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# Nonverbal behaviour in elite football

A descriptive analysis of four elite international football players  
using close-up video.

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## **Abstract**

**Background:** Research on player's nonverbal behaviour (NVB) is slowly emerging in sports (Furley, 2021). Nonverbal behaviour is an interesting research area that recently has gotten increased attention in sports psychology (Furley et al., 2015). However, in football, there is a lack of understanding of how nonverbal behaviours are displayed during a match. This lack of knowledge may lead to players' NVB being ignored, misjudged, or based on subjective opinions.

**Purpose:** The aim of this study was to investigate and describe the nonverbal behaviours displayed by elite football players during a match using close-up video.

**Method:** A non-participatory observational study where four international players were filmed in close-up view, and their nonverbal behaviour was coded descriptively with Hudl Sportscode using a self-developed coding window.

**Results:** The players in this study had a total of 1060 behaviours and a mean frequency of 3.76 behaviours per minute ( $SD=0.829$ ). The results revealed that players most frequently display NVB through tactical arm movements (57,3%). It was found that elite players express tactical and emotional behaviour through various nonverbal behaviours, including facial expressions, head movements, finger movements, hand movements and verbal communication. Verbal, facial and head movements, resulted in a total of 220 behaviours (20 %). While additional behaviours to arm movements (verbal, head, hand and finger movements) were frequent in 603 (73.3%) of all arm movements. Indicating that players most often display more than one informational sign.

**Summary:** This was the first study using close-up video in football investigating NVB. The results reveal a varied range of behaviours displayed by the players. Research should further investigate how players communicate and act in a football match. Close-up video is a suitable method for investigating these behaviours.

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# 1 Introduction

“Harry Maguire is too slow and too nervous to play for a big club like Manchester United”, said former player Paul Parker to “mybettingsites” (Albek, 2023). Manchester United manager Erik Ten Hag was recently asked about Maguire and gave a different perspective, describing him as a leader who communicates with the manager, motivates the team and sets an example during training (Walker, 2023). Describing a player in football is often based on subjective opinions and/or simple observable data such as passing, shots on goal and ball possession. These performance indicators are needed to spot the significant difference between winners and losers (Lepschy et al., 2018). In the Maguire example, Ten Hag indicates that a player may have important attributes that are not picked up by the current performance indicators. It is believed that the ability of football players to perceive and interpret their teammates' signals and body language is vital, as it enables them to effectively read messages and emotions (Williams & Jackson, 2019), and thereby enhancing their overall understanding and collaboration on the pitch.

In football, there seems to be a lack of understanding of how nonverbal behaviours are displayed in a game situation (Furley, 2021). This information could be useful to measure communication in attack, defence, and in the context of match status (McLean et al., 2017), Provide additional information about a player's performance abilities (Seiler et al., 2018), and how players are feeling during a game. Investigating a player's NVB in a match could provide coaches with information about what kind of behaviours players display and raise questions on why this behaviour is being displayed. Lack of knowledge of these behaviours may lead to players' NVB being ignored, misjudged, or based on subjective opinions.

The aim of this study is to investigate and describe the nonverbal behaviours displayed by elite football players during a match using close-up video. The results of this study will be discussed in line with a theoretical framework to better comprehend the meaning behind the behaviours found in this study. Further, an underlying goal is to inspire future researchers to investigate and improve the method of what behaviours elite football players display during a match.

## **2 Literature Review**

In the following sections, I will explain and define the fundamental concepts used in this study. These are communication and nonverbal behaviour (NVB). This will be followed by encoding and decoding, and methodologies of studying encoding and decoding in sports. Further I will present research on NVB in sports and football and a chapter explaining the players' tactical behaviour. Finally, I will present findings on NVB in football based on a previous study conducted by three students from The Norwegian School of Sports Science, which set a basis for this study.

### **2.1 Communication**

“Without communication there can be no human relations, indeed no human life” (Luhmann, 1981, p. 122). Humans spend most of their day in contact with other people, working, learning, parenting, negotiating, or just talking (Burgoon et al., 2021, p. 3). To achieve effective communication, three crucial elements must be considered, the information or message conveyed, the approach or style used in conveying it, and the potential perception or understanding of the recipient. Each of these components plays a vital role in ensuring that the intended message is clearly and accurately communicated and received (Luhmann, 1981, p. 252). None of these components can be presented by themselves, they can only together create communication (Luhmann, 1981, p. 252). When communicating, verbal and nonverbal communication (NVC) often have to be considered together to understand conveyed meanings (Hall et al., 2019). It is, however, estimated that approximately 60-95 % of all communication consists of NVC (Burgoon et al., 2021, p. 18), In addition, research has shown that we form our impressions of other people more on the nonverbal behaviours we observe, than on the spoken word we hear (Bente et al., 2008, p. 269; Burgoon et al., 2021; Newcombe & Ashkanasy, 2002).

#### **2.1.1 Nonverbal communication and nonverbal behaviour (NVB)**

Humans relied on nonverbal communication for thousands of years before developing the capability to communicate with words (Derman et al., 2016). Nonverbal communication can be defined as the behaviour of face, body, or voice without linguistic content (Ambady & Rosenthal, 1998; Hall et al., 2019; Knapp & Hall, 2006), and is a common denominator in social life (Hall et al., 2019). Another way of defining NVC is to look at



what researchers study (Knapp & Hall, 2006, p. 7). For instance, Knapp and Hall (2006) define NVC as focusing on three primary units, the environmental structures (where the communication takes place), the physical characteristics of the communicator, and the various behaviours manifested by the communicators (Knapp & Hall, 2006, p. 7). Nonverbal behaviour, on the other hand, refers to a person's movements and body language and might include body movements, posture, facial expressions, gestures, gaze or touch (Matsumoto et al., 2012, p. 7). To clarify, NVB is a subcategory within the broader category of NVC (Furley, 2021). NVC includes broader terms of nonverbal communication including elements such as colour on the wall or furniture (Knapp & Hall, 2006, p. 7). While NVB is behaviour that occurs within communication or without verbal communication (Matsumoto et al., 2012).

In this thesis, I will focus consequently on NVB. One way to divide the term NVB is a signal versus a sign, where a signal represents behaviours that are part of a consensually understood messaging system engaged with intent, in other words, communication (Hall et al., 2019, pp. 272-273; Wiener et al., 1972, p. 186). While sign represents behaviours that may be informative but unintended and not communicative (Hall et al., 2019, pp. 272-273; Wiener et al., 1972, p. 186). For example, a person crossing their arms during a job interview could be misinterpreted as a sign of disinterest to the interviewer. However, this behaviour might be a way for the person to rest their arms and not intended to convey any message. In the example, as in certain situations, we cannot avoid communicating nonverbally, because one's cues or absence will be interpreted by others (Hall et al., 2019, p. 280). Another way of distinguishing communication from behaviour is whether the parties are actually sharing a code (Hall et al., 2019, p. 273). Giving meaning to behaviour will be further elaborated on in encoding and decoding.

### **2.1.2 Encoding and decoding**

NVB includes a person's signal production (encoding), the behaviour (code), and the receiver of the signal (decoder) (Wiener et al., 1972). Encoding refers to the ability to communicate emotions, attitudes, or other messages through nonverbal cues (Ambady & Rosenthal, 1998). The sender encodes a vast amount of information using visual, auditory, olfactory, and tactile channels of communication, including their emotional, cognitive and attitudinal states, in addition to the nature of their interactions with others (Hall & Knapp 2013, Matsumoto et al. 2016 cited in (Hall et al., 2019, p. 274). The sender

cues may be spontaneous or deliberate (Matsumoto et al., 2012), and can be informative for either the perceiver, both, none, or the sender themselves (Hall et al., 2019, p. 274). The informational value of each cue may be reinforced, contradicted, augmented, minimised, or not impacted by other sender cues or other contextual factors that accompany it (Hall et al., 2019, p. 274). For instance, Furl et al. (2012) found that some facial expressions can reinforce specific outcomes, including decision-making and social learning. Participants more often chose a face displaying a smile rather than an angry face when asked to choose between those two, with the potential of winning money if choosing the correct picture. Distinguishing whether an encoded cue is a sign or a signal might be problematic because the encoder's awareness is hard to determine (Hall et al., 2019, p. 274).

Decoding is picking up nonverbal signals and cues, making sense of them, and acting upon them (Matsumoto et al., 2012). As with encoding, the decoding process may also be automatic or manual (Furley, 2021; Hall et al., 2019, p. 281). We automatically react to familiar and predictable nonharmful stimuli (Matsumoto et al., 2012, p. 226). Psychophysiological data demonstrate that humans respond automatically with their facial muscles, with autonomic responses, and with specific regional brain activation of the amygdala when exposed to emotionally expressive faces (Öhman, 2002). Further, our cognitive system has become attuned to nonverbal cues that are of adaptive relevance (e.g. threats) (Zebrowitz & Collins, 1997). This means that we can decode this kind of information without any additional contribution or higher-order cognitive processes (Furley, 2021). The participants selected in this study are playing in front of a large crowd meaning that all NVB will be visible to either the teammates, coaching staff, referee, crowd, or cameras. Meaning that their nonverbal behaviours may always be decoded by others.

#### **2.1.2.1 Methodologies studying encoding and decoding of nonverbal behaviours**

Furley (2021, p. 5) proposes three different methodologies employed in the study of encoding and decoding of NVB. These are evaluative coding, automated coding, and descriptive coding.

Evaluative coding is an approach where nonverbal expressions are shown to a diverse group of participants, who are asked to evaluate the internal state of a person or make an

inference based on the NVB of a person (Furley, 2021, p. 5). The approach aims to transform observed behaviour into different psychological categories (confidence, aggressiveness, etc.) (Furley, 2021, p. 5). The goal of this approach is not objectivity, but interrater reliability (correlation of judgments) (Bente et al., 2008).

Automated coding is an approach utilizing technological devices to measure muscle activity associated with NVB (Furley, 2021, p. 5). Examples of automatic coding devices are Facial Action Coding System (FACS) (Crivelli et al., 2015), Noldus FaceReader (Hetland et al., 2018), and electromyogram (EMG) (de Morree & Marcora, 2012). This efficient time-saving approach can be expensive and unsuitable in real-world (Furley, 2021, p. 6). However, the advantages of automatic coding in most cases outweigh the cost, making the method increasingly popular (Hetland et al., 2018, p. 5).

Descriptive coding is an approach where NVB is quantified by trained coders who use a predefined descriptive coding system (Furley, 2021, p. 5). The advantage of having coding systems is that they give precise information on the bodily movements shown. However, there are some disadvantages to this coding system, including assigning a specific meaning to specific movements (Furley, 2021, p. 5). This methodology gives unique information abundance of the data sets to facilitate researchers to pursue different research strategies (Bente et al., 2008, p. 276). Descriptive coding is the most time-consuming method (Bente et al., 2008, p. 272) and is the approach that will be applied in this project.

Considering this information, the next sections will present studies on NVB in sports and football. These studies have mostly used evaluative coding and descriptive coding.

## **2.2 Nonverbal behaviour in sport**

There are several studies investigating NVB in sports. Studies have been focusing on emotions (Aviezer et al., 2012; Fritsch et al., 2022; Furley & Schweizer, 2014b), body language and facial expressions (Aviezer et al., 2012; Furley & Schweizer, 2014a), and tactical behaviour (Durdubas et al., 2021).

### **2.2.1 Recognition of nonverbal behaviour**

Furley and Schweizer (2014a) did a study investigating whether people can detect if athletes are trailing or leading in sports based on nonverbal behaviour. Participants (athletes, non-athletes, and children) watched video clips of elite basketball and table tennis players and were asked to rate whether the players were leading or trailing. Results revealed that participants were accurate in estimating leading and trailing athletes based on NVB. There were no differences in estimation between athletes and non-athletes however, there was a slight difference between adults and children. It was not investigated what the participants based their decision on.

Aviezer et al. (2012) found in their study results indicating that people tend to rely more on the athletes' body language rather than facial expressions when evaluating athletes' emotions. The researchers did several experiments to study the difference between positive and negative emotions in high-stakes tennis matches. Forty-five participants in groups of three were shown pictures of peak expressive reactions from professional high-stakes women's and men's tennis matches. The participants were asked to rate the affective valence (pleasantness or unpleasantness of an emotional stimulus) and intensity of either the full image of the face and body, the body alone, or the face. Researchers found that people can distinguish between positive and negative body language, but not based on only facial expressions. In the next experiment, where participants were shown manipulated images of athletes with winning faces and losing bodies and vice versa. Again, participants based their judgments on body language rather than facial expressions. These studies indicate that people can recognize positive and negative emotions in sports and that bodily cues are more influential than facial cues when observing positive and negative emotions in sports.

However, Fritsch et al. (2022) found low recognition rates of positive and negative emotions in tennis players when investigating the distinction between positive and negative emotions. Hundred and fifteen participants (43 female, 2 did not reveal gender, 34 were connected to a tennis club) watched videos of 15 amateur tennis players playing competitive tennis matches. The video clips showed the front side of the player and were cut so that the NVB was shown right after a rally and only included clips of (a) when the full body of the player was in the picture or (b) when footage did not allow any conclusion

about the outcome of the rally (other than their NVB). Three variables were investigated, point outcome, video clip duration, and tennis expertise. The results revealed that the recognition rates were low, and the clip duration did not affect the recognition. Further, participants that were connected to a tennis club had higher recognition rates, and recognition of negative emotions was higher than positive emotions. These results indicate lower recognition rates when rating amateur players, contrarywise to Aviezer et al. (2012) investigating elite athletes. In addition, participants are better at recognising negative emotions, and expert athletes are better at recognizing compared to non-athletes.

### **2.2.2 Importance of nonverbal behaviour in sport**

Previous studies have found several interesting results regarding nonverbal behaviour in sports, For example, athletes are more confident in beating trailing athletes (Furley & Schweizer, 2014b), successful teams exhibit higher levels of tactical and emotional NVB (Durdubas et al., 2021), and that NVB predict future performance (Buenemann & Schweizer, 2021).

Furley and Schweizer (2014b) explored score-related changes in opponents' nonverbal behaviour influencing athletes' confidence in beating their opponents in basketball. Forty participants (experienced basketball players) watched video clips of athletes' nonverbal behaviour and were asked to indicate their confidence in beating the opponent. Video clips were selected from NBA and the top German league (seasons 2010-2012), the video only consisted of clips from breaks during the game (e.g., timeouts and free throws). The clips consisted of five categories of scores in the actual game (far behind, close behind, a draw, close lead, and high lead). Each participant watched sixteen randomized clips (twelve for far behind or high lead and four from the categories close behind, draw, or close lead), and was asked to rate their confidence in beating the team displayed on the video clip on a scale from 0-11 (not confident at all – very confident). Results showed that participants were more confident in beating trailing teams than winning teams. These results indicate that a person's NVB may influence the confidence of the observer.

Further, a study by Buenemann and Schweizer (2021) investigated the relationship between NVB and performance in a longitudinal design. The study found that NVB can predict future performance, but performance cannot predict future NVB. The study

involved data collection from 48 male basketball national teams during their matches in the first qualification round of the 2019 Basketball World Championship in China. Each team was observed in eight matches, which were divided into sections of five minutes. Within each section, five clips were selected based on close-up shots of players who were not holding the ball and who were on the court, including during timeouts. Two blind participants rated the team's NVB based on the clips, using a scale of 0-100, with 0 being very negative (submissive) and 100 being very positive (dominant). These ratings were compared with the scoreline in the game. For every five minutes interval, the score was back to even, meaning that the trailing team still could win the next interval. These results indicate that a player's NVB may influence future performance.

A similar study in handball by Moesch et al. (2018) using a similar method found that teams who have performed well in the past tend to exhibit more gestures from their goal scorer in the future. Additionally, a high amount of physical contact during good performances and less during poor performances are linked to positive team performance in the future. The researchers explored the relationship between a team's history of events, nonverbal post-shot celebrations (gestures and touch) by the shooter after scoring, and the subsequent team performance during handball matches. 616 post-shot periods were analysed, gathered from Sweden's highest women's handball league during the 2011—2012 season. Post behaviours included gestures (one fist down, two fists down, one fist up, two fists up, thumbs up, clapping hands) and touch (low five, high five, high ten, touch shoulders, double touch). One blinded research assistant coded the behaviours displayed after scoring. Several behaviours could be coded from the same situation. These results indicate that gestures and touching behaviours are related to prior performance by the team.

Lastly, Durdubas et al. (2021) explored the relationship between nonverbal communication and team success in professional volleyball games. The study found that the team that was more successful exhibited a higher level of tactical and supportive nonverbal behaviour (NVB) compared to the less successful teams. Moreover, the successful teams showed greater use of tactical NVB when they won, more supportive behaviours when they lost, and a combination of both during tie-break games. The data was collected from 8 professionally sampled teams from the Turkish men's volleyball 1st

league (top 4 and bottom 4) games from 2016-2017. Each team was analysed in three conditions (win, loss, and tie). The coding scheme consisted of 8 NVB categories, team gathering after a point, instructional behaviours, symbols for sharing tactics, celebratory behaviours, supportive behaviours after a mistake, negative behaviours after a mistake, objection to referee decisions, and partial team gathering.

### **2.2.3 Nonverbal Behaviour in Football**

While there have been many studies of nonverbal behaviour in sports (see Furley (2021) for a review), some studies have focused solely on football. Many studies on NVB in football are focused on emotions related to dominant and submissive behaviour (Bijlstra et al., 2020; Brimmell et al., 2018; Furley et al., 2012; Furley & Schweizer, 2017; Seiler et al., 2018; Thrien & Furley, 2021) and emotional behaviour (Leitner & Richlan, 2021).

#### **Dominant and submissive nonverbal behaviour in football**

Seiler et al. (2018) found that when sports students athletes (80 participants, 42 of whom were women) watched videos of dominant and submissive nonverbal behaviour (NVB) from teammates and opponents, their confidence in their team's outcome was higher when a teammate displayed dominant NVB, and an opponent displayed submissive NVB. Conversely, their confidence was lower when an opponent displayed dominant NVB, and a teammate displayed submissive NVB. Team confidence was measured on a scale from 0% (not confident at all) to 100% (absolutely confident) based on whether the player was on the same or opposing team. The study showed that this had an impact on team outcome confidence (Seiler et al., 2018). These experiments suggest that dominant NVB from teammates increases confidence in teammates/observers.

Similar findings were found by Thrien and Furley (2021) but based on the coach Thrien and Furley (2021) conducted several experiments to study how football coaches' behaviour changes depending on the score-line. 72 soccer players were asked to imagine a tied score and look at the coach if he gave confidence in winning the progressing game or not. Participants watched clips of coaches from the German Bundesliga (first and second), UEFA Euro League, Champions League, and Primera division (season 2017/18). The clips consisted of situations of actual scores in the game (far behind - at least two goals behind, close behind – one goal behind, draw – even score-line or close lead – one

goal ahead, high lead – at least two goals ahead). Participants rated confidence on a scale from not confident to confident (0-100). Results revealed that the participants felt more confident about winning the game when they observed the coach's NVB while his team was currently ahead and less confident about winning when the NVB of the coach's team was behind.

Another study by Bijlstra et al. (2020) explored NVB on football players and goalkeepers in a penalty situation. Found that players and goalkeepers who displayed dominant NVB were perceived to perform better than players displaying submissive NVB. In the first experiment, a group of 54 university students, including 40 women, were shown videos of goalkeepers and penalty-takers displaying either dominant or submissive nonverbal behaviour while preparing for a penalty kick. The videos were presented in a standardized format, with actors wearing the same-coloured clothing and following the same timed instructions for both dominant and submissive behaviours. The participants rated the videos on seven impression formation measures: assertiveness, competitiveness, experience, confidence, composure, focus, and relaxation. They also rated the power and accuracy of the penalty/dive and predicted the success rate of the penalty-taker/goalkeeper on a scale of 0 to 100.

Brimmell et al. (2018) explored whether challenge and threat states predicted nonverbal behaviour during a pressurized soccer penalty task. Results revealed that participants who evaluated the task as more of a challenge was perceived (by observers) as more dominant, composed, confident, challenged, and more likely to take an accurate penalty, based on their NVB compared to participants who evaluated the task as more of a threat. The study involved 42 participants, including 7 female individuals, who had at least two years of experience playing competitive soccer. Their cardiovascular data, such as heart beats per minute and blood pumped per minute was recorded. Then, the participants were informed about the task and were put under pressure by being told that their performance would be evaluated, published, and entered into a competition. The participants' cardiovascular data were recorded again in the following minutes. Afterwards, they had to answer two questions using a form: one to rate the evaluated demand of the penalty task and the other to measure their evaluated resources, i.e., their ability to cope with the task. Both questions were rated on a six-point Likert scale ranging from 1 (not at all) to 6



(extremely). Finally, the participants performed the penalty kick. The videos of the penalty kicks were watched by 71 untrained observers, including 17 female individuals, in a randomized order. These observers assessed the participants' expected performance and nonverbal behaviour on six 11-point scales: submissive-dominant, unconfident-confident, on edge-composed, threatened-challenged, and inaccurate-accurate. These results may indicate that confident athletes are perceived as more dominant and more likely to perform well.

However, Seiler et al. (2018) found that when performance-related information was added, the effects on NVB remained large, independent of how strong the information distinguished between low and high-performance players. Sixty-one university students (29 women) were shown videos and told that these were of teammates' or opponents' dominant and submissive nonverbal behaviour (NVB) with performance-related information. The participants were informed that the performance information given to them was based on multiple factors. Firstly, it reflected the player's performance throughout the entire season. Secondly, experts were involved in the evaluation process. Thirdly, the scoring criteria included various aspects such as participation in crucial match situations. Finally, the scores ranged from 0 to 100, with an average score of 50. The performance information was randomized, ensuring that both high and low scores were present in both the submissive and dominant categories.

Leitner and Richlan (2021) did their research in a real-life setting and on elite football players. The researchers compared the emotional behaviour and experience of players, team staff, and officials between matches of the championship group of 2018/19 (with supporters) with the championship group of 2019/20 (without supporters) in the Austrian Bundesliga. This was possible due to COVID-19, limiting the attendance of supporters. FC Red Bull Salzburg (the winner in both seasons) was analysed in full detail. Because of the league rules and due to the pandemic, only the last phase of the league was analysed (the top 6 playing two games against each other). The “Analysis System for Emotional Behaviour in Football” (ASEB-F) was used to identify, classify, and document visually observable behaviour of players, staff, and officials. ASEB-F consists of five categories event (initial trigger), behaviour (word fights, discussion, protest), extra behaviour (observable nonverbal reaction), participants (involved agents), and consequences

(outcome). The results revealed that there were 19.5 % fewer emotional situations in the 19/20 season. Players and team staff got less involved in behaviours such as “words fight” or discussions” with opponent players and/or referees in the absents of supporters. The researchers concluded that missing crowds had an impact on the players, and team staff’s emotions and behaviour. These results indicate that some of the players and staff’s emotional behaviours may be expected or provoked by the fans in the stadium.

### **2.3 Tactical behaviour**

As most of the research on NVB is focused on emotions, the following sections will present some research concerning players' tactical and communicative behaviours used during a match and the reason why tactical behaviour may be important in football.

Sports teams are composed of interacting individuals who develop cooperative relations to achieve successful performance outcomes (Duarte et al., 2012, p. 632). Achieving results in sports require effective team communication, which is the interaction between teammates that result in enhanced team attributes and functioning (Sullivan & Gee, 2007). Playing team sports, athletes often need to make decisions about where and when to move, and which actions to perform in an uncertain and shifting environment (Duarte et al., 2012, p. 634). These actions such as passing or positioning are established on a platform of communication or information exchange (Duarte et al., 2012). A few studies have investigated the communication between athletes in a real game-setting (Lausic et al., 2009; LeCouteur & Feo, 2011).

LeCouteur and Feo (2011) investigated the communication choices made by elite netball players during defensive segments of play. Results revealed that the highest frequency of talk appeared during the less successful defensive performance phases. Lausic et al. (2009) found that winning teams communicated twice as much as losing teams. 10 participants played tennis doubles matches and their communication was transcript and coded in different statements, including uncertainty, action, acknowledgement, factual, non-task, and emotional. Over fifty percent of the communication was in the emotional statement category. Further findings from the studies indicate what can be important for performance. LeCouteur and Feo (2011) found that when a defender's tactical talk was matched by a teammate (the teammate did what was told, e.g., marked the opposition

player or moved to the area that needed to be defended) the opposition had fewer shots at goal (LeCouteur & Feo, 2011). Similar findings were found by Lausic et al. (2009) who found that winning teams clarified, planned, and discussed more during the match, than losing teams (Lausic et al., 2009). This kind of role-related information exchange is often communicated by individuals in a position of authority (Carron et al., 2005, as cited in Crozier et al., 2013). These authorities or leaders are important for teams to avoid confusion, know what is expected, and what to do (Crozier et al., 2013).

### **2.3.1 Leadership**

Leadership is one of the most important topics in the human sciences and historically one of the more poorly understood topics (Hogan & Kaiser, 2005). The abilities and skills of a leader are an important factor in motivating employees to work better (Atiq, 2022). The leader determines the direction of the organization's goals and what is necessary to reach the goals (Atiq, 2022). A Leader's duty is to create and maintain good relationships with his/her subordinates to work productively (Atiq, 2022). The most researched leadership styles are transformational and transactional leadership (Cho et al., 2019). Transformational leaders stimulate and inspire followers to achieve extraordinary outcomes and develop their leadership own capacity (Bass & Riggio, 2005, p. 3). Transactional leaders, on the other hand, are focused on external motivation, reward and punishment (Bass & Riggio, 2005, pp. 3-4).

A review article by Molan et al. (2019) exploring processes in elite sports and other high-performance domains, found that transactional leadership behaviours were the most evident (Molan et al., 2019). Transactional leadership behaviours were positive reinforcement and actively monitoring and managing (Molan et al., 2019, pp. 97-98). However, the authors concluded that leadership behaviours appear to be strongly context and situation-dependent (Molan et al., 2019, p. 100). For example, using more directive leadership (transactional) when coordinating within a team, or inspirational leadership (transformational) when meeting a demanding task (Molan et al., 2019, p. 98).

In sports, a primary mechanism of organizing a team is the existence of leaders (Passos et al., 2013). A leader supervises the behaviours of others during the game and provides instructions on what actions are required and when they are to be performed (Passos et

al., 2013). The formal leaders of a team are the coach and the captain, these are often chosen by the organization or the group (Loughead & Hardy, 2005). In a real-game setting, guidance by one leader (coach or captain) can be difficult, making it vital to also distribute responsibility to other athletes (LeCouteur & Feo, 2011; Passos et al., 2011). Athlete leadership is “an athlete, occupying a formal or informal role within a team, who influences a group of team members to achieve a common goal” (Loughead et al., 2006).

Further, Fransen et al. (2014) explored the myth of the team captain as a formal leader. 4451 players and coaches from nine different sports answered a survey on four leadership roles: task, motivational, social, and external. The task leader was defined as a leader that helps the team to focus on goals, the tactical decision-making, and gives teammates tactical advice during games. A motivational leader was defined as the biggest motivator on the field and one that steers all emotions in the team in the right direction to perform optimally. These two roles are believed to be fulfilled mainly on the field during a game or in practice (Fransen et al., 2014, p. 1392). Results revealed that 44% of the participants did not perceive their captain as the principal leader in any of the four roles. The researchers concluded that leadership is spread throughout the team with informal leaders (Fransen et al., 2014). Fransen et al. (2020) also found results indicating the importance of informal leaders. 30 handball teams (428 players) and 83 coaches answered a questionnaire on psychological safety, leadership, team identification, team resilience, satisfaction with team performance, and health. The results revealed that informal leaders contributed to strengthening team identification and were most important for the performance pathway. An informal leader can demonstrate a range of leadership behaviours such as tactical guidance, encouragement, and social support (Fransen et al., 2014), meaning that they can affect a team's communication, coordination, and cooperation (Fransen et al., 2014).

### **2.3.2 Coordination**

When a team succeeds in coordinating as a unit, it can optimize what is required to perform well (Steiner et al., 2017). Sports require that different individuals, each with their own skills, intentions, patterns of action and cognition, be brought together in the right way at the right time (Williamson & Cox, 2014, p. 640). An example, in football, is when the defence is coordinated with optimal distances between players and has coverage

over dangerous areas. Or in attack, when the position network in the team increases passing opportunities between team members. Members of a team have a defined set of roles and responsibilities and are interdependent, meaning that the actions of team members depend on the actions of others (McLaren & Spink, 2018). Further, successful team coordination is believed to depend on shared knowledge between team members (Eccles & Tenenbaum, 2004; Silva et al., 2013).

### **2.3.2.1 Shared knowledge**

Shared knowledge results from the possession by team members of complementary goals, strategies, and tactics, providing a shared understanding of desired performance outcomes (Silva et al., 2013, p. 766). Team members form clear expectations about each other's actions making them able to coordinate quickly and efficiently to the changes in the performance environment (Eccles & Tenenbaum, 2004). Eccles (2016) gives two examples where shared knowledge takes place, one is prior to the game and the other is during a game. Prior to the game a lot of planning is done, by the coaching staff. The coach chooses training drills, a starting line-up, formation, and tactics, and arranges the team meeting (info about the opponent, set plays, etc.) (Eccles, 2016, pp. 467-468). Football is a dynamic game (Lames et al., 2021), meaning that a lot of unpredictability can happen. A team trailing might not proceed with the same game plan as at the start of the game, requiring players to communicate and update each other on the new game plan (Eccles, 2016, p. 471). These updates are often communicated verbally (shouting, talking) or nonverbal (directing, pointing, or facial expressions) (Eccles, 2016, p. 471). Negative emotions might occur if the new game plan is not working and the team is still trailing. This shared experience can lead to emotional reactions within the teamwork, which may have an impact on the attitudes and behaviour of the members (Jamshed & Majeed, 2019). Negative emotions are generally associated with maladaptive performance outcomes (Wilson et al., 2009).

## **2.4 A Norwegian school of sports science project.**

In 2022, three master students from the Norwegian School of Sports Science studied tactical and emotional NVB in elite football for women (Kleppe, 2022; Knai, 2022) and men (Jenssen, 2022; Knai, 2022). The students used tactical view (showing all players)

and broadcast-view (tv-pictures) to investigate tactical and emotional behaviour in arm movements. The results revealed that the women had a frequency of 2.15 NVB per minute (Kleppe, 2022; Knai, 2022), while the men had a frequency of 1.87 NVB per minute. The most frequent behaviour in all studies was tactical (Jenssen, 2022; Kleppe, 2022; Knai, 2022). Further, all studies found differences in the frequency of both tactical and emotional NVB in relation to playing positions. The Centre-backs had the highest frequency in both studies, with 2.80 per minute for women (Kleppe, 2022) and 2.46 per minute (Knai, 2022) and 2.65 per minute for men (Jenssen, 2022) and 2.23 per minute (Knai, 2022). Lastly, Kleppe (2022) investigated NVB in relation to leadership and found that captains display more tactical and positive NVB compared to the rest of the team.

### **3 Theoretical framework**

#### **3.1 Defining emotion**

Emotions are discrete, automatic responses to universally shared, culture- and individual-specific events (Ekman & Cordaro, 2011). Emotions are said to be biological, psychological, and social. Biological as they involve physiological responses from the central and autonomic nervous systems. Psychological as they involve specific mental processes required for elicitation and regulation of response, direct mental activities and motivate behaviour. And, social as social factors often elicit them and have social meaning when elicited (Matsumoto et al., 2012, p. 17). In other words, emotions influence how we act and how we feel (Lazarus, 1991). An emotional response begins with an appraisal of the personal significance of an event (Lazarus, 1991). Personal significance consists of what we consider personally important and our beliefs about how things work (Ekman, 1999; Frijda, 1988; Lazarus, 1991). An important distinction between emotions and other affective states, such as moods and stress is that emotions are short, discrete, and specific (Gross, 2015, p. 3). Moods and stress are longer-lasting affective states, that can last for hours, days, or weeks, while emotions only last a few seconds or minutes (Matsumoto et al., 2012, p. 19).

In the following sections, I will present the theoretical framework used in this thesis. The theoretical framework on emotion is Basic emotions Theory (BET) and Behavioural Ecology Theory (BECV). These theories' view emotions in two ways. BET views emotions as something evolutionary, claiming that emotions serve some function or

adaptability. While BECV views emotions as social, focusing on emotions' social and intention aspects. The theories will be explained in detail and will be discussed in relation to the results of this study.

### **3.2 Basic emotions theory**

The Basic Emotions Theory (BET) suggests that humans experience a limited number of biologically and psychologically fundamental emotions (Wilson-Mendenhall et al., 2013). These emotions, such as fear and anger, evolved to assist in essential life tasks like fleeing danger or defending oneself, aiding in survival (Gu et al., 2019; Matsumoto et al., 2012, p. 17). Emotions trigger physical changes in the body, thoughts, movements, and behaviours that work together to convey information (Keltner et al., 2019, p. 3). When we experience emotional responses from another person, it's a sign that something important is happening. These responses help us prepare to handle important events, which has been beneficial in the past (Ekman, 1992). This includes the individual's experiences and what benefited the species in the past (Ekman & Cordaro, 2011).

According to Keltner et al. (2019), one of the first and most influential studies researched was done by Ekman and Friesen (1986). They found that individuals from New Guinea can identify six fundamental emotions when presented with pictures depicting them. This made the foundation that there were basic emotions that were universal.

Ekman (1999), which is central to this theory, states that each emotion is a family of related states, rather than a single affective or psychological state. The members of an emotion-family share commonalities in expression, physiological activity, former events they arise from, or/and in the appraisal processes. The criteria that form the basis of an emotion family is that it consists of individual differences or variations on the emotional “theme”. The “theme” consists of the characteristics unique to the family, while variations are a product of individual differences and other differences in the specific occasion in which an emotion occurs. The “themes” can be described as a product of evolution and learning (Ekman, 1999; Ekman & Cordaro, 2011). An example is that 60 different anger expressions share certain structures and properties which distinguish them from the family of fear expressions and disgust expressions (Ekman, 1993).

Ekman and Cordaro (2011) propose thirteen characteristics found in most basic emotions:

1. Distinctive universal signals.
2. Distinctive physiology.
3. Automatic appraisal.
4. Distinctive universal in antecedent events.
5. Presence in other primates.
6. Capable of quick onset.
7. Can be of brief duration.
8. Unbidden occurrence
9. Distinctive thoughts, memories, and images
10. Distinctive subjective experience.
11. Refractory period filters information available to what supports the emotion.
12. Target of emotion unconstrained.
13. Emotion can be enacted in either a constructive or destructive fashion.

The basic emotions are anger, fear, sadness, enjoyment, disgust, and surprise (Ekman, 1992). Early studies on emotions focused almost exclusively on facial muscle movements (Keltner et al., 2019, p. 136). Later studies have focused on other emotional expressions, including gaze, hand activity, head movements and body movements (Keltner et al., 2019, p. 136). This suggests that emotions also signal value in body movements other than in the face (Keltner et al., 2019, p. 136). It is hypothesized that emotion expressions began as cues and further evolved to signals (Shariff & Tracy, 2011). As social signals became increasingly possible and important, the way we communicate through facial expressions and body movements has become more relevant. Understanding and recognising emotions efficiently and accurately appears universal, as understanding others' emotions is beneficial (Shariff & Tracy, 2011).

### **3.3 Behavioural ecology view theory**

The Behavioural Ecology View (BECV) was created in the 1990s as a solution to the paradox found in BET (Crivelli & Fridlund, 2019). Rather than human facial displays being a way to communicate inner emotions, as BET suggests, BECV states that facial displays can be described as “social tools” that have meanings within interactions, signalling our contingent next move to alter others, humans alter their interaction toward



a certain outcome, often with mutual gain (Crivelli & Fridlund, 2018). For instance, an angry face is only displayed when there is an overtly hostile intention and a suitable audience to receive the message (Parkinson, 2005). According to BECV, facial behaviour and its impact on social interactions is a flexible tool that has evolved over time to benefit both parties involved (Fridlund, 1991), that depends on the interactants, their aim with the interactions, and the proximal and historical contexts of their interactions (Crivelli & Fridlund, 2019). This evolution occurs through natural or cultural selection, resulting in either uniformity or diversity.

The sociality hypothesis is a crucial aspect of BECV. It suggests that actions like gestures and facial expressions are used to persuade and affect an audience. Therefore, how these displays are presented is strongly influenced by the audience's presence and location (Crivelli & Fridlund, 2018). There is been found support for this in research (Fernández-Dols & Ruiz-Belda, 1995; Kraut & Johnston, 1979), Fernández-Dols and Ruiz-Belda (1995) found that gold medalists only smiled when interacting with other people when receiving the medal on the podium. They did not smile when turning toward the flag hearing the national anthem or when waiting behind the podium. Additionally, Kraut and Johnston (1979) found that bowlers did not smile as they made a strike but did so when they turned and saw their companions. These findings indicate that a smile is more reliably associated with social motivations than with the emotional experience (Kraut & Johnston, 1979; Schmitt et al., 1997, p. 97).

Both theories have different views of emotions, which could be useful in understanding the results of this study. Therefore, I will include both theories in the discussion later in this thesis.

## **4 Research question**

Based on all the information above, the aim of this study is to present and describe nonverbal behaviours displayed by elite players in a football match.

1. What characterizes an elite football player's tactical and emotional nonverbal behaviour?

## **5 Methodology**

The following paragraphs will carefully explain this study. They will provide detailed information on the design, participants, and data collection. Moreover, the variables investigated, validity, reliability, ethical considerations, and other critical details will be fully presented.

### **5.1 Design**

In this project, descriptive coding was used to analyse players' NVB. This is a naturalistic observational study, where players have accepted being filmed during one international match. This design gathers rich data within a real-world setting with high ecological validity (Hertenstein et al., 2006, p. 25). The study intended to look at the tactical and emotional NVB of professional football players and, develop and improve the method of tracking this information. The coding and analysing tools basics were already developed and tested by previous students from the Norwegian School of Sports Science doing a similar study. However, in this study, close-up video (not used in other studies) made it possible to further develop the coding window by adding variables. After gathering the footage, the coding and analysing tool (see Figures 1 and 2) was used to code different categories of NVB (tactical, emotional, and contextual factors). These variables will briefly show how frequently these behaviours happen during a match.

### **5.2 Participants**

The sample consisted of four players playing for their national team. The players were chosen based on their playing position and club league status. I will not display which leagues the players play in to avoid identification. However, investigating an international player, regardless of his league status, gives us a brief baseline on NVB displayed by elite football players. The selection process also consisted of getting permission from the national team management and the player. This permission was predicted to be manageable, as we got indications that the project may give enriching information to the team and players. With permission from the participants, we recorded each player in one game. The number of minutes each player played will not be displayed to secure anonymity. Due to injuries, substitutes, tactics, or other events, we could not fully control

who would play or for how long. All players play in different positions, one defender, one midfielder and two attackers.

## **5.3 Data Collection**

### **5.3.1 Pre video analysis**

The process consisted of a few steps; the first step was to get access to the stadium. We sent an email to the national team management explaining our research and asking for permission to film. At the stadium, we filmed each player in close-up view and received a tactical view (video) from the national team's own analysis crew. The received tactical view is a high-placed camera, filming all the players (except goalkeepers) (see Figure 1). This allows the ability to look at and code the context in which the player displays an NVB. The Close-up video was recorded by a research team from The Norwegian School of Sports Science (NSSS) on a Panasonic HC-VX1EG-K (4k video with 22mm wide lens and 24x zoom), Sony FDR-AX43A (4k video with 26,8 mm wide lens and 20x zoom), and Panasonic AG-UX90 (4k video with 24,5 mm wide lens and 15x zoom). Each student filmed one player. The full body of the player was always visible in the close-up view.

The researcher recorded the players during two matches (two players in each game). In the first match, the filming location was in the upper middle part of the stadium (close to the ceiling). The cameras were placed approximately one meter apart. Camera sensitivity, zoom, and angles were tested and adjusted during the warm-up. Recording started ten/fifteen seconds before kick-off. In the first match, the angle from the tactical view was on the opposite side as the close-up angle, this meant that the angle was different when switching between the two different camera angles when coding. In the second game, the filming location was in the press zone on the same side as the tactical view. Cameras were set up as in the first game and followed the same procedure.

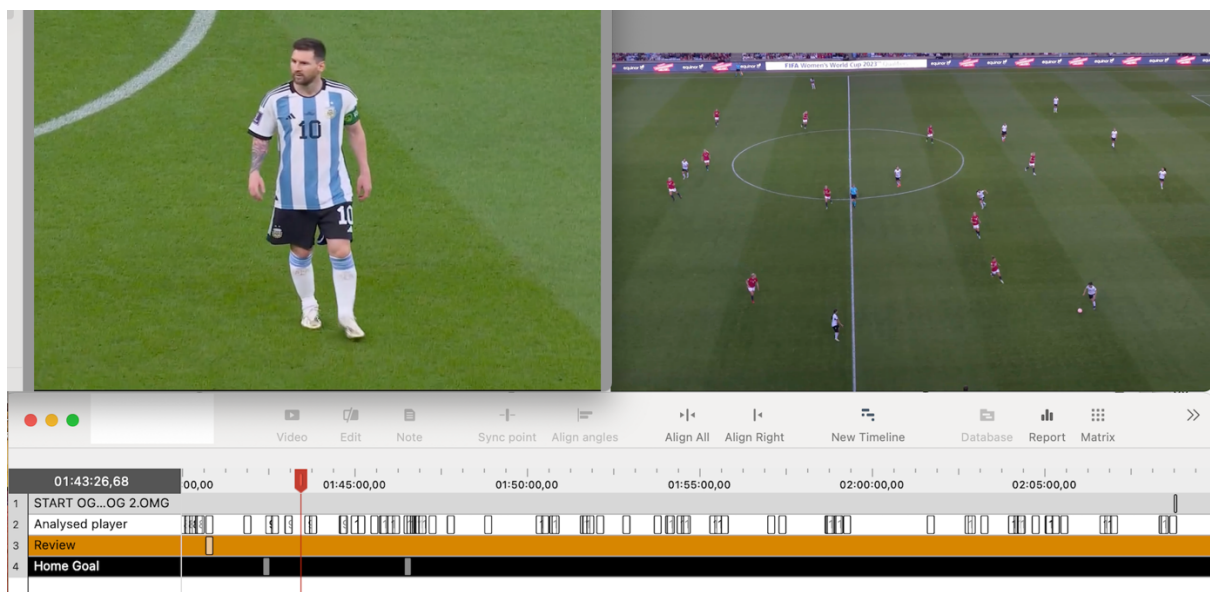
### **5.3.2 Process of coding**

The match with each player was analysed using Hudl sportscodel. Hudl is a program that makes it possible to watch videos and at the same time code NVB behaviours (using the predeveloped code window). Analysing requires a laptop and an additional screen, with one screen showing the tactical and close-up video (see Figure 1), and the second screen (laptop) showing the coding window (see figure 2). Footage from tactical and close-up

was perfectly synchronized in hudl so that the clips were at the same moment in the game only with different angles. An NVB was coded as the coder detected a tactical or emotional behaviour. A new NVB was coded every time the player was back in a neutral position or changed his behaviour. This means that if a player held his hands up for 10 seconds only one NVB would be coded. However, if the player held his hand up and returned to a neutral position (hands down in line with body) and then raised his hand again, two behaviours would be coded. Depending on the situation the second coding could either be the same as the first one or a different category. In addition, if an NVB was changed from one category to another without returning hands to a neutral position, two behaviours would be coded. For example, if a player directs his teammate to position and in a split second raises his hand to influence the referee due to the opposition wasting time. Behaviour occurring during long injury breaks (1,5 minutes) and post-scoring would not be coded. Coding would restart 5 seconds before kick-off or game restart.

**Figure 1**

*Screenshot from close-up and tactical view*



Note: Example from close-up and tactical view. This figure is a combination of two different matches used during the training period.

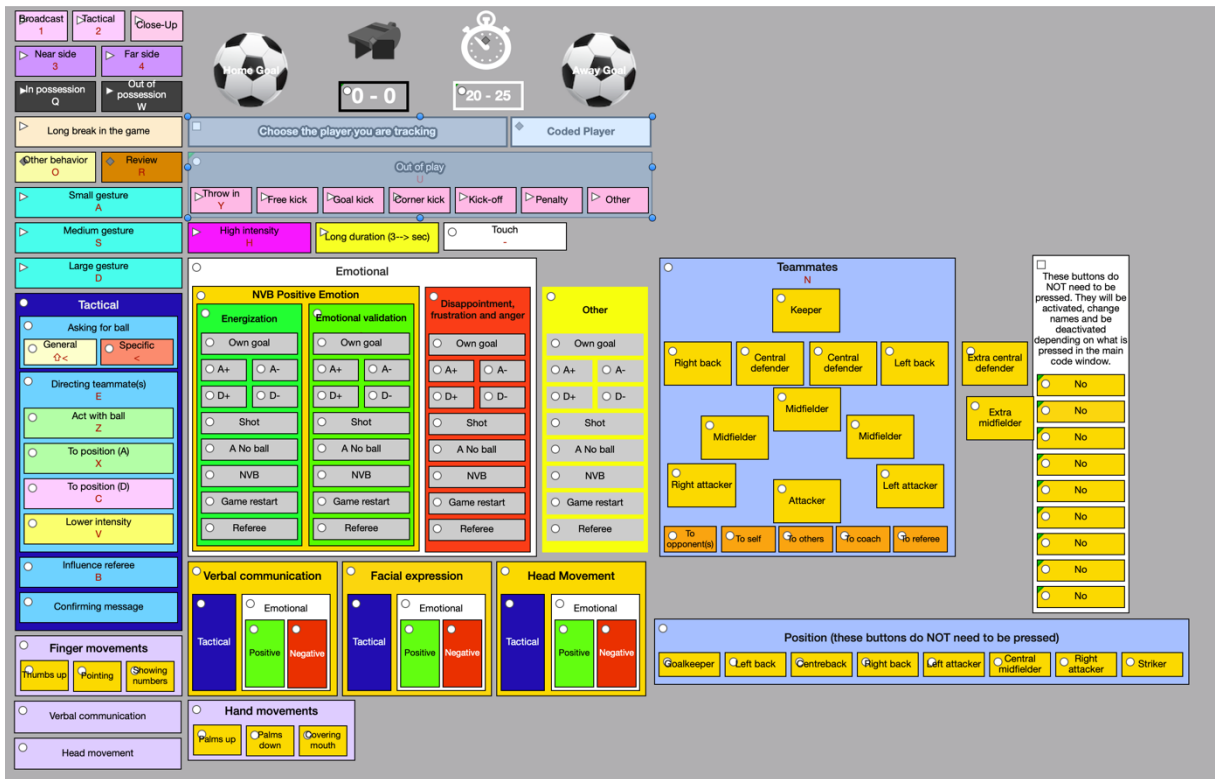
Each of the player's coding would be completed before the next player was coded. The coding window tracked the game's time (five-minute intervals). The contextual variables are displayed in the coding window (figure 2) at the top left corner. This button would always be active since all behaviours were detected using the close-up view. If the ball

were out of play, one of the (free-kick, corner, throw-in etc.) buttons would be pressed. However, if the ball was out of play but the NVB was triggered by something happening before the ball was out of play, the out-of-play button would not be pressed. Size (small, medium, large) and intensity (high) would determine the size and intensity of the behaviour.

When the contextual variables were correct, the behaviour was coded in either one of the tactical, emotional, or additional categories. These will be elaborated on further in the following section. Because arm and hand movements were the easiest to detect, the big blue tactical button and the big white emotional button (see figure 2), were only used when arm or hand movements were displayed. The purple buttons (in the lower-left corner) were only used in addition to other finger- or hand movements and/or additional behaviours (head movements or verbal communication). While the yellow buttons (in the lower middle) were only used when hand- or arm movements were not displayed. The final phase was to code whom the player was communicating with. All potential receivers were displayed in the blue “teammates” button (on the right side). When it was not clear whom the player was communicating with, but it was clear it was to one of the teammates, the big teammates' button would be pressed. The coder coded what NVB he/she thought was displayed, what triggered it, and whom the player was communicating with.

**Figure 2**

*Screenshot of the coding window*



Note: Coding window with every variable.

### 5.3.3 Post coding

After coding the player, the timeline was saved on a CSV file and added to excel. In Excel the players' NVB was displayed and categorized. In Excel, a player's NVB categories could be sorted and counted. For example, one could see the number of times a player had communicated with a teammate and what the communication was coded as. Sports code also displayed a matrix with categorised information on every variable. Some numbers were double-checked in Excel, and the video was reviewed again in some situations. This was typically unusual situations which caught the first author's mind. For example, one player displayed four tactical thumbs-up, in other cases, usually coded as emotional.

## 5.4 Variables

The paper at hand categorises variables into three groups: tactical, emotional, and contextual. To ensure accuracy and reliability, the coding window used in this study was derived from the previous work done by a team of experts from the Norwegian School of Sports Science (Jenssen, 2022; Kleppe, 2022; Knai, 2022). It is worth noting that the previous coding window was only based on what could be seen using tactical and broadcast camera views. Some of the variables and definitions used in these studies have been included in the coding window developed for this study. These variables are presented in Table 1.

**Table 1**

*Categories, variables and descriptions*

Category	Variable	Description
Tactical arm movements	Tactical (Ball seeking behaviour) <ul style="list-style-type: none"> <li>- Asking for ball (general)</li> <li>- Asking for ball (specific)</li> </ul>	<p><b>Asking for ball (general):</b> The player indicates through arm-movements that he wants the ball, but not specifically WHERE he wants the ball. Typically, with both hands, possibly when on the other side of the pitch. “Look at the amount of space I have got to receive the ball”.</p> <p><b>Asking for ball (Specific):</b> The player indicates through arm-movements that he wants the ball, and leaves clues as to WHERE he wants it (into space, to his feet, to his body etc).</p>
	Tactical (Directing teammate(s)) <ul style="list-style-type: none"> <li>- Act with ball</li> <li>- To position (A)</li> <li>- To position (D)</li> <li>- Lower intensity</li> </ul>	<p><b>Act with ball:</b> The analysed player uses arm-movements to suggest a course of action for the player with the ball. Typically, pass to the right back, clear the ball etc.</p> <p><b>To position (A):</b> The analysed player uses arm-movements to suggest to a teammate that they make a movement, either to receive the ball or to create space. Applies most often in attack but can also happen early in the transition phase.</p>

	<p>Tactical</p> <ul style="list-style-type: none"> <li>- Influencing referee</li> </ul> <p>Tactical</p> <ul style="list-style-type: none"> <li>- Confirming message</li> </ul>	<p><b>To position (D):</b> The analysed player uses arm-movements to suggest to a teammate that they make a movement, either to cover space or to cover an opposition player.</p> <p><b>Lower intensity:</b> The analysed players use arm-movements to indicate that the team need to lower intensity. For example, when leading the game or to reposition.</p> <p><b>Influencing referee:</b> Any behaviour and arm-movement that is done to influence the referee. Often made proactively, before the referee blows the whistle to challenge for a desired outcome. Typical example is that a teammate is tackled, and the analysed player raises his arms to challenge the referee and indicate that it is a foul. Could also happen after a foul, as the player tries to avoid a booking.</p> <p><b>Confirming message:</b> This button is used if the players confirms that he has received a message. This is typically giving a thumbs up after receiving a tactical message, often pre or post a specific situation.</p>
Emotional	<p>Positive NVB</p> <ul style="list-style-type: none"> <li>- Energization</li> <li>- Emotional validation</li> </ul>	<p><b>Energization:</b> Any arm-related behaviour where the analysed player tries to increase and/or activate energy or intensity levels in himself, teammate(s), or fans.</p> <p>This will possibly occur after the goalkeeper saves a penalty, a team is awarded a penalty, a last-ditch sliding tackle, a teammate misses a shot, etc. Press this button if you are certain you see an energizing gesture</p>



		<b>Emotional validation:</b> Emotional validation is typically gestures where the analysed player's behaviour indicates he tries to recognize and/or acknowledge other players' emotions. Press this button when you are certain you see an emotional validation gesture
Emotional	Negative emotional NVB - Disappointment, frustration, and anger.	<b>Disappointment, frustration, and anger:</b> Any behaviour indicating that the analysed player is disappointed, frustrated, or angry. Disappointment relates to sadness or displeasure caused by the non-fulfilment of one's hope or expectations. Frustration arises from the perceived resistance to the fulfilment of an individual's will or goal and is likely to increase when a will or goal is denied or blocked. Anger involves a strong uncomfortable and non-cooperative response to a perceived provocation, hurt or threat

Note: Variables and definitions used in this study developed by three coding experts from the Norwegian School of Sports Science (Jenssen, 2022; Kleppe, 2022; Knai, 2022)

As this study incorporates close-up views (with tactical view) to provide a more comprehensive and detailed understanding of players' behaviour, it allowed for additional variables to be added, thereby enriching the analysis. When filming at the stadium and coding, it became evident that more detailed information could be detected beyond arm movements (which was the basis of a previous coding window). This is the reason why a new coding window was developed. Since no studies have investigated these variables in a match-setting, the variables were chosen, based on expert discussions, and observations during coding exercises on male players from the World Cup. These variables are described in Tables 2 and 3. These include verbal communication, facial expression, head movements (Table 2) and additional information and behaviours to arm movements (Table 3). Additional information includes hand movements (palms-up, palms down, covering mouth) and finger movements (thumbs-up, pointing, and showing- numbers). Additional behaviours include head movements and verbal communication. Although

verbal communication is not classified as NVB, it was included to indicate the frequency shown during a match.

**Table 2**

*Categories, variables and description of the coding window used in this study*

<p><b>Added variables</b></p>	<p>New behaviours (Big yellow buttons). These buttons would only be coded when Arm movements are not displayed.</p> <p>Verbal communication</p> <ul style="list-style-type: none"> <li>- Tactical</li> <li>- Positive</li> <li>- Negative</li> </ul>	<p><b>Tactical:</b> Use this button if the player uses verbal communication to give a tactical message. This can be talking to a player before or after a set piece, during injury or in play.</p> <p><b>Positive:</b> Use this button if the verbal communication is positive, often displayed with a smile or positive facial expression.</p> <p><b>Negative:</b> Use this button if the verbal communication is negative, this can often be screaming, shouting, or arguing.</p>
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<p><b>Added variables</b></p>	<p>Facial expression (This behaviour is only coded when the facial behaviour is clearly expressive)</p> <ul style="list-style-type: none"> <li>- Tactical</li> <li>- Positive</li> <li>- Negative</li> </ul>	<p><b>Tactical:</b> Use this button if the player is showing a facial expression in connection to something tactical</p>
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		<p><b>Positive:</b> Use this button if the facial expression is positive, typically, smiling.</p> <p><b>Negative:</b> Use this button if the facial expression is negative, for example rolling eyes, eyes closed or other sign disappointment, anger or frustration.</p>
<b>Added variables</b>	<p>Head movement</p> <ul style="list-style-type: none"> <li>- Tactical</li> <li>- Positive</li> <li>- Negative</li> </ul>	<p><b>Tactical:</b> Use this button if the head movement is related to something tactical. This could be if a player nods his head to confirm a message. Head movements is only coded when the coder feels that the player is expressing something using his head. Scanning is therefore not included.</p> <p><b>Positive:</b> Use this when the head movement is considered positive.</p> <p><b>Negative:</b> Use this button if the head movement is considered negative. This often happens after missing a big chance or while frustrated.</p>

Note: Description of every new variable added, which is not arm movements.

**Table 3**

*Additional behaviours to arm movements*

<p><b>Additional information to arm movements</b></p>	<p>Additional behaviours to arm movements (Purple buttons). These buttons would only be coded when an arm movement is displayed.</p> <p>Finger movements</p> <ul style="list-style-type: none"> <li>- Thumbs-up</li> <li>- Pointing</li> <li>- Showing numbers</li> </ul>	<p><b>Thumbs-up:</b> Use this button when the arm movement includes a thumbs-up.</p> <p><b>Pointing:</b> Use this button when the arm movement includes pointing, usually at most one or two fingers.</p> <p><b>Showing numbers:</b> Use this button if the player is showing numbers on his hand.</p>
<p><b>Additional information to arm movements</b></p>	<p>Hand movements</p> <ul style="list-style-type: none"> <li>- Palms-up</li> <li>- Palms-down</li> <li>- Covering mouth</li> </ul>	<p><b>Palms-up:</b> Use this button when the palm of the player is showing, which means that he player have turned his wrist. Most used when asking for the ball or in emotional arm movements</p> <p><b>Palms-down:</b> Use this button if the player is having his palms down toward the ground.</p> <p><b>Covering mouth:</b> Use this button if the player is clearly covering his mouth when engaging with a teammate or</p>

		opponent. This could be to avoid cameras or other to understand what is said.
<b>Additional behaviours to arm movements</b>	Verbal communication and head movement	<p><b>Verbal communication:</b> Use this button when the player is displaying verbal communication is accompanying an arm movement.</p> <p><b>Head movement:</b> Use this button when a expressive head movement is accompanying an arm movement. For example if the head movement is in an unnatural position</p>

Note: The new additional behaviour to arm movements. Adding additional information to the coding situation and detail to the arm movement.

## 5.5 Validity and reliability

Validity refers to the degree to which the instrument measures what it is supposed to measure (Scholtes et al., 2011, p. 239). There are three kinds of validity: concept, internal, and external ((Laake et al., 2008, p. 135). Concept validity is connected to the validity of the concept we are studying (Laake et al., 2008, p. 135), in this case, NVB. It is important that the term being studied is operationalised, meaning that it is precise and easy to understand (Laake et al., 2008, p. 136). NVB is a term that has been defined and used by several researchers and experts. As mentioned, variables used in the coding window were chosen and discussed by experts in the football field, making them relevant for studying NVB in football.

Internal and external validity involves whether the conclusion in this study is valid or not (Laake et al., 2008). Internal validity is connected to the validity of the population we are studying (Laake et al., 2008), further, internal validity involves controlling all variables

so that the researcher can eliminate other hypotheses (Thomas et al., 2015). Internal validity consists of three factors, only one is relevant in this study. Statistical validity refers to using the right measures and statistical analysis to avoid Felt type I and II errors (Laake et al., 2008; Thomas et al., 2015). The study observed players in a highly competitive setting who were aware that they were being studied. However, it is believed that the study did not affect their behaviour because the players are familiar with performing in front of large crowds and in intense environments. This design enables the gathering of data from real-world phenomena. The concept of external validity pertains to the ability to generalize the results to a particular population or subset of the population (Laake et al., 2008, p. 138). This study aimed not to generalize the results on a population but rather to examine top-level football players, develop the method and coding window, and investigate additional NVB that has not been investigated before.

### **5.5.1 Reliability**

Reliability is the consistency and repeatability of a measure (Thomas et al., 2015, p. 368). In the coding window, the variables are static. The primary source of potential measurement error in this study is the rater or coder. The reliability and quality of the measurement instrument and the coder increase as the measurement error decreases. (Scholtes et al., 2011, p. 237). Several factors may introduce measurement errors. For example, inaccuracy, or poor scaling of the items within an instrument (poor internal consistency), issues with test-retest reliability, or measurement instability between the coders (Hallgren, 2012). There are three types of reliability tests, inter-rater, intra-rater and test-retest.

Inter-rater reliability refers to the degree of agreement among multiple raters who use the same measurement instrument. It measures whether or not the raters have consensus in their scores (Scholtes et al., 2011, p. 237). This research involved coding a series of matches to measure the reliability between different raters and expert coders. Initially, one player was coded for a full ninety-minute match and compared by multiple raters. A review button was available for coders who were unsure about certain situations in the match, which were later discussed and clarified. Two matches involving two different players were coded using the new coding window. Data from these matches were compared and ranked from 0-2, with 0 meaning both have coded the same, 1 both have

coded but not the same category, and 2 only one has coded. The total agreement has been measured by dividing the number of times the coders have coded the same on the overall total codings. The agreement is defined as the degree to which score/ratings are identical (Gisev et al., 2013). The agreement between rater one and rater two (Table 2) was 0.7 in these two games. When coding tactical behaviour, the consensus was 0.79, while it was 0.81 when coding emotional behaviour. The agreement on the verbal, facial and head movements variables was 0.5. When removing these new variables, the inter-rater agreement is 0.78 in the first game and 0.75 in the second game on the tactical and emotional variables.

**Table 4**

*Inter-rater agreement between coder 1 and 2 on tactical and emotional NVB*

<b>Game 1</b>	Tactical arm movements	Emotional arm movements	Total without Verbal, facial, head movements	Verbal, facial Head movements	Total
Agreement	0.75	1	0.78	0.5	0.75
<b>Game 2</b>	Tactical	Emotional		Verbal, facial head movements	Total
Agreement	0.83	0.625	0.75	0.5	0.66
<b>Mean</b>	<b>0.79</b>	<b>0.81</b>	<b>0.76</b>	<b>0.5</b>	<b>0.7</b>

Note: Description of the agreement of coder 1 and 2.

Intra-rater refers to reliability across different times (Scholtes et al., 2011, p. 237). The first author coded the same player in the same match several months apart and compared the data. A total of 164 situations were coded, were 100 were tactical arm movements, 36 were emotional arm movements and 28 were verbal/facial/head movements. In the retest, 174 situations were coded. 114 were tactical arm movements, 41 were emotional arm movements and 26 were verbal, facial and head movements.

**Table 5**

*Intra-rater agreement*

<u>Tactical arm movements:</u>	<u>Emotional arm movements:</u>	<u>Verbal, facial, head:</u>
<b>0.87</b>	<b>0.87</b>	<b>0.92</b>

Note: Agreement of first author test-retest.

## **5.6 Ethical considerations**

Ethics pertains to appropriate conduct in the real world (Laake et al., 2008, p. 66). Ethical values and regulations in scientific research serve as guidelines, such as preventing research misconduct. The Nürnberg-code outlines three principles for human research, including obtaining the subject's consent, allowing them to withdraw from the research at any time, and minimizing the risk involved in the project (Laake et al., 2008, pp. 90-91) In our project, the subjects gave their consent to film and observe their NVB in a football match. This information could provide the players with insight into their behaviour during a match. This also means that the behaviour they displayed will be discussed and given meaning based on the coders' subjective interpretation. Although a football player is playing in a public stadium, close-up video for ninety minutes is considered highly personal, and obtaining their consent was deemed most appropriate. Moreover, none of the participants has reported withdrawing from the project, and no risks are involved, other than the normal risks of playing a football match, which they would be regardless of this study. Approval was conducted from the Norwegian Center for Research Data (NSD) to advance this research (see appendix). NSD has approved the use of personal data on the participants. In addition, consent is obtained by the players in the study. However, confidentiality has been secured by not displaying any personal information about the players.



## 6 Results

In this section, I will present the results of 1060 registered behaviours from a total of 270 minutes of football. While having collected a large amount of data on each player during a match, not all variables will be presented. Instead, the focus will be on presenting descriptive statistics of players' tactical, emotional (positive and negative) behaviours. This last section is particularly important as it will include information on behaviours not previously investigated. To secure that information could not lead to a player being identified, the number of minutes played and which game the player played will not be presented. Also, the results will be given in behaviour per minute, meaning that the number of minutes played does not affect the overall frequency. Table 6 provides an overview of frequency per minute and game outcome. The position of the players is not shown to ensure anonymity.

**Table 6**

*Basic information about the players in this study*

<b>Position</b>	<b>Frequency per minute</b>	<b>Game outcome</b>	<b>Importance of game</b>
Player 1	<b>3.62</b>	Lost	Important
Player 2	<b>4.97</b>	Lost	Important
Player 3	<b>3.12</b>	Draw	Friendly
Players 4	<b>3.33</b>	Draw	Friendly

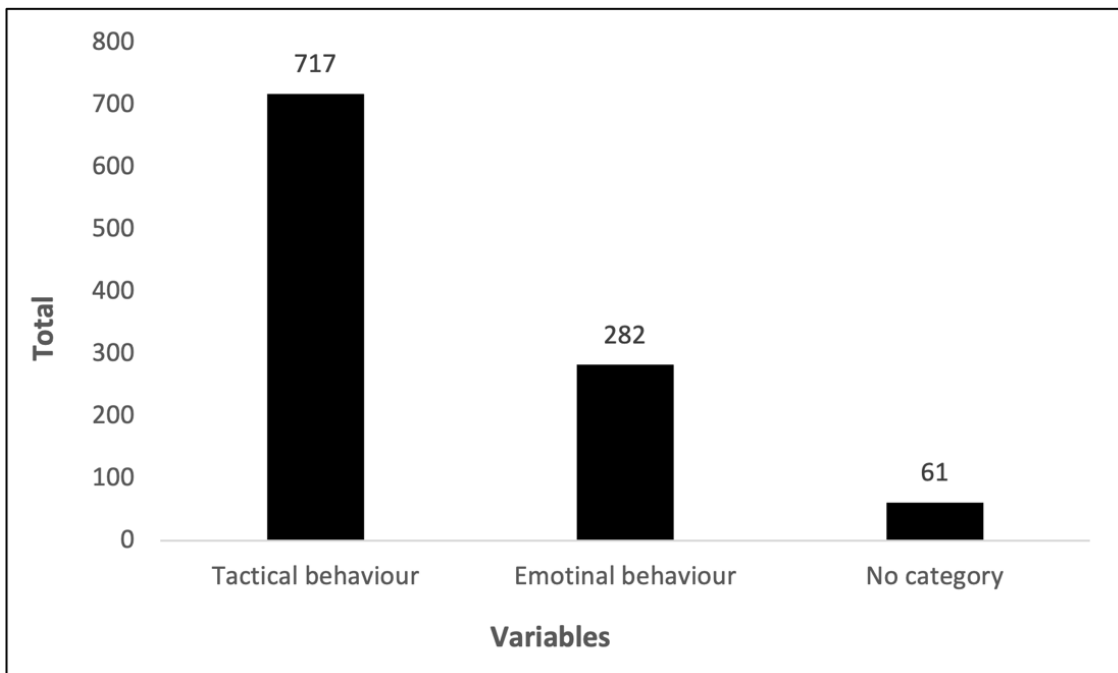
Note: Overview of the frequency per minute and game outcome by the four players. Contextual factors (Game outcome and importance of game) are added. The total score and player position is removed to ensure that the players could not be identified.

## 6.1 Nonverbal Behaviour during a football match

Figure 3 displays the total number of NVB found in the study. The players all had higher frequencies of tactical behaviour, with a mean of 2,46 behaviours per minute (SD=0.70). Emotional behaviours were lower, with a mean of 1,06 behaviours per minute (SD=0.24).

**Figure 3**

*Total number of tactical and emotional behaviours*



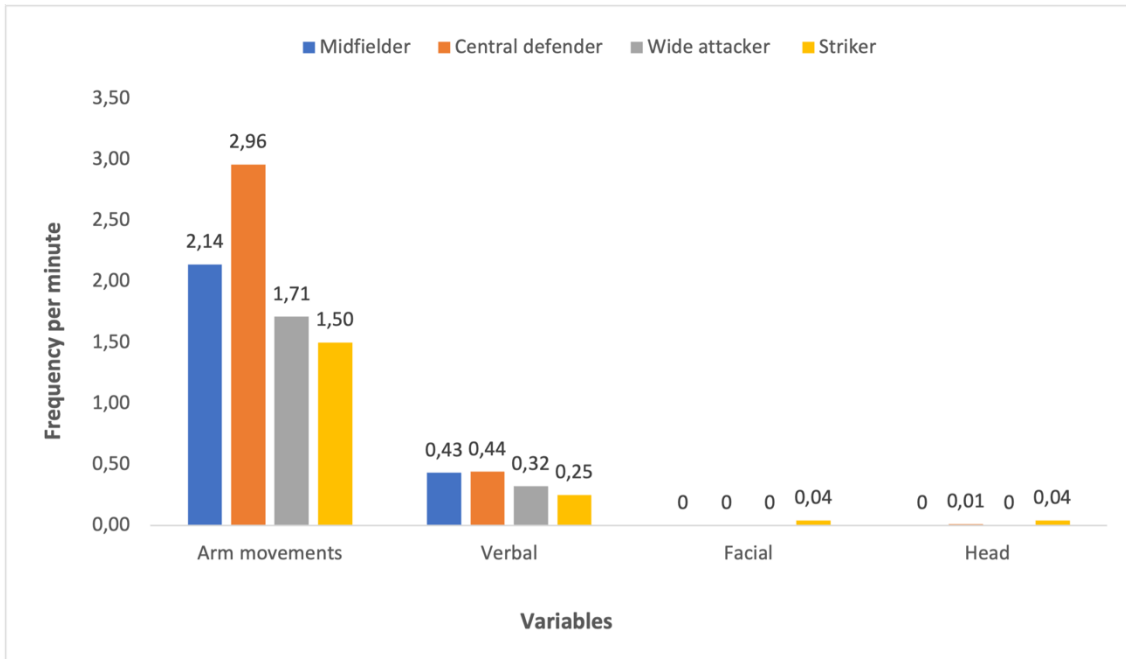
Note: The total number of NVB registration on tactical and emotional behaviour. No category=behaviours that were not determined to be either emotional or tactical, 16 of these were touching behaviour.

## 6.2 Tactical nonverbal behaviours

The players' frequency of tactical behaviours per minute varied, as shown in Figure 4. All players showed the highest frequency in terms of tactical arm movements with a mean of 2,08 behaviours per minute (SD=0.645). Secondly, verbal behaviour with a mean of 0.36 behaviours per minute (SD=0.09), Tactical arm movements were displayed in 608 cases, accounting for 85% of the total tactical behaviours. This indicates the importance of tactical arm movements. Tactical verbal was displayed in 106 cases, accounting for 14% of all tactical behaviour. Some players did not exhibit tactical facial or head behaviour.

**Figure 4**

*Players' frequency of tactical behaviours based on player positions*

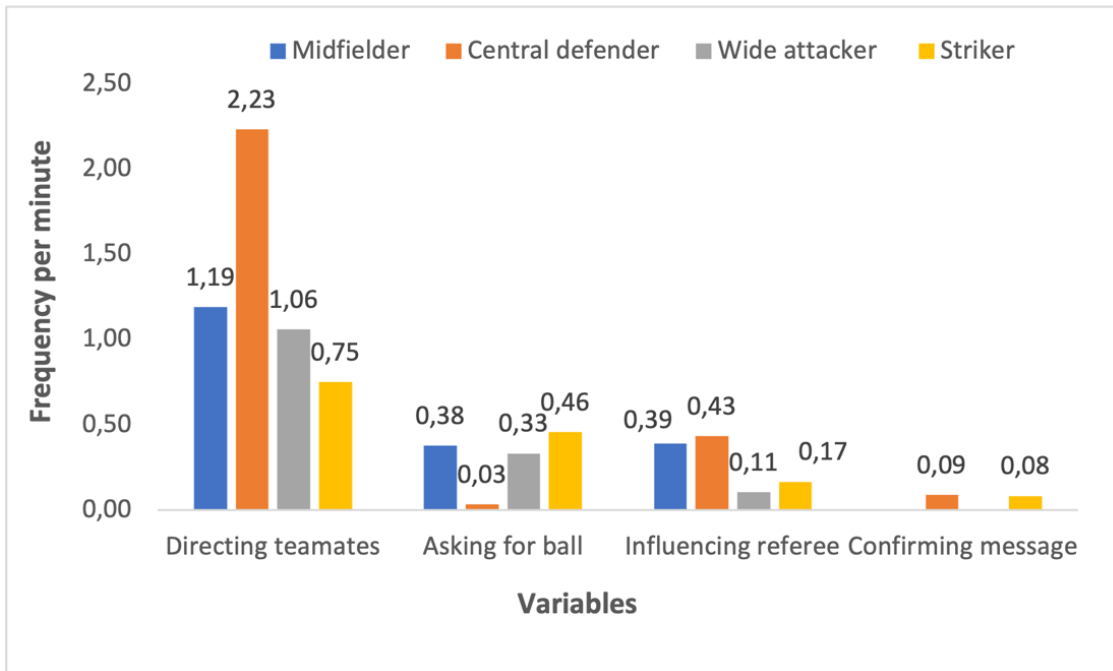


Note: Player's frequency of tactical nonverbal behaviours per minute in different positions. Verbal=Verbal communication, Facial=facial expression, Head=head movements

As tactical behaviour was the most frequent behaviour found in this study, Figure 5 presents a breakdown of each player's frequency per minute in various tactical subcategories. All players had higher degrees of directing teammates' behaviour with a mean of 1.31 behaviours per minute ( $SD=0.64$ ). Asking for ball had a lower mean frequency of 0.30 behaviours per minute ( $SD=0.19$ ), and influencing the referee had a mean of 0.27 per minute ( $SD=0.16$ ). Directing teammates were coded 396 times overall, equaling 65 % of all tactical arm movements.

**Figure 5**

*Players' frequency of tactical arm movements subcategories*

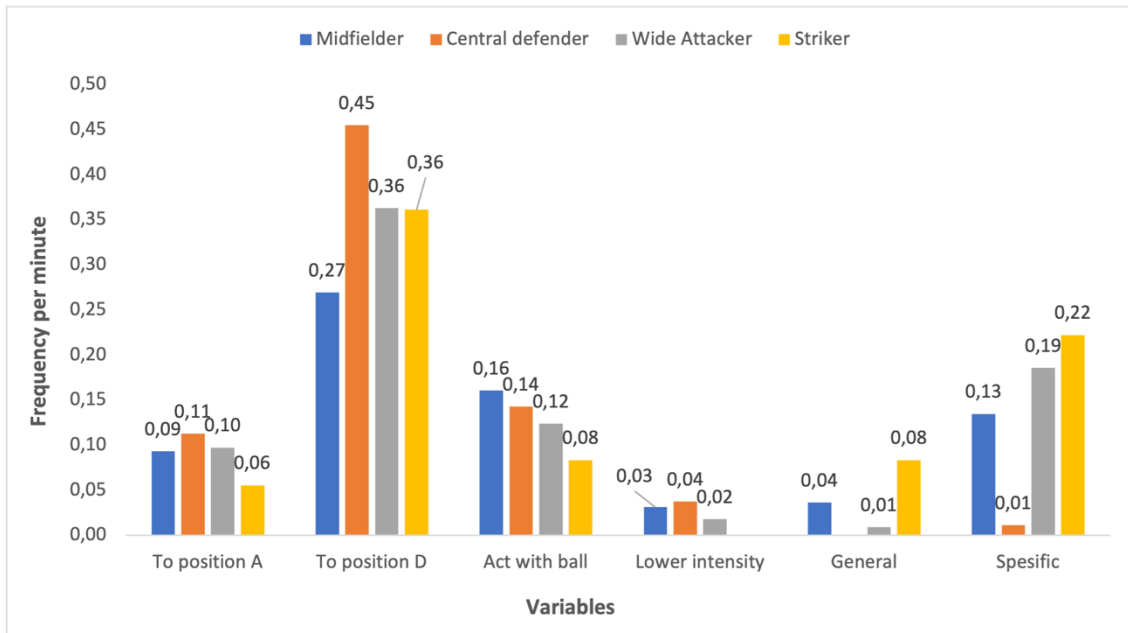


Note: Display of players frequency of directing teammates, asking for ball and influencing referee and confirming message. Two players did not display any behaviour coded as confirming message, this information is not shown in figure 5.

As directing behaviour was the most frequent subcategory of tactical behaviour. Figure 6 shows that the most frequent subcategory was directing to position defensively, with a mean frequency of 0.36 behaviours per minute (SD=0.08). Followed by asking for ball specific with a mean of 0.14 behaviours per minute (SD=0.09). Third was act with ball with a mean frequency of 0.13 (SD=0.03). Directing to position defensively was coded 227 times, equaling 57 % of all directing behaviour.

**Figure 6**

*Player frequency per minute of directing teammates subcategories*

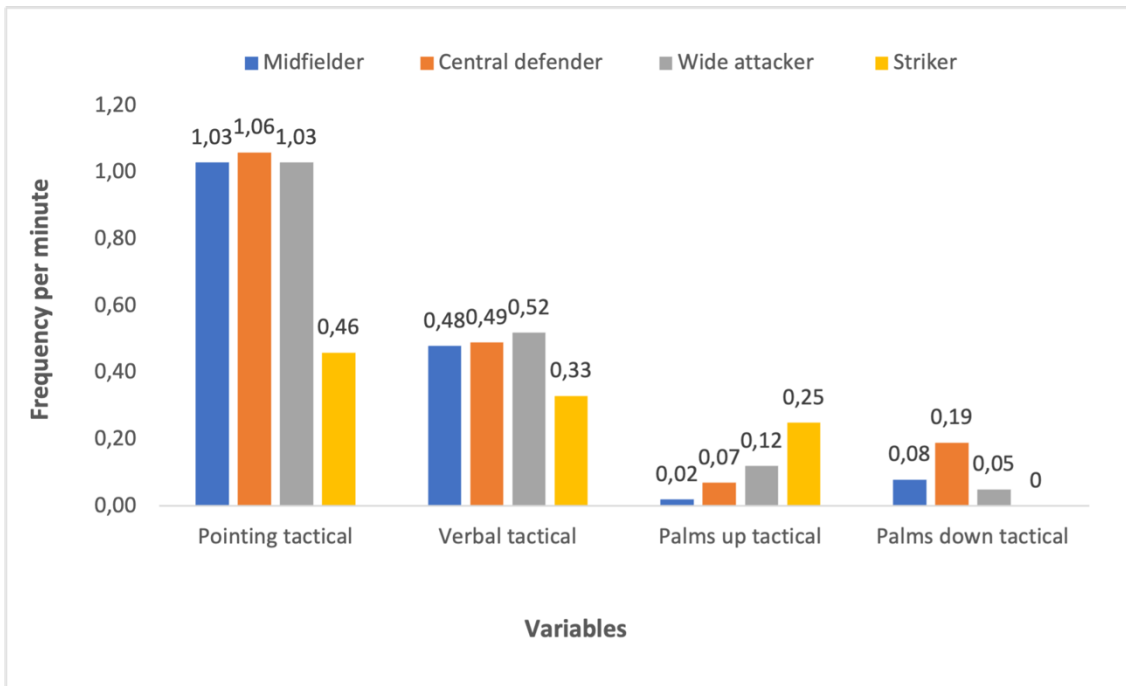


Note: frequency of each player's in the directing teammates variable. To position A=To position in attack, To position D=To position defensively or who to mark, Act with ball=Directing the teammate on the ball, Lower intensity=Lower game speed or don't rush, General=Asking for ball in general, Specific=Asking for ball and specifying where.

This study investigated the accompanying behaviours to arm movements. Figure 7 gives an overview over the most frequent additional tactical behaviours found in this study. The two highest accompanying behaviours were pointing with a mean of 0.90 behaviours per minute (SD=0.29), and verbal with a mean frequency of 0,46 behaviours per minute (SD=0.09). Of all the pointing behaviour found in this study, 98% were coded as tactical. Three players displayed a thumbs-up in relation to a tactical message. The midfielder and striker displayed one (0.01 and 0.04 per minute), while the central defender displayed 4 behaviours (0.04 per minute). None of the players displayed a tactical head movement.

**Figure 7**

*Players frequency of additional behaviours to tactical arm movements*



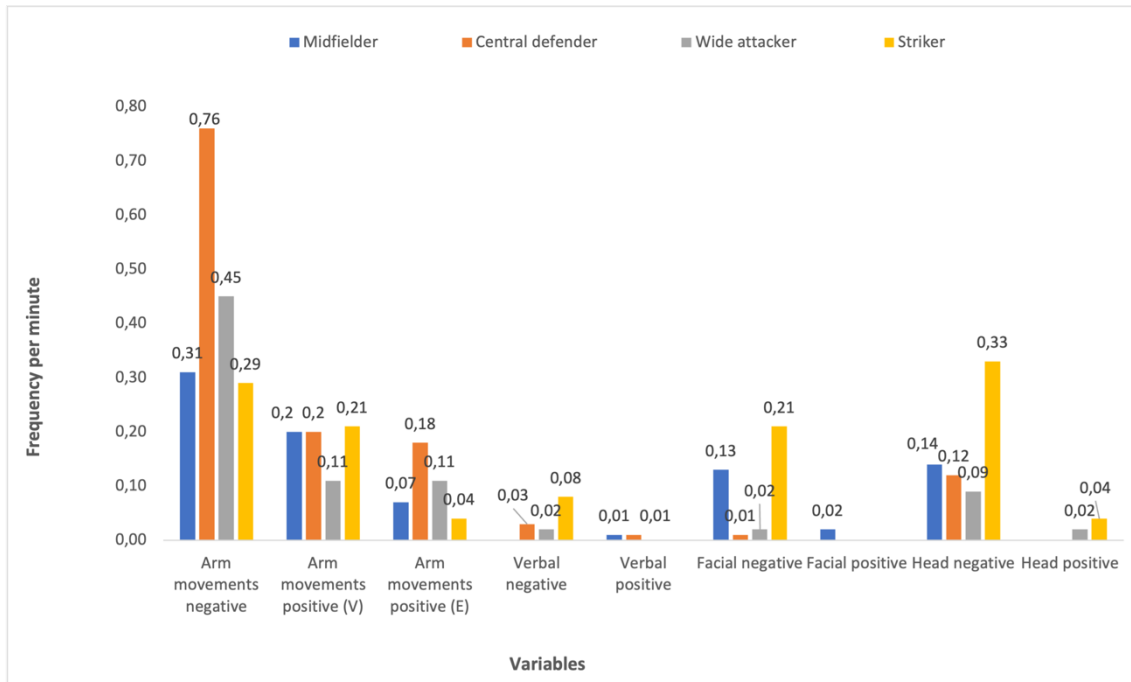
Note: the most frequent additional behaviours to arm movements. Finger, verbal and hand movements. Thumbs-up and head movements were also investigated but is not included in this figure.

### 6.3 Emotional nonverbal behaviours

Figure 8 shows the frequency of the emotional behaviours investigated in this study. It is evident that the highest frequency was negative arm movements with a mean frequency of 0,45 behaviours per minute (SD=0.22). Positive arm movements combined had a mean frequency of 0,14 behaviours per minute (SD=0.06). further, the results show that negative emotions are expressed more strongly through verbal, facial, and head movements than positive ones. It is worth noting that, two players had 65 % and 54% of their negative arm movements towards the referee (Mean 59%). The two other players had 13% and 14% of their negative arm movements towards the referee.

**Figure 8**

*Players' frequency of emotional behaviour*

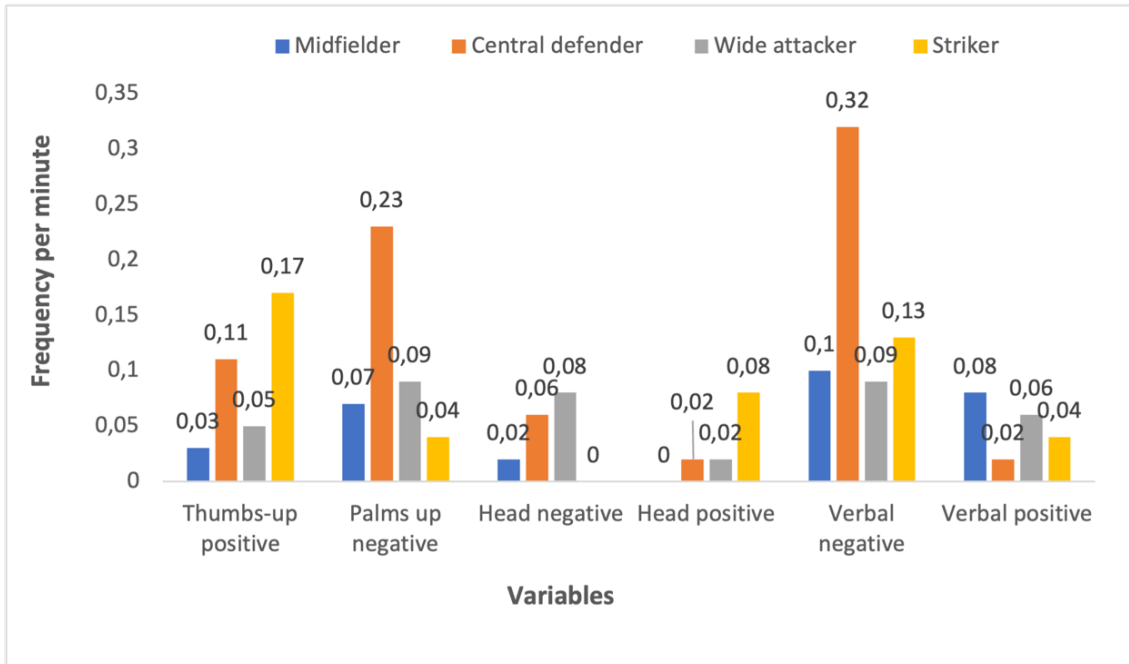


Note: Players' frequency of emotional behaviour per minute. Arm movements negative=disappointment/frustration or anger. Arm movements positive (V)=Emotional Validation. Arm movements positive (E)=Emotional Energization.

Figure 9 shows an overview over the most accompanying behaviours to emotional arm movements. Verbal negative was the most coded accompanying behaviour to emotional arm movements with a mean of 0,16 behaviours per minute (SD=0.06). Palms up negative was also frequent with a mean of 0,11 behaviours per minute (SD=0.08). Palms down positive and negative, had 6 behaviours combined. Verbal negative behaviour was coded 47 times, representing 33% of all accompanying emotional arm behaviour.

**Figure 9**

*Players' frequency of additional information and behaviour per minute*



Note: The most frequent additional behaviours to emotional arm movements. Thumbs-up negative, palms-up positive, palms-down negative and positive, and pointing positive and negative were not included in this figure.

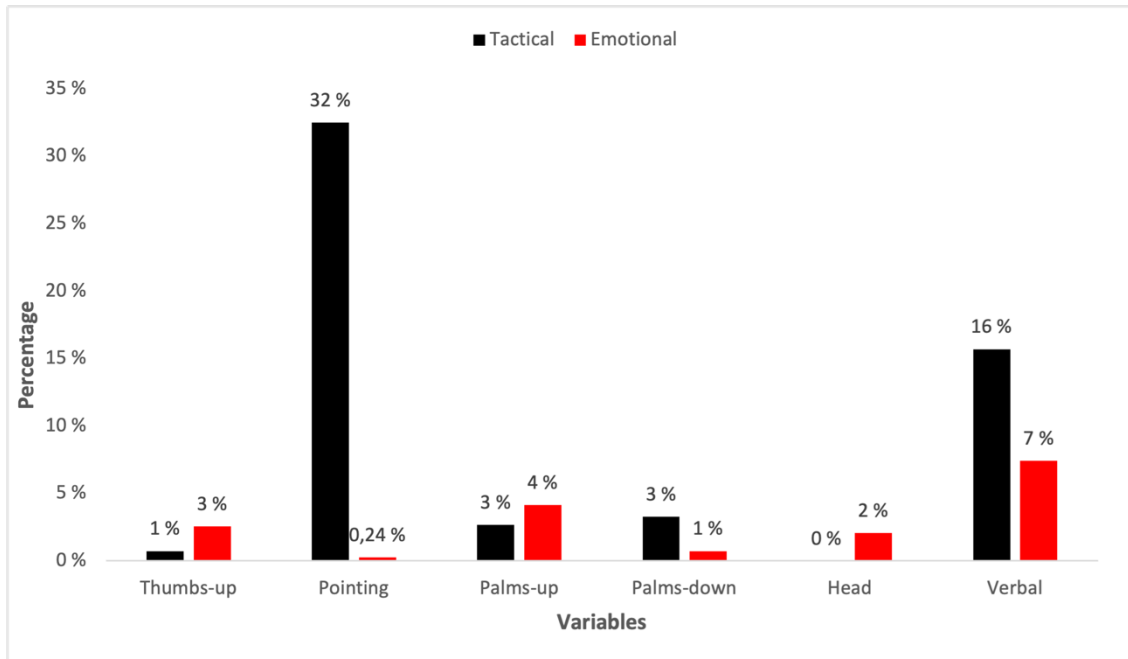
#### **6.4 Accompanying behaviours to arm movements.**

In Figure 10, you can see the percentage of arm movements that come with extra information and behaviours. It also shows whether these movements are related to emotions or tactics. Additional information (hand or finger movements) and additional behaviours (verbal and head behaviour). The tactical behaviours displayed in Figure 10 were coded in 55% of all arm movements, while the emotional behaviours were coded in 17% of all arm movements, meaning that arm movements, without any additional information, were coded in 28% of all arm movements.



**Figure 10**

*Additional information and behaviours to arm movements*



Note: Percentage of all registered accompanying behaviours to arm movements. Showing how often players display more information or accompanying behaviours when an arm movement is coded.

## 7 Discussion

This research aimed to investigate and describe the nonverbal behaviours of elite football players using close-up video. This exploratory study aims to discover behaviours not previously investigated in football. The subsequent sections will discuss the most frequent behaviours observed in the results, focusing on the tactical and emotional behaviours displayed. These behaviours will be discussed in relation to the method, theoretical framework, and possible interpretations. Some contextual information will also be discussed, these shown in table 6. Finally, this section will conclude with the study's limitations, practical applications, and recommendations for future research.

Before going into the discussion, it is important to mention a limitation that may greatly affect the results. According to Ekman (1992); Furley (2021), a universal understanding of NVB exists. However, the inter-rater reliability is a limitation in this study. The overall inter-rater reliability was 0.7, meaning that the two coders coded the same behaviour 70 % of the time. When coding tactical and emotional arm movements, the reliability was

0.79 (tactical) and 0.81 (emotional), which is considered good. However, the reliability when coding verbal, facial and head movements was 0.5, meaning that half the time, only one coded the behaviour. This needs to be considered when reading the discussion about these variables.

## **7.1 Tactical behaviour**

Tactical behaviour was the most displayed behaviour, with 67% of all behaviour observed in this study. Top professional football places high demands in terms of tactical skills (Huijgen et al., 2009; Kannekens et al., 2009). In order to maximize their performance, players may need to assist their teammates with positioning, choices with the ball, or which opposition player to mark.

Based on the findings of this study, arm movements and verbal communication were the most frequent tactical behaviour. This showed that players tend to use arm movements more frequently than verbal communication when conveying tactical messages. Coaches may need to consider this in their tactical training approach as the effectiveness of teaching verbal communication to players may not be as high if elite players mainly use arm movements to communicate. However, it's important to mention that the study only observed verbal behaviour when players were facing the camera, so the actual frequency of verbal communication may be underestimated. According to Sullivan and Jowett (2014), verbal communication is crucial in team sports. A study on football players found that the most frequent type of verbal communication was orientation communication (Blaser & Seiler, 2019). This is in line with the finding in this study that verbal communication was more frequent in relation to something tactical than emotional. Further, Blaser and Seiler (2019) found that verbal communication among team members decreased as their shared knowledge increased. This suggests that the frequency of verbal communication may vary depending on the specific teammates involved, based on their relationship and level of shared knowledge. To engage in speculation, this could mean that players with lower levels of verbal communication in this study may have a higher level of shared knowledge with their teammates than the players with higher levels of verbal communication. If this is true, it could provide the coach with information on relationships and tactical links between players. For instance, we do not know whether players with good links or relationships communicate less or more during a match.

Another interesting finding was that players' most common tactical arm movement was directing their teammates. Although there is little research on directing behaviour in football, the directing behaviour may be related to leadership. According to Williamson and Cox (2014), sports and football involve bringing together individuals with varying skills, intentions, patterns of action, and cognition at the right time and in the right manner. To ensure that a team is working effectively, the players may need assistance on where to position, where to pass the ball or which opposition player to mark. Molan et al. (2019, p. 98) concluded that in situations where people need to coordinate within a team, they might use more directive leadership. Perhaps the player with the highest frequency of directing behaviour in this study (central defender), may have been given the responsibility or role of leading and directing his teammates. Moreover, since players possess varying ratings in diverse directing behaviour subcategories, it implies that certain players may be better suited for directing during specific phases of the game. For example, the midfielder who directed their teammates the most frequently while the team had the ball (act with ball), may have a better understanding of the game during the attacking phase. Having different leaders in a team is in line with Fransen et al. (2014), concluding that leadership is spread throughout the team with informal leaders.

The most common type of direction given was related to defensive positioning and marking, suggesting that defensive directing may be important for performance. A previous study by LeCouteur and Feo (2011) supports this as they found that when players followed positional directions, their team had better defensive performance and allowed fewer shots on goal. One possible explanation for the prevalence of defensive directing in football is that teams expend significant energy trying to prevent the opposing team from gaining advantageous positions and scoring a goal. A Further explanation is related to ball possession. It is likely, that the team with a low level of ball possession are defending more and therefore having higher levels of defensive directing. However, the mean ball possession during these two games was calculated to be 50%, suggesting that ball possession may not be the reason for higher levels of defensive directing behaviour in this study. Instead, as suggested by Eccles (2016), when a team plan ahead of a game, creates a starting line-up, and chooses the formation and tactics, the players know what is required of them. The defensive phase of football may be more consistent and predictable than, perhaps the attacking phase, which requires more creativity, players may

therefore communicate more in the defensive phase as they know the requirements of the team better than in the attacking phase.

The last tactical behaviours that will be discussed are the most frequent additional behaviours to tactical arm movements, these were pointing and verbal communication. According to Hall et al. (2019, p. 272), verbal and nonverbal communication often has to be considered together to understand the meaning. In 16% of a displayed tactical arm movement, it was accompanied by verbal communication. It is possible that players use verbal communication along with arm movements to provide more specific information. Studies have revealed that players often use short verbal directives and repeat them (LeCouteur & Feo, 2011). This frequent use of additional verbal behaviour could suggest that players aim to be as precise as possible, particularly when there is a lot at stake. For instance, a player may point out which opponent their teammate needs to mark and simultaneously call out "number 8" to provide additional information that cannot be misunderstood. Further, pointing was the most common way of providing additional information along with arm movements. Pointing may also help avoid misunderstandings as it directs attention to a particular object or location (Hare, 2001). Pointing was accompanying arm movements in 31 % of all coding situations suggesting that players are trying to be specific in their communication. An alternative explanation for using more specific cues when displaying a behaviour may be to get attention from teammates or the referee. It's pointless to show a teammate where to position if they're not paying attention.

## **7.2 Emotional behaviour**

Emotional behaviour accounted for only 26.7% of all behaviours observed. This could be due to players being skilled at controlling their emotions to avoid affecting their teammates. This is backed up by a previous study by Tamminen and Crocker (2013) which found that curling players regulate their emotions for the benefit of the team. It was surprising to find that 70% of all emotional arm movements exhibited by all players were negative. This could be due to the coder detecting more negative emotions than positive ones (Fritsch et al., 2022). Studies have found that people tend to focus more on negative stimuli as they contain more valuable information than positive stimuli (Fiske, 1980; Peeters & Czapinski, 1990). It may be easier to notice negative emotions than positive

ones, which could be why they occur more frequently in this study. Another explanation may be that the players were not satisfied with the result. According to a study by Furley et al. (2023), NVB ratings tend to be more negative when players are losing. The players involved in the study may be experiencing feelings of disappointment due to their performance and the results of the game. Experts suggest that this may hold true as the opponents' teams were expected to be defeated. To further investigate this, it was found that the two players playing the important game had a mean of 59 % (SD=0.07) negative arm movements towards the referee. In football, the referee is an authority that can affect a match's outcome (Erikstad & Johansen, 2020). This result can be explained by using BET, stating that anger could be a solution to threatening situations. As the referee has the power to affect the outcome, the players may perceive him as a threat to the chances of winning the game. One can speculate that referees, opponents or even teammates could cause anger if they are perceived as threatening the chances of a team's success. Another way to look at this result is from a BECV. BECV suggest that gestures and facial expressions are strongly influenced by the audience's presence and location. Coaches, teammates, and supporters might expect a good performance when playing important games. Players may have higher frequencies of negative emotions to show their fellow team members and supporters the importance of the event. This result is supported by Leitner and Richlan (2021), finding lower levels of emotional situations, including "word fights" and discussions with opponents and referees in the absence of supporters. Additionally, this study found a lower mean of 14% negative arm movements towards the referee in the friendly game with a lower attendance in the stadium.

An important note is that we did not distinguish between frustration, disappointment, or anger. Although the results revealed higher frequencies of negative emotions in this study, we cannot say which emotion was more frequent (frustration, disappointment, or anger). Research has found that displays of disappointment resulted in guilt by the decoder, while displays of anger resulted in anger by the decoder (Johnson & Connelly, 2014; Lelieveld et al., 2012). This indicates that these two emotions may evoke different reactions from the decoder. In line with BECV, stating that emotions are used socially to show intentions (Keltner et al., 2019). Perhaps displaying disappointment towards the referee or a teammate may be used to show provoke a desired outcome. When a player doesn't receive a free kick or penalty from the referee, they may attempt to influence the referee's

emotions. Expressing disappointment could lead the referee to feel guilty and decide in favour of the player. Future research should differentiate between these emotions to determine which players utilize the most.

There were generally higher levels of negative accompanying behaviour to arm movements. As negative arm movements were the most frequent this is probably the reason. Apart from verbal communication (which already have been discussed), palms-up and head movements were the most frequent accompanying behaviours to emotional arm movements. A study by Chu et al. (2014) investigating hand gestures, found that palms-up were the most frequent hand gesture. Our findings suggest that palms-up also is most frequently used in elite football. In our study palms-up were used when asking for the ball tactically and when displaying negative arm movements. However, it is hypothesized that palms-up is not used aggressively but more disappointingly. This should be further investigated in future research. Next, we found that 88% of head movements were negative, which is in line with previous research that suggests losing athletes tend to display more head movements than winning athletes (Drewes et al., 2020). Head movements, in general, may be difficult to detect and hard to define. This needs to be further researched in a football context.

### **7.3 Method**

Our coding window resulted in 220 tactical and emotional non-arm movements (20%) of all behaviour observed in this study, and 603 additional information and behaviours, used in 73% of all arm movements. These numbers suggest that players express themselves in various ways in a football match, not just through arm movements. Previous studies have shown that when several nonverbal cues are considered together and have the same meaning, participants are more likely to guess the correct outcome (Aviezer et al., 2012; Fritsch et al., 2022; Furley & Schweizer, 2014a). This supports that close-up video is a better way of investigating NVB than a tactical view. Close-up video generally captures a wide range of behaviours, including large arm movements and smaller finger movements or facial expressions.

However, some behaviours were not observed often or at all. There could be several reasons for this, for example, none of the players showed tactical head movements, indicating that communicating tactical messages may not require using the head. Secondly, pointing behaviour was consistently associated with tactical messages except for two instances, indicating that it is primarily used for communicating tactical information rather than emotional expressions. Also, none of the players exhibited palms up positive behaviour, which suggests that this behaviour is an indicator of negative emotions. Further, thumbs-up gestures were most associated with positive emotional responses. Lastly, the facial expression category had the lowest frequency of all variables, occurring only 0.09 times per minute. This may be because facial expressions are small movements that can be difficult to detect for a coder (Harrigan et al., 2008). There is another possible explanation that facial expressions may not always effectively convey emotions during football games. For instance, a player's smile towards their teammate who made a good effort may be better understood through a thumbs-up gesture. Additionally, since this study only utilized one camera on each player, it is possible that some facial expressions were not captured. This holds true especially as the player was not facing the camera the whole game. The results on some of these behaviours suggest that certain additional behaviours should be associated with either tactical or emotional behaviour, while others should be linked to both.

In order to better understand why certain behaviours, occur less frequently in football, it is necessary to conduct further investigation. It would be intriguing to explore these behaviours in various countries and regions worldwide, to determine if they are utilized differently or are consistent across all football players worldwide.

#### **7.4 Strengths and limitations**

This study is a non-participating observational study where international players were filmed during a friendly and important competitive match. The design used descriptive coding, which is favourable when investigating NVB (Furley, 2021). This study observed players in a real-world setting, meaning that researchers did not manipulate or teach their nonverbal behaviours. Using a close-up video angle allowed for detecting several nonverbal behaviours and made it easier to identify displayed behaviours. However, there

were some challenges with this approach. Research suggests that detecting arm movements is easier than facial expressions when coding body movement, as they have a larger and more noticeable range of motion (Harrigan et al., 2008). This may explain why this study has high levels of arm movements.

Further, it wasn't easy to distinguish between different coding situations in some cases. For example, if a player raised both arms after the team missed a big chance, it could be interpreted as disappointment for not scoring or as an attempt to influence the referee to give a corner. To address these situations, additional variables were predicted to make it easier to provide a better understanding of what triggered the nonverbal behaviour. However, research also argues that multiple nonverbal cues compared to a single one can differentiate the truth (Matsumoto & Hwang, 2021). This means that different signals may convey different messages. For example, a player might give a thumbs-up but display a negative facial expression, indicating anger towards their teammate while trying to be supportive. Additionally, Furley and Schweizer (2020) have found that people can fake certain nonverbal expressions, indicating that these expressions may not always provide reliable insight into a person's true internal state. According to these sources, our data might not give the completely correct picture of what the players express in a football match. One concrete variable that was difficult to assign meaning to was verbal behaviour, as the coder couldn't hear or confirm if it were verbal behaviour.

Descriptive coding is the most time-consuming method in coding NVB (Furley, 2021). Although this study only has four player analyses, the training process and developing new variables were challenging and time-consuming. Several meetings and discussions with fellow students were done frequently over the year. It took several hours to code one match, and certain individual scenarios were reviewed multiple times. When using descriptive coding, we may be limited by the fact that previous judgments, such as stereotypes or prejudice can influence our assessment of someone else's behaviour (Bente et al., 2008, p. 270). Already knowing information about the players could have influenced the coding process. Lastly, a football match may contain complex social interactions and unpredictable behaviours, which makes it impossible to consider every possible outcome.



### **7.4.1 Participants**

The data for this project is limited to four players who were filmed and analysed. However, there have been collected high numbers of data on each participant. Additionally, filming players close-up during a game is very time-consuming and stressful event. Due to having lower participant levels, it is impossible to generalise the findings to male football players. This means that the study's external validity is low (Laake et al., 2008). Additionally, the players were only observed in one match, so their NVB may not represent their behaviour in every match. Lastly, the study did not consider other factors, such as tactics and gameplan, which could also impact a player's NVB. It is important to consider that different coaches, teammates, and tactical systems and the referee may affect a player's NVB.

### **7.4.2 Video Footage**

This study's video footage included close-up and a tactical view. The close-up video was a major strength of the study, as it allowed for a detailed analysis of a player's behaviour during an entire football match. This increased the chances of detecting every behaviour and accurately selecting the correct ones. The close-up video also enabled the observation of details in the player's non-verbal behaviour and the investigation of their personal characteristics and trends of a player. However, close-up shots may present limitations, such as difficulty capturing sudden changes in direction, and only one camera per player may limit the variables that can be observed. For instance, if a player is not facing the camera and displaying a facial expression or giving a tactical message, it cannot be captured and coded, thus resulting in some missed behaviours.

### **7.4.3 Inclusion exclusion criteria**

This research uses variables and coding-window as prior researchers investigating NVB in football (Jenssen, 2022; Kleppe, 2022; Knai, 2022). These researchers choose to limit NVB to arm movements, whereas normal arm movements displayed due to jumping or running were excluded. In our study, we enhanced the collection of behaviour data by incorporating different body movements such as facial expressions, head movements, and verbal communication. We were able to code these movements due to the close-up footage. Additionally, we included more specific behaviours such as thumbs up, pointing, and showing numbers related to tactical and emotional behaviour. The variables chosen

were based on behaviours detected and discussed during the training period of close-up footage. The training footage used was from the men's world cup. These variables are believed to give an additional perspective on players' behaviours during a match.

Descriptive coding based on contextual factors relies on the subjective evaluation of the different coders. NVB is not ruled-based or follows explicit grammar and cannot be looked up in a dictionary (Bente et al., 2008, p. 269), meaning it can be difficult to convey certain meanings to different NVB. To strengthen this understanding discussions and getting consensus were a frequent part of the process in this project. Further, both coders have several years of playing, coaching, and watching football, strengthening the understanding of NVB in the context. This is supported by research as Fritsch et al. (2022) found that expert athletes have better recognition rates on NVB than non-athletes.

## **7.5 Implication for coaching practice**

This study provides insight into the behaviours exhibited by elite football players during a match. Coaches can use this information to identify commonly used behaviours, assess tactical communication among players, and understand emotional expressions. Coaches can use the information on when a player decreases his normal NVB or when the rates are moving towards a destructive manner and substitute the player before his performance decreases. As found in this study, players have different ratings in different emotional and tactical categories. A coach might substitute a player for a specific occasion. For example, if a team is in a low block and protecting a lead with few minutes left, a coach can substitute a player that is especially good at directing his teammates or substitute a player with high rates of positive emotional behaviours to encourage the teammates to fight in the last minutes. Further, a coach might use NVB information about a player when recruiting players to the team. If a team loses a player specifically important in offensive directing (Act with ball), his replacement might preferably have similar NVB ratings. Lastly, a coach could use the NVB ratings and communication patterns to investigate links between players or identify potential mismatches between players in his team. High levels of negative behaviour towards a teammate might indicate that there is something wrong.

## **7.6 Future research**

Future research should continue using and developing methods to investigate football players' nonverbal behaviours during football matches. This study was a brief overview of four players. Future research should investigate players in different environments, perhaps differences from their national and club teams. When collecting this information, researchers should use additional cameras to get a more accurate picture of the frequency of behaviours displayed. Further, the variables used in this study should be operationalized further to get the best possible fitting behaviour. For instance, negative emotions may perhaps include other emotions such as fear and sadness. Another improvement could be to interview players after the game to question their intentions with specific behaviours that they display. This should increase the likelihood that the researchers and coding window capture the correct meaning behind the behaviour. Future research should include player location and more context when displaying the behaviour. For example, investigate NVB in different phases of the game, and where on the field. This could give information about what behaviours are most used in attack and defence. This study did not code behaviours in long injury breaks and after a goal. Future research should include this to detect what kind of behaviours happen during these moments of the game. Finally, in relation to emotional behaviour, it would be interesting to know whether the emotional behaviour resulted in the desired outcome. For example, if a player tries to influence the referee and never gets the desired outcome, his behaviour might shift.

## **8 Conclusion**

Nonverbal behaviour in sports and football is still slowly emerging (Furley, 2021). Previous studies have provided evidence that people could recognize NVB in elite athletes (Aviezer et al., 2012; Furley & Schweizer, 2014a), athletes are more confident in beating trailing athletes (Furley & Schweizer, 2014b), successful teams exhibit higher levels of tactical and emotional NVB (Durdubas et al., 2021), dominant athletes are perceived to perform better (Seiler et al., 2018). While Lausic et al. (2009); LeCouteur and Feo (2011) found results indicating the importance of effective communication.

The studies conducted have helped enhance our understanding of NVB in sports and football. However, none of these studies has investigated NVB a football player displays during a real-match setting.

This study aimed to investigate and describe the nonverbal behaviours displayed by elite football players during a match using close-up video. This study found that players exhibit a lot of tactical behaviours, and that tactical and emotional behaviours are mainly expressed through arm movements. The emotional behaviours investigated were mostly negative. This study also found that players display tactical and emotional behaviours through various nonverbal behaviours, including facial expressions, head movements, finger movements, hand movements and verbal communication. The thesis presents some possible explanations for the varying types of nonverbal behaviours observed in the results. However, further research is necessary to fully understand how players display nonverbal behaviour during gameplay.

## References

- Albek, N. (2023, June 6). *Former Manchester United Man Makes Harry Kane Transfer Claim*. <https://mybettingsites.co.uk/news/former-manchester-united-man-makes-harry-kane-transfer-claim/>
- Ambady, N., & Rosenthal, R. (1998). Nonverbal communication. *Encyclopedia of mental health*, 2, 775-782.
- Atiq, A. (2022). Leadership, Teamwork, and Motivation of Football Player. *International Journal of Social Science And Human Research*, 05. <https://doi.org/10.47191/ijsshr/v5-i6-91>
- Aviezer, H., Trope, Y., & Todorov, A. (2012). Body cues, not facial expressions, discriminate between intense positive and negative emotions. *Science*, 338(6111), 1225-1229. <https://doi.org/10.1126/science.1224313>
- Bass, B. M., & Riggio, R. E. (2005). *Transformational leadership* (Vol. 2). Psychology Press.
- Bente, G., Senokozlieva, M., Pennig, S., Al-Issa, A., & Fischer, O. (2008). Deciphering the secret code: A new methodology for the cross-cultural analysis of nonverbal behavior. *Behavior Research Methods*, 40(1), 269-277. <https://doi.org/https://doi.org/10.3758/BRM.40.1.269>
- Bijlstra, G., Furley, P., & Nieuwenhuys, A. (2020). The power of nonverbal behavior: Penalty-takers' body language influences impression formation and anticipation performance in goalkeepers in a simulated soccer penalty task. *Psychology of Sport and Exercise*, 46, 101612. <https://doi.org/https://doi.org/10.1016/j.psychsport.2019.101612>
- Blaser, M. A., & Seiler, R. (2019). Shared Knowledge and Verbal Communication in Football: Changes in Team Cognition Through Collective Training [Original Research]. *Frontiers in psychology*, 10. <https://doi.org/10.3389/fpsyg.2019.00077>
- Brimmell, J., Parker, J., Furley, P., & Moore, L. (2018). Nonverbal behavior accompanying challenge and threat states under pressure. *Psychology of Sport and Exercise*, 39. <https://doi.org/10.1016/j.psychsport.2018.08.003>
- Buenemann, S., & Schweizer, G. (2021). The reciprocal relationship between nonverbal behavior and sports performance in a cross-lagged panel model. *Psychology of Sport and Exercise*, 55, 101956. <https://doi.org/https://doi.org/10.1016/j.psychsport.2021.101956>
- Burgoon, J. K., Manusov, V., & Guerrero, L. K. (2021). *Nonverbal communication*. Routledge. <https://doi.org/https://doi.org/10.4324/9781315663425>
- Cho, Y., Shin, M., Billing, T. K., & Bhagat, R. S. (2019). Transformational leadership, transactional leadership, and affective organizational commitment: a closer look at their relationships in two distinct national contexts. *Asian Business & Management*, 18, 187-210. <https://doi.org/https://doi.org/10.1057/s41291-019-00059-1>
- Chu, M., Meyer, A., Foulkes, L., & Kita, S. (2014). Individual differences in frequency and saliency of speech-accompanying gestures: The role of cognitive abilities and empathy. *Journal of Experimental Psychology: General*, 143(2), 694. <https://doi.org/10.1037/a0033861>
- Crivelli, C., Carrera, P., & Fernández-Dols, J.-M. (2015). Are smiles a sign of happiness? Spontaneous expressions of judo winners. *Evolution and Human*

- Behavior*, 36(1), 52-58.  
<https://doi.org/https://doi.org/10.1016/j.evolhumbehav.2014.08.009>
- Crivelli, C., & Fridlund, A. J. (2018). Facial Displays Are Tools for Social Influence. *Trends in Cognitive Sciences*, 22(5), 388-399.  
<https://doi.org/https://doi.org/10.1016/j.tics.2018.02.006>
- Crivelli, C., & Fridlund, A. J. (2019). Inside-Out: From Basic Emotions Theory to the Behavioral Ecology View. *Journal of nonverbal behavior*, 43(2), 161-194.  
<https://doi.org/10.1007/s10919-019-00294-2>
- Crozier, A. J., Loughead, T. M., & Munroe-Chandler, K. J. (2013). Examining the benefits of athlete leaders in sport. *Journal of Sport Behavior*, 36(4), 346-364.
- de Morree, H. M., & Marcora, S. M. (2012). Frowning muscle activity and perception of effort during constant-workload cycling. *European journal of applied physiology*, 112, 1967-1972. <https://doi.org/10.1007/s00421-011-2138-2>
- Derman, A., Dubinko, O., & Bazyleva, I. (2016). Body language.
- Drewes, V., Neumann, N., Konstantinidis, I., & Helmich, I. (2020). Spontaneous head movements characterize losing athletes during competition. *International Journal of Sports Science & Coaching*, 15(5-6), 669-676.  
<https://doi.org/10.1177/1747954120934598>
- Duarte, R., Araújo, D., Correia, V., & Davids, K. (2012). Sports Teams as Superorganisms. *Sports Medicine*, 42(8), 633-642.  
<https://doi.org/10.1007/BF03262285>
- Durdubas, D., Martin, L. J., & Koruc, Z. (2021). An examination of nonverbal behaviours in successful and unsuccessful professional volleyball teams. *International Journal of Sport and Exercise Psychology*, 19(1), 120-133.  
<https://doi.org/https://doi.org/10.1080/1612197X.2019.1623284>
- Eccles, D. W. (2016). Team coordination. In. Routledge.
- Eccles, D. W., & Tenenbaum, G. (2004). Why an Expert Team Is More than a Team of Experts: A Social-Cognitive Conceptualization of Team Coordination and Communication in Sport. *Journal of Sport and Exercise Psychology*, 26(4), 542-560. <https://doi.org/10.1123/jsep.26.4.542>
- Ekman, P. (1992). An argument for basic emotions. *Cognition & emotion*, 6(3-4), 169-200. <https://doi.org/https://doi.org/10.1080/02699939208411068>
- Ekman, P. (1993). Facial expression and emotion. *American psychologist*, 48(4), 384.  
<https://doi.org/10.1037//0003-066x.48.4.384>
- Ekman, P. (1999). Basic emotions. In *Handbook of cognition and emotion* (Vol. 98, pp. 16).
- Ekman, P., & Cordaro, D. (2011). What is Meant by Calling Emotions Basic. *Emotion Review*, 3(4), 364-370. <https://doi.org/10.1177/1754073911410740>
- Ekman, P., & Friesen, W. V. (1986). A new pan-cultural facial expression of emotion. *Motivation and emotion*, 10(2), 159-168.  
<https://doi.org/https://doi.org/10.1007/BF00992253>
- Erikstad, M. K., & Johansen, B. T. (2020). Referee Bias in Professional Football: Favoritism Toward Successful Teams in Potential Penalty Situations [Brief Research Report]. *Frontiers in Sports and Active Living*, 2.  
<https://doi.org/10.3389/fspor.2020.00019>
- Fernández-Dols, J.-M., & Ruiz-Belda, M.-A. (1995). Are smiles a sign of happiness? Gold medal winners at the Olympic Games. *Journal of personality and social psychology*, 69(6), 1113. <https://doi.org/10.1037/0022-3514.69.6.1113>

- Fiske, S. T. (1980). Attention and weight in person perception: The impact of negative and extreme behavior. *Journal of personality and social psychology*, 38(6), 889. <https://doi.org/10.1037/0022-3514.38.6.889>
- Fransen, K., McEwan, D., & Sarkar, M. (2020). The impact of identity leadership on team functioning and well-being in team sport: Is psychological safety the missing link? *Psychology of Sport and Exercise*, 51, 101763. <https://doi.org/https://doi.org/10.1016/j.psychsport.2020.101763>
- Fransen, K., Vanbeselaere, N., De Cuyper, B., Vande Broek, G., & Boen, F. (2014). The myth of the team captain as principal leader: Extending the athlete leadership classification within sport teams. *Journal of Sports Sciences*, 32(14), 1389-1397. <https://doi.org/10.1080/02640414.2014.891291>
- Fridlund, A. J. (1991). Sociality of solitary smiling: potentiation by an implicit audience. *Journal of personality and social psychology*, 60(2), 229. <https://doi.org/10.1037/0022-3514.60.2.229>
- Frijda, N. H. (1988). *The Laws of Emotion*.
- Fritsch, J., Preine, L., & Jekauc, D. (2022). The examination of factors influencing the recognition of affective states associated with tennis players' non-verbal behaviour. *Psychology of Sport and Exercise*, 61, 102206. <https://doi.org/https://doi.org/10.1016/j.psychsport.2022.102206>
- Furl, N., Gallagher, S., & Averbeck, B. B. (2012). A selective emotional decision-making bias elicited by facial expressions. *PLoS One*, 7(3), e33461. <https://doi.org/https://doi.org/10.1371/journal.pone.0033461>
- Furley, P. (2021). The nature and culture of nonverbal behavior in sports: theory, methodology, and a review of the literature. *International Review of Sport and Exercise Psychology*, 1-26. <https://doi.org/10.1080/1750984X.2021.1894594>
- Furley, P., Dicks, M., & Memmert, D. (2012). Nonverbal Behavior in Soccer: The Influence of Dominant and Submissive Body Language on the Impression Formation and Expectancy of Success of Soccer Players. *Journal of sport & exercise psychology*, 34, 61-82. <https://doi.org/10.1123/jsep.34.1.61>
- Furley, P., Moll, T., & Memmert, D. (2015). "Put your Hands up in the Air"? The interpersonal effects of pride and shame expressions on opponents and teammates. *Frontiers in psychology*, 6, 1361. <https://doi.org/10.3389/fpsyg.2015.01361>
- Furley, P., Riedl, N., & Lobinger, B. (2023). Non-verbal behaviour of professional soccer players performing in the absence or presence of fans. *European Journal of Social Psychology*. <https://doi.org/https://doi.org/10.1002/ejsp.2964>
- Furley, P., & Schweizer, G. (2014a). The Expression of Victory and Loss: Estimating Who's Leading or Trailing from Nonverbal Cues in Sports. *Journal of nonverbal behavior*, 38(1), 13-29. <https://doi.org/10.1007/s10919-013-0168-7>
- Furley, P., & Schweizer, G. (2014b). "I'm pretty sure that we will win!": The influence of score-related nonverbal behavioral changes on the confidence in winning a basketball game. *Journal of Sport and Exercise Psychology*, 36(3), 315-319. <https://doi.org/10.1123/jsep.2013-0199>
- Furley, P., & Schweizer, G. (2017). Nonverbal Communication of Confidence in Soccer Referees: An Experimental Test of Darwin's Leakage Hypothesis. *Journal of Sport & Exercise Psychology*, 38. <https://doi.org/10.1123/jsep.2016-0192>
- Furley, P., & Schweizer, G. (2020). Body language in sport. In G. E. Tenenbaum, Robert (Ed.), *Handbook of sport psychology* (pp. 1201-1219). <https://doi.org/https://doi.org/10.1002/9781119568124.ch59>

- Gisev, N., Bell, J. S., & Chen, T. F. (2013). Interrater agreement and interrater reliability: Key concepts, approaches, and applications. *Research in Social and Administrative Pharmacy*, 9(3), 330-338. <https://doi.org/https://doi.org/10.1016/j.sapharm.2012.04.004>
- Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological inquiry*, 26(1), 1-26. <https://doi.org/https://doi.org/10.1080/1047840X.2014.940781>
- Gu, S., Wang, F., Patel, N. P., Bourgeois, J. A., & Huang, J. H. (2019). A Model for Basic Emotions Using Observations of Behavior in Drosophila. *Front Psychol*, 10, 781. <https://doi.org/10.3389/fpsyg.2019.00781>
- Hall, J. A., Horgan, T. G., & Murphy, N. A. (2019). Nonverbal Communication. *Annual Review of Psychology*, 70(1), 271-294. <https://doi.org/10.1146/annurev-psych-010418-103145>
- Hallgren, K. A. (2012). Computing Inter-Rater Reliability for Observational Data: An Overview and Tutorial. *Tutor Quant Methods Psychol*, 8(1), 23-34. <https://doi.org/10.20982/tqmp.08.1.p023>
- Hare, B. (2001). Can competitive paradigms increase the validity of experiments on primate social cognition? *Animal Cognition*, 4, 269-280. <https://doi.org/10.1007/s100710100084>
- Harrigan, J., Rosenthal, R., & Scherer, K. (2008). *New handbook of methods in nonverbal behavior research*. Oxford University Press.
- Hertenstein, M. J., Verkamp, J. M., Kerestes, A. M., & Holmes, R. M. (2006). The communicative functions of touch in humans, nonhuman primates, and rats: a review and synthesis of the empirical research. *Genetic, social, and general psychology monographs*, 132(1), 5-94. <https://doi.org/10.3200/mono.132.1.5-94>
- Hetland, A., Vittersø, J., Oscar Bø Wie, S., Kjelstrup, E., Mittner, M., & Dahl, T. I. (2018). Skiing and thinking about it: Moment-to-moment and retrospective analysis of emotions in an extreme sport. *Frontiers in psychology*, 9, 971. <https://doi.org/10.3389/fpsyg.2018.00971>
- Hogan, R., & Kaiser, R. B. (2005). What we know about leadership. *Review of General Psychology*, 9(2), 169-180. <https://doi.org/https://doi.org/10.1037/1089-2680.9.2.169>
- Huijgen, B. C., Elferink-Gemser, M. T., Post, W. J., & Visscher, C. (2009). Soccer skill development in professionals. *International journal of sports medicine*, 30(08), 585-591. <https://doi.org/10.1055/s-0029-1202354>
- Jamshed, S., & Majeed, N. (2019). Relationship between team culture and team performance through lens of knowledge sharing and team emotional intelligence. *Journal of knowledge management*, 23(1), 90-109. <https://doi.org/10.1108/JKM-04-2018-0265>
- Jenssen, T. (2022). *Nonverbal behaviour (NVB) in the Premier League: An observational study on football players' tactical and emotional gestures during a football match*
- Johnson, G., & Connelly, S. (2014). Negative emotions in informal feedback: The benefits of disappointment and drawbacks of anger. *Human Relations*, 67(10), 1265-1290. <https://doi.org/https://doi.org/10.1177/0018726714532856>
- Kannekens, R., Elferink-Gemser, M. T., & Visscher, C. (2009). Tactical skills of world-class youth soccer teams. *Journal of Sports Sciences*, 27(8), 807-812. <https://doi.org/10.1080/02640410902894339>



- Keltner, D., Sauter, D., Tracy, J., & Cowen, A. (2019). Emotional Expression: Advances in Basic Emotion Theory. *Journal of nonverbal behavior*, 43(2), 133-160. <https://doi.org/10.1007/s10919-019-00293-3>
- Kleppe, M. (2022). *FA Women's Super League players nonverbal behaviors in match: A descriptive analysis of 173 women football players in the 2021/22 season*
- Knai, M. J. (2022). *Sammenligning av ikke-verbal atferd mellom kvinner og menn i elitefotball: En kvantitativ komparativ studie av ikke-verbal atferd i kamp hos spillere i Premier League og FA Woman's Super League*
- Knapp, M. L., & Hall, J. A. (2006). *Nonverbal communication in human interaction* (6 ed.). Wadsworth/Thomson Learning.
- Kraut, R. E., & Johnston, R. E. (1979). Social and emotional messages of smiling: an ethological approach. *Journal of personality and social psychology*, 37(9), 1539. <https://doi.org/10.1037/0022-3514.37.9.1539>
- Lames, M., Hermann, S., Prüßner, R., & Meth, H. (2021). Football Match Dynamics Explored by Recurrence Analysis. *Front Psychol*, 12, 747058. <https://doi.org/10.3389/fpsyg.2021.747058>
- Lausic, D., Tennebaum, G., Eccles, D., Jeong, A., & Johnson, T. (2009). Intrateam communication and performance in doubles tennis. *Res Q Exerc Sport*, 80(2), 281-290. <https://doi.org/10.1080/02701367.2009.10599563>
- Lazarus, R. S. (1991). *Emotion and adaptation*. Oxford University Press.
- LeCouteur, A., & Feo, R. (2011). Real-time communication during play: Analysis of team-mates' talk and interaction. *Psychology of Sport and Exercise*, 12(2), 124-134. <https://doi.org/https://doi.org/10.1016/j.psychsport.2010.07.003>
- Leitner, M. C., & Richlan, F. (2021). No Fans-No Pressure: Referees in Professional Football During the COVID-19 Pandemic. *Front Sports Act Living*, 3, 720488. <https://doi.org/10.3389/fspor.2021.720488>
- Lelieveld, G.-J., Van Dijk, E., Van Beest, I., & Van Kleef, G. A. (2012). Why anger and disappointment affect other's bargaining behavior differently: The moderating role of power and the mediating role of reciprocal and complementary emotions. *Personality and Social Psychology Bulletin*, 38(9), 1209-1221. <https://doi.org/10.1177/0146167212446938>
- Lepschy, H., Wäsche, H., & Woll, A. (2018). How to be successful in football: a systematic review. *The open sports sciences journal*, 11(1). <https://doi.org/10.2174/1875399X01811010003>
- Loughead, T. M., & Hardy, J. (2005). An examination of coach and peer leader behaviors in sport. *Psychology of Sport and Exercise*, 6(3), 303-312. <https://doi.org/https://doi.org/10.1016/j.psychsport.2004.02.001>
- Loughead, T. M., Hardy, J., & Eys, M. A. (2006). The nature of athlete leadership. *Journal of Sport Behavior*, 29(2).
- Luhmann, N. (1981). The improbability of communication. *International Social Science Journal*, 33(1), 122-132.
- Laake, P., Olsen, B. R., & Benestad, H. B. (2008). *Forskning i medisin og biofag* (2. utg. ed.). Gyldendal akademisk.
- Matsumoto, D., Frank, M. G., & Hwang, H. S. (2012). *Nonverbal communication: Science and applications*. Sage Publications.
- Matsumoto, D., & Hwang, H. C. (2021). Clusters of nonverbal behavior differentiate truths and lies about future malicious intent in checkpoint screening interviews. *Psychiatr Psychol Law*, 28(4), 463-478. <https://doi.org/10.1080/13218719.2020.1794999>

- McLaren, C. D., & Spink, K. S. (2018). Examining communication as information exchange as a predictor of task cohesion in sport teams. *International journal of sport communication*, 11(2), 149-162.  
<https://doi.org/https://doi.org/10.1123/ijsc.2018-0004>
- McLean, S., Salmon, P. M., Gorman, A. D., Read, G. J., & Solomon, C. (2017). What's in a game? A systems approach to enhancing performance analysis in football. *PLoS One*, 12(2), e0172565.  
<https://doi.org/https://doi.org/10.1371/journal.pone.0172565>
- Moesch, K., Kenttä, G., Bäckström, M., & Mattsson, C. M. (2018). Nonverbal post-shot celebrations and their relationship with performance in elite handball. *International Journal of Sport and Exercise Psychology*, 16(3), 235-249.  
<https://doi.org/https://doi.org/10.1080/1612197X.2016.1216148>
- Molan, C., Kelly, S., Arnold, R., & Matthews, J. (2019). Performance management: A systematic review of processes in elite sport and other performance domains. *Journal of Applied Sport Psychology*, 31(1), 87-104.  
<https://doi.org/https://doi.org/10.1080/10413200.2018.1440659>
- Newcombe, M. J., & Ashkanasy, N. M. (2002). The role of affect and affective congruence in perceptions of leaders: An experimental study. *The leadership quarterly*, 13(5), 601-614. [https://doi.org/https://doi.org/10.1016/S1048-9843\(02\)00146-7](https://doi.org/https://doi.org/10.1016/S1048-9843(02)00146-7)
- Parkinson, B. (2005). Do facial movements express emotions or communicate motives? *Personality and social psychology review*, 9(4), 278-311.  
[https://doi.org/https://doi.org/10.1207/s15327957pspr0904\\_1](https://doi.org/https://doi.org/10.1207/s15327957pspr0904_1)
- Passos, P., Araújo, D., & Davids, K. (2013). Self-Organization Processes in Field-Invasion Team Sports. *Sports Medicine*, 43(1), 1-7.  
<https://doi.org/10.1007/s40279-012-0001-1>
- Passos, P., Davids, K., Araújo, D., Paz, N., Minguéns, J., & Mendes, J. (2011). Networks as a novel tool for studying team ball sports as complex social systems. *J Sci Med Sport*, 14(2), 170-176.  
<https://doi.org/10.1016/j.jsams.2010.10.459>
- Peeters, G., & Czapinski, J. (1990). Positive-negative asymmetry in evaluations: The distinction between affective and informational negativity effects. *European review of social psychology*, 1(1), 33-60.  
<https://doi.org/https://doi.org/10.1080/14792779108401856>
- Schmitt, A., Atzwanger, K., Grammer, K., & Schäfer, K. (1997). *New aspects of human ethology*. Springer.
- Scholtes, V. A., Terwee, C. B., & Poolman, R. W. (2011). What makes a measurement instrument valid and reliable? *Injury*, 42(3), 236-240.  
<https://doi.org/10.1016/j.injury.2010.11.042>
- Seiler, K., Schweizer, G., & Seiler, R. (2018). Do the effects of nonverbal behaviour on team outcome confidence in team sports depend on the availability of additional performance information? *Psychology of Sport and Exercise*, 36, 29-40.  
<https://doi.org/https://doi.org/10.1016/j.psychsport.2017.12.007>
- Shariff, A. F., & Tracy, J. L. (2011). What are emotion expressions for? *Current Directions in Psychological Science*, 20(6), 395-399. <https://doi.org/DOI:10.1177/0963721411424739>
- Silva, P., Garganta, J., Araújo, D., Davids, K., & Aguiar, P. (2013). Shared Knowledge or Shared Affordances? Insights from an Ecological Dynamics Approach to

- Team Coordination in Sports. *Sports Medicine*, 43(9), 765-772.  
<https://doi.org/10.1007/s40279-013-0070-9>
- Steiner, S., Macquet, A.-C., & Seiler, R. (2017). An integrative perspective on interpersonal coordination in interactive team sports. *Frontiers in psychology*, 8, 1440. <https://doi.org/https://doi.org/10.3389/fpsyg.2017.01440>
- Sullivan, P., & Jowett, S. (2014). Communication in sport teams. In *Routledge companion to sport and exercise psychology* (pp. 583-594). Routledge.
- Sullivan, P. J., & Gee, C. J. (2007). The relationship between athletic satisfaction and intrateam communication. *Group dynamics: theory, research, and practice*, 11(2), 107. <https://doi.org/DOI:10.1037/1089-2699.11.2.107>
- Tamminen, K. A., & Crocker, P. R. E. (2013). "I control my own emotions for the sake of the team": Emotional self-regulation and interpersonal emotion regulation among female high-performance curlers. *Psychology of Sport and Exercise*, 14(5), 737-747. <https://doi.org/https://doi.org/10.1016/j.psychsport.2013.05.002>
- Thomas, J. R., Martin, P., Etnier, J., & Silverman, S. J. (2015). *Research methods in physical activity*. Human kinetics.
- Thrien, F., & Furley, P. (2021). Nonverbal expressions of soccer coaches during the game and their potential effects on observers. *International Journal of Sports Science & Coaching*, 16(5), 1063-1073.  
<https://doi.org/https://doi.org/10.1177/17479541211028520>
- Walker, R. (2023, April 21). 'He's the EXAMPLE': Erik ten Hag hits back at critics of Harry Maguire following the debacle in Seville... as he insists the Man United captain still has an 'important role' to play at the club. Daily Mail. Retrieved 26. June 2023 from <https://www.dailymail.co.uk/sport/football/article-12000275/Hes-EXAMPLE-Erik-ten-Hag-rebuked-criticism-fire-Harry-Maguire.html>
- Wiener, M., Devoe, S., Rubinow, S., & Geller, J. (1972). Nonverbal behavior and nonverbal communication. *Psychological review*, 79(3), 185.
- Williams, A. M., & Jackson, C., R. (2019). *Anticipation and Decision Making in Sport*. Routledge. <https://books.google.no/books?id=WgFYswEACAAJ>
- Williamson, K., & Cox, R. (2014). Distributed Cognition in Sports Teams: Explaining successful and expert performance. *Educational Philosophy and Theory*, 46(6), 640-654. <https://doi.org/10.1080/00131857.2013.779215>
- Wilson, M. R., Wood, G., & Vine, S. J. (2009). Anxiety, attentional control, and performance impairment in penalty kicks. *Journal of Sport and Exercise Psychology*, 31(6), 761-775. <https://doi.org/10.1123/jsep.31.6.761>
- Wilson-Mendenhall, C. D., Barrett, L. F., & Barsalou, L. W. (2013). Neural evidence that human emotions share core affective properties. *Psychological science*, 24(6), 947-956. <https://doi.org/10.1177/0956797612464242>
- Zebrowitz, L. A., & Collins, M. A. (1997). Accurate social perception at zero acquaintance: The affordances of a Gibsonian approach. *Personality and social psychology review*, 1(3), 204-223.  
[https://doi.org/10.1207/s15327957pspr0103\\_2](https://doi.org/10.1207/s15327957pspr0103_2)
- Öhman, A. (2002). Automaticity and the amygdala: Nonconscious responses to emotional faces. *Current Directions in Psychological Science*, 11(2), 62-66.  
<https://doi.org/https://doi.org/10.1111/1467-8721.00169>

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## Registrationsform NSD:

# NSD NORSK SENTER FOR FORSKNINGSDATA

## Meldeskjema

### Referansenummer

534932

### Hvilke personopplysninger skal du behandle?

---

- Navn (også ved signatur/samtykke)
- Bilder eller videoopptak av personer

### Prosjektinformasjon

---

#### Prosjektittel

Kroppsspråk hos elitefotballspillere

#### Prosjektbeskrivelse

Vi skal gjøre analyser av kroppsspråket til norske landslagsspillere for å (a) sammenligne metodiske tilnærming til slik forskning og (b) se hvordan kroppsspråk henger sammen med andre variabler (spillerposisjon, prestasjoner, etc.)

#### Begrunn behovet for å behandle personopplysningene

Vi trenger ulike videoopptak av fotballspillerne for å kunne analysere spillernes kroppsspråk og sammenligne metodiske tilnærminger for slike analyser.

#### Ekstern finansiering

#### Type prosjekt

Forskerprosjekt

### Behandlingsansvar

---

#### Behandlingsansvarlig institusjon

Norges idrettshøgskole / Institutt for idrett og samfunnsvitenskap

#### Prosjektansvarlig (vitenskapelig ansatt/veileder eller stipendiat)

Geir Jordet, geirj@nih.no, tlf: +4790780250

## Skal behandlingsansvaret deles med andre institusjoner (felles behandlingsansvarlige)?

Nei

### Utvalg 1

---

#### Beskriv utvalget

Profesjonelle fotballspillere

#### Alder

18 - 37

#### Personopplysninger for utvalg 1

- Navn (også ved signatur/samtykke)
- Bilder eller videoopptak av personer

#### Hvordan samler du inn data fra utvalg 1?

#### Ikke-deltakende observasjon

#### Grunnlag for å behandle alminnelige kategorier av personopplysninger

Allmenn interesse eller offentlig myndighet (art. 6 nr. 1 bokstav e)

#### Redegjør for valget av behandlingsgrunnlag

Prosjektet sikter på å frembringe mer kunnskap om kroppsspråk i elitefotball (landslagskamper) og metodiske tilnærminger for å forske på dette. Fotballkamper på dette nivået er av stor offentlig interesse og blir allerede analysert i detalj av mange analysefirmaer/private analytikere og TV-produsenter som publiseres og offentliggjøres til fans over hele verden. I tillegg gjør lagene selv (både på klubbnivå og landslagsnivå) analyser av sitt lag og sine spillere, i tillegg til av motstanderlag. Dette er for å skaffe seg konkurransefordeler i fremtiden.

Slike analyser er ofte av taktisk og teknisk dimensjon. Når det kommer til analyser av kroppsspråk/nonverbal kommunikasjon i kamp finnes det per i dag lite/ikke noe vitenskapelig grunnlag. Det gjør at denne dimensjonen av spillernes prestasjoner enten ignoreres eller feilvurderes som et resultat av synsing/forutinntatthet. Med andre ord vet man lite om hvordan spillerne kommuniserer med hverandre på banen under kamp. Dette kan føre til at det blir tatt avgjørelser om spillere på mangelfullt eller feil grunnlag, som kan ha negative konsekvenser for både enkeltspillere og lag. For eksempel, kan spillere rekrutteres på feil grunnlag (man tenker at en spiller vil passe godt inn på laget sitt, men det viser seg at han/hun ikke gjør ELLER man tror at en spiller ikke passer inn, men egentlig ville passet godt inn på laget). Videre kan det også få konsekvenser for laget ved at trenerteamet ikke er i stand til å coache/utvikle spillere på effektive måter å kommunisere med hverandre fordi man ikke innehar relevante analyser/kunnskap om dette. Samlet sett mener vi det vil kunne ha stor allmenn nytte å frambringe slik kunnskap, og viktig for utviklingen av fotball.

Til vårt kjennskap finnes det ingen studier som er publisert på temaet beskrevet over, men prosjektansvarlig (Geir Jordet) har også vært/er en del av et større prosjekt som nylig fikk godkjenning fra NSD om lignende datainnsamling (referansenummer 459744). Kunnskap om kroppsspråk i elitefotball er derfor nylig i utvikling, og publisering(er) forventes i fremtiden. Likevel mener vi det er viktig å fortsette forskningen, og vi ønsker nå altså å utvide populasjonen (til landslag, ikke bare klubbnivå) og sammenligne metoder for å forske på dette.



Data til dette prosjektet vil være videoopptak fra offentlige avholdte fotballkamper. Vi har vært i kontakt med fotballanalytikere ved Norges fotballforbund og fått godkjenning til å få tilgang til video som blir tatt opp under kampene, i tillegg til godkjenning om å filme noen av enkeltspillerne i close-up under kampene. Etter mye vurdering frem og tilbake har vi konkludert med at innhenting av samtykke virker unødvendig. Som Winter & Maughan (2009, artikkel lagt ved i søknaden) har nevnt, må profesjonelle toppidrettsutøvere påregne å gjennomgå en del tester og analyser som del av sitt yrke, og at dette faller utenom normal innhenting av samtykke. Det er også viktig å understreke at kampene som spillerne blir analysert fra er offentlige avholdte fotballkamper, som spillerne uansett skal spille. I pressesonen av slike kamper er det mange kameraer som filmer ettersom disse kampene har høy offentlig interesse. Med dagens teknologi kan til og med publikum gjøre egne opptak fra kamper ved hjelp av mobiltelefoner. Vi vil selvfølgelig få tillatelse og akkreditering fra landslagene før vi gjør våre close-up videoopptak. Det er altså i samsvar med ledende idrettsvitenskapelige tidsskrift (Journal of Sports Sciences) at vi mener data kan samles inn som "ikkedeltakende observasjon": Spillere må påregne dette som en del av sitt yrke og disse kampene er av høy offentlig interesse.

Hvis vi følger dette betyr det at vi må påregne ekstra strenge krav til å ivareta spillernes rettigheter, som tilsier høye krav til datasikkerhet, sikker kommunikasjon og full konfidensialitet i rapportering av resultater.

## **Informasjon for utvalg 1**

### **Informerer du utvalget om behandlingen av opplysningene?**

Nei

### **Begrunn hvorfor du ikke informerer utvalget om behandlingen.**

Av samme årsak som skrevet i punktet over (spørsmål om samtykke) tror vi det er lite hensiktsmessig å informere enkeltspillere om opplysningene. Som nevnt må eliteutøvere påregne å gjennomgå analyser som en del av sitt yrke, og dette faller utenom vanlige informasjons- og samtykkekrav (Winter & Maughan, Journal of Sports Sciences, 2009). Særlig i elitefotball blir utøvere analysert på mange ulike måter, av mange ulike aktører. For eksempel, blir tekniske og taktiske vurderinger ofte analysert av eksperter underveis og etter kamper på ulike TV-stasjoner, slik at seere får tilgang til detaljrik informasjon i pausen og etter kampslutt. I tillegg kommer ofte informasjon om antall prosent lagene har hatt i possession underveis i kampen på TV-skjermen. Mange spillere blir også intervjuet av presse etter kamp, og kan bli vurdert gjennom det. I tillegg gjøres analyser av private analytikere som deles med fans over hele verden. Med andre ord blir disse fotballspillerne analysert og gransket i detalj fra før av, og vi vil fungere som en av hundre, kanskje tusenvis, av andre som også utfører analyser. Forskjellen er at vi ikke vil ha den samme offentlige formidlingen av analysene våre, og at vi følger strenge regler for å ivareta spillernes anonymitet. I tillegg vil potensielle publiseringer være i tidsskrifter som også har strenge krav til fagfellevurdering.

I tillegg er disse utøverne på toppnivå og kan få hundrevis av henvendelser/forespørsler i løpet av en uke, noe som vil gjøre det vanskelig å nå enkeltspillerne.

Likevel, ønsker vi å ha løpende kontakt med analyse-team/trenerteam til landslagene, slik at de kan få tilgang til data dersom det er ønskelig. Det har også blitt nevnt som ønskelig fra analytikeren vi har vært i kontakt med.

## **Tredjepersoner**

---

### **Skal du behandle personopplysninger om tredjepersoner?**

Nei

## Dokumentasjon

---

### Hvordan kan de registrerte få innsyn, rettet eller slettet opplysninger om seg selv?

I kommunikasjon med trenerteamet/analyseteamet vil vi legge til rette for at det er mulig å kontakte veileder/prosjektansvarlig eller stipendiat dersom en enkeltspiller ønsker en oversikt over sine personopplysninger som blir behandlet, om formålet og hvorfor de blir behandlet. **Totalt antall registrerte i prosjektet**  
1-99

## Tillatelser

---

### Skal du innhente følgende godkjenninger eller tillatelser for prosjektet?

- Annen godkjenning

#### **Annen godkjenning**

Vi er også i søknadsprosess med NIHs interne forskningsetiske organ (Norges Idrettshøgskoles etiske komite).

## Behandling

---

### Hvor behandles opplysningene?

- Ekstern tjeneste eller nettverk (databehandler)
- Mobile enheter tilhørende behandlingsansvarlig institusjon

### Hvem behandler/har tilgang til opplysningene?

- Prosjektansvarlig
- Student (studentprosjekt)
- Interne medarbeidere
- Andre med tilgang til opplysningene Databehandler
- **Hvilken databehandler har tilgang til opplysningene?**

Hudl, som leverer videoanalyseprogrammet Sportscode vil potensielt ha tilgang til opplysninger.

I tidligere søknad til NSD (referansenummer: 459744) står det at NSD hadde spørsmål om det foreligger en databehandleravtale. Som nevnt da, foreligger dette. Lenke til informasjon om "Section 9: Data Protection" er her: [https://www.hudl.com/en\\_gb/eula](https://www.hudl.com/en_gb/eula)

### **Andre som har tilgang til opplysningene**

En tidligere student ved NIH, Yaw Amankwah, blir brukt som ekspert og rådgiver på dette prosjektet og tilfører viktig og verdifull ekspertise. Han innordner seg imidlertid de samme krav til datasikkerhet, konfidensialitet og etiske retningslinjer som andre studenter som er involvert i prosjektet.

### **Tilgjengeliggjøres opplysningene utenfor EU/EØS til en tredjestat eller internasjonal organisasjon?**

Nei

## Sikkerhet

---

### **Oppbevares personopplysningene atskilt fra øvrige data (koblingsnøkkel)?**

Ja

#### **Hvilke tekniske og fysiske tiltak sikrer personopplysningene?**

- Opplysningene anonymiseres fortløpende

## Varighet

---

### **Prosjektperiode**

06.09.2022 - 30.06.2023

#### **Hva skjer med dataene ved prosjektslutt?**

Data med personopplysninger oppbevares midlertidig til: 30.06.2028

#### **Hva er formålet med den videre oppbevaringen av dataene?**

Forskningsformål

#### **Vil de registrerte kunne identifiseres (direkte eller indirekte) i oppgave/avhandling/øvrige publikasjoner fra prosjektet?**

Nei

## Tilleggsopplysninger

---

Prosjektet er en del av doktorgradsoppgaven til Ingrid Lian. I tillegg vil masterstudenten Lasse Drage være involvert, og bruke dataen som en del av sin masteroppgave.

Grunnen til at dataen blir lagret 5 år etter prosjektslutt er av flere grunner. Som nevnt er studien en del av et doktorgradsprosjekt, og det vil derfor være nyttig å ha dataen lagret frem til stipendiatstillingen utløper (mai 2026) for å kunne ha oppfølgingsstudier. Hvis/når dette er aktuelt vil det selvfølgelig bli sendt inn nye søknader til NSD. Videre er denne studien et av de første (sammen med studien som ble godkjent av NSD med referansenummer 459744) på dette området, og hvis resultatene tilsier at dette er noe som er verdt å følge opp kan longitudinelle studier knyttet til våre variabler være aktuelle (for eksempel ved å se på hvordan forskning på kroppsspråk endrer seg over tid). Derfor ser vi det som verdifullt, og nødvendig, å oppbevare dataene utover prosjektslutt.

Vedlagt ligger artikkelen til Winter & Maughan (2009)



[Meldeskjema](#) / [Kroppsspråk hos elitefotballspillere](#) / Vurdering

## Vurdering av behandling av personopplysninger

<b>Referansenummer</b>	<b>Vurderingstype</b>	<b>Dato</b>
534932	Standard	02.01.2023

**Prosjekttittel**  
Kroppsspråk hos elitefotballspillere

**Behandlingsansvarlig institusjon**  
Norges idrettshøgskole / Institutt for idrett og samfunnsvitenskap

**Prosjektansvarlig**  
Geir Jordet

**Prosjektperiode**  
06.09.2022 - 30.06.2023

**Kategorier personopplysninger**  
Alminnelige

**Lovlig grunnlag**  
Samtykke (Personvernforordningen art. 6 nr. 1 bokstav a)

Behandlingen av personopplysningene er lovlig så fremt den gjennomføres som oppgitt i meldeskjemaet. Det lovlige grunnlaget gjelder til 30.06.2028.

[Meldeskjema](#)

### Kommentar

#### OM VURDERINGEN

Sikt har en avtale med institusjonen du forsker eller studerer ved. Denne avtalen innebærer at vi skal gi deg råd slik at behandlingen av personopplysninger i prosjektet ditt er lovlig etter personvernregelverket.

#### FØLG DIN INSTITUSJONS RETNINGSLINJER

Vi har vurdert at du har lovlig grunnlag til å behandle personopplysningene, men husk at det er institusjonen du er ansatt/student ved som avgjør hvilke databehandlere du kan bruke og hvordan du må lagre og sikre data i ditt prosjekt. Husk å bruke leverandører som din institusjon har avtale med (f.eks. ved skylagring, nettspørreskjema, videosamtale el.

Personverntjenester legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32).

#### MELD VESENTLIGE ENDRINGER

Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde dette til oss ved å oppdatere meldeskjemaet. Se våre nettsider om hvilke endringer du må melde: <https://sikt.no/melde-endringer-i-meldeskjema>

#### OPPFØLGING AV PROSJEKTET

Vi vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet. Lykke til med prosjektet!