding the research that might have biased the students' behavior and the final result was shared in advanced. After the end of the experiment, all of the participants were de-briefed and more exhaustive details regarding the research and its aim was distributed.

Analytical Tools

Linguistic Inquiry and Word Count (LIWC) dictionary

The Linguistic Inquiry and Word Count dictionary possesses the ability to analyze a given body of text and calculate the percentage of words that fulfill pre-determined conditions (language categories). As a result, the percentage of words reflecting different emotions, social concerns, various communication styles and even parts of speech could be counted. LIWC's language categories have been created to capture both people's psychological and social states ("LIWC | Linguistic Inquiry and Word Count," n.d.).

In this research, LIWC dictionary had an essential role in the analysis of the virtual team members' written communication behavior and language use. The textual correspondence exchanged amongst the teammates was thoroughly analyzed using some of the language categories provided by LIWC. In order to utilize the dictionary according to the requirements set in the research, the following variables were examined:

1. The *talkativeness* of the group members, represented by the total word count per individual.
2. Each participant's ability of *communicating in an assertive way* was measured through detection of the assertive words used in their messages.
3. The *affect* of the participant was measured, through detecting the positive and negative words with which their posts were charged.
4. The participants' *pronoun use* revealing how did they referred to their teammates and whether they have demonstrated high or low status during the discussion.
5. The individuals' *affiliating communication drive*, reflecting their need to establish and maintain proper emotional connection with the others.
6. The students' ability of *analytical thinking*, or in other words, their ability to think in more hierarchical, formal and logical way.

The final outcomes were linked to results from further analysis of the personality traits and the participants' abilities to detect emotions. A comprehensive conclusion about the

participants' possession of leadership traits and their capability to emerge as leaders in the virtual teams was made.

IBM Watson Personality Insights

The following services, provided by IBM Watson's application programming interface (API) allow easier determination of personality insights from sources like social media or other digital communications, like group chats. IBM Watson Personality Insights uses linguistic analytical thinking to interpret participants' intrinsic personality characteristics from digital written communications such as text messages. The Big Five Model, as one of the main models on which this tool is established is perceived as the most popular technique in generally describing how a person engages with the world ("Watson Personality Insights," n.d.). With reference to this model the main focus was put on the following two personality characteristics, as the ones most widely used in relation to the leadership figure and the process of leadership emergence:

1. *Conscientiousness,* as one's inclination to behave in more coordinated or considered way.
2. *Extraversion*, as one's impulse to look for stimulation while communicating with the group members.

Emotional Intelligence (EI) as operationalized through the Diagnostic Analysis of Nonverbal Accuracy Test (DANVA2)

The Diagnostic Analysis of Nonverbal Accuracy 2 (DANVA2) is a performance-based test showing photographs and recordings of professional actors while recreating a situation, in which they express one of the following four basic emotions: fear, angriness, sadness and happiness. These emotions are presented with high or low intensity on both the audio and visual components and are considered to be the most commonly used emotions in daily communication (Nowicki, 2006). It is expected that every person should have learned to detect and differentiate them by the age of ten-years-old (Kirouac & Dore, 1983; Camras & Allison, 1985; Curtrini & Feldman, 1989). Without being able to detect these basic emotions, it is likely those people to have limited knowledge of proper social behavior and further difficulties in learning to distinguish between more complex emotions like shame or guilt.

According to Mayer and Salovey (1997), *emotional intelligence* could be characterized as one's capability to distinguish emotions, to create, correctly interpret and regulate emotions in order to encourage intellectual and emotional growth. In this research, DANVA 2 was utilized as the main tool in the process of examining the participants' ability to detect emotions. As being one of the main components building up the concept of EI, the process of recognition of emotional nuances facilitated the indirect evaluation of the participants' levels of *emotional intelligence*. Therefore, DANVA 2 was considered as a reliable source in the indication of the emotional intelligence capabilities of each participant.

Measures

Measurement of conversation activity

After a thorough text analysis of the group conversation, with the well-renowned LIWC dictionary, key information regarding the participants' communication behavior was extracted. The variable "talkativeness" or in other words, communication activity of the individuals, was derived in this part of the analysis.

Talkativeness - Measured as the sum of the total number of words, found in the messages of each participant.

Measurement of each participant's language use

Besides the conversation activity of the participant, the content of their messages was also analyzed in terms of language use. For the purpose of detecting the levels of "affect" and "assertiveness" of the participants, the predefined LIWC dictionary was utilized. With the help of this dictionary, additional variables like "analytical thinking", "total pronoun" and "affiliation (drive)", were also able to be analyzed.

Analytical Thinking - Acted as a summary measure, established on previously published, by Pennebaker Labs, algorithms. Because of some commercial agreements, access to the exact algorithms is not available. The interpretations of the calculated results for this variable are as follows: participants with high scores for the analytical thinking variable are expected to be more hierarchical, formal and logical. Meanwhile, the ones with low scores, are likely to possess more narrative, personal and informal thinking (Pennebaker, Booth, Boyd & Francis, 2015).

Affiliation (drive) - Includes McClelland-like dimensions that could be related to the desire of the individuals to maintain, restore or even build a positive emotional relationship with other people. Since it is usually associated with positive personal relationships, references to other participants, made by the teammates during the discussion were also considered important and included in the analysis.

Assertiveness - Measured as the frequency of use of certainty words, such as ''always'', ''surely'' or "never", posted by each participant. This analysis was based on a number of predetermined assertiveness words within the LIWC dictionary, divided by the total number of words used in each message.

Affect - Measured as the frequency of use of words like ''cried'', ''happy'', ''smiled'', ''ugly'', etc., posted by the conversation participants, and divided by the total words count, shared in each message.

Total pronoun (I or we) - Measured as the frequency of use of both first-person singular and first-person plural pronouns posted by the participants. All pronouns separated by tabs and spaces as well as the contracted ones were counted.

Measurement of personality traits

In order to measure some of the personality characteristics strongly related to the leadership role, namely, *conscientiousness* and *extraversion*, the IBM Watson Personality Traits API was used. The messages from each group conversation were extracted and analyzed as a separate body texts, per person. The results reported by IBM Watson Personality Insights were normalized and presented in the form of "percentiles" within the range of 0 and 1 ("IBM Cloud Docs," n.d.). The greater the percentile, the stronger would the individuals have demonstrated the given personality trait in their communication.

Conscientiousness – Defined as the tendency of individuals to behave in a more thoughtful and organized way. During the analysis, the facets "achievement striving", "self-efficacy", "self-discipline", "cautiousness", "dutifulness" and "orderliness", parts of the conscientiousness personality trait, were also considered. The results reported for the facets and the personality characteristics were not based on any mathematical relationship: the IBM service calculates them independently ("IBM Cloud Docs," n.d.).

Extraversion – Defined as the tendency of individuals to look for stimulation while communicating with others. During the text analysis, the facets "excitement-seeking", "outgoing", "activity level", "cheerfulness" and "assertiveness", parts of the extraversion personality trait, were taken into account. Identically to the conscientiousness personality trait, the final score for both the extroversion characteristic and its facets were calculated separately.

Due to the nature and scope of the research, the results related to the personality traits of the participants were not used as a means of comparison among the team members and their abilities to emerge as leaders. The analysis of the individuals' personality traits was beneficial in defining and better understanding the participants' nature, regardless the other factors. The calculated results were dependent on the provided number of words per participant; therefore the outcomes were strictly individual and any comparison among the other participants was not recommended.

In order to make the following results more statistically significant, samples of text bigger than 3000 words and gathered over longer periods of time, should be submitted. The samples used for this research range between 12.5% and 12.2% in terms of Average Mean Absolute Error (MAE) based on the submitted quantity of words. The highest precision in terms of MAE could reach as much as 12.1% ("IBM Cloud Docs," n.d.).

Measurement of participants' ability to detect emotions

By utilizing the Diagnostic Analysis of Nonverbal Accuracy (DANVA) test, the participants' ability to detect emotional cues in different levels of intensity was measured. For that purpose, the four basic emotions – *happiness*, *fear*, *anger* and *sadness* were shown via both audio and visual elements. The exposition of the elements was speeded, meaning that the participants had no more than 5 seconds to look at each picture and limited time to hear the pre-recorded messages.

The results are shown in number of errors made by each participant. The higher the number, the lower is the ability of emotion detection demonstrated by the participant.

Measurement of participants' experience and perception

After the end of the online group discussion, a short questionnaire was distributed among the participants. Thanks to the given answers, more conclusive information about the participants experience during the experiment and in their personal lives, with regards to their working experience, was gathered.

Perception of leadership – Participants shared their insights gathered during the experiment. After a one-hour conversation with the other group members, in which a common problem was discussed, the participants were asked to rank each of their teammates, including themselves, according to their general perception of who appeared to possess and show stronger leadership skills. The ranking was done through the scale from 1 to 4, 1 being the highest and 4 the lowest score.

Working experience - Measured as the total number months/years of active working experience of the participants. It may have included internships, leadership positions occupied at school, present professional affairs etc. Regardless of the position, the activities should have met the given requirements to provide (or have provided) appropriate professional environment, implying responsible attitude from the participants and including the opportunity to effectively interact with various individuals. In other words, to provide favorable, professional environment, in which the participants to be able to, successfully, develop their emotional abilities.

Analysis

A central variable in the detection of emergent leaders in virtual teams was considered the designation of the leadership figure by the members of those groups. The relevant results were extracted through an anonymous questionnaire, which took part as the second component in the experiment and aimed at revealing the participants' perception of the emergent leaders in their teams. Once the questionnaire was fulfilled the following actions were performed:

1. The data per participant was selected and registered individually.

2. The means of the extracted results were calculated and comparison between the participants' personal scores was made so the individuals perceived as emerging leaders to be revealed.

In order to use the text derived from the first part of the experiment, namely the group chats, and to find a viable pattern among the communication behavior and personality traits of the emergent leaders, the following steps were encountered:

1. All of the messages sent by the participants were extracted from the communication application Skype.
2. In order to make the analysis more conclusive, the data was cleaned and the text was divided by participants. After that, the messages were saved in separate text files by senders.
3. Possessing the individual text files facilitated the consecutive process of precise data analysis. In order to receive the information about the individuals' communication behavior and personality characteristic, the extracted textual data was loaded into the software applications - IBM Watson Personality Insights and LIWC dictionary.
4. Based on the requirements, specific rules or conditions were assigned to these tools in order the needed results to be extracted.
5. Comparison between the individual results was made in order to detect a pattern revealing common features in the communication behavior and personalities of the team members, earlier defined as emergent leaders.

For the last part of the experiment, where the participants had to fulfill a performance-based test, analyzing their ability to detect emotional nuances, each individual had registered results of 24 audio and 24 visual components. All of the errors made by the participants were recorded and at the end the total number of incorrect answers (errors) was used to indicate their level of ability to detect emotions. Since the test was performed individually, all the records were separately registered. That is why only one additional action was needed in order to further differentiate the emergent leaders in terms of their EI skills:

1. Comparison between the total number of mistakes for each of the two types of components (audio and visual) among the participants per group was performed. The higher the number of errors, the lower is the ability of the individual to distinguish between emotional nuances.

4. Results

While analyzing the data, gathered during the conducted experiments, three participants were unanimously recognized as emergent leaders of their virtual teams. In relation to that, the following section provides detailed description of the outcomes, derived from the analysis of each participant's communication behavior, personality characteristics

and emotion detection skills, and aims at further clarifying the power dynamics in such virtual settings.

4.1. Group 1: Red Gemstones

This group consisted of four participants. In order to preserve their anonymity, red gemstones names were assigned to each one of them, respectively: Ruby, Garnet, Red Jasper and Red Coral.

Perception of leadership and EI traits

Leaders are best defined by their followers; thus, the first important measure, that was examined, was "perception of leadership". By having the highest score of 1, the participant under the name Ruby, was unanimously chosen as the leader of the "Red Gemstones" virtual team. Contrary to that, Red Jasper was considered as the one possessing the least leadership skills and according to the team members did not appear as a leader during the group's conversation.

Moving further towards the examination of the power dynamics in virtual work settings, another important variable was considered the emotion detection ability of the participants. The latter measure was used in order to indirectly detect the levels of emotional intelligence of each individual. According to the data presented in the table below, the participant under the name Garnet appeared to have the highest ability to detect emotions, shortly followed by the perceived leader of the group. The other two teammates - Red Jasper and Red Coral have slightly more errors in the visual components and more than 50% extra errors in the audio ones. Compared to them, Ruby still has significantly high results, falling behind Garnet by only one additional mistake, made in the group of audio elements. This revelation only partially supports the concept that EI has a great importance in the process of leadership emergence (Côté, Lopes, Salovey, & Miners, 2010).

These rather not categorical results in terms of the importance of EI in the process of leadership emergence, have abetted further investigation of the concept of emotional intelligence. For that reason, this research has also considered other factors that could have had additional influence on the formation of power dynamics in such small virtual teams. That is why as a supplementary variable, the working experience of each individual was analyzed as well. This variable was considered as an important prerequisite in the introduction of the concept of emotional competence. In relation to the latter, some academics state that that EI could have great influence over work performance and leadership emergence, only if it is moderated by EC (Goleman, 1998; Abraham, 2004; Vaida & Opre, 2014). Some scholars also imply that EC could be thought overtime and through the right experience, training, etc. (Goleman, 2006). Therefore, the working experience of the individuals was intended as the appropriate professional experience, predisposing individuals towards developing the needed

emotional competence. Thus, the working experience as a variable was considered only with regards to the development of the EI/EC skills over time.

With reference to that, from Table 1, it becomes obvious that the participant under the name Ruby was the one having the most extensive working experience. This team member was also the one appointed by the other teammates as a unanimous leader of the virtual team.

Table 1: Leadership perception, emotion recognition and experience of the "Red Gemstones" team members

Participants	Role	Perception of leadership	EI /visual/	EI /audio/	Working experience
Ruby	Absolute leader	1	4	3	10 years
Garnet	Possible leader	2.75	4	2	7 years
Red Coral	Not a leader	3	5	8	3 years
Red Jasper	Not a leader	3.25	6	8	3 years

*EI /visual components/- total number of errors made in DANVA 2 – "Adults' faces section"
**EI /audio components/ - total number of errors made in DANVA 2 – "Adults' voices section"

According to this research:
o Perception of leadership – results closer to 1 represent the unanimous designation of the emergent leader
o EI/visual/, EI/audio/ - lower results are interpreted as more favorable for the emergent leader's figure
o Working experience – higher results are considered as more favorable for the emergent leaders

Communication behavior

In order to make the analysis of the process of leadership emergence more conclusive, and given the nature of the research, an examination of the written communication behavior of the participants was performed.

Interesting outcomes were discovered from the first two variables – "Word Count" or in other words communication activity and "Analytical Thinking". Contrary to some studies on CMC and leadership, where the most active members of the conversation are anticipated as leaders (Yoo & Alavi, 2004, Sudweeks & Simoff, 2005, Misiolek & Heckman, 2005), the perceived leader in the "Red Gemstones" virtual team, did not appear to act accordingly by ranking second, in terms of volume of posted messages. The second surprising revelation was the perceived leader, Ruby, scoring last in terms of analytical thinking. With a score of 60.85, Ruby's results suggested that he had demonstrated more personal, informal and narrative thinking, during the experiment, compared to the other participants. Furthermore, Ruby appeared to score first in terms of his/her drive of affiliation. This means that the perceived leader was using higher number of words related to his/her needs to maintain, restore or initially establish a positive emotional relationship with the other team members.

Appearing as more persuasive compared to the other team members, Ruby did show the highest scores in assertiveness in his/her messages and the lowest scores in use of negative words. Positive language was prevailing in the speech of all of the participants; however, Ruby strongly differentiated him/her-self with the lack of usage of negative words.

Lastly, pronoun use also played an important part in the communication behavior analysis. It is considered that depending on the individual's pronouns choice, he/she could demonstrate higher or lower status. Interesting discovery here was the fact that the Ruby's frequency of use of both first-plural and first-singular pronouns was almost equal, unlike those of the other participants. With this result Ruby showed that during the discussion he has demonstrated his/her neutrality in terms of rank and attitude towards the other participants.

Table 2: Communication behavior of the "Red Gemstones" team members

Participants	Word Count (activity)	Analytical Thinking	Affiliation (Drive)	Assertiveness (Certainty)	Positive Language	Negative Language	Pronoun Use (I)	Pronoun Use (We)
Ruby	503	60.85	5.96	2.98	3.78	0.60	4.17	4.57
Garnet	407	85.09	3.44	1.47	3.44	0.98	1.97	3.19
Red Coral	837	80.40	5.50	1.79	2.39	0.72	1.91	4.30
Red Jasper	498	69.90	4.82	1.20	4.22	1.00	2.21	3.41

According to this research:
o Word Count, Affiliation (drive), Assertiveness – higher results are considered more favorable for the emergent leaders
o Analytical thinking, Negative language use – lower scores are interpreted as more advantageous for the emergent leadership figure
o Pronoun use (I vs. We) – equal, or close to equal, frequency of use of first-singular and first-plural pronouns are considered common for the emergent leaders
o Positive language use – higher than the negative language frequency of use is considered favorable for the virtual team leaders

Personality Insights

Finally, two of the most widely bind to leadership personality characteristics were analyzed. As already mentioned, the results from this section had rather descriptive function. The outcomes from the text analysis, with reference to the personality insights, were used in order a more thorough picture of the perceived emergent leaders and their communication approaches to be built. Each score was considered strictly individual, dependent on the volume of the participants' messages, and was not use for any comparison between teammates within a same group.

Nevertheless, a general conclusion about the importance of the two personality traits, Conscientiousness and Extraversion, for the process of leadership emergence in virtual settings was able to be drawn. Evident from the results became that the majority of the participants demonstrated higher levels of possession of the conscientiousness trait in their messages. Contrary to that, their scores with regards to the extroversion characteristic were significantly lower, around and less than 0.22. Some of the facets, part of each trait group, were also differentiated based on the estimated final scores. The higher the score, the greater is the likelihood that the individuals possess these particular facets. For conscientiousness, such distinctive facets were *achievement striving*, *cautiousness*, *dutifulness*, *self-efficacy* and *self-discipline*, with scores of 0,70 or above for all of the participants; whereas, the facet *orderliness* did not appear as dominant one in this group. Such significant facets in the extraversion group were considered only *activity level* and *assertiveness*, both displaying results as high as 0.95 or above per individual. All of the other facets in the extraversion trait

group had been defined with a rather low score, excluding the *outgoing* facet for which almost all of the participants received average, scores close to 0.50.

According to the interpretations given by IBM Watson Personality Traits manual, participants who have high scores in the conscientiousness trait and low score in extraversion can be described as more confident, punctual, cautious, serious and principled. In the "Red Gemstone" virtual team 75% of all of the participants' correspond to this personality description. Only one person, Red Jasper, has scored higher than average (0.50) for both conscientiousness and extraversion traits. His/ Her personality description includes competitive, ambitious, persistent, alert, etc. ("IBM Cloud Docs," n.d.). Interesting fact is that Red Jasper is also the one, who was ranked last in terms of leadership perception by the other teammates.

Table3: Personality insights of the "Red Gemstones" team members

College	Ruby	Garnet	Red Coral	Red Jasper
Conscientiousness	0.74	0.69	0.83	0.93
Achievement striving	0.95	0.97	0.97	0.94
Cautiousness	0.80	0.78	0.94	0.91
Dutifulness	0.77	0.70	0.75	0.55
Orderliness	0.31	0.21	0.35	0.33
Self-discipline	0.83	0.87	0.88	0.90
Self-efficacy	0.98	0.99	0.98	0.87
Extraversion	0.11	0.22	0.15	0.66
Activity level	0.96	0.98	0.98	0.98
Assertiveness	0.95	0.98	0.98	0.97
Cheerfulness	0.44	0.23	0.33	0.15
Excitement-seeking	0.24	0.23	0.17	0.05
Outgoing	0.65	0.52	0.55	0.65
Gregariousness	0.22	0.09	0.08	0.15

Legend:

*Achievement striving – Want to be seen as successful and are doing their best to fulfill their goals.
*Cautiousness- Tend to carefully think-through all possibilities before taking a decision.
*Dutifulness- Possess a rather strong sense of commitment and duty.
*Orderliness- Neat and organized individuals.
* Self-discipline- Possess the will to be self-disciplined and to act persistently in difficult situations.
* Self-efficacy- Confident in themselves and their abilities.

**Activity level- Energetic individuals, busy participating in many activities.
**Assertiveness- Individuals who like to lead and handle difficult situations.
**Cheerfulness- Usually experience more positive emotions such as happiness, optimism, etc.
**Excitement-seeking- Get easily bored when experiencing lack of stimulation.
**Outgoing- Really like others and show positive attitude towards them.
**Gregariousness- Enjoy crowds and consider the company of other as rewarding.

According to this research:
o Conscientiousness– higher than average (0.50) results are considered common for the emergent leaders
o Extraversion – lower than average (0.50) results are considered common for the emergent leadership figure

Summary of the emergent leadership figure in the "Red Gemstones" team

1. Ruby was unanimously chosen as a team leader, with all of the four participants, including the emergent leader him/her-self, ranking him/her as the fittest one for the role.
2. This individual had also received the highest scores for variables like:
    o   Assertiveness;
    o   Drive for affiliation.
3. Ruby took the leading position in using the least amount of negative language in his/her messages.
4. The perceived leader managed to remain neutral in terms of demonstrating higher or lower rank through showing almost equal frequency of use of first-plural and first-singular pronouns.
5. Ruby also ranked last in terms of analytical thinking, demonstrating a more informal and narrative style instead.
6. The emergent leader's overall score of 0.74 for the conscientiousness variable was significantly higher compared to his/her extraversion one. The latter score was 0.11, which could be considered a low one.
7. Ruby turned out to have second to the highest results with reference to his/her EI levels, and appeared to have the most extensive working experience compared to all of his/her team members. These two factors combined could also suggest that this individual possessed and was pre-disposed to the most favorable factors and traits in order to develop his/her emotional competence skills. In turn, the latter could be considered as another essential factor that has contributed to his/her leadership emergence process within the virtual team.

4.2.   Group 2: Yellow Gemstones

Similar to the previous team, names of gemstones were given to the team members in order to keep their identities confidential. The color of the chosen gemstones was yellow and the individuals' names respectively: Amber, Aragonite, Marcasite, and Citrine.

Perception of leadership and EI traits

Three out of the four teammates of the "Yellow Gemstones" virtual team, decided to rank Aragonite, as the most successful one in playing the role of emergent leader in their group discussion. Interesting phenomenon in this group was that they almost collectively nominated the individual, who has shown the least potential to become a leader, during the group's conversation. The participant under the name Amber was ranked last with the lowest score of 3.5.

With regards to the Emotional Intelligence levels, Amber demonstrated the highest ability to the detect emotions. At the same time, similarly to the "Red Gemstones" virtual

team, the perceived leader of the "Yellow Gemstones" scored the second highest results. With only 2 extra mistakes in both the audio and visual groups, Aragonite occupied the second highest position in terms of EI. The other teammates – Marcasite and Citrine differentiate themselves with approximately 50% more errors in both the audio and visual element groups.

Moving forward towards the work experience of the participants, it became evident that the perceived, by the other teammates, leader took the first place in terms of years of working experience. Interesting discovery was also the fact that the participant with the least working experience was also ranked last with reference to his/her leadership skills and potential. These results could only confirm the statement that EI by itself may not have such big importance for the power dynamics in standard teams (Goleman. 2006), and in virtual ones as well.

Table 4: Leadership perception, emotion detection and working experience of the "Yellow Gemstones" virtual team members

Participants	Role	Perception of leadership	EI /visual/	EI /audio/	Working experience
Aragonite	Absolute leader	1.25	5	7	5 years
Marcasite	Possible leader	2.25	6	10	3.5 years
Citrine	Not a leader	3	6	9	4 years
Amber	Not a leader	3.5	3	5	2 years

*EI /visual components/- total number of errors made in DANVA 2 – "Adults' faces section"
**EI /audio components/ - total number of errors made in DANVA 2 – "Adults' voices section"

According to this research:
o Perception of leadership – results closer to 1 represent the unanimous designation of the emergent leader
o EI/visual/, EI/audio/ - lower results are interpreted as more favorable for the emergent leader's figure
o Working experience – higher results are considered as more favorable for the emergent leaders

Communication behavior

In support to a number of academic studies (Yoo & Alavi, 2004, Sudweeks & Simoff, 2005, Misiolek & Heckman, 2005), regarding the topic of leadership emergence, the perceived leader of this virtual team, Aragonite, did show the highest scores in talkativeness (Word Count) and assertiveness in his/her communication. At the same time Aragonite has shown the lowest scores in use of negative words and second to the highest of positive language use. Therefore, due to his/her stronger, emotionally charged messages and the volume of his/her text, it appeared that Aragonite had much stronger influence over the other team members.

Interesting revelation, identical to the one of the previous virtual team, was the fact that in terms of analytical thinking, the perceived leader ranked last with the lowest score of 58.90. At the same time, Aragonite appeared to be the first, in using words revealing his/her drive for affiliation. Those words were disclosing the participant's desire to be part of and maintain successful, affective relationship with his/her teammates.

Finally, use of pronouns of each team member was analyzed. Similar to the other participants of the "Yellow Gemstones" virtual team, Aragonite had used the first-person

plural pronouns more than the first-person singular ones. With such scores, it could be interpreted that the participants were more prone to demonstrate higher rank, rather than lower, during the discussion.

Table 5: Communication behavior of the "Yellow Gemstones" team members

Participants	Word Count (activity)	Analytical Thinking	Certainty (Assertiveness)	Drive (Affiliation)	Positive Language	Negative Language	Pronoun Use (I)	Pronoun Use (We)
Aragonite	1905	58.90	1.84	6.61	3.78	1.52	4.09	5.20
Marcasite	1863	74.94	0.64	4.19	1.83	2.52	1.66	2.63
Citrine	666	68.72	1.05	3.60	2.10	4.80	2.10	3.45
Amber	1058	81.47	1.51	4.16	3.88	1.70	2.55	3.12

According to this research:
o Word Count, Affiliation (drive), Assertiveness – higher results are considered more favorable for the emergent leaders
o Analytical thinking, Negative language use – lower scores are interpreted as more advantageous for the emergent leadership figure
o Pronoun use (I vs. We) – equal, or close to equal, frequency of use of first-singular and first-plural pronouns are considered common for the emergent leaders
o Positive language use – higher than the negative language frequency of use is considered favorable for the virtual team leaders

Personality Insights

From the result presented in Table 6, it could be determined that there were some fluctuations in the final scores of the participants for both personality traits. Dominant facets in the group of the conscientiousness personality trait were considered *achievement striving, cautiousness, self-efficacy* and *self-discipline*, each with scores of approximately 0,65 or above for all of the teammates; meanwhile, the facets *dutifulness* and *orderliness* were ranked with scores starting at around 0.55 or less. For extraversion such distinctive variables were considered *activity level* and *assertiveness* with most of the participants having scores around 0.95.The rest of the facets revealed rather low or average results for the majority of participants, with scores around and below 0.50.

In addition, from the results presented in the table below, it also becomes evident that the perceived leader is the only one having high scores for the contentiousness personality trait and low ones in extraversion. According to the interpretation of the data, provided by IBM Watson Personality Insights manual, individuals with such scores could be characterized as more confident, punctual, cautious, principled etc. For 50% of the participants of this virtual team, average scores for conscientiousness and relatively low scores for extraversion were reported. These types of personalities could be described as more serious, restrained, calm-seeking etc. Only one individual, Marcasite, had scored lower than average (0.50) in both conscientiousness and extraversion. Subsequently, his/her personality type, in relation to the conscientiousness and extraversion traits, could be defined as unenergetic, vague, non-persistent, noncommittal, etc. ("IBM Cloud Docs," n.d.).

Table 6: Personality insights of the "Yellow Gemstones" team members

College	Aragonite	Marcasite	Citrine	Amber
*Conscientiousness	0.75	0.36	0.54	0.53
Achievement striving	0.93	0.74	0.88	0.97
Cautiousness	0.92	0.65	0.77	0.85
Dutifulness	0.67	0.14	0.51	0.51
Orderliness	0.33	0.52	0.34	0.61
Self-discipline	0.88	0.77	0.71	0.94
Self-efficacy	0.84	0.91	0.98	0.97
**Extraversion	0.21	0.10	0.02	0.45
Activity level	0.95	0.88	0.83	0.98
Assertiveness	0.95	0.89	0.96	0.99
Cheerfulness	0.40	0.09	0.04	0.40
Excitement-seeking	0.11	0.47	0.19	0.20
Outgoing	0.66	0.28	0.14	0.83
Gregariousness	0.26	0.12	0.02	0.40

Legend:

*Achievement striving – Want to be seen as successful and are doing their best to fulfill their goals.
*Cautiousness- Tend to carefully think-through all possibilities before taking a decision.
*Dutifulness- Possess a rather strong sense of commitment and duty.
*Orderliness- Neat and organized individuals.
* Self-discipline- Possess the will to be self-disciplined and to act persistently in difficult situations.
* Self-efficacy- Confident in themselves and their abilities.

**Activity level- Energetic individuals, busy participating in many activities.
**Assertiveness- Individuals who like to lead and handle difficult situations.
**Cheerfulness- Usually experience more positive emotions such as happiness, optimism, etc.
**Excitement-seeking- Get easily bored when experiencing lack of stimulation.
**Outgoing- Really like others and show positive attitude towards them.
**Gregariousness- Enjoy crowds and consider the company of other as rewarding.

According to this research:
o Conscientiousness– higher than average (0.50) results are considered common for the emergent leaders
o Extraversion – lower than average (0.50) results are considered common for the emergent leadership figure

Summary of the emergent leadership figure in the "Yellow Gemstones" team

1. Three out of four individuals ranked Aragonite as the most suitable for the leadership position.
2. The perceived leader ranked first for variables like:
    o Assertiveness;
    o Drive for affiliation.
    o Word Count (communication activity)
3. The designated leader of the "Yellow Gemstone" team was the person who used the least amount of negative language in his/her messages.

4. Ranking last in terms of analytical thinking, Aragonite demonstrated more personal and informal thinking style.
5. The emergent leader's overall score of 0.75 for the conscientiousness variable was significantly higher compared to his/her extraversion ones. Aragonite's extraversion score was 0.21, which could be accepted as a low one.
6. Finally, Aragonite was ranked second for his EI abilities and also took the leading position as the individual with the most extensive working experience among the team members.

4.3.   Group 3: Green Gemstones

Green was the color of the chosen gemstones for the last virtual team, and the individuals' names respectively: Emerald, Amazonite, Peridot, and Jade.

Perception of leadership and EI traits

According to the uncontested vote of the participants, Peridot was ranked as the perceived leader of the "Green Gemstones" virtual team. All of the four team members pointed out Peridot as the one who, according to them, showed the strongest leadership skills during the experiment. In contrast to that, three out of four people ranked Amazonite as the one the least prone to become leader; therefore, he occupied the last position with a score of 3.75.

In terms of emotion detection and EI, the results displayed in Table 7, reveal that two of the members of the "Green Gemstone" virtual team, shared the first position in terms of their ability to detect emotions. Both of these participants, namely Peridot and Jade were nominated as the two people possessing the highest leadership skills during the experiment, with Peridot leading the rating and Jade being second. Compared to them, the other two team members made more errors in both the audio and visual components and were ranked, respectively, third and fourth.

In addition to his/her high results for level of emotional intelligence, Peridot, the perceived emergent leader of the "Green Gemstones" virtual team, was ranked as the most experienced participant with a score of 15 years of working experience. Falling behind with more than 13 years, all of the other participants had relatively equal amount of working experience among each other, with a small difference of a few months. Nevertheless, the person that was ranked last in terms of leadership skills and behavior was Amazonite, who had the second longest working experience, after Peridot and the lowest score for his/her ability to detect emotion.

Table 7: Leadership perception, emotion detection and working experience of the "Green Gemstones" virtual team members

Participants	Role	Perception of leadership	EI /visual /	EI /audio/	Working experience
Peridot	Absolute Leader	1	4	5	15 years
Jade	Possible leader	2.25	4	5	1.5 years
Emerald	Not a leader	3	6	8	1 year
Amazonite	Not a leader	3.75	10	4	1.9 years

*EI /visual components/- total number of errors made in DANVA 2 – "Adults' faces section"
**EI /audio components/ - total number of errors made in DANVA 2 – "Adults' voices section"

According to this research:
o Perception of leadership – results closer to 1 represent the unanimous designation of the emergent leader
o EI/visual/, EI/audio/ - lower results are interpreted as more favorable for the emergent leader's figure
o Working experience – higher results are considered as more favorable for the emergent leaders

Communication behavior

With approximately 50% difference, the perceived leader, of this virtual team, scored first for measures such as Word Count and Assertiveness. By being the most active and reassuring the other team members of his/her competence and professionalism, the perceived leader, Peridot, facilitated his designation as a team leader.

Compared to the rest of the participants, Peridot ranked last in terms of the analytical thinking variable. With a score of 73.15, Peridot's communication behavior was interpreted as more personal, narrated and informal during the group discussion. A compelling revelation was the fact that Peridot's frequencies of use of both first-person singular and first-person plural pronouns were absolutely identical, meaning that this participant did not demonstrate any status discrepancy and remained neutral throughout the whole group discussion.

Rather unusual were the other scores of Peridot, as he/she did not differentiate him/her-self in terms of language affection and need for affiliation. In fact, Amazonite, the participant who had the highest scores in use of affiliating language, was rated, by the other participants, as the person possessing the least potential of becoming a team leader.

Table 8: Communication behavior of the "Green Gemstones" team members

Participants	Word Count	Analytical Thinking	Certainty (Assertiveness)	Drive (Affiliation)	Positive Language	Negative Language	Pronoun Use (I)	Pronoun Use (We)
Peridot	1162	73.15	1.38	3.44	2.41	1.38	2.07	2.07
Jade	620	84.44	0.48	2.42	2.74	0.65	1.77	1.94
Emerald	391	78.35	0.77	3.58	6.91	2.05	2.81	2.56

Amazonite	560	74.79	0.71	5.18	4.11	1.07	2.86	4.29

According to this research:
o Word Count, Affiliation (drive), Assertiveness – higher results are considered more favorable for the emergent leaders
o Analytical thinking, Negative language use – lower scores are interpreted as more advantageous for the emergent leadership figure
o Pronoun use (I vs. We) – equal, or close to equal, frequency of use of first-singular and first-plural pronouns are considered common for the emergent leaders
o Positive language use – higher than the negative language frequency of use is considered favorable for the virtual team leaders

Personality Insights

Based on the results presented in Table 9, it could be confirmed that exactly 50% of the participants obtained high scores for possession of the conscientiousness personality trait and all of them received low scores for the extraversion one. Some of the facets, part of each trait group, were also differentiated based on their estimated final outcomes. For the conscientiousness: *cautiousness*, *achievement striving*, *self-efficacy* and *self-discipline* were considered such distinctive facets. Almost all of the participants received scores of 0.80 or above for these four facets. Meanwhile for *dutifulness,* half of the participants scored rather low with results of 0.13 and 0.21 and the other half reached scores between 0.70 and 0.80. Lastly, for the facet *orderliness*, all of the participants received results below the average. Simultaneously, there were only a couple of such distinctive facets in the group of the extraversion personality trait. *Activity level* and *assertiveness* were the only two facets for which all of the participants scored high, starting with results from 0.89 or above. All of the other facets in this trait group had been defined with low or average scores.

In contradiction to the present literature on the leadership topic, the perceived leader of the "Green Gemstones" virtual team, along with one more participant, had rather unusual results for individuals perceived as possessing high leadership qualities. Both of them received low scores in extraversion and conscientiousness and as a result appeared as indecisive, unambitious, indirect and non-persistent during the experiment, which could be bizarre for a leader. This phenomenon could be justified with the significantly extensive working experience of Peridot, and the concept of EC.

Simultaneously, high scores in conscientiousness and significantly low ones in extraversion received the other 50% of the participants, suggesting that those individuals were acting rather discrete, cautious, principled, etc. during the group discussion ("IBM Cloud Docs," n.d.).

Table 9: Personality insights of the "Green Gemstones" team members

	Peridot	Jade	Emerald	Amazonite
Conscientiousness	**0.27**	**0.27**	**0.84**	**0.60**
Achievement striving	0.83	0.85	0.96	0.98
Cautiousness	0.36	0.79	0.80	0.94
Dutifulness	0.13	0.21	0.70	0.81
Orderliness	0.20	0.41	0.24	0.43
Self-discipline	0.57	0.79	0.87	0.97

Self-efficacy	0.99	0.99	0.99	0.97
Extraversion	**0.11**	**0.04**	**0.11**	**0.17**
Activity level	0.94	0.90	0.99	0.99
Assertiveness	0.91	0.89	0.99	0.98
Cheerfulness	0.15	0.04	0.10	0.32
Excitement-seeking	0.74	0.53	0.24	0.14
Outgoing	0.17	0.11	0.44	0.69
Gregariousness	0.06	0.01	0.07	0.12

Legend:

*Achievement striving – Want to be seen as successful and are doing their best to fulfill their goals.
*Cautiousness- Tend to carefully think-through all possibilities before taking a decision.
*Dutifulness- Possess a rather strong sense of commitment and duty.
*Orderliness- Neat and organized individuals.
* Self-discipline- Possess the will to be self-disciplined and to act persistently in difficult situations.
* Self-efficacy- Confident in themselves and their abilities.

**Activity level- Energetic individuals, busy participating in many activities.
**Assertiveness- Individuals who like to lead and handle difficult situations.
**Cheerfulness- Usually experience more positive emotions such as happiness, optimism, etc.
**Excitement-seeking- Get easily bored when experiencing lack of stimulation.
**Outgoing- Really like others and show positive attitude towards them.
**Gregariousness- Enjoy crowds and consider the company of other as rewarding.

According to this research:
o Conscientiousness– higher than average (0.50) results are considered common for the emergent leaders
o Extraversion – lower than average (0.50) results are considered common for the emergent leadership figure

Summary of the emergent leadership figure in the "Green Gemstones" team

1. Peridot was unanimously designated as leader of his group with four out of four people ranking him/her as the most suitable. According to these results, the perceived leader also voted for him/her-self.
2. The emergent leader was ranked first in terms of the variables:
     o Assertiveness;
     o Word Count (communication activity)
3. Peridot received the lowest scores among his teammates for his Analytical thinking abilities.
4. The designated leader of the "Green Gemstones" team managed to remain neutral in terms of rank. He/she did that by having precisely identical frequency of use for both first-plural and first-singular pronouns.
5. In terms of personality characteristics, the emergent leader received below average results for both conscientiousness and extraversion.
6. Finally, Peridot was ranked among the participants with the highest results in EI abilities and as the team member with the most extensive working experience within the team and among all of the 12 participants.

Overall summary of the leadership figure

Even though coming from different backgrounds, professional experience and nationalities, all of the three emergent leaders were unanimously chosen for this role by their teammates. After a cross-comparison among the results of those individuals, it became evident that the three leaders shared some similarities in their behavior and personality characteristics. Among the most common traits was the assertiveness, as the usage of powerful language, and the individuals using it tend to be more persuasive and influential (Burrell & Koper, 1998). The emergent leaders in virtual work settings also appeared to have high levels of affiliation drive, aiming at creating and maintaining successful emotional relationships with their teammates. They tended to remain neutral in terms of status distinction and kept the amount of negative language use to its minimum. On top of that, they demonstrate more informal and narrative thinking style, having the lowest scores of the analytical thinking variable.

In terms of personality traits and their relation to the leadership emergence process, it was revealed that two out of the three emergent leaders showed considerably high levels of conscientiousness and all of the three shared common low score for the extroversion trait. Their estimated results for the latter personality trait were close to and lower than 0.21, suggesting its limited importance for the emerging leadership figure. This particular revelation strongly contradicts some of the present literature on the topics of leadership and organizational power dynamics, where it is considered common for extraverts to acquire leadership roles and to be perceived as leaders (Gardner & Avolio, 1998)

As for their emotion-detection abilities and working experience, all of the participants were among the team members with the highest EI results – two occupied the second highest positions within their teams and one took the leading position, sharing it with another teammate form his/her virtual team. Along with that, the working experiences of the designated virtual team leaders appeared to be the most extensive ones.

Table 10: Summary of the leadership figure

Variables	Ruby	Aragonite	Peridot
Leadership perception			
Leadership perception (followers' choice of emergent leaders)	✓	✓	✓
Communication behavior			
Communication activity (Total word count)		✓	✓
Assertiveness	✓	✓	✓
Affiliation	✓	✓	
Pronoun use (equal frequency of use of firs-singular/plural)	✓		✓
Affect (lack of use of negative language)	✓	✓	
Analytical thinking (lowest scores)	✓	✓	✓
Personality characteristics			
Conscientiousness (high scores)	✓	✓	
Extroversion (low scores)	✓	✓	✓

Personality characteristics			
DANVA 2 results (highest ability to detect emotions)			✓
DANVA 2 results (second to the highest ability to detect emotions)	✓	✓	
Working experience			
Working experience (in years)	✓	✓	✓

5. Discussion

Building up further, towards the leadership figure in the new virtual team settings, a clear pattern of the important variables in the leadership emergence process was defined. From the derived results it could be proposed that an absolute skill a virtual team leader tends to possess is assertiveness: successful leadership figures should differentiate when to be tough and when to step back and find alternative, more collegial ways to communicate and influence others. These leaders differentiate themselves in their ability to set expectations of high performance and quality, and to personally see through their accomplishment (Goleman, 2006). Usually, they tend to earn other people's trust by appearing as determined and confident in taking hard decisions. Indeed, in virtual settings, where there is no officially appointed leader, the possession of assertive skills could help an individual to step up as a leader when there is a need for that, and then go back to his/her previous role after the unusual situation is over.

Adding up to the assertiveness skills, it could be suggested that a successful leader of a virtual team would greatly benefit from being more affiliating. According to Goleman (2006), an outstanding leader would not stay invisible, he/she would frequently try to interact with his/her colleagues and try to build and maintain strong and long-lasting relationships. Such a typical atmosphere of openness and unrestricted communication between teammates could also facilitate a better information exchange and no exclusion of individuals who are showing superior leadership skills. In addition, this harmonious relationship between team members could also be strengthened by the way an individual refers to his/her teammates. By his/her choice of pronoun use, one could be seen as demonstrating either higher or lower rank (Kacewicz, Pennebaker, Davis, Jeon & Graesser, 2009). From the available data, it could be concluded that emergent leaders in virtual settings try to remain neutral with regards to their status. This could be achieved by frequently involving others in their discussions and confidently commenting on their performance, rather than being uncertain and focusing on themselves (Tausczik & Pennebaker, 2010).

As a matter of fact, the frequent interaction of individuals and their extensive contribution to the group discussion has also been considered as beneficial and typical for the leadership figure, in such working environment. It has been proven that by being more active during the conversation, one has a better chance to strongly influence his/her recipients (Weimann, 1994) and also successfully foster a stronger social identity among his/her colleagues (Koh, Kim, Butler & Bock, 2007). In addition, it appeared that not only the communication activity of the individuals had a contribution to their emergence as leaders,

but the affect with which their messages were charged, could greatly add up to that as well. People are able to differentiate emotional nuances by analyzing numerous cues like timing, choice of words, etc. Actually, it is the emotional signals that could either keep, or not, the conversation and the team successfully functioning (Goleman, 2006). It has been proven that the use of more positive language in computer-mediated communication would facilitate more successful interaction and stronger sense of community within the virtual team (Joyce & Kraut, 2006). The results derived in this research have also supported the argument that online communication could greatly benefit from more positively charged language. However, an additional revelation was made, suggesting that perceived leaders were not the individuals using the highest amount of positive words and messages, but rather those that used the least amount of negative ones. It is known that people have the ability to influence each other's emotions; it is considered as a natural occurrence, so subtle that it is usually left unnoticed (Goleman, 2006). Therefore, if emergent leaders of virtual teams try to reduce their use of negative language, they could avoid unfavorable feedback. In addition to that individuals could also benefit from the emotional cues, as they could be powerful persuasive tools throughout the group discussion and the process of leadership emergence.

As for the personalities of the detected leaders in this research, it became evident that those individuals could be characterized with high levels of conscientiousness. This means that they could be described as driven, persistent, dutiful, self-assured and deliberate. They would usually set high goals and do everything that is needed to achieve them. Taking seriously every rule or obligation, they would carefully assess every decision they make. At the end, these individuals would be confident in their abilities and they would go even through the hardest task and tackle it successfully ("IBM Cloud Docs," n.d.).

Lastly, even though not having the topmost results in detecting emotional nuances, the perceived leaders still appeared to have relatively high abilities to sense emotional cues. In combination with their vast working experience, the concept of the emotional competence was brought into the spotlight. According to Goleman (1998) EI could be developed overtime, through learning how to handle our own emotions and becoming more mature; however, in order EI to actually contribute to one's leadership abilities and work performance, it is considered that it should be moderated by emotional competence. Also, it was suggested that having the highest levels of EI does not ensure that people would develop the needed emotional competences, like leadership. Such favorable outcomes would be dependent on other factors like working environment, organizational climate, individuals' interest and type of experience (Goleman, 2006). Thus, the extensive working experience, intertwined with various leadership and social responsibilities and in combination with the relatively high EI levels of the participants, suggested that they most probably had developed the needed competences over time, in order to be perceived as leaders. Furthermore, a distinction between both EI and EC concepts was made and the significant interconnection between the two was noticed. However, when it comes to the process of emergent leadership in virtual work settings, the concept of EC appeared as more dominant.

Other characteristics and skills, like extraversion and analytical thinking, were not considered valuable for the process of leadership emergence in virtual settings. Much more valued were skills that could promote sense of community, security, competence and

understanding. In a virtual working setting, where the interaction between the participants could be rather impersonal, abilities that would facilitate a friendly interaction, bonding and building of trust and understanding, among the participants, should be the ones cherished and developed by the future leaders of virtual teams.

Limitations

There are no perfect tools or ways to measure emotional intelligence and emotional competence (Goleman, 2006). The same is valid for the personality characteristics and communication behavior of individuals. Positive and negative feedback can be found for both self-evaluation approaches as well as evaluations performed by others. The method chosen for this research was a complex solution providing detailed data on a number of variables. Combining cutting-edge technologies, like IBM Watson Personality Insights and LIWC dictionary, along with a performance-based emotion detection test, facilitated the extraction and analysis of a multifarious data. However, one of the components needed for the further analysis of each participant's communication behavior was an anonymous questionnaire that required the participants to self-assess and rank themselves as well. This process of self-assessment brought up some feeling of confusion among a couple of individuals, therefore it could be considered as a potential limitation in terms of the realistic ranking and final results.

In addition, due to the nature and scope of this research, several other limitations were encountered:

1. The participant sample, consisting of only students, and the limited time frame in which they had to fulfill their task, as well as the fictitiously created virtual team environment, could all be considered as potential limitations.
2. Some of the technologies incorporated in the process of data extraction and analysis were not able to be fully utilized. In order to benefit from IBM Watson in all respects, samples of body texts larger than 3000 words and gathered over longer periods of time, should be submitted. In this way, more statistically significant results could be derived with an Average Mean Absolute Error (MAE) of 12.1%, as the most optimal one provided by the respective tool.
3. The speeded stimulus exposition in the emotion detection test, DANVA, might have led to some inconclusive results. The extent, to which participants' performances differ, from one another, either due to their inability to sense emotional nuances or because of the time-restricted task, remains unclear.

Nevertheless, as a particular strength of the study design, was considered the combination of various sources of data and the innovative tools appropriated for its analysis. Most widely utilized for Marketing purposes, analysis of customer needs and preferences, IBM Watson Personality Insights API was applied just as successfully in the Organizational Behavior field. Not only that, but the overall, unique, mix of data sources and tools greatly aided the analysis of emergent leaders within the virtual teams and further facilitated their comprehensive designation.

Implications

Several potential implications could be defined from this research. From an academic perspective, it has been suggested that:

1. Emotional competence has a more dominant role in the process of leadership emergence in virtual teams, compared to emotional intelligence.
2. Extraversion and analytical thinking have appeared to have limited, contribution to the designation of the leaders in such working environments.
3. Assertiveness was defined as the most important skill of the emergent leaders, in virtual settings, before talkativeness, conscientiousness and affect.

From a practical perspective, the results of this research emphasized on the importance of some skills and personality traits that, with time, could be developed or further improved. The development of the before mentioned abilities is considered to be strongly dependent on the current business environment, previous experience and most of all, on the perseverance of the individuals. All of the traits and skills are considered to be assessable; therefore they could be determined at any given time.

Indeed, it has been suggested that if individuals possess the above described skills and personality traits, they might not only have better chances of emerging as virtual team leaders, but their performance might significantly improve as well. Thus, it could be concluded that the whole team, even the whole organization, could benefit from such employees on their side. Knowing all of that, it could be accepted as reasonable for a representative in a managerial position, to test some of the abovementioned skills and personality traits of his/her employees before assigning them to certain jobs. Being strictly case-sensitive, such a decision should be taken, depending on the requirements of the given task. However, deeply rooted practice in the existent virtual teams is to be created without any formally assigned leaders (Conger & Pearce, 2003; Pearce, 2004); such was the nature of the experiments performed for this research as well. Therefore, any suggestion to a different kind of group formation should be additionally researched and tested.

Future research

Even though this study provides some insightful revelations, in terms of leadership emergence, some further research would need to be done in order to prove whether the derived pattern is going to remain consistent regardless the sample size, time-frame and context. The present study proposes that additional research, examining the difference between the concepts of emotional intelligence and emotional competence, with regards to the given context, should be performed. Also a broader scope of variables related to the behavior of communication of the participants should be considered, as it might be an essential prerequisite of the detection of leadership figures.

In terms of the analytical tools utilized in this research, their broader application into the world of organizational behavior and communications, or in the academic context of such,

could be further explored. Based on the revealed capacity in this study and the extensive analytical features represented via the "language categories", LIWC dictionary can have great potential to be implemented into the academic world and to prove beneficial for various topics. Further analysis related to its successful implementation in studies exploring CMC or other type of textual data could be useful. Additionally, broader inclusion of its numerous language categories in the analysis of the communication behavior of individuals holds great potential as well, since they have been created to capture both people's psychological and social states ("LIWC | Linguistic Inquiry and Word Count," n.d.).

The other analytical tool IBM Watson Personality Insights, in practice mainly utilized in the marketing field, could also be successfully implemented in the context of organizational behavior and communications. Newly introduced to the academic world, this innovative tool holds great potential of being utilized in studies focusing on various working contexts, like virtual and traditional ones. As long as researchers have the ability to extract textual data from some kind of communication source, that could vary from enterprise data to posts in one's social media channels, they can predict people's personality traits, values and needs. Furthermore, researchers have the ability to set rules complying with the requirements of each specific study; they can extract strictly individual scores from a given text, providing results similar to ones of an individual personality test or they can also considered each input as part of and compared within a sample population. All of these various text analysis options have found successful application in the business world, where this tool has been used to improve customer experience, marketing effectiveness, etc. Based on the working experience with IBM Watson Personality Insights in this study, suggestions of its great potential to be implemented also into the academic world were made. Furthermore, additional research addressing its implementation and contribution to diverse topics such as leadership emergence, employees' engagement and marketing effectiveness is encouraged, as it could further reveal the potential of this tool and facilitated the analytical process accompanying the fulfillment of the research.

Conclusion

In conclusion, organizational climate, appropriate experience and training, working environment, determination, etc., these, and many more factors contribute to the process of leadership emergence in virtual teams. According to this research, leaders, emerging in virtual work settings tend to possess skills and personality traits that could help them establish and maintain strong relationships with their colleagues. They aim at creating a friendly atmosphere, characterized with open communication and understanding, and at the same time, to have high levels of commitment and influence. Emergent leaders of virtual teams should be able to detect emotional nuances but most importantly they should be able to manage and react properly to them. The appropriate response to emotional cues could be learned with the right experience, over time, and in adequate conditions; therefore, proving the essential role of the blend between working experience and both emotional intelligence and competence. Lastly, this research proposes a slight shift from the attention, paid by current literature, on

variables like extraversion, to measures like emotional competence and affiliation, as more significant in the process of leadership emergence in virtual teams.

Reference List

Abraham, R. (2004). Emotional competence as antecedent to performance: a contingency framework. *Genetic, Social, and General Psychology Monographs*, 130(2), 117-143.

Anderson, C., & Kilduff, G. J. (2009). Why do dominant personalities attain influence in face-to-face groups? The competence-signaling effects of trait dominance. *Journal of Personality and Social Psychology*, 96,491–503.

Ashton-James, C., & Ashkanasy, N. M. (2006). Evaluating the Claims : Emotional Intelligence in the Workplace . *Chapter 14 Evaluating the Claims : Emotional Intelligence in the Workplace*.

Balthazard, P., Waldman, D., & Warren, J. E. (2009). Predictors of the emergence of transformational leadership in virtual decision teams. *The Leadership Quarterly*, 20, 651–663.

Barrick, M.P., & Mount, M.K. (1991). The big five personality dimensions and job performance: A meta analysis. *Personnel Psyshology,* 44, 1 – 26.

Boyatzis, R. E., Stubbs, E. C., & Taylor, S. N. (2002). Learning cognitive and emotional intelligence competencies through graduate management education. A*cademy of Management Journal on Learning and Education*, 1(2), 150-162.

Brotheridge, C. M. (2006). The role of emotional intelligence and other individual differences in predicting emotional labor relative to situational demands. *Psicothema*, 18, 139–144.

Burrell, N. A., & Koper, R. J. (1998). The efficacy of powerful/powerless language on attitudes and source credibility. In M. Allen & R. W. Preiss (Eds.), *Persuasion: Advances through meta-analysis* (pp. 203–216). Cresskill, NJ: Hampton Press.

Cameli, A. & Jozman, Z.E. (2006). The relationship among emotional intelligence, task performance, and organizational citizenship behaviours. *Journal of Human Performance*, 19 (4), 403 – 419.

Cherniss, C. (2010). Emotional intelligence: Toward clarification of a concept. *Industrial and Organizational Psychology*, 3(2), 110-126.

Conger, J. A., & Pearce, C. L. (2003). A landscape of opportunities: Future research on shared leadership. In C. L. Pearce & J.A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 285–301). Thousand Oaks, CA: Sage.

Côté, S., Lopes, P. N., Salovey, P., & Miners, C. T. (2010). Emotional intelligence and leadership emergence in small groups. T*he Leadership Quarterly*, 21(3), 496-508.

Côté, S., & Hideg, I. (2011). The ability to influence others via emotional displays: A new dimension of emotional intelligence. *Organizational Psychology Review,* 1, 53–71. http://dx.doi.org/10.1177/2041386610379257

Costa, P. T., Jr., & McCrae, R. R. (1992a). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment*, 4,5–13.

Costa, P. T., Jr., & McCrae, R. R. (1992b). Four ways five factors are basic. *Personality and*

Individual Differences, 13,653–665

DeRue, D. S., Nahrgang, J. D., Wellman, N., & Humphrey, S. E. (2011). Trait and behavioral theories of leadership: An integration and meta-Analytical Thinking test of their relative validity. *Personnel Psychology*, 64,7–52. http://dx.doi.org/10.1111/j.1744-6570.2010.01201.x.

Elfenbein, H. A., Marsh, A. A., & Ambady, N. (2002). Emotional intelligence and the recognition of emotion from facial expressions. In L. F. Barrett & P. Salovey (Eds.), *The wisdom in feeling: Psychological processes in emotional intelligence* (pp. 37–59). New York: Guilford.

Elfenbein, H. A., Polzer, J. T., & Ambady, N. (2007). Team emotion recognition accuracy and team performance. In C. E. J. Härtel, N. M. Ashkanasy, & W. J. Zerbe (Eds.), *Research on emotion in organizations*, Vol. 3. (pp. 87–119)Amsterdam: Elsevier.

Erdheim, J., Wang, M., & Zickar, M.J. (2006). Linking the big five personality constructs to organizational commitment. *Personality and Individual Differences*, 41(5), 959-970.

Gardner, W. L., & Avolio, B. J. (1998). The charismatic relationship: A dramaturgical perspective. *Academy of Management Review*, 23,32–58.

George, J. M. (2000). Emotions and Leadership: The Role of Emotional Intelligence. *Human Relations* 53(8):1027-1055.

Goleman, D. (1995). *Emotional Intelligence*. New York: Bantam Books.

Goleman, D. (1998, 2006). Working with emotional intelligence. Bantam.

Hardin, A. M., Fuller, M. A., & Davison, R. M. (2007). I know i can, but can we? Culture and efficacy beliefs in global virtual teams. *Small Group Research*, *38*(1), 130–155.

Hogan, R., Curphy, G. J., & Hogan, J. (1994). What we know about leadership: Effectiveness and personality. *American Psychologist*, 49, 493–504.

Hollander, E. P. (1961). Emergent leadership and social influence. In L. Petrullo & B. M. Bass (Eds.), *Leadership and interpersonal behavior* (pp. 30–47). New York: Holt, Rinehart and Winston.

Hoch, J. E., & Dulebohn, J. H. (2017). Team personality composition, emergent leadership and shared leadership in virtual teams: A theoretical framework. *Human Resource Management Review*, 27(4), 678-693.

Huffaker, D. (2010). Dimensions of leadership and social influence in online communities. *Human Communication Research*, 36(4), 593-617.

IBM Watson Personality Insights. (n.d.). Retrieved from https://www.ibm.com/watson/services/personality-insights/

IBM Cloud Docs. (n.d.). Retrieved from https://cloud.ibm.com/docs/services/personality-insights?topic=personality-insights-input#sufficient

Joyce, E., & Kraut, R. (2006). Predicting continued participation in newsgroups. *Journal of Computer-Mediated Communication*, 11(3), 723–747.

Judge, T., & Piccolo, R. F. (2004). Transformational and transactional leadership: A meta-Analytical Thinking test of their relative validity. *Journal of Applied Psychology,* 89,755–768.

Kacewicz, E., Pennebaker, J. W., Davis, M., Jeon, M., & Graesser, A. C. (2009). *The language of social hierarchies.* Manuscript submitted for publication.

Kammeyer-Mueller, J. D., & Wanberg, C. R. (2003). Unwrapping the organizational entry process: Disentangling multiple antecedents and their pathways to adjustment. *Journal of Applied Psychology*, 88(5), 779-794.

Kirkman, B. L., & Rosen, B. (1999). Beyond self-management: Antecedents and consequences of team empowerment. *Academy of Management Journal*, 42,56–74.

Kirkpatrick, S.A., & Locke, E.A. (1991). Leadership: Do traits matter? *Academy of Management Executive*, 5(2), 48–60.

Koh, J., Kim, Y.-G., Butler, B., & Bock, G.-W. (2007). Encouraging participation in virtual communities. *Communications of the ACM*, 50(2), 68–73.

Kristof-Brown, A., Barrick, M., & Stevens, C. K. (2005). When opposites attract: A multi-sample demonstration of complementary person-team fit on Extraversion. *Journal of Personality,* 73,935–957.

Leshed, G., Hancock, J. T., Cosley, D., McLeod, P. L., & Gay, G. (2007). Feedback for guiding reflection on teamwork practices. In *Proceedings of the 2007 international ACM conference on supporting group work* (pp. 217-220). New York: Association for Computing Machinery Press.

Lipnack, J., & Stamps, J. (2000). *Virtual teams: People working across boundaries with technology*, 2 New York: John Wiley.

Litizinger, W.D., & Shaefer, T.E. (1986). Something more—the nature of transcendent management. *Business Horizons*, 29(2), 68–72.

LIWC | Linguistic Inquiry and Word Count. (n.d.). Retrieved from https://liwc.wpengine.com/

Lord, R.G., &Hall, R.J. (1992). Contemporary views of leadership and individual differences. *Leadership Quarterly*, 3(2), 137–157.

Malhotra, A., Majchrzak, A., and Rosen, B. (2007) Leading virtual teams, Academy of Management Perspectives, 21, 1, pp 60-70.

Manz, C. C., & Sims, H. P., Jr. (1987). Leading workers to lead themselves: The external leadership of self-managing work teams. *Administrative Science Quarterly*, 32, 106–128.

Mayer, J. D., & Salovey, P. (1997). What is emotional intelligence? In P.Salovey & D. Sluyter (Eds.), *Emotional development and emotional intelligence: Implications for educators* (pp. 3-31). New York: Basic Books.

Maznevski, M. L., & Chudoba, K. M. (2000). Bridging Space Over Time: Global Virtual Team Dynamics and Effectiveness. *Organization Science*, *11*(5), 473–492.

McClelland, D. C. (1987). *Human motivation*. CUP Archive.

Misiolek, N. L., & Heckman, R. (2005, January 3–6). P*atterns of emergent leadership in virtual teams*. Paper presented at the 38th Annual Hawaii International Conference on System Sciences (HICSS-38), Waikoloa, HI.

Morris, C.G., &Hackman, J.R. (1969). Behavioral correlates of perceived leadership. *Journal of Personality and Social Psychology*, 13, 350–361.

Morris, C. G., & Maisto, A. A. (2002). *Understanding psychology, 10th edition*. Upper Saddle River, N.J: Prentice Hall.

Neubert, M. J., & Taggar, S. (2004). Pathways to informal leadership: The moderating role of gender on the relationship of individual differences and team member network centrality to informal leadership emergence. *The Leadership Quarterly*, 15,175–194.

Ng, S. H., & Bradac, J. J. (1993). Power in language: Verbal communication and socialinfluence. Newbury Park: Sage.

Nowicki, S., Jr., & Duke, M. P. (2001). Nonverbal receptivity: The diagnostic analysis of nonverbal accuracy (DANVA). In J. A. Hall & F. J. Bernieri (Eds.), *Interpersonal sensitivity: Theory and measurement* (pp. 183–198). Mahaw, NJ: Lawrence Erlbaum.

Nowicki, S., Jr. (2006). *Manual for the receptive tests of the Diagnostic Analysis of Nonverbal Accuracy 2*. Atlanta, GA: Department of Psychology, Emory University.

Pearce, C. L. (2004). The future of leadership: Combining vertical and shared leadership to transform knowledge work. *Academy of Management Executive,* 18(1), 47–57.

Pearce, C. L., Yoo, Y., & Alavi, M. (2004). Leadership, social work, and virtual teams: The relative influence of vertical versus shared leadership in the nonprofit sector. In R. Riggio & S. Smitt-Orr (Eds.), *Improving leadership in nonprofit organizations* (pp. 180–203). San Francisco: Jossey-Bass.

Pennebaker, J.W., Booth, R.J., Boyd, R.L., & Francis, M.E. (2015). Linguistic Inquiry and Word Count: LIWC2015. Austin, TX: Pennebaker Conglomerates (www.LIWC.net)

Pierce, E.A., & Hansen, S.W. (2008).Leadership, trust, and effectivemess in virtual teams, *International Conference on Information Systems (ICIS)*, Paris, France.

Rice, R. E. (1987). New patterns of social structure in an information society. In J. S. L. Lievrouw (Ed.), C*ompeting visions, complex realities: Social aspects of the information society* (pp. 107–120). Norwood, NJ: Ablex.

Rubin, R. S., Munz, D., & Bommer, W. H. (2005). Leading from within: The effects of emotion recognition and personality on transformational leadership behavior. *Academy of Management Journal*, 48, 845–858. http://dx.doi.org/10.5465/AMJ.2005.18803926.

Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition,* Vol. 2. (pp. 527–561)New York: Guilford.

Schneider, C. E., & Goktepe, J. R. (1983). Issues in emergent leadership: The contingency model of leadership, leader sex, leader behavior. In H. H. Blumberg, A. P. Hare, V.

Kent, & M. F. Davies (Eds.), *Small groups and social interaction*, 1.(pp.413–421). Chicester, England: John Wiley.

Simoff, S. J., & Sudweeks, F. (2005). Leading conversations: Communication behaviors of emergent leaders in virtual teams. *Hawaii International Conference of Science Systems*.

Smith, S. M., & Petty, R. E. (1996). Message framing and persuasion: A message processing analysis. *Personality and Social Psychology Bulletin*, 22(3), 257–268.

Sorrentino, R. M. (1973). An extension of theory of achievement motivation to the study of emergent leadership. *Journal of Personality and Social Psychology*, 26, 356-368.

Sorrentino, R. M., & Field, N. (1986). Emergent leadership over time: The functional value of positive motivation. *Journal of Personality and Social Psychology*, 50(6), 1091.

Taggar, S., Hackett, R., & Saha, S. (1999, 2006). Leadership emergence in autonomous work teams: Antecedents and outcomes. *Personnel Psychology*, 52, 899–926

Taggar, S. (2002). Individual creativity and group ability to utilize individual creative resources: A multilevel model. *Academy of Management Journal*, 45,315–330.

Tausczik, Y. R., & Pennebaker, J. W. (2010). The psychological meaning of words: LIWC and computerized text analysis methods. *Journal of language and social psychology*, 29(1), 24-54.

Teng, C.I. (2008). Personality differences between online game players and non-players in a student sample. *Cyber Psychology & Behaviour,* 11 (2), 232 – 234.

Turner, J. C. (1991). *Social influence*. Buckingham, UK: Open University Press.

Van Kleef, G. A. (2009). How emotions regulate social life: The emotions as social information (EASI) model. *Current Directions in Psychological Science*, 18, 184–188. http://dx.doi.org/10.1111/j.1467-8721.2009.01633.x.

Vaida, S., & Opre, A. (2014). Emotional intelligence versus emotional competence. *Journal of Psychological and Educational Research*, 22(1), 26.

Wakefield, R. L., Leidner, D. E., & Garrison, G. (2008). A model of conflict, leadership, and performance in virtual teams. *Information Systems Research*, *19*(4), 434–455.

Wakeman, C. (2006). Emotional Intelligence: Testing, measurement and analysis. *Research in Education*, 75, 71-93.

Wang, N., Young, T., Wilhite, S., & Marczyk, G. (2011). Assessing Students'Emotional Competence in Higher Education: Development and Validation of the Widener Emotional Learning Scale. *Journal of Psychoeducational Assessment*, 29(1), 47-62.

Watson, D., & Clark, L. A. (1997). Extraversion and its positive emotional core. In R. Hogan, J. A. Johnson, & S. R. Briggs (Eds.), *Handbook of personality psychology* (pp. 767–793). San Diego, CA: Academic Press.

Weimann, G. (1994). *The influentials: People who influence people.* Albany, NY: State University of New York Press

Wickham, K. R., & Walther, J. B. (2009). Perceived behaviors of emergent and assigned

leaders in virtual groups. *International Journal of E-Collaboration*, 3,1–17 (Special Issue on Virtual Team Leadership).

Wolff, S. B., Pescosolido, A. T., & Druskat, V. U. (2002). Emotional intelligence as the basis of leadership emergence in self-managing teams. *The Leadership Quarterly*, 13, 505–522. http://dx.doi.org/10.1016/S1048-9843(02)00141-8.

Wong, C. S., & Law, K. S. (2002). The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study. *The leadership quarterly*, 13(3), 243-274.

Yoo, Y., & Alavi, M. (2004). Emergent leadership in virtual teams: What do emergent leaders do? *Information and Organization*, 14(1), 27–58.

Zaccaro, S. J., Gilbert, J. A., Thor, K. K., & Mumford, M. D. (1991). Leadership and social intelligence: Linking social perceptiveness and behavioral flexibility to leader effectiveness. *The Leadership Quarterly*, 2, 317–342.

Zigurs, I. (2003). Leadership in virtual teams: Oxymoron or opportunity? *Organizational Dynamics*, 31(4), 339-351.