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Studying Leader-member exchange in remote meetings through eye-tracking and emotions-capture

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ABSTRACT:
The shift to remote work has accelerated in recent years, and while not a new concept, it was unfamiliar to many employees. Although surveys suggested that remote work was well received by employees, this transition presented several challenges. Employees reported feelings of isolation and declines in job performance, while leaders faced difficulties in managing teams remotely, particularly in maintaining influence and building trust with team members. This thesis investigates leadership behavior in remote meetings using eye-tracking and emotion-capture technologies, moving beyond self-reported surveys. iMotions 10 software was employed to collect eye-tracking and emotion data from leaders during live remote meetings. The results were supplemented by two questionnaires to explore whether these technologies can contribute to studies on leader-member exchange (LMX) relationships. As a pilot study in this field, it focused on areas of interest (AOI), specifically the live team members participating in remote meetings, with tasks designed to mirror real-world organizational challenges. Initial findings suggest that leaders tended to spend the most time looking at the team members they later ranked as their top performers. However, results were mixed in terms of the emotions expressed by leaders towards each team member. Teams formed from volunteer students at Vaasa University also showed that joy was the most commonly expressed emotion by leaders during remote meetings.

KEYWORDS: Eye-tracking, emotion-capture, LMX, remote work environment, leader emotions in remote meetings

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ABSTRACT:
Siirtyminen etätyön on kiihtynyt viime vuosina, ja vaikka konsepti ei ole uusi, se on monille työntekijöille vieras. Vaikka kyselyt viittasivat siihen, että etätyö otettiin työntekijöiden keskuudessa hyvin vastaan, siirtymä toi mukanaan kuitenkin useita haasteita. Työntekijät raportoivat esimerkiksi eristäytyneisyyden ja työyksinäisyydestä, sekä oli myös havaittavissa heikkenemistä työtehokuudessa. Esihenkilöt puolestaan kohtasivat vaikeuksia tiimiensä etäjohtamisessa, erityisesti vaikutusvaltansa ylläpitämisessä ja luottamuksen rakentamisessa tiimin jäseniin ja esihenkilön vöille. Tämän tutkimuksen tarkoituksena on selvittää esihenkilöiden käyttäytymistä etäkokouksissa hyödyntäen katseenseurannan ja tunneanalyysin teknologioita, ja näin siirtyä tarkempaa datan keräykseen, totuttujen itsearviointikyselyiden sijaan. iMotions 10-ohjelmistoa käytettiin esihenkilöiden katseenseuranta- ja tunneaineiston keräämiseen reaaliaikaisissa etäkokouksissa. Tuloksia täydennettiin kahdella kyselyllä, joiden tarkoitus oli vahvistaa kerättyä dataa ja voivatko nämä teknologiat edistää johtaja-alainen-suhteen (LMX) tutkimusta. Tässä omien tietojeni mukaan pilottitutkimuksessa, jossa katseenseurannan ja tunteiden kiinnostusalueet (AOI), olivat etäkokouksiin osallistuvien tiimin jäsenten reaaliaikainen havainnointi ja reagointi koko tiimin osallistuessa tehtävään, joka oli suunniteltu peilaamaan todellisia organisaation haasteita. Alustavat tulokset viittaavat siihen, että esihenkilöt viettivät eniten aikaa katsellen niitä tiimin jäseniä, jotka he myöhemmin arvioivat parhaiksi suorittajiksi. Toisaalta tunteiden ilmaisussa eri tiimin jäseniä kohtaan tulokset olivat vaihtelevia. Vaasan yliopiston vapaaehtoisista opiskelijoista muodostetut tiimit osoittivat myös selvästi, että ilo oli yleisimmin ilmaistu tunne johtajien keskuudessa etäkokouksissa.

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1 Introduction

In the age of globalization, work groups, teams, and co-workers have been staying in contact with each other remotely for years, including but not limited to phone calls, e-mails, and text messaging. Communication in work environments has changed trough resent years dramatically and for example video conferencing and meetings are no longer limited to higher up managers in international companies or for a minority of employees in advanced tech companies. Now, working remotely has become a common practice and a norm in most companies, and this pushes employees to engage in advanced virtual communications to engage their work environment (Blanchard, 2021).

Working remotely might seem something that most common office workers would not be appealed to, but this might not to be the case, as Kähkönen (2023) researched Finnish state administration unit's experiences of remote work. The results of the qualitative study indicated that over 90% of the employees considered remote working to be a positive working practice. However, Wang, Liu, Qian & Parker (2021) study finds that there are differences between individuals and how each of them manages to adapt in new norm in a new remote working environment. Furthermore, not only individuals differ in remote work, but also their job descriptions have different impact on the level of virtual communication they are affected with (Golden & Gajendran, 2019).

New remote working practices might be challenging for organizations' employees, but remote working environment brings its own challenges for the leaders and managers as well. Leonardelli (2022) describes how after the massive transition to remote work environment has left leaders somewhat uncertain of their influence on their team members. Furthermore, how this uncertainty might influence trust between leaders and their team members, leaders, and their colleagues and how leaders can manage trust between team members. All this seems to be related on one of the key issues Wang et al. (2021) identified in remote challenges as ineffective communication, and furthermore challenge the job well-being of the employees.

The transition to remote work environment in organizations, with its acknowledged benefits for the employees, the evident change and issues still are the changes in human relationships Varma, Jaiswal, Pereira & Kumar (2022). There for leader-member exchange (LMX) theory and its contribution to the study of leadership can be also seen in the center of leading remote work (Day & Miscenko, 2014). According to Liden & Maslyn (1998) the leader-member exchange forms from multidimensional factors that include affectedness, contribution, respect, and loyalty. In addition, the quality and overall experience of the leader-member exchange relationships differ between the leader and each of the team members (Varma et al., 2022; Day & Miscenko, 2014). That said, in the remote work there might also lie an opportunity for the leaders to even out these quality differences, as Jansson & Kangas (2024) research claims that interactions and feedback through communication technology is seen as a good way for members to communicate with their leaders.

Although employees do seem to see many benefits that remote work is bringing to the working life, Varma et al. (2022) are concerned that digital communication hinders more deeper relationships from forming between leaders and members. As this might not sound as a thing that does have any strong relevance to maintaining relationships that are work related, still Cropanzano et al. (2017) suggest, that the personal affection level between leader and member seem to create higher quality LMX relationships, than that are based on mainly on performance and results. Even so, it should also be noted, as Day & Miscenko (2014) argues, that the LMX quality is robustly aligned with the performance of the team members.

Organizations are advised to observe and develop LMX relationships in their teams, but to also realize how leader-member exchange can extend to the quality of team-member exchange (TMX) relationships (Kim, Atwater, Jolly, Ugwuanyi, Baik & Yu, 2021). According toWang & Hollenbeck (2019) TMX was developed by Anson Seers in 1989 to social studies to understand how it is common for team members to rely on each other's on information, support, and resources in need. Still, the foundation of good TMX relations falls

under team leadership. There for the organizations should enable the team leader to create and maintain a working climate of healthy team-member exchange for communication and interactions (Kim et al., 2021). The importance of a healthy working climate cannot be stressed enough, for as the organization brings encouragement for communication, social interaction and support. Wang et al. (2021) suggest that this can lead to employees feeling more engaged to work, feel less loneliness, and furthermore influence employees' well-being, which is seen to have a strong connection with job performance.

Enabling an environment for creation of a healthy climate for leader-member exchange and team-member exchange would seem be beneficial for the organization. For this Jansson & Kangas (2024) suggest that the communication for leader-member exchange should be systemized for it be realized as more improved communications, that might lead also to deeper LMX relationships. Yet, as Kim et al. (2021) argues that consistent nurture of a supportive working climate is beneficial for LMX and TMX relations. As for TMX relationships, according to Chekwa (2018), it also creates opportunities for forming overlapping social networks where friendships might be formed in the professional environment and can be seen as a strengthening organizational network.

The most fundamental aspect of any relationship seems to be trust, and the leader-member exchange is no different, as Varma et al. (2022) suggests that trust is the foundation for leader-member exchange. Furthermore, Hirvi et al. (2021) study found how emotional factors have strong bounds to trust, and in addition Belkin & Rothman (2017) argues how trust is strongly connected to high-quality LMX relationships. Hirvi et al. (2021) study's results also indicated how the leader's expression of emotions has a robust connection to the members experience of a decreased or an elevated feeling of trust towards their leader. Moreover, Belkin & Rothman (2017) found that emotions are indeed in the core of the process of forming trust between people, also Kang & Stewart (2007) highlights how trust affects leader-member cooperation, knowledge sharing and emotional support.

High-quality leader-member exchange is suggested to have formidable impact on employee well-being and thus, have a further positive affect on job performance, and potentially increases the value of the whole organization (Mushonga, 2018). Emotions in leadership are not a new subject by any means, and emotions and especially emotional intelligence was seen as a way to enhance effective leadership by George (2000). In addition, emotional intelligence is described as an intrapersonal self-aware, with capability to express feelings in a healthy way (Wittmer & Hopkins, 2022). Furthermore, leaders own emotions have very direct influence on the leader-member exchange, and what kind of a relationship it will form in to (Ayoko, Tan & Li, 2023). The importance of receiving emotional cues such as facial expressions, vocalization, body movement, gestures and eyes, are the foundation of human interactions according to Keltner et al. (2019). Thus, the importance of leader's expression of emotions in daily bases seem to influence the team members job performance as well (Bartels et al., 2022).

For identifying emotions in social interactions, eye-region of the face is seen as most fundamental part for acquiring and interpreting social cues (Itier & Batty, 2009). There where eye-region is considered most expressive of emotions, Rahal & Fiedler (2019) suggests that eye-tracking might provide useful information and understanding of human actions and behavior patterns to bring clarification to socio-cognitive and affective processes. Haddioui & Khaldi (2012) are also convinced that eye-tracking is a trustworthy technology for collecting data and knowledge of the emotions and interest of the observer. With the visual attention that eye-tracking can provide it could provide valuable information of leadership and the leaders social influence over the team members (Cheng et al., 2023).

According to Krajbich, Armel & Rangel (2010) eye-tracking research there is correlation with people's fixation times to their overall choice, when deciding between presented objects of choice. The overall fixation' duration for a certain object or area of interest is seen as an indicator of how the observer finds other objects more informative or otherwise interesting over the other choices. As far as to date, most research and studies

around social exchange like LMX and TMX have been conducted with questionnaires and surveys, for example Liden et al. (2000) study involving interpersonal relationships and work outcomes was implemented with questionnaires and interviews. More recently Wang & Hollenbeck (2019) performed a study in the same field that involved three phase questionnaires. The same trend follows to Bartels et al. (2022) study of LMX relationships and leaders' emotions, trust and affective states, which was carried out also with self-reported daily surveys.

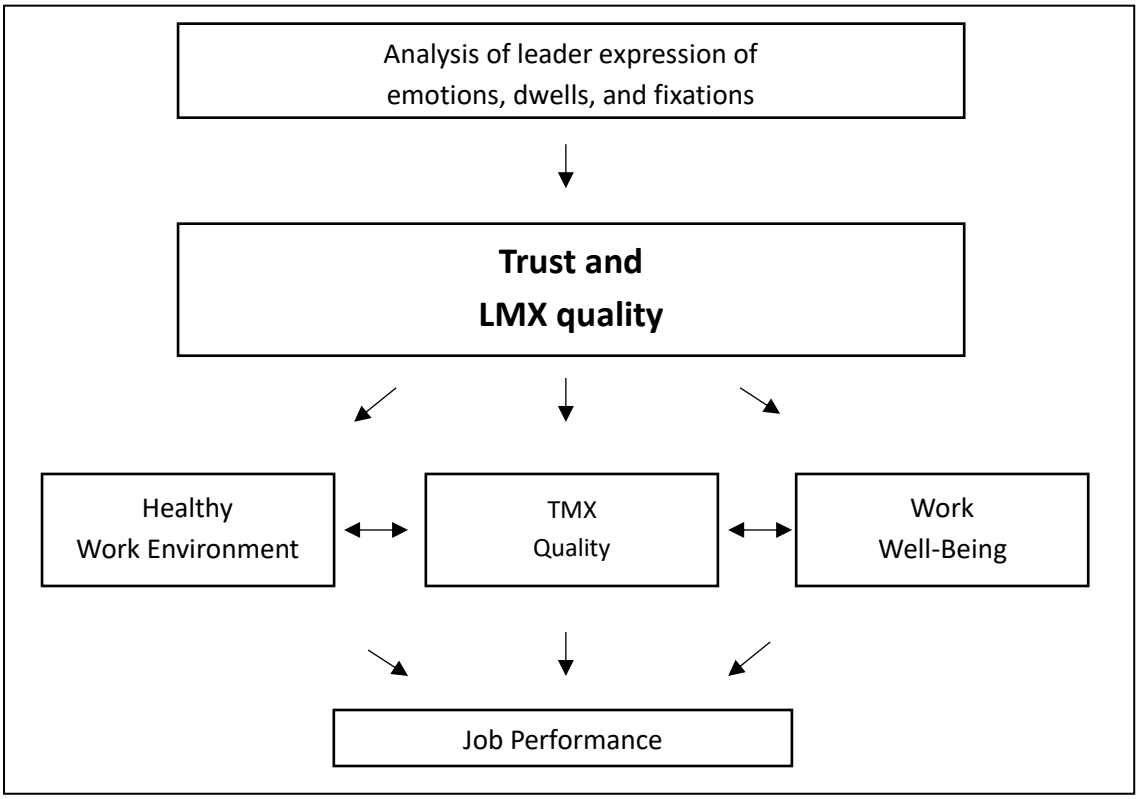
The possibility of self-answered questionnaires being biased is the main reason and for that matter the focus of this thesis, and the reason of using eye-tracking and AI assisted emotion-capture for the data collection. Linking these exact computer-collected results to LMX theory is then supported with questionnaires, with the faults they might have. At least at the start of this study it seems there is no other research that could be found, conducted this way that focuses on leader's dwells and fixation times on team members in a remote meeting, and furthermore combining them with emotion-capture of the observed leader, and linking the data with questionnaire answers provided by the participants.

1.1 The purpose of this thesis

This pilot research setup for team leader's eye-tracking and emotion-capture was carried out in the Vaasa University's VME laboratories (VME Laboratory, 2024). The data was collected as part of a broader research project carried out by the LEADIS team at the University of Vaasa. The teams were assembled from university students as one option that was part of a modular class they were taking. The research data was collected with eye-tracking software installed on the VME-laboratories computer. The eye-tracking software is capable of tracking the eyesight on the computer screen by external eye-tracking camera and a webcam is used for AI assisted emotion-capture from the facial muscle movement, and an additional webcam is used for the leader's video feed for the remote meeting (iMotions, 2024). The research also included two sets of questionnaires for all the participants that involved questions about the team members and the team leader.

As both eye-tracking and emotion-capture metrics can provide information from very specific sets of data to various fields of research, this thesis' purpose is to investigate the leader-member exchange in a remote work environment. The data collected and presented is restricted to compliment the multidimensional factors of LMX mentioned earlier and introduced by Liden & Maslyn (1998). With the selected measurements in the pursuit of understanding the leaders' behaviors influence in remote meetings and is there a possibility to improve this behavior to alter the relations in the more positive directions. While the focus is on the study of LMX theory, it can be beneficial to bear in mind how the research LMX relations can also have an effect in more than one way to benefit organizations. As introduced before, trust is a founding part of LMX relations, and high quality has a positive affection on TMX quality, healthy work environment, work well-being, and how all these lead to better job performance as displayed in figure 1.

Figure 1. Layout of the research of LMX with eye-tracking and emotion-capture and the possible effects of quality LMX relationships.



1.2 Research questions

The research questions are built to answer most contemporary questions about LMX relationships in remote meetings and how eye-tracking and emotion-capture can help to receive data and information about remote interactions, without relying only on survey-based research. For support for the numeric data collected the research is supported by Questionnaire 1 and Questionnaire 2. The questionnaires' purpose is to give a reflection point for the data collected, to have more understanding and perhaps clarify the results of LMX relationships during the meetings.

The research questions are constructed to complement the possibilities of eye-tracking and emotion-capture in the study of LMX relations, what they appear to be good for and how the method can contribute to the research field of LMX theory.

1. What emotions do leaders express, and do the emotions reflect trust in a remote meeting?

2. Does the focus of the leaders' gaze during remote interactions relate to their evaluation of team members' performance?

3. Can emotion-capture and eye-tracking provide useful data to study leader-member exchange relationships?

1.3 The structure of the thesis

This thesis is constructed into six chapters. The first chapter is the introduction of the thesis and contains the overview of the main themes and topics that are considered the key elements of the research and their contemporary meaning in the field of research. Through this the introduction will lead to the specification of the research questions and what or how they might contribute insights for the academic world.

The next chapters two and three are sections of literature review, where the background and their relevance to leading remote work environment and what needs to be considered for a fully functioning remote team. Furthermore, the literature review seeks relevant information and knowledge of concepts like emotions, behavior, eyesight, and eye-tracking, what they are, what they mean, and why they matter in the perspective of leader-member exchange (LMX), and furthermore how they function in a remote work environment.

The fourth chapter contains the overview of the research methodology, data collection, and results. Containing the setup of the research with sample sizes and participants layout and specifications of the equipment, devices and software that used in the research. Also, the chapter will contain the data collection metrics and the explanations of the introduced measurements and what they can tell about the studied samples and what they might indicate.

The fifth chapter will present and evaluate the findings of the data collected and attempts to draw the meanings and usefulness of them to answer the research questions of this thesis. Finally, in the sixth chapter will come to the thesis's closure with reflection on the reviewed literature and will wrap-up in a discussion and conclusions that can be made with the collected data available. Furthermore, the uniqueness of this study, as I could not find similar studies, there will be quite a few suggestions for further studies.

2 Teams in remote work environment

Remote work is not by any means a new concept, this was first discussed in the 1970 and was conducted by phone and usage of couriers. However, the means of working in remote work environment has changed and evolved significantly in many and diverse ways through IT and ICT development (Leonardelli, 2022). Even today's point of view remote work has been done quite a while with various means of communication at least in a portion of organizations. Now the resent world events leaded to that most of the organizations had to change and adapt to the ways of remote working (Kähkönen, 2023).

In the past there was a shortage of expressing nonverbal communication in remote work, as the communication was mostly done by texting. Today as video conferencing is everyday life, expressing nonverbal communication is as well, although it still cannot be straightly compared to what face-to-face interactions offer to communication (Blanchard, 2021). This change in organizations separates the team's members from their leader and this alters the way leaders must adapt to communicate and lead through communication technology interfaces (Bell, McAlpine & Hill, 2019; Höddinghaus, Nohe & Hertel, 2023). Furthermore Bell McAlpine & Hill (2022) points out that this organizational transformation also affects not only how leaders and members interact, but how information and knowledge is created and shared.

Kähkönen (2023) acknowledges that trust is one of the most important factors that should be considered in organizational change. Gustafsson, Gillespie, Searle, Hope, Hailey & Dietz (2021) are also concerned that change to distributive environments might pose an actual threat to organizational trust. Kähkönen (2023) describes that in the case of change to remote work, the relationship between leader and member has not changed, but the frame it has formed is. This change can lead to situations, where a failure to communicate through digital platforms create misinterpretation of the other's intentions and behavior, and this can impact trust and trustworthiness, between leader-member relations, and employer-employee relations as well. In the circumstances of

remote working, leaders and their capabilities rise to the spotlight to harness the new possibilities to maintain and possibly build up their workforce performance in voluntary compliance (Leonardelli, 2022). Although this kind of leadership skills might be natural to others in traditional face-to-face work environment, in the remote setting additional tools might come in question to all leaders. In the matter Blanchard (2021) highlights the importance of copresence and supportive social processes and how they can provide and enhance successful remote workforce. The importance of understanding remote working is increasing by day, as global pandemics might settle down, globalization of the world is not. Bell et al. (2019) observes how globalization has had organizations rethink their structured foundations and how they can keep employees around the world motivated, engaged and building their knowledge in remote work. In addition, Blanchard (2021) suggest that it was crucial to move from audio interactions to video interactions. However, even with swift adaptation of video conferencing it seems that decision-making, relationship forming, and employee attitude development take longer than in daily face-to-face interactions.

Although there seems to be all kinds of trouble and growing pains in the field of remote work environments, there are also indications of what it can bring for the organizations, and for its leaders and employees. As research findings have shown indications of employee well-being been increasing, as remote working brings benefits for employees as in work autonomy, flexibility, participation and social interactions, even amplifying these benefits related to work well-being (Castellacci & Viñas-Bardolet, 2019).

2.1 Leaders and members in remote work environment

The pandemic driven change to remote work and how after the initial steps and doubts started to fade and employees began to enjoy the autonomy, the time, and the freedom, what working from home brought the work life. In the end as the working itself adapted, the biggest change that remains is the human relationships throughout organizations and its functions as day-to-day interactions between employees and between employees and their leaders (Varma et al., 2022).

Leader-member exchange (LMX) theory has a substantial history of advancing research and contributing to the field of study of leadership (Day, Miscenko, Bauer & Erdogan 2014). One of the most important advances LMX theory has brought the leadership research is the shift from the focus of leader-attributes to understanding and studying the importance of leader-member relationships, and their impact on organizational results (Kang & Stewart, 2007). Furthermore, according to Varma, Jaiswal, Pereira & Kumar (2022) the quality of leader-member relations differs from one to another. This relationship quality may translate for more attention, better assignments and overall higher ratings and evaluations of the member enjoying quality relations with the leader. Also, the LMX is not based on a single factor of exchange but is formed as a multidimensional construct and consists of affectedness, contribution, respect, and loyalty (Liden & Maslyn, 1998). As Liden & Maslyn (1998) research did find consistent correlation with previous empirical data that supported the four-dimensional model, and how affect, contribution, respect, and loyalty, all had regression value results indicate that there is significant variance to distinguish these four-dimensions.

In the stage of remote work environment leader-member exchange and their relationship might be considered highly important and the importance of acknowledgment of its challenges. In the past there have been concerns about communication diminishing in remote work, however Jansson & Kangas (2024) suggests that this does not seem to be the case, and the founding base of leader-member relations, interaction and feedback through communication technology is considered as welcome form of interaction for members to reach their leader. That said, as Chekwa (2018) is aligned with the employee job satisfaction increasing through remote work, this is not the whole picture. As Wang et al. (2021), study finds that the quality of virtual communication, and how this is one of the key challenges of communicating in remote work environment, not only it might hinder performance but also affect professional relations (Camacho, Hassanein & Head, 2018). For the challenge of remote team's performance issues, it should be considered fostering and developing the team's cognitive, motivational, and affective states, as they

are tied to team's productivity. This falls to the leader's hands to help, guide, and enable such circumstances for the team to rise and address these possible challenges (Bell et al., 2019). Communication in a face-to-face environment has greatly increased the change of instant feedback, provides additional resources, constant support and fortification on employees' performance (Chekwa, 2018). Furthermore, Jansson & Kangas (2024) study suggests that there is a high imbalance how leaders and members uphold their ongoing communication in a remote work environment. Establishing and maintaining this leader-member connection falls quite solely under the leader's responsibilities. As the burden of communication is weighted heavily on the leader, the exchange between leaders and members is altered. This shift in communication can also change the members view of the leader, for the work itself, and even the feel towards to the work might be altered (Varma et al., 2022). This might indicate that mere communication is not enough to build trust relations, and the members need to feel more connected to their leaders (Hirvi et al., 2021).

In a remote work environment, it can be difficult to form deeper relationships between leaders and members, as it might be harder to express feelings through digital communication (Varma et al., 2022). As Hietanen, Peltola & Hietanen (2020) study claims that there is no significant difference in a person's psychological response for a direct eye contact if the person looking at them is physically present or not. Hench, this regards only direct eye contact, and not for the averted gaze that is present in vast majority of organizations conference calls to date. This leads to the overall nature of video conferencing. Though video conferencing has narrowed the gap between online and live meetings and non-verbal cues and gestures can be caught even in remote work circumstances. The video meetings tend to be shorter and all around limited compared to engaging daily face-to-face communication in real life (Blanchard, 2021). For this limited time window for live communication via video meetings, seems to lead to situation what Varma et al. (2022) suggests, that the lack of possibility to observe each other's facial reactions and physical cues, might hinder trust and liking development. This might lead to stopping them from reaching the level of trust and liking that might form in face-to-face work

environment. Moreover, it suggested that personal affection between leader and member in the development of leader-member exchange is surpassed even the member's job performance level (Cropanzano, Dasborough & Weiss, 2017).

Furthermore, Day et al. (2014) suggests that the leader and member relationships and how they are formed, are in the center of the maintenance and development of the leader-member exchange. The quality of this exchange relationship is also linked to work performance, and with that it should be considered highly important for any organization. Also, it should be noted how Leonardelli (2022) points out, how it is invadable that working in an organization is interconnected and codependent interaction. As for organizations to function properly in their remote collaborative actions, Walvoord, Redden, Elliott & Coovert (2008) suggests that teams' goals should be explicit to reach the quality of their interactions that brings out their best performance. This aligns with Chekwa's (2018) intake of how organizations that foster networking and promotes shared and collective communication environments cultivates and encourages employees to share their resources and knowledge, but also constructs positive work relations.

Much weight is given for leader-member relationships and its quality, but organizational interaction quality observation and development, should not be limited to leader-member exchange, but also considered as a possibility to improve team-member communication and interactions. Leaders should create and maintain a supportive climate for their team members, and with this climate encourage a healthy team-member exchange (TMX) work environment (Kim, Atwater, Jolly, Ugwuanyi, Baik & Yu, 2021). This comes to line with what Wang et al. (2021) argues, that social support for remote co-workers is the key for reducing work loneliness and provide emotional support for handling work-home challenges. Castellacci & Viñas-Bardolet, (2019) study also finds that introducing new ways of communication in remote work environment, can improve job satisfaction as it creates stronger sense of belonging and participation in the organization. Furthermore, it is proposed that enabling and encouraging communication, social interaction and support, employees can feel less loneliness and connecting them to others to feel

more engaged to work and help reduce task procrastination and thus improve job performance and their own well-being (B. Wang et al., 2021). As the study by Martin et al. (2023) suggest the importance of leaders contacting their members in remote work environment more than just task related topics, supports the employees' well-being by creating them sense of worth, value and belonging to the organization. Furthermore, it should be noted how supportive leadership on team level influences team-member exchange on an individual level by creating supportive work climate (Kim et al., 2021). In addition, Varma et al. (2022) sees this starting from the organizational level for enabling the leaders to craft and create on truly visible remote work environment and a work culture around it, as this would promote mutual trust within organizations members.

As it was written in this part of the chapter, the organization creates opportunities for leaders to create a working climate that promotes organizational results and the employees' work satisfaction and well-being, leading to better performance. It is the leaders who do the job and are responsible for the task of creating, nurturing, and maintaining a work environment that can reach this level of operating. With a willing workforce, this might be a call for a leader to rise as a cultural champion (Leonardelli, 2022).

2.2 Leading in remote work environment

When a leader nurtures a supportive working climate for the team to participate, it is suggested that this mediates supportive leader relationship and a supportive team-member exchange (Kim et al., 2021). This supportive climate may also create member member relationships and lead, how Chekwa (2018) describes it, to an opportunity for the individuals working together to start to form friendships. This will lead to their professional, organizational, and social networks to overlap, and ultimately this process will strengthen the networking chain, and with it strengthen the organization as well. For leaders to improve communication throughout members, it is shown that the communication should be systemized. This would generate work surroundings that would seem more real, thought out of, and appear as improved communications. This kind of effort shown for remote communications, might lead also more deeper relations of the leaders

and members (Jansson & Kangas, 2024). For communication in remote work network, is not only for exchanging task related information between employees, but it also is for building interpersonal relationships (Walvoord et al., 2008). This kind of structure of communications would also benefit team leaders, as Jansson & Kangas, 2024) study clams that, while acknowledged that informal communication is the foundation for possibilities to feedback, leaders do find that constant open channels for members to contact are indeed burdening.

Jansson & Kangas (2024) argues that active feedback seeking from members should not be operated by leaders, as their study findings claim that the leaders' efforts of technological support and efforts to encourage members to seek feedback, does not activate the members to do so. Chekwa (2018) suggest that employees should adapt to proactive behavior to seek and create opportunities for active communication with their peers and leaders involving learning and performance-related feedback. That said, it would be beneficial to the organization to understand that human resource development's foundation is built on leader-member exchange relationships and by developed by fostering team-member exchange relationships (Chekwa, 2018).

Martin et al. (2023) study finds that as there can be distinguished two main forms of leader-member exchanges, which can be described as social and an economic LMX relationships. The findings also suggest that social exchange improves LMX quality and leads to more positive outcomes, where mainly task related economic exchange did not affect the LMC quality in a positive manner. On the other hand, Chekwa (2018) finds that as forming a remote working communication network, it is beneficial to note that communication interactions are most useful when they create mutual benefit. The gained benefits may vary from interaction to interaction but may contain for example social and emotional support for the other, and for the other it brings assistance and support for a task related process or for an ongoing project. Hirvi et al. (2021) research found that emotional factors seem to be very closely tied to trust. As for members, the experiences of the leader's emotions were strongly highlighted as an indicator that elevated or

decreased trust in their leader. For the matter of collectiveness, both members and leaders seemed to value this factor as a strong indicator for constructing trust.

Especially in the context of remote work, our focus should be in interpersonal trust, for this is what both leader-member exchange and human resources development (HRD) builds on (Varma et al., 2022). The leader-member exchange quality varies daily for most of the personnel, which indicates that when exchange relationship is formed between leader and member, it is not a relation that stays static (Martin et al., 2023). Moreover, the findings of Belkin's & Rothman's (2017) study demonstrates how observed emotional expressions are indeed very important in trust development. Furthermore, trust rises to play as an important role in leader-member cooperation, sharing knowledge and in emotional support (Kang & Stewart, 2007).

George (2000) writes, how it is suggested that moods and emotions are the core elements in cognitive processes and behavior. Moods and emotions are separated by their intensity, where emotions tend to linger on, after their cause has been addressed. Affective events theory (AET) introduced by Weiss & Cropanzano (1996), focuses on the outcomes of structures, causes and consequences of affective experiences at work. As affective events theory's central focus is that affective experience is not the same as experience of satisfaction. It also translates to how the members experience developing the same relationships with their leaders, even as their leader would express the same emotions towards them. For different individuals' response is different, even to the same emotions expressed to them (Cropanzano et al. 2017). This seems to align with Chekwa, (2018), and the remote work environment communication needs, as emotions initiate the trust building in LMX relations.

Belkin & Rothman (2017) argues that individuals may develop certain social behavior stereotypes by judging one's verbal and nonverbal expression of emotions. This observation of emotional expressions forms a picture of the person's character and intentions, which are linked to their sociability, morality, and competence. Thou it is said that leader-

member roles that are established are quite stable, this might not be the case. For unexpected situations might occur, where new affective reactions are expressed, and thus influence and develop the leader-member relations (Cropanzano et al., 2017). Moreover, Hirvi et al. (2021) study suggest that trust in a leader-member exchange relationship, is not developed solely by dyadic interactions of the leader and member but is formed in a much vast and complex social events and processes.

Belkin & Rothman (2017) study indicates that when a person is in an initial competitive setup with a stranger, the expression of happiness influences such stereotypes as sociability, morality, and competence on a positive manner. These findings are extremely important, for these also indicate the development of initial trust (Chekwa, 2018), in comparison to neutrality and how the expression of anger affects negatively in these aspects of human behavior. Furthermore, affective trust has a strong impact on the quality of LMX relationship, this might be from when a member develops emotional bonds with a leader, the affective relations would lead to that the members to work harder for their leader in a high-quality exchange relationship, and again affecting the leader's affection for the member (Mushonga, 2018).

As highlighted by Jansson & Kangas (2024) remote work needs maintaining, fostering, and developing LMX relationships. In addition, as Chekwa (2018) finds that it would be beneficial to create a remote working climate where leader-member exchange relationships can be cultivated and grown, for a better work environment and higher well-being. Furthermore, as Belkin & Rothman (2017) brings forward that the LMX relationships seem to rise to high-quality when emotions that enhance the experience of trust are expressed by the leader. Moreover, the developed trust between leader and member is likely to lead to employees' higher job performance and valuable for the whole organization (Mushonga, 2018). For this, there seems to be a need to understand the leader's emotions better and how understanding them helps to understand members behavior in remote working environment.

3 Emotions and eye-tracking

“We have also seen that expression in itself, or the language of the emotions, as it has sometimes been called, is certainly of importance for welfare of mankind”. (Darwin, 1872/1965 p.366).

Darwin’s work has been an inspiration for a vast variety of studies in the field of Basic Emotions Theory (BET), including identifying what should be considered as “basic” emotions. Ekman et al. (1969) research suggests that there are six pan-cultural emotions that can be indicated as basic emotions. These emotions were identified as happiness, anger, fear, sadness, surprise and disgust, disgust was also seen parallel or adjacent with contempt and seen as one emotion. Although there have been years of advancement in the study of emotions, and Keltner, Sater, Tracy & Cowen (2019) indicates, how the Ekman et al.’s 1969 study roused plenty of critique, questioning validity of the results. However, these six emotions that could be considered as the foundation of emotions, seem to still play a part in the year 2024.

Although Keltner et al. (2019) found that it is suggested that there are various emotions from 22 to up to 51, that can distinguish between one and another, this does not mean that the basic six emotions are somehow irrelevant. The most apparent change that has occurred is that originally in BET emotions disgust and contempt were seen with similar expression features, but Ekman & Cordaro (2011) separated them from one and another and leads to seven distinguishable emotions. These emotions also are what iMotions (2024) software considers to be the core emotions that can be captured with facial expressions. The naming of the basic emotions and core emotions are mostly cohesive, except for happiness emotion, that iMotions (2024) refer as the emotion of joy, and because of this, happiness will be referred as joy/happiness to avoid misinterpretation. The seven emotions themselves that will be further discussed in this thesis, are described by Ekman & Cordaro (2011) as follows:

Anger: can be seen as an emotion triggered when something or someone is seemingly trying to harm us or someone we care about, would it be physical or mental harm. This often involves some kind of reaction or wish to try to hurt the offender. Anger also is seen as an emotion that emergers when there is an attempt to pursue a goal that is cared about and there are obstacles that need to be countered or removed. **Fear:** is a response to a physical or a psychological harm and triggers reactions to freeze or flee, and furthermore fear might also trigger emotions of anger. **Sadness:** is a response when something that has been considered as valuable and very attached to is lost or feared to be lost. **Joy/happiness:** is an emotion that is a response to enjoyable feelings, and there are many different triggers for differed kinds of happiness and as they can be distinguished from each other and are quite finely nuanced, they all fall under happiness. **Disgust:** is often seen as a response of repulsion by a sight, smell or taste of something, but is also triggered often in human interactions, when someone's actions are revolting or ideas, they provide are somehow offensive. **Contempt:** is an emotion that makes one feel morally superior to another person. **Surprise:** is the briefest of the basic emotions and is a response to a sudden and unexpected event.

Ekman & Cordaro (2011) describes how basic emotions are formed from two main components. First there must be a clear and discrete difference in a basic emotion, that can be distinguished from others. Secondly a basic emotion should involve a founding characteristic that it has evolved and adapted to the surroundings. Barbalet (2011) also clarifies that, emotions must be linked to the experiences of the surrounding world of the participant. Including continuous evaluation, attention and engagement to various objects, things, events and persons, including oneself and receive emotional responses through these objects. As in literature and entertainment, so is in organizations and in their symbols, and stories, is that the appeal of them for the observer is usually driven by emotions. In the operational level, being aware of feelings and emotions of others and one's own, and knowing their causes, could be described as emotional intelligence, and how it is connected to potentially contributing in to cultivating an effective leader (George, 2000). In social psychological research the focus is mainly on situational

behavior of individuals concerning which action is more probable over an another. As these behavioral actions take many forms, such as helping others, to how discrimination emerges from different individuals, to what it takes to conclude in trusting a person (Rahal & Fiedler, 2019). All-in-all navigating through social life, would it be personal or working environment, the interpretation of verbal and non-verbal social signals are essential for communication (Bayless, Glover, Taylor & Itier, 2011).

The eye-region could be considered the most fundamental part for interpreting the social cues, for it is seen as necessary for identity and emotional processing, furthermore it provides suggestions of gaze direction indicating points of attention and perhaps future intentions (Itier & Batty, 2009). Furthermore, Hietanen et al. (2020) suggests that eye-contact arouses positive reactions and emotions, which can be read from facial expression, and these reactions seems to indicate that the experience of been noticed is the trigger for these positive autonomic reactions. In addition, eye-tracking may provide additional information about human actions and elaborate our understanding of behavior patterns, as the socio-cognitive and affective processes in a whole are still lacking understanding and unexplored in many areas of social psychology (Rahal & Fiedler, 2019).

Eye-tracking is an established technology which is suitable for acquiring knowledge of the observer's interests and emotions (Haddioui & Khaldi, 2012). Moreover, gaze and visual attention is considered valid, as a proxy indicator for determining leadership and its social influence in a team context. For when tracking a leader's eye-movement in a team meeting, where there are several points or areas of interest that are the team members. As the leader can only be looking at one area at the time, and if one team member receives more gaze dwelling and fixations over the others, the rest will receive less attention from the leader (Cheng et al., 2023). To conclude, combining the leader's emotions and eye-tracking in remote meetings might lead to new insight to leader-member exchange in remote work environment.

3.1 Emotions in remote meetings

The quote from Charles Darwin starting this chapter, i.e. emotions and wellbeing, even written over a century ago, couldn't be a more current issue in today's business world. As George (2000), decades ago analyzed how it seems that emotions and emotional intelligence has high potential to contribute and enhance effective leadership. This effectiveness in leadership can be shown through acknowledgement of how emotions might affect decision making, moreover the leaders with high emotional intelligence can use their understanding of emotions and their root causes for finding more positive ways to look at them, thus improve and maintain more functioning organization.

Now fast forwarding to the more contemporary age, it does seem that being mindful and understanding emotions are only now being noted more seriously in the working environment. As according to Wittmer & Hopkins (2022) emotional intelligence, at its core is founded by intrapersonal self-aware, recognition of strengths and weaknesses, and from expressing feelings in a healthy way. In correlation Ayoko, Tan & Li (2023), found that leaders own emotional reappraisal and behavior have a direct and robust influence in the leader-member exchange relationships. For, as noted by Gabel-Shemueli & Zaferson (2021) the final stage in building leader-member exchange evolves from mere behavioral to more established emotional ties.

Indeed, in building relations of any kind, it is important to be able to acquire emotional cues from facial expressions, vocalization, body movement, gestures, and gaze, as according to Keltner et al. (2019), are part of dyadic and group interactions between humans. Because of this, the communication channels are in a place of importance in interactions between leaders and members, and members to members alike. For nonverbal channels are prone to misinterpretations, as they may be presented unclear and offsets original intentions or their accuracy. This chance of misunderstanding can be seen as the lack of noticeable behaviors and emotional cues of intentions (Leonardelli, 2022; Dinh, Reyes, Kayga, Lindgren, Feitosa & Salas, 2021). Where warm smile will perhaps initiate a counter between individuals where the observer seeks to find out more about

the smile and creates positive emotions in themselves, and furthermore creating more approachable behavior and environment for positive interaction (Keltner et al., 2019). However, a smile that is seen as proud and dominant smile, might result the same kind of autonomous information seek, but this time ending with experience of threat and creating an avoidant behavior atmosphere (Keltner et al., 2019).

In the consideration of leaders' emotions, the results were quite clear that members perception of the leader's daily emanation of emotions influenced the members working processes. They did alter the daily performance by lowering the result in more negative emotions, whiles resulting in higher result with positive affective states (Bartels et al., 2022). To build lasting and high-quality leader-member exchange relationships, dyadic trust seems to be essential. As trust relies on positive feelings of the coming actions of another that will have an affection on the other's wellbeing (Barbalet, 2011). Furthermore, in increasing team performance to its optimal level, leaders should influence their team members with positive reinforcement and motivation by managing their own and the emotions of others in a responsible way (Dinh et al., 2021). It is also suggested that emotion tracking could be used as a stress indicator in an organizational level to understand job related stressors in a remote work environment (Kaur et al., 2022). In close relations align a suggestion that leaders should be aware and possibly support team members cognitive and emotional resources as work and off-work life can take their toll, especially in a remote work environment (Dinh et al., 2021).

As emotions are observable in remote meetings and can be recorded with emotion-capture software, there is a possibility that they will provide information about the quality of LMX relationships, especially when the focus is on the dyadic exchange with a leader and a member. Here eye-tracking comes in, and with it the level of observation and data collection of the leader's behavior is greatly increased. When the leaders captured expression of emotions can be pointed more specifically to the member that is currently looked at and provide more suggestions of the leader's emotions for different members of the team, and how they might vary between them.

3.2 Eye-tracking in remote meetings

It is said that social psychology research is mostly depended on self-reports, as Liden et al. (2000) study that involved interpersonal relationships and their affection to work outcomes was researched by questionnaires and interviews. Another more resent example is Wang & Hollenbeck (2019) study that was conducted by a three-phase questionnaire method. Because of this, methods such as eye-tracking is favorable for getting research data without e.g. self-answered surveys, data, and information report that might contain biases (Rahal & Fiedler, 2019; Cheng et al., 2023). As eye-tracking can record a vast variety of eye movement metrics and collect large amounts of data from the participants gaze patterns, providing much more accurate data for procession (Kröger, Lutz & Müller, 2020). Furthermore, as the studies suggest eyes can be considered as a reliable source of behavioral information, that can provide more understanding of the hierarchical and functions of team leaders teams and team members (Cheng et al., 2023).

In a remote work environment, Hietanen et al., (2020) study does find that if eye-contact is made, it does not matter for an autonomic arousal response are the participants in the same physical space or not as long as the gaze is not adverted. That said, even in today's technical advancements such devices and webcams that can provide direct eye-contact, are very scarce and expensive. However, Standaert, Muylle & Basu, (2021) suggests that live video feed is indeed more social form of communication, than without it. Furthermore, video communication can result in more positive emotions when interacting with co-workers, and in addition to leader-member exchange, also improve team-member exchange relationships. Although as it might be that video meetings are considered more social way of communicating, it might be wise to acknowledge and take in consideration what, Liang et al., (2021) study finds. As it may, smiling is considered as a joyful expression of emotion, but when it is linked with an averted gaze the emotion might be seen more likely as sadness or fear. For countering this effect in remote meeting and for gathering more specific data from the team leader's point of view, eye-tacking is considered as an established approach for receiving direct measures and insights for what are the triggers for arousal in real-time measures in various situations (Rahal &

Fiedler, 2019). As eye-tracking may provide these insights into the thinking and processing of decision-making, for individuals choices, judgements, and reactions for different situations. For example, in the context of choosing something over another, the final choices are a limited information provider and cannot provide insight of the path that was taken for the final decision (Rahal & Fiedler, 2019). This in mind, visual attention might be used to imply recognition, value, and worthy of others respect. It is likely that if the target is gazed at regularly by the leader, it can result as increased feel of prestige-based status of the individual gazed at (Cheng, Gerpott, Benson, Bucker, Foulsham, Lansu, Schülke & Tsuchiya, 2023).

Eye-tracking is a function that involves tracking one's eye movement (Farnsworth, 2023), in other words, their gaze, which can be defined as an act of looking at something or someone, and the eyes are directed to this location in the seen world. This indicates that one's eye movement seems not to be only to gather visual information of the surroundings but also to emanate information to others (Hessels, 2020). For instance, is the leader looking at all the team members equally or are they paying attention for certain team members and leave some with the feel of less recognition, it could be suggested that the social evaluation is elevated for the person the leader is looking at (Cheng et al., 2023). In addition, it seems that if the leader's attention is focused on a lower-level team member, the attention of the other members change focus as well and can even result as better overall team performance (Cheng et al., 2023).

Eye movement for what is looked at and in what period in time, is an automatic function and for most of the time it is an unconscious process. Eye-tracking software is a method that can illuminate this hidden side of interest with eye tracking metrics that may reveal more without conscious biases and preferences (Farnsworth, 2023). Moreover Hessels (2020) argues that eyes and what one is looking at seems to reveal more accurately the more subtle expressions of emotions as they occur in interaction situations that the more robust and extremely expressed basic emotions. Furthermore, Krajbich, Armel & Rangel (2010) research data suggests that there seems to be a strong connection

between fixations and choice overall, and that for fixations are the core of deciphering eye-tracking functions. Farnsworth (2023) explains that when multiple gaze points in time and space are close together, they form a cluster that is described as a fixation. Furthermore, as the eye movement is focused and built from a number of fixations points, it is seen to be a sign of attention towards the stimulus. As the fixations' duration is an indicator of how informative or interesting the observed target is (Gerpott, Lehmann-Willenbrock, Silvis, & van Vugt 2018; Haddioui & Khaldi, 2012). However, fixations for certain objects might be affected by visual properties that are not correlated with the actual value of the object in interest (Krajbich et al., 2010).

When observers are not constrained by where they can look or how long they can look, it would appear that they prefer to focus their attention on other people over objects. In these people-oriented fixations, the fixations the faces are preferred over bodies, and eyes are preferred over other facial features (Hessels, 2020). Correlating with this, Itier & Batty (2009) also finds that eyes are in high importance in reading facial expressions and processing visual social cognition containing the aspects of identity and recognizing emotions in others. To conclude the review of eye-tracking, the importance of eye-movement, and the significance of eye region in interpreting social cues and emotions, Hessels (2020) findings suggests that fixations have a significant part in initiating and regulating people's interactions, and furthermore it might even play a part in speech recognition and understanding speech even in challenged audio surroundings.

In conclusion, the research of leader-member exchange (LMX) by combining emotion-capture and eye-tracking measurements in a remote meeting environment, might provide deeper insight and unconscious actions in a leader-member relations, without possible biases provided by surveys alone. Furthermore, through emotion and eye-tracking software collected data might provide yet unknow knowledge about how does a newly found team's leader's emotions vary between different members and are they correlated with eye-tracking fixations.

4 Research method

This mixed-method research is a pilot study of emotion-capture and eye-tracking measuring a team leader in a remote meeting, and it is part of a broader research project by the LEADIS team at the University of Vaasa. As far as I can tell, there was not a similar way of setting leader emotion-capture and eye-tracking study to be found. The research will be broadened with a two-part Questionnaire, where the participants are asked to fill in a survey shortly after team introductions in the meeting and a second part immediately after the meeting. The teams were formed from students who got an option to get partial credits for an ongoing class if they participated. The teams consisted of one leader who participated from University of Vaasa's VME Laboratory, and 3 team members were attending the meeting remotely, from their home or other chosen location.

The main goal of this research was to have clearer insights, without biases of self-answering, of what leaders go through emotionally and what they are looking at in a remote meeting. Does it matter how long the dwell time or fixations on different members is, on how the leaders will rank the participants in the final questionnaire. In the questionnaire they are asked to place the members in a ranked order by how they engaged and participated in the meeting from the leader's point of view. Secondly with the emotions-capture enabled during the remote meeting, there will be an attempt to see if the leader's recorded emotions have some factors that might indicate how the team members see and evaluate the leader, at the start and after the meeting.

When eye-tracking, emotion-capture, and the questionnaires are combined, there is a possibility to find much needed answers to how leadership takes place in the context of remote meetings, how the LMX relationships start to emerge in these meetings, and furthermore, how they relate to evaluations of each performance during the remote meetings. Moreover, is there something is it possible to indicate where the leaders are focus during the meetings and can this revelation of the focus points used to improve the leader-member exchange and their relationship.

4.1 Research equipment and specifications

Below is a list of all equipment and software specifications used in this study and the design of the teams and what are the main metrics and variables to be captured.

- Eye-tracking application: iMotions 10
- Equipment:
  - *Display Dell P2312H 23" 16:9 Height: 28,6cm Width: 50.9 cm Distance: approx. 75cm Resolution 1920x1080 Screen refresh rate 60 Hz.*
  - *Camera facial expressions: Logitech HD Pro Webcam C920*
  - *Camera Zoom meeting: Logitech HD Pro Webcam C920*
  - *Blu-Tack: Attaching the web cameras atop each other.*
  - *Eye-tracking: Tobii Pro Nano*
- Meeting application: Zoom
  - *Zoom meeting software.*
- Sample size and study location:
  - *4 to 6 groups of 4 participants. University of Vaasa, VME laboratory with remote locations.*
- Stimuli presentation and a specification of area of interest
  - *Each participant has an AOI marked on the leaders Zoom screen (including leader's own video feed).*
- Eye-tracking metrics and variables
  - *Visual attention: Eye gaze dwell and fixation points within Areas of Interest (AOI) with two dimensions. Small w 180 h 90 and normal w 420 h 300.*
  - *Emotions: Anger, sadness, disgust, joy/happiness, surprise, fear and contempt*
- Missing, excluded and corrected data.
  - *As there were some complications in the data collection, the data is formed from the most consistent and noncorrupted data.*

4.2 Measurements and metrics

The data that iMotions 10 can collect is vast and multifaceted, and there for in this thesis will be introduced only the aspects that are used to determinate the research questions most comfortably, and of course provide the closest data relevant to the subject of leader-member exchange in remote meetings.

Fixations and gaze points: Are gaze clusters that form from series of gaze points and because of this they form a gaze cluster, which can be called a fixation. These fixations are the most basic output measure when dealing with measuring eye-tracking (Farnsworth, 2023).

Area of interest (AOI): Is an area that is a selected region of the displayed stimulus that is looked at. As AOI is not an actual metric, its purpose is to define areas that can provide information of the region were eye-tracking metrics are calculated (Farnsworth, 2023).

Dwell time: Is an eye-tracking metric that provides data about the amount of time the participant looked at a specific AOI. If this time spend an a specific AOI over the other is longer than the others, it could indicate that the AOI is somehow more motivating or otherwise interesting to look at (Farnsworth, 2023).

Frame count: Is measurement of quantity and the frames are single images appearing in the run time of the meeting video and is an alternative for measuring happenings in time.

Emotions: The core emotions are captured by a webcam that include anger, fear, sadness, joy/happiness, disgust, contempt and surprise, as discussed in chapter 3. The values are measured from 0 to 100, depending on how strong the facial expression is in relevance to each emotion. Even as emotion capture can identify seemingly the smallest gesture of an emotion, in the values under 1, this might be considered more as background noise or just facial muscle movement formed from talking. The emotion strength is set as 30% that the emotion is clearly expressed and suits the nature of this research.

4.3 Research setup and data collection

The study is built up around a remote meeting where teams of 4 participants are attending a Zoom meeting. The team members are participating in the meeting remotely from their chosen location, as the team leaders are located at the VME laboratory, where their eye-tracking and emotions-capture was recorded. The participants were instructed to always keep their webcams on during the meeting. The team members were held in a waiting room in Zoom where a supporting researcher went through how the meeting is recorded and how the research is following the GDPR guidelines. All participants were asked to give their informed consent to participate in the study. As the team leaders are attending the meeting from the laboratory, they were explained the same circumstances they are under and how the data collected will be stored within GDPR guidelines, and they were asked to sign the acceptance of the recording of the meeting, where their eye movement is eye-tracked, and emotions are captured with a webcam.

The leaders were also introduced to a task they would present to the team, that they had no prior knowledge of, and that they must solve and prepare a short presentation of their conclusions for their teacher. The teacher would be contacted and invited to the Zoom meeting to hear the presentation. The leader was also informed that the task could be completed as they like and instruct the members for the best course of action. The emotion-capture was done by a webcam and iMotions 10 software that identifies facial movement and expressions with AI assisted emotion recognition. As there is the possibility to analyze separate facial expressions and muscle movement, however this thesis will only cover the 7 core emotions that are expressed by the leaders. The emotions are recognized on the scale of 0 to 100 and can be seen in percentages of how strong and clear the emotion is during each time of the ongoing meeting. The eye-tracking data was also collected with iMotions 10 software and Tobii Nano eye-tracking camera. The eye-tracking equipment is capable of tracking far more specific data than is included here, including metrics like saccades and the acceleration of eye movement during changing between fixation points. However, as these kinds of measurements seem closer to neurology or maybe psycho neurology and how the speed of exchanging fixation points

might be connected to specific emotions, in this thesis the interest is focused on the behavioral aspect of the leader's eye-tracking and what it can tell us.

As part of the research the leaders and the members were asked to evaluate each other in two questionnaires, and in addition the leaders also had to rank the team members by performance and contribution in the second questionnaire. In Questionnaire 1 was send by research moderator to the Zoom chat after the leaders were asked to invite them to the meeting. This occurred after 10 to 20 min from the start of the meeting, as the various length introductions of the teams were made. After the meeting Questionnaire 2 was sent to all participants by email and they were instructed to answer it immediately after the meeting. They were asked the same question again as in Questionnaire 1, but with a few additional questions, that could only be answered after the participants had spent some time together. Questionnaire 1 had 8 questions for all the participants, and 2 additional for the team members regarding the leader. Questionnaire 2 had a total of 14 questions and in for the leader was also added task of ranking of the team members. The questions were set to scale from 1 to 4, meaning that even 1 drop or increase of a score would make clear impact 25% for the participants evaluation. Furthermore, the lack of middle ground is set to push the participants for an actual evaluation, tipping the results clearly in the positive or the negative direction. For this thesis only the most relevant questions are presented in the findings section in chapter 5, that are used as an indicator for determining the eye-tracking and emotion-capture results regarding leader-member exchange (LMX) in remote meetings. Also, in Questionnaire 2 the final question to the leaders was to rank the members attending the meeting by their performance and their contribution to the task they were given. The ranking was restricted so that the leader had to put the members in order from worst as in 3rd, second as in 2nd and the best as in the 1st, based on their overall opinion of them as a team member.

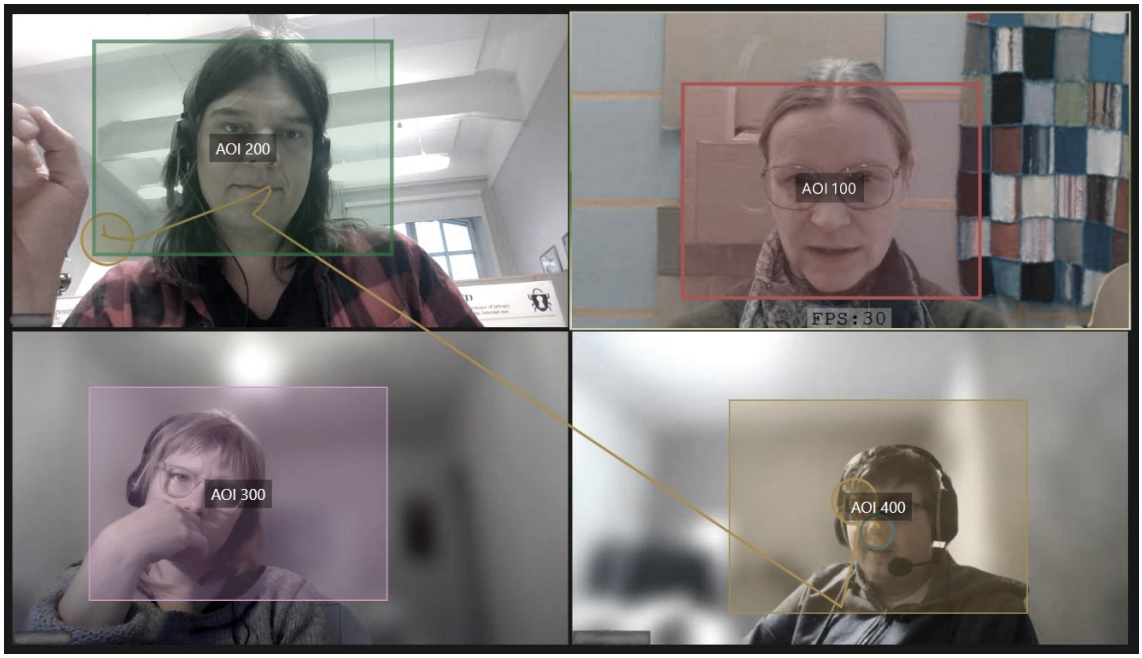
As mentioned earlier, Liden & Maslyn (1998) suggests that leader-member exchange is a multidimensional construct, formed from factors of affectedness, contribution, respect, and loyalty. As respect and loyalty are factors that might take longer time to develop,

this thesis attempts to address only the factors of affectedness and contribution. The questions from Questionnaires that seem to compliment affectedness and contribution are the ones regarding personal traits: “This person could be my friend”, “Our personalities are similar”, and “I like this participant as a person”, and” did you know well this person from before?”. The work-oriented questions are: “It was easy to work with this person”, “This person had skills that are useful for the task”, and “This person performed well in contributing to the task”. In addition, the questions for the members regarding the solely the Leaders performance as a leader: “This person performed well as the team leader”, and “This person was equal for all the team members”.

The meeting was held in Zoom, and it was set on gallery view, so that the participants would appear equally on the screen. However, the modification of the view was not restricted for the leader during the meeting, as too many rules might distract the natural course of participation of the research subjects. The gallery view was disturbed on all occasions, as the team started to write down their presentation and the screen was shared for all to see the notes. Because of this, there were two sizes of area of interest (AOI) framing the participants, a normal size with width of 420 pixels and a height of 180 pixels. The smaller one was used when the presentation mode was on, and the participants’ video feed was reduced to a ribbon on the screen and had a frame width of 180 pixels and height of 90 pixels. The AOI’s were postprocessed and moved manually during the analysis of the recording of the meeting when needed to.

In Figure 1 below, it can be seen the eye-tracking in motion as in orange line and circles. The team leader of the test Team 00 is coded as AOI 100 as in participant 1 of Team 00. The leader’s eye movement on the computer screen is tracked with an eye-tracking camera and the emotions capture are recorded with a webcam. Furthermore, the Zoom meeting needed a webcam of its own, as one webcam could not be split between two software even with a virtual IP-camera program. The solution was to place the second webcam on top of the first one, and the means in hand was a bit of Blu Tack, and this turned out to be simple and effective.

Figure 1. Screen capture of a Zoom meeting set up for a test run with eye-tracking and emotion-capture, with few members of the Vaasa University's LEADIS-team researchers.



Some complications did occur during the recording sessions and unfortunately, some of the data was not fully collected from the meetings and these parts of the data had to be excluded from the research. The teams 01 and 02 are left out from the eye-tracking results, due to a recording time limiter being left on, and it interfered too much for the dwell and fixation time results, still these teams are included in the emotion-capture results. Teams 03 and 04 are left out from the emotions capture, for the emotion data quality was only 30 % as it should be somewhere in the 90 to 100 %, however the teams are included in the eye-tracking results. For the third part the teams 05 and 06 were the only ones to qualify for both eye-tracking and emotion capture, and the leaders' emotions could be evaluated when they are looking at the different members of their team. The limitation of the useful data brings this thesis having overall results from 6 teams, but the results are divided according to the uncorrupted data collected and are divided as follows: For the leader emotions capture 4 teams are included n=4, eye-tracking from 4 teams resulting n=4. Only 2 of the teams were qualified for both measurements and to combine the eye-tracking and emotions when looking at each of the team members. As both teams have 1 leader and 3 members, the research participants' quantity ends up having n count of 6.

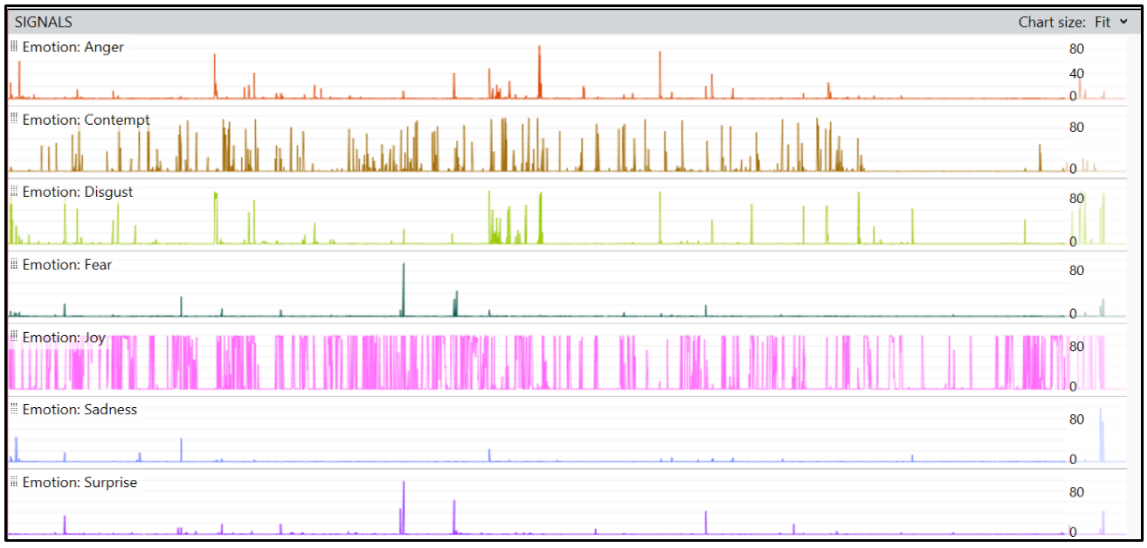
4.4 The data collected via eye-tracking and emotion-capture

The eye-tracking and the emotion-capture data recorder are in their whole quantity quite massive. Because of this, here are presented the data received from the team leaders that seem to be most useful for the research questions asked in this thesis. First are the measurements of overall emotions that the leaders experienced or expressed during the remote meeting they led their teams through. The second part will contain eye-tracking data of where the leaders looked during the meeting and how their fixating was distributed on the members of team. The third part is results of the combined data available, where the emotions that the leaders expressed as they were looking at each of their team members and how the eye-tracking data might be related to these emotions.

4.4.1 Emotion-capture

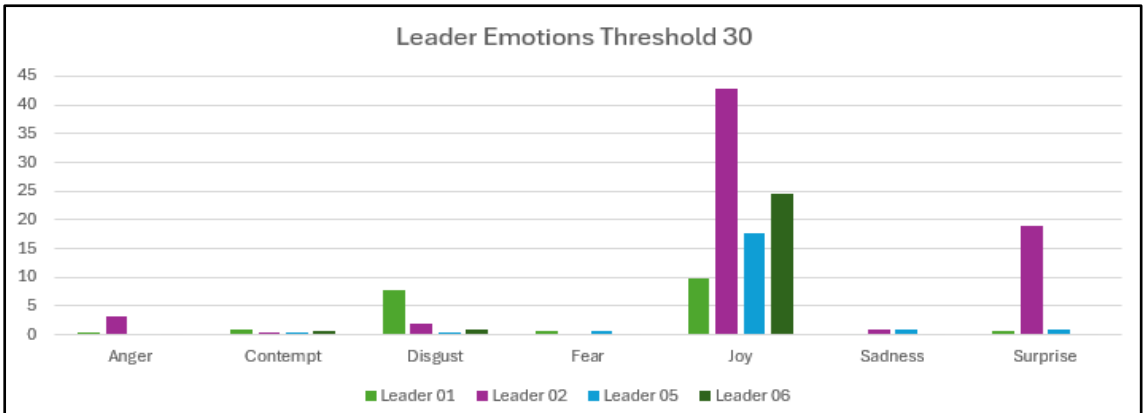
Below in Figure 3 can be seen an example of how the leader's core emotions are identified during the meeting runtime and to get a good overall picture of what are the strongest and the most reoccurring emotions expressed by the leaders. However, the results will be presented as a column chart for clearer presentation and comparison.

Figure 3. A visual example of an overall emotion captured during a full-length meeting and the emotions expressed on the scale of 0 to 100.



The leaders' emotions captured during a remote meeting ended up having the sample size of n=4. The collected data is in Table 1 below, that presents the data in numbers and with a clear visual graphic of how different emotions were averagely experienced by the different leaders. From Table 1, can be seen the percentage of how often the leaders showed each of the emotions and what was their overall quantity over the meeting runtime.

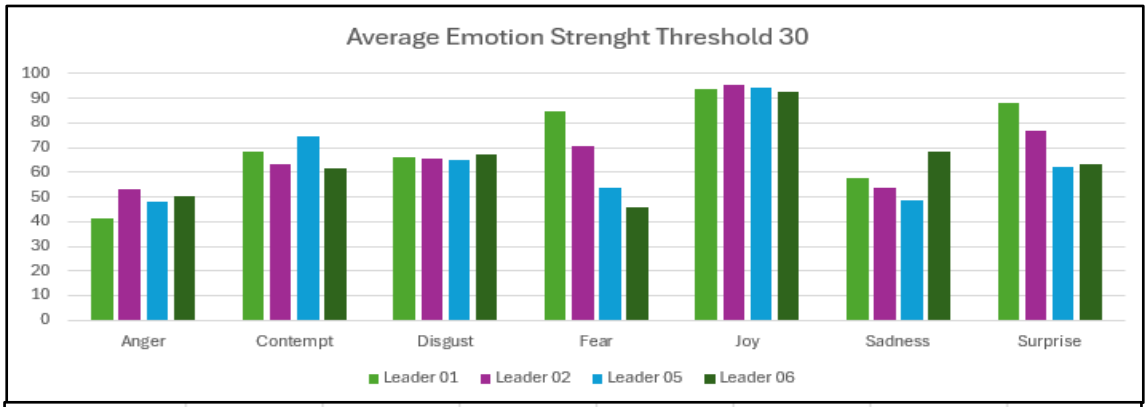
Table 1. Data and graphic visualization of the percentage of leaders' average quantity of emotions experienced with a threshold of 30%, during a remote meeting.



T30	Anger	Contempt	Disgust	Fear	Joy	Sadness	Surprise
Leader 01	0,43	1,04	7,84	0,65	9,94	0,06	0,79
Leader 02	3,26	0,39	2,04	0,09	42,76	0,88	18,91
Leader 05	0,11	0,39	0,40	0,58	17,70	0,93	1,06
Leader 06	0,20	0,77	0,95	0,03	24,56	0,06	0,04

The measurements in Table 1, are presented as an average percentage of the entire runtime of the meetings and this is the reason why most of them appear in rather low numbers. In Table 2, the emotions can be distinguished more clearly by investigating how strongly the emotions are expressed, and perhaps from this point of view there can be found something more to study and even the scarcer emotions appearance can be evaluated by studying their expression strength.

Table 2. Data and graphic visualization of the percentage of leaders' average emotions strength experienced with a threshold of 30%.

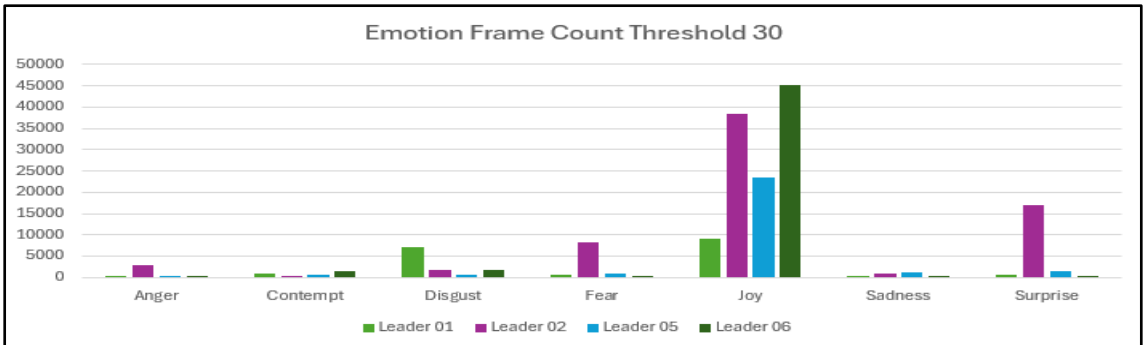


AVG EMO T30	Anger	Contempt	Disgust	Fear	Joy	Sadness	Surprise
Leader 01	41,15	68,32	66,35	84,75	94,03	57,47	88,01
Leader 02	53,16	63,17	65,53	70,78	95,55	53,97	76,60
Leader 05	48,00	74,65	64,90	53,55	94,11	48,39	62,30
Leader 06	50,34	61,81	67,03	45,68	92,72	68,49	63,12

The numbers in Table 2, give a clearer picture of the emotions the leaders are going through and how intense the emotions are, this can be interpreted as quality over quantity sort of way. As Table 2 describes the overall average strength of the emotions, still this does not tell anything about the frequency of the emotions that are experienced, that is not tied to the overall runtime and with all the frames that also includes the ones with no mentionable emotions like Table 1 includes. Because of this it might be useful to include additional measurements to further elaborate the data and include only the frames that include emotions.

In Table 3 below is presented all the frames that contained emotions that exceeded the 30% threshold and how the frames are divided between the different core emotions, between different leaders. From here can be seen that for example in Table 1 there was barely a notable amount of sadness present, and if there were its expression strength in Table 2 was around 50%. Despite earlier measurements did not bring much of a difference between the Leaders expression from Table 3 it still can be seen how much they really can vary when taken a closer look.

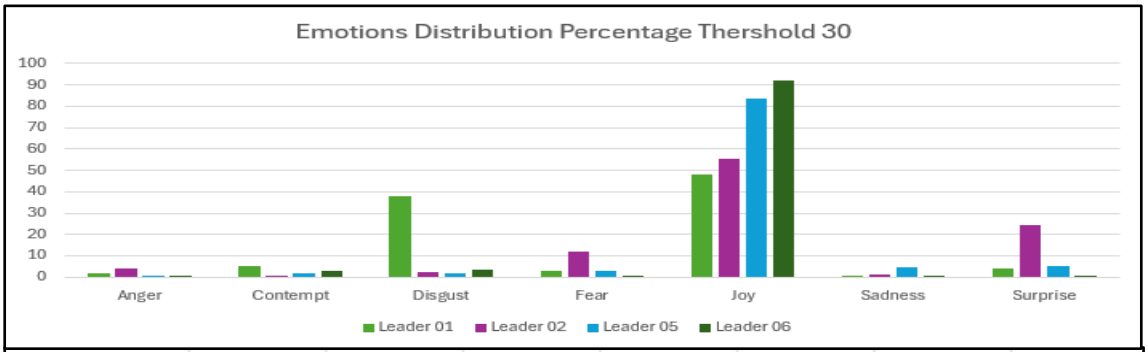
Table 3. Data and graphic visualization of the emotions frame count quantity expressed by the leaders, with a threshold of 30%.



EMO Count	Anger	Contempt	Disgust	Fear	Joy	Sadness	Surprise
Leader 01	384	935	7055	585	8949	58	714
Leader 02	2936	350	1833	8281	38488	794	17015
Leader 05	145	517	531	776	23593	1236	1411
Leader 06	370	1416	1755	54	45323	111	73

To further investigate the leaders' emotions and how they occur in the meeting, it might be practical to calculate the percentage of each emotion and how they are distributed between all the emotion frames counted per leader. Below in Table 4 it can be seen, yet again, that the initial results of Table 1 emotions percentage did give a different kind of view of who is e.g. the most joyful leader. The difference between these results could indicate that when only the meaningful frames that contain emotions are taken into consideration the expressions within in these frames might be the ones that count.

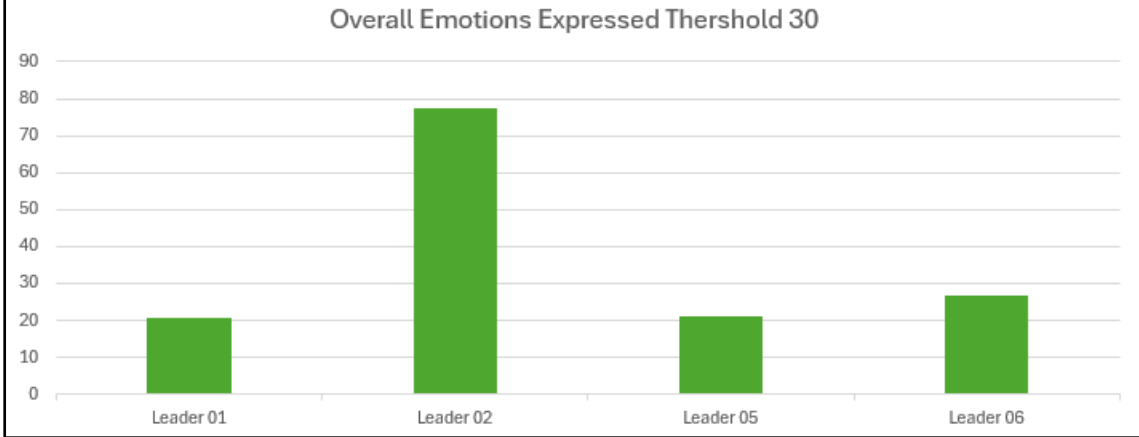
Table 4. Data and graphic visualization of the percentage of emotions distributed within the count of emotions expressed, with a threshold of 30%.



EMO % T30	Anger	Contempt	Disgust	Fear	Joy	Sadness	Surprise
Leader 01	2,06	5,01	37,77	3,13	47,91	0,31	3,82
Leader 02	4,21	0,50	2,63	11,88	55,22	1,14	24,41
Leader 05	0,51	1,83	1,88	2,75	83,64	4,38	5,00
Leader 06	0,75	2,88	3,57	0,11	92,30	0,23	0,15

Finaly to wrap this section, in Table 5 is presented the overall percentage of emotions the leaders expressed during the whole running time of the meeting. There is somewhat surprisingly very little variation between the Leaders 01, 05 and 06, but the Leader 02 is a major exception compared to the others, with notable emotions expressed as in 77,44% of the emotion frames of the meeting. What this might indicate or how they could be relevant for leading remote meetings will be discussed in the next chapter.

Table 5. Data and graphic visualization of the percentage of emotions frames distributed in overall meeting runtime, with a threshold of 30%.

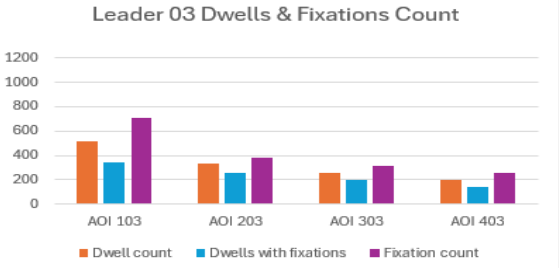


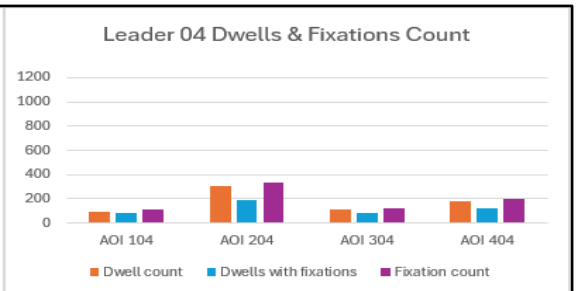
All Frames	Leader 01	Leader 02	Leader 05	Leader 06
EMO %	20,76	77,44	21,16	26,61

4.4.2 Eye-tracking

In Table 6 below, is presented the most useful metrics for acquiring information of the leaders' eye movement behavior and what they are most interested in looking at during a remote meeting. Stimulus duration is the runtime of the meetings in milliseconds, dwell time and fixation duration are the total time in milliseconds spent looking at each of the AOIs. Dwells and fixations are also presented as counted frames, which is the most convenient and comprehensible measurement, and is used to mainly present the results.

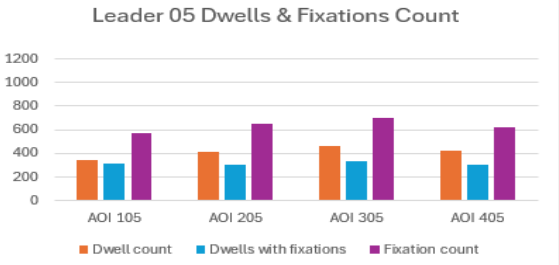
Table 6. Data collected with eye-tracking during the remote meetings.

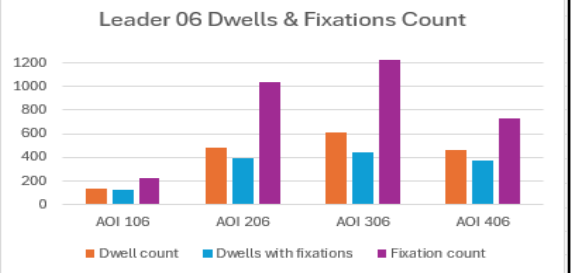




Team 03	AOI 103	AOI 203	AOI 303	AOI 403
Stimulus duration	4970630	4970630	4970630	4970630
Dwell count	521	**332**	257	197
Dwell time (ms)	483753	**252942**	185676	169559
Dwells with fixations	340	**252**	195	144,5
Fixation count	707	**383**	318	255
Fixation duration (ms)	619,54	**754,50**	612,22	718,32
Member Ranked	-	**1**	2	3

Team 04	AOI 104	AOI 204	AOI 304	AOI 404
Stimulus duration	5196130	5196130	5196130	5196130
Dwell count	93	**304**	108	177
Dwell time (ms)	52482	**343084**	84291	176268
Dwells with fixations	86	**189**	85	118
Fixation count	112	**339**	124	200
Fixation duration (ms)	474,81	**1071,8**	672,1	938,24
Member Ranked	-	**1**	3	2



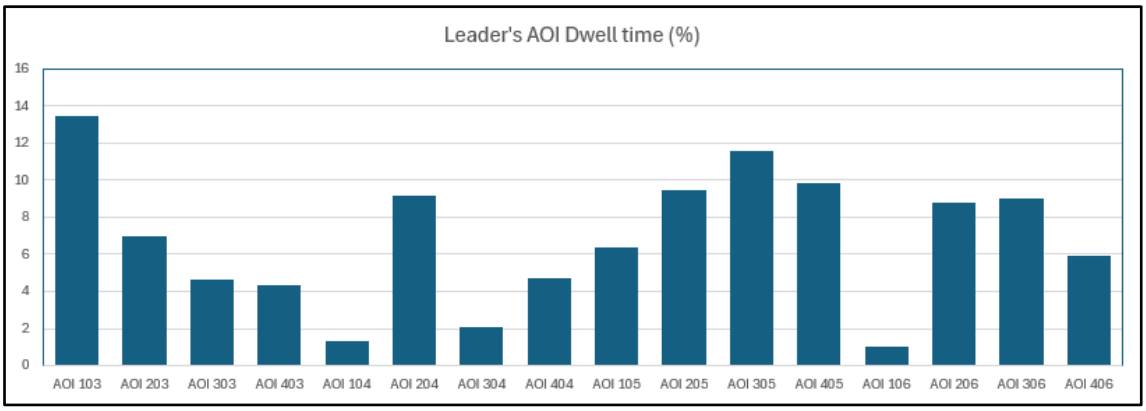


Team 05	AOI 105	AOI 205	AOI 305	AOI 405
Stimulus duration	4444046	4444046	4444046	4444046
Dwell count	345	416	**465**	419
Dwell time (ms)	268405	368172	**440110**	344876
Dwells with fixations	317	300	**337**	300
Fixation count	574	651	**701**	624
Fixation duration (ms)	428,29	564,88	**641,57**	609,63
Member Ranked	-	2	**1**	3

Team 06	AOI 106	AOI 206	AOI 306	AOI 406
Stimulus duration	6151113	6151113	6151113	6151113
Dwell count	140	482	**612**	465
Dwell time (ms)	69860	582794	**611433**	348868
Dwells with fixations	130	392	**440**	373
Fixation count	221	1034	**1228**	727
Fixation duration (ms)	270,62	**480,1**	415,42	459,46
Member Ranked	-	**1**	2	3

Figure 4 below presents the overall dwell time on each AOI by their respective leader to give a better view of how time was spent by each leader. In addition, it should be noted that the AOI numbers presented in Figure 4, do not add up to 100%, this is because only the members and leader were coded as an AOI. The presentation notes shared, brief chats, looking of screen, and the teacher's appearance in the meeting, are considered as the rest of the dwell time occurring in the meeting. The results in Table 6 above, the highest numbers of dwells and fixations, and the rank of the member that was ranked 1st by the leader, are marked with bold font type to distinguish them more easily from other results. Although all the leaders have their own AOI and they are presented here as part of the research, they are not ranked by the leaders and only have a more supportive role for the metrics of the study. Still, it might be noted that in Figure 4 can be seen the quite big variations between the leaders spending time on their own AOI's.

Figure 4. Visual presentation of dwell time percentage of the leaders on their teams AOI's.



For the ranking results that are in Table 6, indicate that all the dwell times and fixations are in milliseconds and/or in counted number of times. The Leaders 03, 04, and 05 ranked 1st as the members who they had dwelled and fixated at the most during the meeting. In most cases these three Leaders, especially 03 and 04 also ranked 3rd the member they had dwelled and fixated the least on during the meeting runtime. Leader 06 was an exception, and ranked member AOI 206 over the most dwelled and fixated member AOI 306, however, the fixation time in milliseconds was on AOI 206.

Table 7. Remote meetings lengths in milliseconds converted to minutes.

Stimulus duration	Team 03	Team 04	Team 05	Team 06
Duration in minutes	82,84	86,60	74,07	102,52

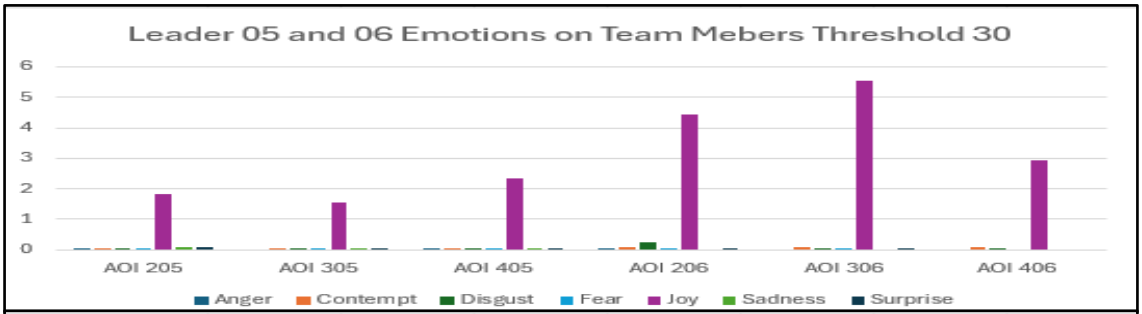
For better understanding of the timeline in Table 7 above the duration of the remote meetings are converted from milliseconds to minutes (time in milliseconds / 60000). This might give some clarity about how the meetings recording length compared to each other, and the variation is approximately from 18 to 28 minutes.

4.4.3 Emotions combined with eye-tracking

Finaly in the last section of this chapter is presented the results of the mixed measurements that combine the eye-tracking dwell times and fixations with the emotions experienced, in pursue to reveal what emotions the leaders are showing when they are

looking at the different members of their team. Now, as stated before, I did see only two of the team leaders and their teams qualify for the analyses of these results, which are Leader 05 and Leader 06. Despite this, the actual subject count rises to n=6, as there were 6 members in total for the team leaders to look at, which ends up having the highest of the participant counts among the research focus points. The results are presented below in Table 8, with a visual presentation of the overall distribution of the emotions between the team members AOI's. The table includes results for both leaders', as AOI 105, AOI 205 and AOI 305 are Leder 05 team members and AOI 106, AOI 206 and AOI 306 are Leader 06 team members.

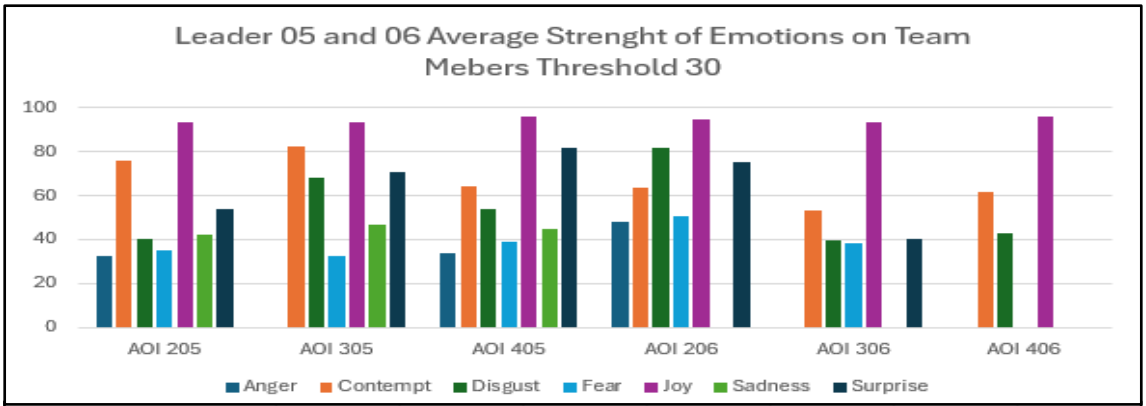
Table 8. Presentation of percentage of how Leader 05 and Leader 06 express emotions when they are looking at their respective team members.



T30	Anger	Contempt	Disgust	Fear	Joy	Sadness	Surprise
AOI 205	0,008	0,013	0,007	0,014	1,808	0,075	0,087
AOI 305	0,000	0,008	0,041	0,002	1,556	0,060	0,044
AOI 405	0,001	0,027	0,016	0,010	2,329	0,056	0,048
AOI 206	0,064	0,094	0,261	0,019	4,448	0,000	0,027
AOI 306	0,000	0,095	0,011	0,007	5,534	0,000	0,004
AOI 406	0,000	0,070	0,009	0,000	2,926	0,000	0,000

The quantities of emotions expressed in Table 8 are, as expected, very similar to Table 1 and the presence of other emotions than joy is barely noticeable. Again, this does not mean they are not there, or they do not matter. As the other emotions still get strong expressions of these emotions, thou they tend to be scarcer than joy. The average strength of the emotions experienced for each member could be quite useful knowledge to evaluate. For easier referencing, the numbers and comparing the results for the member that the leader did rank as the 1st are marked with bolded font type.

Table 9. Data and visual presentation of Leader 05 and Leader 06, average strength of emotions experienced when looking at their respective team members.



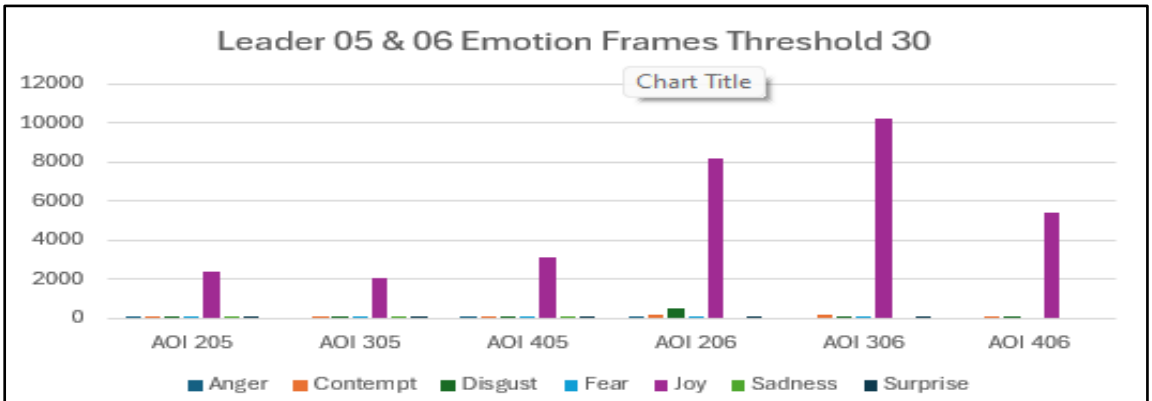
AVG STR T30	Anger	Contempt	Disgust	Fear	Joy	Sadness	Surprise
AOI 205	32,474	75,939	40,502	35,029	93,318	42,084	53,930
AOI 305	**0,000**	**82,647**	**68,236**	**32,270**	**93,530**	**46,749**	**70,859**
AOI 405	33,586	64,158	53,775	38,779	95,801	44,888	81,510
AOI 206	**48,319**	**63,810**	**81,447**	**50,792**	**94,490**	**0,000**	**75,083**
AOI 306	0,000	53,109	39,327	38,530	93,381	0,000	40,092
AOI 406	0,000	61,460	42,581	0,000	95,840	0,000	0,000

In Table 9 above, can be witnessed that as rare some emotions can be, their average strength is something to be taken into consideration. Again, starting with the emotion of joy, which is the strongest appearing emotion within both leaders, and this time the strength of the emotion is well over 90%. This indicates that even Leader 05's quantity of joy over the team members is far less than Leader 06's, the strength of this emotion is as strong, when the average of the emotion is calculated with the threshold of 30%. The second strongest emotion expressed by the leaders is contempt and is somewhat higher with Leader 05 towards the team members. Expression of disgust is the final emotion that was expressed for all the members, as after this surprise is the first emotion which has a member that this emotions strength did not surpass in average the threshold of 30%. This absence of emotions happens also with the rest of the emotions fear, sadness, and anger.

Next, as in the overall emotions results, with the data collected there can also be seen how the emotions were distributed within the team members and is there something more to be found and seen as useful data. In Table 10 above, can be seen the emotions

frames, and how each of the team members have the share of them. Unsurprisingly joy frames are the most common in all cases, but interestingly they are not the highest among the members who were selected as number 1 participant. With Leader 05, the only other emotion is contempt that had three times the quantity in frames with the member AOI 405 who was ranked as 3rd in comparison to AOI 305. This however does not recur with Leader 06, furthermore Leader 06 anger frames were only present with AOI 206 who was ranked 1st. These will be examined more closely in the next chapter.

Table 10. Data and visual presentation of Leader 05 and Leader 06 total frames of emotions expressed with a threshold of 30 %.



FRAMES T30	Anger	Contempt	Disgust	Fear	Joy	Sadness	Surprise
AOI 205	10	17	9	18	2410	100	116
AOI 305	**0**	**11**	**55**	**3**	**2074**	**80**	**58**
AOI 405	1	36	21	13	3105	74	64
AOI 206	**119**	**174**	**482**	**35**	**8208**	**0**	**49**
AOI 306	0	175	20	12	10212	0	8
AOI 406	0	129	17	0	5399	0	0

5 Research findings

In this chapter the research results of the eye-tracking and emotion-capture data collected will be analyzed what they might suggest about leader-member exchange and leaders themselves in remote meetings, and through this answering the research questions laid out for this thesis. The results will also be referenced to the Questionnaire 1 and 2 answers more broadly to evaluate the scale of seemingly harsh evaluation scale from 1 to 4. In the final part of this chapter the data will be brought together for a compact overview of the results collected to lay down the guidelines for the discussion and conclusions in the final chapter.

5.1 What emotions do leaders express, and do they reflect trust?

Results of the overall emotions that the leaders experienced or expressed during their leadership guiding the remote meetings run time were cohesive among the participants, regarding what of the core emotions were captured and in what quantity they appeared. The emotions captured are from 4 leaders and the most expressed emotion clearly was joy/happiness in quantity, frequency and in the strength by the run times of the meetings. This should be a good indication that all the leader participants are on the right track keeping remote meetings, as the expression of positive emotions for upcoming task or actions should be affecting positively on other team members and increasing their wellbeing.

The rest of the core emotions in quantity measured by percents was merely present, all thou there was a raise in Leaders 01's disgust and somewhat surprisingly Leader 02's anger, considering that Leader 02's expression of joy/happiness exceeded all the others. This, however, might not be a sign of been mad at someone or something, as the definition of the expression of anger also can be the sign of determination and the state when things are moving along and getting done. Also with Leader 02, there was frequent capture of signs of surprise, that would indicate that there were lot to be surprised at during the meeting. On the other hand, when summing up all the emotions between the

leaders, Leader 02 also had the most expressions of all the emotion combined. This would indicate that Leader 02 was also the most emotional of the leaders, but this might also be that the Leader 02 had the liveliest facial movements, that registered as emotions. This can be the case, for as previously indicated trust is strongly tied to positive emotions, and the members answers on the Questionnaire 1, on two occasion a value increased from 3 to 4, and one stayed as 4 in Questionnaire 2, as they were asked: “I like this participant as a person”. This, however, could also mean that the all the emotions were there, but the all-around high positivity throughout the meeting was really felt and a remembered, and the members answered the Questionnaires according to this experience of the leader.

The second important metric of the emotions of the leaders is the strength of the emotions registered. As most of them were scarce, their appearance still could be notable and maybe even more so as they are not so consistent. In average joy/happiness again was the most noticeable emotion, but this time all the emotions are strongly present. Most of the emotions are quite close in strength to each other between all the leaders, and from this point of view there seem to be less difference as they were in their quantity. This might be because, as the emotion threshold was set to 30%, as no subtle nuance would be registered as a full emotion. Now, the average of the emotions would end up been between 30 to 100. These results could indicate that the actual emotions between the leaders are similar in their strength as an emotion. In other words, as an emotion is expressed their expression strength with each emotion seem to be similar with the participants.

The third measurement taken in consideration of contributing leaders’ emotions in their relationship with expressing trust, was the frame count where certain emotions were expressed. As the metrics are similar to the overall percentage they need to be counted for, because they do open another perspective analyzing the leaders. In Table 3, one of the emotions that was distinguishable from earlier in its strength was Leader 01’s fear emotion, as in its average strength surpasses all the other leaders. As it might been seen

as a strong emotion in Table 2, in Table 3 things are different and it becomes quite clear that Leader 01's fear frequency is far from being the most fearful, only second to Leader 06. Moreover, the numbers do indicate that Leader 01's framerate of emotions are the lowest compared to the others, and disgust is not that far from the top emotion joy, which is still clearly the most expressed emotion by the leaders. It can also be seen that Leader 06 was the leader that expressed most frames joy/happiness, when only the frames with emotions are taken into consideration. In both Questionnaires Leader 06 was evaluated performing as a leader among the members in the highest rank of 4, so no increasing or decreasing was found there. The joyful leadership perhaps did make one of the members increase their evaluation from 3 to 4 regarding the question "This person could be my friend", as the two other members kept their rank of 3 unchanged. In addition, the members were asked separately for evaluation of the leader's leadership skills with the question: "This person performed well as the team leader". The original rates were 3, 4 and 4, and after the meeting one of the members increased the evaluation, resulting in maximum points.

Still there was more to unravel from the measurements of the emotions' metrics, and the fourth point of view that seems to make bit of different outcome is the overall percentage of the emotion frames divided between all the emotions captured. This time the interest pivots for the Leader 05, although in the Table 4 Leader 05's joy emotion percentage was the second highest with 83,64%, compared to Leder 06's 92,30%, it is still much higher than Leader 02's that was initially the highest in the overall frames of the meetings. Furthermore, Leader 05's other emotions were well in check and there was almost no indication of anger, contempt or disgust, which could be seen perhaps as the most negative of the 7 core emotions. For the results, it would seem that, with in the initial overall results the Leader 05 that seemed not that notable in expressing emotions compared to others, is beginning to show proper leader qualities.

5.2 What eye-tracking reveals about leaders on who they are looking at?

The results from the eye-tracking measurements were extracted from four leaders that I did see qualify for comparison, which are the Leaders 03, 04, 05 and 06. Although it is quite impossible to have exact lengths of meetings to compare to each other, as the requirement for length or restriction of it may interfere with measurements. However, these four leaders' meeting runtimes are seemingly close enough, at least for a simple numeric comparison of the results collected. The eye-tracking metrics selected for analysis are the ones that can be compared to each other in the same scale of quantity, and they included dwell count, fixation count and dwells with fixations. As the mentioned metrics are the focus of the research findings, there also are notable notations for the time spent in dwelling and fixations in addition for their counts.

The overall result confirms that meetings length, from approximately 74 minutes to 102 minutes, is not on issue for comparing the participants eye-tracking between each other. For example, Leader 05 from the shortest meeting did have few more dwellings than the Leader 06 with the longest running meeting. Another instantly notable finding from Table 6, is that Leader 04 has the lowest dwell and fixations counts, and the difference for the other leaders is quite clear in most cases. What makes this interesting is that despite the low counts Leader 04 still has by far the highest score on fixation duration in milliseconds. This could be a clear indication, that as Leader 04 does not take constat interest in the members, the leader seems to be giving the members full attention when they are perhaps talking about their ideas for solving the problems in the task the team was given. This could also be supported by the matter that there was quite a bit of variance in the overall time that the leaders looked at the specified AOI's of their teams. For instance, Leader 03 looked at the AOI's 21,97% of the time, Leader 05 had the highest score of 31,99%, and Leader 06 with 26,22%, were Leader 04 spent only 12,63% at looking the AOI's in the meeting runtime. Because no difference was made between looking at task paper on the shared screen in Zoom or perhaps a physical notebook on the table, it could still be suggested that Leader 04 might be the most task oriented of the four studied leaders. Another point that is distinguishable from the other leaders is that

Leader 06 has the highest score on fixation counts, but still the separate and the combined fixation duration are the lowest of the studied leaders. This might indicate that Leader 06 is also task oriented, but is willing to notice the member more often, but quickly returning to overlook the progression of the task that is been created in the Zoom screen. As for the Leader 03 and Leader 05, the dwell and fixation count, and their overall time seem to be quite similar and perhaps when compared to the other two Leaders and to each other, they might lay some sort of middle ground or on indication of an average that these kinds of meetings might turn out to be, even in larger quantities.

In the previous chapter the ranking results indicated that all the leaders who ranked their members from worst to best with as 3rd, 2nd, and 1st, the most common finding was that that the dwells and fixations times and counts were corelating with the ranking score. Meaning that the Leaders took the most interest in the team members in all measurements who they ranked the 1st, as the best performing and participating member. Now the exception was Leader 06 who ranked the member 2nd who the most visual interest was given to, yet the fixation duration for the 1st member was the highest. This would suggest that from all the measurements and their metrics the fixation duration might be seen to be the most valuable of them, as in the indicator to reveal the most positively encountered interested. Where leaders were asked to rank the members, the members were also asked questions about their leader's personality, leadership skills, and their performance. Again, early in the meeting and right after the meeting, with the scale from 1 to 4 were 4 is the most positive score.

In a broad glance the members were quite positive in their initial valuation and in the final score as well, however there were a few interesting things to point out. The Leader 03 did have the most downgrades from the team members, lowering leading related performance from 4 to 3 and even from 3 to 2 in the personal factor. These scores came from AOI 403 and AOI 303, but the team member AOI 203 who the Leader 03 spent most time looking at, and was ranked number 1 team member, did rise almost all the initial scores to the highest score of 4. This might suggest that there was something building

between Leader 03 and AOI 203, or perhaps AOI 203 noticed the increased attention that was received over the other members.

The rest of the scores given for the leaders were positive and if there were some changes they were increased from 3 to 4 in most cases, with Leader 04 and Leader 06. Leader 05 had some differences compared to the other leaders, as Leader 05 was ranked initially with the highest scores of 4 on leadership performance, and 3 and 4 for personal traits. However, the member AOI 205 who was ranked by the leader as 2nd best member, did drop the personal traits: “this person could be my friend” and “this person’s personality is close to my own”, from 3 to 2. This however did not change AOI 205’s opinion of the Leader 05’s leadership skills and the overall performance as a leader. This might be an indication that, as it is good for the LMX relationships to work from positive bases, this might not be necessary for a team member to acknowledge a good leader when one is presented for them.

Finally, Questionnaire 2 there was one of the questions that was asked from all the participants: “did they know this person from before”, from the scale 1 to 4, were 1 being not or barely knew at all and 4 that the person it was known well or even a good friend. From the studied leaders only Leader 05 was known before by two of the members and only with a modest score of 2. An interesting observation is that the member AOI 205, who did know Leader 05 from before was also the one that dropped the friendship aspects after the meeting. This could support the factor that even as AOI 205 was bit of disappointed in Leaders 05 personal traits and backed away from them having a chance of being friends. AOI 205 still did not change the opinion about ranking Leader 05 with the highest scores of 4 in the leadership skills and traits. As this might be telling more about the member AOI 205 as a balanced and very capable in objective thinking, there is a chance that, as noted in the previous paragraph, maybe good leaders are given the recognition they deserve when good leadership is truly valued by the members.

5.3 Do leader's emotions between members affect their evaluation?

Eye-tracking combined with emotion-capture there are unique and curious results and findings to be discovered, which can lead to new insights of leader behavior and does this behavior affect the members receiving the emotional gestures as they evaluate their leaders. The overall picture of the meetings, emotions experienced by the leaders and how they distributed between the members of the team seemed at first perhaps even meaningless. For where the share in quantity might not be much, but their strength is something to be taken into consideration, especially as the emotions portrayed here are averages of the emotions detected that exceed the 30% threshold.

In the results, joy is the strongest of the emotions that is expressed by both leaders towards their members, and there is particularly no deviation in the emotion's strength across the board. The constant re-occurring of joy in quantity and in quality is perhaps a clear indicator that when teams are built from students the results are leaning heavily to a very joyful experience. Maybe the remote meeting is seen as sort of a playground, that is connected to the real world and real-world problems that do need to resolve through the given task. Still the emotion capture reveals that it is not just fun and games, and various emotions still are experienced by the leaders, and it is possible that they light up in certain situations for certain members of the team.

The strongest emotion was joy, the weakest emotion that leaders experienced was anger, and the findings what anger indicates are mixed. As the members AOI 205 and AOI 405 did share mild expressions of anger by the Leader AOI 105 and only the count of ten frames. Still AOI 305 did not receive any frames of anger within the threshold and AOI 305 was ranked number 1 performing member by the Leader 05. Now on the other hand, the participants AOI 306 and AOI 406 did not receive any frames of anger from their Leader AOI 106. Because of this, it means that AOI 206 did get all the anger frames expressed by Leader 06 and summed up to the count of 119 frames. This does not support what Leader 05's anger would have suggested that Leaders would not express anger towards for the team member they ranked number 1. However as said before, the

expression of anger is not always about being mad at someone, but the same expression can be seen as determination or the sign that the task at hand is simply moving along with accepted pace and quality. This might be the case with the Leader 06, and the expression of anger was a sign of approval for a member taking an initiative.

Contempt was one of the more noticeable emotions in its strength, and all the AOIs did get a fair share of it. The overall strength of contempt projected forwards for the team members was very similar. The strongest is for the team members AOI 305 and AOI 206, who both are ranked as number 1, while AOI 206's contempt was pretty much the same as the AOI 306's in quantity, on the other hand AOI 305 did have the lowest count in frames. With the data at hand, the quantity difference being very varied between the leaders, it still could be said based on the strength of it, that maybe contempt could be an emotion that is expressed for others who are performing well. Another more negative emotion that shows in strength is disgust and thou it is behind of contempt, in quantity for the best performing members it is the highest for both AOI 305 and AOI 206, and for the latter the second highest of all emotions expressed for the team members. This could be because in basic emotions contempt and disgust were seen very similar expressions, but later in core emotions these were separated from one and another. Yet, there is also the possibility that the expression of contempt and disgust do have something to do with noticing competence from the person they are looking at. That said, Leader 05's total of 2,41% of the emotions for the member ranked number 1, were disgust and for the Leader 06's number 1 with 5,32%, and perhaps they are only there for the moment of on good or a bad idea was introduced by a member, and as they move on moment later, joy replaces these emotions.

For the rest of the emotions that were directed to the team members, fear and sadness are presented but, in their strength, they are barely crossing the 30% threshold, furthermore Leader 06's team members AOI 206, AOI 306, and AOI 406 did not have single frame of sadness experienced towards them. However the emotion of surprise was quite strong for the team members ranked as the best performers, this might indicate that

during the task there was probably few good moments of surprise from these team members, and thus perhaps even affect the ranking for them by the leaders. On the other hand, maybe Leader 05 did have a disappointing surprise from the member AOI 405 as the surprise strength average is the highest of the participants.

The next step of the research is to compare the Questionnaires 1 and Questionnaires 2 values, and did the values given by the members for the leaders change during the meeting as the members received the emotions experienced and expressed by the team leaders for them. The most changed questions by the members were: “I like this participant as a person”,” it was easy to work with this person?”, and “this person could be my friend?”. There also was a question in Questionnaire 2 for all the participants, that asked:” did you know well this person from before?”. In the Leader 06’s team it was clear that none of the participants knew or barely knew each other from before. Leader 05’s team did seem to know each other a bit better and the leader, but none seemed to see others to be actual friends. There were also some variations in how well they thought they knew each other.

Most notable changes in the team members answers for the Questionnaires were from AOI 205 who was ranked 2nd, was the only one to drop Leader 05’s evaluation as being a potential friend, but still kept the rest of the leadership related skills the same. Leader 05 did not change anything about AOI 205’s values but did increase some of them for AOI 305 and AOI 405. This ended up that all the team members were valued by Leader 05 very high and there was no deviation between the end results. This might be a sign that Leader 05 is quite benevolent, and perhaps not easily give poor evaluations, then again maybe all the team members were indeed very good at their performance. Furthermore, Leader 05 probably did struggle in ranking them quite harshly, from best to worst. This might be supported by the emotion results, as when comparing these valuations to the emotions Leader 05 expressed for the individual members, there is little to no variance between 2nd and 3rd ranks. Still the only thing setting them apart from rank 1, is the expression of anger and somewhat higher contempt. In addition, the Leader 05

did rate for knowing the member AOI 403 from before as high as 3, still this did not interfere judging the participants meeting performance. This would suggest that Leader 05 is very capable of objective evaluations of the team members.

Most dramatic decrease of all the evaluations was the Leader 06's evaluation of the member AOI 406, and was in all the three question, that are related to for the personal traits of the participants, that were mentioned earlier. Curiously Leder 06, did increase AOI 406's one of the task related skills from 1 to 3, but still ranked AOI 406 as 3rd in the final evaluation. This would be some kind of suggestion that, as Leader 06 did note and give value for the knowledge AOI 406 did eventually bring for the task, still it did not affect for example how easy it was to work with AOI 406. Now, as both AOI 306 and AOI 206 did have their values increased, originally AOI 205 did have the higher scores and because of this it could be suggested that the reason that AOI 205 was ranked 1st, is that the Leader 06 did see the members value straight from the beginning. However, Leader 06 did get a few increases based on leading performance in general and for some of the personal traits. This left only a little improvement for the highest scores, and it seems that the Leader 06 was seen as a good leader from the beginning by all the team members, even though none of the members knew the leader from before.

As for Leader 05 and Team 05 there were no significant alterations to determine that the leader's emotions affected the evaluation, this seems to be the case with Leader 06 and Team 06 as well. The results involving anger for example are all the way around with Leader 06 that could be presumed, and between teams, contempt and disgust did change places when comparing the best valued members of the teams. Still, it is interesting to find that the only thing that the rank 1 members seem to share within their leaders' emotions is a high value in the strength of surprise, and this leaves a question hanging, is there a surprise coming that involves the expression of surprise? This, however, will be discussed in the final chapter.

5.4 Emotion-capture and eye-tracking in the study of LMX

Next it is time to wrap-up all the findings of this chapter together and present an overview and a summary of the knowledge that has been gathered through the results to answer the research questions presented in this thesis. Involving the themes of emotions and trust, eye-tracking with dwell and fixations, and are these methods useful in the research sector of leader-member exchange.

1. What emotions do leaders express, and do the leaders' emotions reflect trust for the team members in a remote meeting? As joy/happiness was the most common emotion that the Leaders expressed in quantity and in strength as well. It could be said that the studied Leaders had expressions that should evoke trust for the team members in the remote meeting. Initially Leader 02 was most joyful of the leaders when all the frames of the runtime were counted for, but as the frames were reduced to only count for frames with emotions attached Leader 05 and Leader 06 joy frame count exceeded Leader 02. This also might indicate that in the end Leader 06, with the highest joy score, end up having quite a lot of positive upgrades in Questionnaire 2. Furthermore, Leader 05 who did not originally stand up with high emotional expressions, and thou were seconded by Leader 06 in joy, Leader 05 had the most positive evaluations from the team members, which furthermore strengthens the assumption that positive emotions evoke trust among team members, and this could be captured in a remote meeting.

2. Does what leaders are looking at during remote interaction relate to their evaluation of their team members' performance? Eye-tracking might be even more established technology over the emotion-capture, for as we can decide where we are looking at, we cannot control everything we are looking at, especially in a task-oriented situation involving other people. The eye-tracking metrics that were studied were dwell count and fixation count in frames, and in addition combined dwell and fixation measured in milliseconds. The most notable difference between the behavior in the leaders' eye-tracking was that Leader 04 had very notable lower dwell and fixation counts. This finding becomes interesting when it becomes clear that despite the lowest number of dwell and

fixation counts, Leader 04 did have the highest fixation time in milliseconds, exceeding the other with notable difference. What this might indicate is that, while Leader 04 was not that interested looking at the team members, still, when this happened the team members were given full attention. The clearest finding must be that the leaders were asked to rank the members based on their participation in the meeting and contributing to the given task. The Leaders did have the highest counts of dwell and fixation, and the time spent in dwells and fixations on the team members ranked 1st. The exception was Leader 06, who ranked 2nd, the member that had most frames in dwells and fixations, but still the combined value of dwells and fixations in milliseconds was the highest for the member ranked 1st.

3. Can emotion-capture and eye-tracking provide useful data to study leader-member exchange relationships? As the results were somewhat mixed with the last part of the study, and no clear indications could not be found involving leader emotions and who they are looking at. Still, it could be suggested that teams that are formed with students tend to be quite objective in their judgement over fellow student team leaders. Even as there was decrease in evaluations of personal and friendship values towards the Leader, their evaluation of them as a leader did change, and offering an indication that a good leader can be recognized even if the members do not find personal compatibilities with them. This also might be seen other way around and for example familiarity with the member from before did not seem to have an impact in the ranking part of the Questionnaire 2. To conclude, eye-tracking and emotion-capture and their combination can be a very capable tool for the study of leader-member exchange. For they can provide valuable information about leaders' behavior and interest in a remote meeting and provide useful knowledge with questionnaires only acting as a support for the collected data in the research field about leaders and members and the leader-member exchange relationships.

6 Discussion and conclusions

The whole research process, including the planning and implementation of the eye-tracking and emotion-capture methods with the questionnaires for data collection, was indeed an interesting process. The main reason for the curiosity for the upcoming results was as Rahal & Fiedler (2019) also previously referred observation was that social psychology relies heavily on self-report surveys, and how these surveys can be quite biased regarding the one's own perception. Especially when this requires looking back as long as a month for example, and the questions might also be unnecessarily complicated.

This last chapter will conclude the pilot research of emotion-capture and eye-tracking in remote meetings and what can they tell about leadership and leader-member exchange. The attempt here is to reference the research results and findings with the previous literature reviews, including leaders-member exchange, and to some length to member-member exchange. Furthermore, investigations will be conducted in LMX relations to more detailed effects to employee performance and wellbeing and are these all tied to trust between leaders and team members. In addition, the relevance of eye-tracking and emotion-capture will be discussed in the field of remote meetings, LMX relations and how they may be of use in leadership development. Moreover, this chapter will discuss the limitations of the data collection, results and their findings, however they also will be practical implications and suggestions for future research.

The change of work environment might have been changed forever and because of this is extremely relevant and contemporary to continue the research in the field of remote, hybrid and virtual work environments. In this thesis the focus is solely on remote work and remote meetings, but the findings can be extended to broader concepts of work environments. Furthermore, while not entirely impossible it is at least troublesome to collect data with eye-tracking and especially emotion capture of the leaders in face-to-face meetings. For something like this is what remote meetings are a well-established platform, that can leave leaders eventually forget that how they are monitored during a

remote meeting. As trust is considered to be the foundation for leader-member exchange (Varma et al., 2022) one of the major issues in remote work environment is seen how this communication through digital platforms, might be a threat to trust in organizations and leader-member exchange (Kähkönen, 2023; Gustafsson et al., 2021). These factors are one of the main reasons for this research as with emotion-capture it is possible to witness what emotions the leader is expressing during the remote meetings and are they presenting joy/happiness, as according to (Cropanzano et al., 2017), this affects the presentation of sociability, morality and competence in a positive way as well.

In this thesis the findings did clearly indicate extremely high joy/happiness expression from the leaders and there for most of their evaluation as a good leader was very high as well. Furthermore, trust is a complicated concept and is formed by many aspects and can be defined from differed points of view in different disciplines. Still trust is also seen as a foundation for decision making in various context and the basis of problem solving (Cho, Chan & Adali, 2015). This mutual understanding of the importance of trust can be also seen as the foundation of a well-working organization, and as Hirvi et al., (2021) stated, that emotions what the leader expresses is a strong indicator of increase or decrease of trust in them by their team members.

The talk about how trust is a founding part of problem solving and how this leads to a well-working organization, is something that seems to align with the results of emotion-capture. As there were instances in the results that in the beginning of the meeting the members did evaluate the Leader's personal traits as being friends with them, but after the meeting the member did see them be friends anymore, but still raised or kept the leader's performance as a leader in the highest score. This might be the outcome from the leader's positive attitude and the emanation of joy/happiness throughout the meeting. That said the member who did lower the personal scores of the leader was evaluated by the leader to be the worst performing member of the team. This might be an indicator what Ozbek, (2018), suggests that in LMX the friendship factors do have a meaning and

maybe this was witnessed here, and the member did not reach a connection with leader, and thus suffered from efforts for task contribution and the leader noticed this.

The impression that the literature and this study's results offer regarding LMX and friendship and trust bonds suggests that if a member feels unconnected with the leader their job performance might decline and furthermore lead to poor work-wellbeing. This is a concern of its own in a remote work environment, even with positive relations with the leader, as and Wang et al.'s (2021) studies' findings indicated. Here might be quite clear indications that if there is a way to observe and collect data without major interference in the communications between leaders and member, can prove valuable and as Chen, Mao, Hsieh, Liu, & Yen (2013) suggest that interactive justice can also meditate TMX relations, and furthermore affect job performance and wellbeing. With today's AI assisted technology, setting up emotion-capture for team meetings is not that complicated. It could be suggested that data collection from established teams in remote meetings could provide valuable information. If weekly recordings seem to be too often, for example monthly recordings might provide more compliance from the team. The most important factor of the data collection could be seen the consistent collection over time. With the data the possible fluctuations or consistencies can be pointed out and the results cloud be used as training material for the current and future leaders.

Eye-tracking being the lead research interest of this thesis, and not diminish the findings of emotion-capture, eye-tracking did seem to deliver more consistent results. An as stated by Haddioui & Khaldi (2012), already established technology for data collection about the subject's interest and even emotions by its own by monitoring behavioral inters patterns. What this thesis' research findings did uncover was that most of the eye-tracking results revealed that the Leaders did look at the team members the longest who they ranked in the final Questionnaire as the best performing member of their teams. This aligns with the conclusions by Cheng et al. (2023), that visual attention is a valid measurement for evaluation of social behavior and influence in organizations and within its teams.

6.1 Practical implications

As real-life practical implications eye-tracking could be a technique seen useful in determining how and why leaders do prefer certain team members even more accurately than emotions-capture alone could do. For the dwell and fixation frame counts and the overall time spend on an area of interest might be more accurate and even further awareness free indicator of behavioral and affective patterns and processes, as Rahal & Fiedler, (2019) suggest. This could provide a well-received strategy in the pursuit of social-cognitive and psychology in the field of business and organizational performance.

Another idea that emerges from eye-tracking and the team members who do get most of the leaders' attention in dwells and fixations. Is what Gerpott et al. (2018) study found how emergent leaders were looked at the most by the study subject who were merely observing a team meeting from a video. This in mind there is a chance that this could be also the case where the leaders' dwells and fixations are concentrated for a certain team member, as the leaders might be unconsciously looking for a right hand from the team. In practice this could mean that resources and funding required costly external recruiting could be avoided as the organization already might have explanatory data that can reveal the potential new leaders from within. Although this thesis did not research what are the qualifications of the team member, they looked at the most, companies might have value for researching was the leader paying attention to a rising leader or an expert in their field. As it is that sometimes the best experts are not the best leaders, and truly just like what they are doing and what they are good at. This might lead to recruiting the wrong person to function as a leader, but perhaps with further investigation these traits could be distinguished from one another. This could develop into a practice in the future as the organization perhaps sees a need for a team of the best of the best experts, now they already have a recruiting pool ready inside the company.

The results were somewhat mixed with the combined eye-tracking and emotion-capture, as the results of the emotions the Leaders were expressing towards the team members did not align with one another. The only similar emotion shared with the Leaders looking

at the members who were ranked as number 1, was the amount of surprise. Cropanzano et al. (2017), did exclude surprise as an emotion from their research as the expression might be like the expression of fear, furthermore it is even suggested by Ortony (2022), that surprise violates the basic emotion minimal test. However, Neta & Kim (2023) counter claimed that surprise indeed is valid as a basic emotion, for its capability for valence and is a positive or a negative one. This would support my own findings and observations, that maybe the high scores of surprises on the 1st ranked members is indeed a positive reaction that is expressed as new good idea or is presented by a team member. For practical uses, this could be an additional confirmation for spotting idea rich employees from team meetings that are eye-tracked and emotion-captured, especially if the remote meetings would be similar as the one's research with students and they are overpowered with joy/happiness. In addition, as the Leaders emotions were not that self-explanatory, some indicators were found that team members might respond to leader behavior and therefore lowering the friendship and other person-oriented scores.

Although one of the reasons for researching LMX relationships with other means than self-answered surveys is the possibility for more accurate and non-self-aware data collection. Still, it seems that surveys and questionnaires are somewhat re-enforcing aspects in the field of leader-member exchange and can still be promoted as part of these research, even with the mass data collection being the primary source of data to construct knowledge of the research field. As this thesis did not investigate different types of surveys, still it could be suggested that in everyday practice it might be beneficial to implicate practices of combined data from all sources, and the surveys to be short and explicit to accompany the eye-tracking and emotion-capture data.

6.2 Limitations and suggestions for future research

The most notable limitation for this Theis's research was the quantity of subjects and so the results that were acquired cannot on their own provide enough evidence for the research field of leader-member exchange. However, the excitement was real as the results seemed to have some reoccurring patterns and how it was possible to draw, at least

cautious conclusions, what the mass data was suggesting about the leaders' emotions, interests and behavior during the remote meetings. How all this did find its place in the research questions and theories reviewed. With this in mind, I do believe that eye-tracking, emotion-capture, and their combinations are a valid method in the studies and investigations of learning more and more specific transactional behavior in the leader-member exchange and in the vast field of organization behavior.

Still, it should be noted that there is a clear difference between attention and awareness (Lamme, 2003), this means that the attention can move on to the next interest available when the process of previous information and the reaction to it is still in process (Engbert et al., 2005). This could be one of the explanations for the results of this study where the emotion of anger did not correlate with the number 1 performing members from the leader's point of view. Still remembering from before, that this might also be the dual functioning expression of anger that could be sign of determination, but this does not remove the awareness problem. Furthermore, transcription of the meetings could bring more valuable information about the situations and what was said at a moment when emotion of anger does have a more extreme spike.

Most importantly it comes as appropriate to bear in mind that Barrett, Adolphs, Marsella, Martinez & Pollak (2019), do claim that emotion identification technology is reading facial muscle movement rather than identifying actual emotions. This argument does bring me back to the laboratory sessions where I did wonder who peoples natural resting facial features do come across, because there was participant with naturally more frowned eyebrows and on the other hand bit sad looking or perhaps it was more surprised look. This, however, was the reason to use the threshold of 30% to puffer these natural and subtle expressions out of the data, but one still wonders, if the expression is there constantly, can it be ruled out from the collected data.

In addition, regarding the eye-tracking side of the limitations. The results did suggest that the Leaders had the most dwells and fixations for the members they ranked 1st, this

still does not tell us explicitly for example, were the members talking more than the other members or did the Leaders perhaps look at them even if some other member was talking. This part of the research methodology could be probably enhanced with monitoring the Zoom's voice indicator that lights up whenever someone is speaking and maybe this data could be referenced with eye-tracking results. These results maybe even be supported and elaborated with the valence of the emotions-capture to identify the positive or more negative attention, or engagement in various situations.

While the previously suggested improvements to reduce the number of limitations might rule out some of them, at this age of technology there are quite astonishing possibilities to acquire quite precise data from our minds. This, however, is quite a farfetched stretch in the research field of leader-member exchange. Still the idea of the possibilities to monitor and receive more accurate data of what the participants are thinking at any taken moment, even separate words and syllables form one's mind. As the study by Hakala, Lindh-Knuutila, Hultén, Lehtonen & Salmelin (2024) with Vectorview MEG (magnetoencephalography) system findings suggest being possible. This setup, at least in theory, could be operated also in a remote meeting. Well, that said, how much this kind of laboratory setup affect the Leaders performance, and moreover how it would affect the members watching the Leader sitting a MEG on head. This might be a method that can be used in the future, but at this date of time I limit my future suggestions for eye-tracking and emotion-capture in the field of leader-member exchange and organizational behavior to the following.

For future suggestions in research of using eye-tracking and emotion-capture, the possibilities can be quite numerous, and they can take myriad forms in their specifications and in their depth and precision. The most clear and sensible one is to get a laptop, extra webcam, and an eye-tracking camera to companies and organizations with established teams and record several remote team meetings from several different teams to find out are the findings that are in this research repeatable. Furthermore, does the same team leader repeat the same patterns in the meetings over and again. Another suggestion

would be to pursue research with transcriptions to form more accurate insight into what is said and what emotions are expressed, maybe this could clarify the problem of the attention-awareness issue. The quantity of observed subjects can only be so much as transcriptions are extremely time taking. AI assisted transcriptions can be helpful in the transcription itself, the process of human attention might come to need in interpreting what is said and how it is said. Thirdly, for the future suggestions is to broaden the research in hybrid meetings, as the technology is here, and the leader's eye-tracking can be traced with no more than thick framed glasses. This could bring valuable information about are the team members attending the meeting remotely left out more than the ones accompanying the leader in the comfort of the office conference room.

6.3 Closure

Finally for the closing words of this thesis. As much as it pained me to witness the data collection failures, and as it probably would have been possible to present results without explaining the compromised data, it just did not feel right, and still the research questions got their answers. As 1st what emotions do leaders express, and do the leaders' emotions reflect trust for the team members in a remote meeting? It did seem that all the leaders did mostly express joy and happiness and as a positive emotion this should invoke trust in the team members. For 2nd does what leaders are looking at during remote interaction relate to their evaluation of their team members' performance? The results were quite clear, and it indeed seems that the leaders looked at the team member the longest who they ranked as number 1 contributor from the team. And finally, the 3rd can emotion-capture and eye-tracking provide useful data to study leader-member exchange relationships? Although there were mixed results from the emotions expressed towards the team members, there also were many interesting results what could be researched. With the combined method of eye-tracking, emotion-capture and questionnaires, there seems to be large unknow world to uncover within the study of leader-member exchange.

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