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Post Goal Behaviors And Team Performance In Elite Soccer

Master thesis in Sport Sciences
Department of Coaching and Psychology
Norwegian School of Sport Sciences, 2015

Abstract

This study explored nonverbal behaviors displayed after a goal was scored in regular soccer games (*post goal behaviors*). After developing the post goal behavioral coding scheme in soccer (the PGB-CS-S), 226 post goal behaviors and two intensity measures from 208 post goal periods stemming from 120 elite soccer games involving 16 teams were coded. Chi-square tests were used to investigate the relationship between a) post goal behaviors and the standing in the match prior to the goal was scored as predictor of post goal behaviors, and b) post goal behaviors and the game outcome of regular soccer games. The chi-square tests revealed no significant findings at $p<0.05$ after Bonferroni corrections were conducted. However, due to the critique of the Bonferroni corrections of being too conservative (Perneger 1998; Narum, 2006), a selection of the significant findings prior to the corrections are discussed in the paper. Furthermore, linear regression analysis were conducted to examine possible predictors of the intensity of post goal behaviors, and the hypothesis that intensity of post goal behaviors predicted game outcome. The results gave a detailed description of the post goal behaviors displayed. Furthermore, the results of the linear regression analysis revealed the following predictors of post goal behaviors: higher attendance at the stadium was associated with higher intensity of the post goal behaviors, higher number of times the team regained the ball prior to the goal was scored, led to higher intensity of the post goal behaviors, scoring a goal by out-maneuvering a team in balance was associated with higher intensity, and attacks starting with a set piece far away from the goal (goal-kick and kick off) was associated with higher intensity than set pieces closer to the goal (corner-kick and penalty kick). Ultimately, the results revealed that the higher intensity of the post score behavior, the higher chance that the player was on a team that ended up winning the game. The results are interpreted in terms of the mechanism of emotional contagion and schema-driven impression formation. The results of the present study suggests that the intensity of the individual post-performance expressions in the period after a goal is scored in soccer serves a direct purpose in enhancing the player's likelihood of being on the team that ultimately wins the game in regular soccer games.

Keywords: *post-performance behaviors, soccer, team performance, emotional contagion, team dynamics, nonverbal behaviors, post goal behaviors, intensity.*

Table of content

Foreword

First, I want to thank my supervisor, Geir Jordet for his contributions in the expert panel, and for his highly competent feedback on methodical issues and in the writing process.

Secondly, I want to highlight the contribution made by Tjerk Moll. Without his expertise and sincere interest in the present study, the quality of the coding scheme and the study in total would not have reached the standards that it has.

Thirdly, I want to thank the rest of the members in the expert panel, Erik Hofseth, Tynke Toering and Kenneth Wilsgård, for their expert opinions at various stages in the process of the creation and execution of the present study.

Ultimately, I want to thank my two beautiful sons, Theodor and Mikkel, for their contributions as motivators in times of need. I love you!

1. Introduction

Goals are important in soccer (Turner, 2012). Opta, the world's leading sports data company (Opta, 2015), recorded 2.842 events in the Champions League final between Inter Milan and Bayern Munich in 2010, in which only two were goals (Anderson & Sally, 2013). This indicates that goals, are of major importance in team sports, particularly in soccer as the goals are so rare, approx. 2.5 goals a game in the Europe's top four leagues (Anderson & Sally, 2013). Andersen and Sally (2013) stated that it might be as simple as "goals win games" (p. 95), but interestingly, recent research suggests that not only the goal in itself, but also the behaviors displayed *after* a goal is scored seems to influence team performance (Moll, Jordet & Pepping, 2010; Moesch, Kenttä, Bäckström & Mattsson, 2015b). "It takes so much effort to score that each goal is celebrated that little bit more joyously" (Anderson & Sally, 2013 p. 72). Immediately after a goal is scored, the celebration of the goal (incl. absence of celebration) occur. In the current study, we labeled the behaviors expressed after a goal is scored as "*post goal behaviors*". Despite the findings of Moll et al. (2010) and Moesch et al. (2015b), little is known about the role of post goal behaviors. Given these findings, we need to better understand which post goal behaviors are displayed in specific sports to determine how these link with subsequent performance. The main purposes of the current study were to; in detail describe which behaviors that were displayed in post goal behavior in soccer, and investigate the relationship between the post goal behaviors displayed and game outcome in regular soccer games.

In a response to the outcome of numerous events in a team sport competition, including responses after scoring a goal, players usually display different types of behaviors (Moesch et al., 2015b). In the current study, we are interested in the *nonverbal behaviors* displayed after a goal is scored in soccer. Based in the nature of soccer, an elite sport with many stressors (Mellalieu, Neil, Hanton, & Fletcher, 2009) such as spectator noise, and taking into account the size of the pitch, verbal communication can be difficult to hear. Thus, it is likely that players need to rely heavily on nonverbal behaviors to communicate. Add in that Argyle and colleagues (1970) found that nonverbal cues had 4.3 times the effect of verbal cues when subjects analyzed the communication of submissive and dominant attitude, and it is obvious that nonverbal behaviors plays a certain role in sport contexts. Riggio and Riggio (2012)

defines nonverbal behaviors as cues such as facial expressions, posture, gestures or touch. There are several functions of nonverbal behavior, and expressing emotions is one area that surely plays an important role in team sports (Besler & Buroon, 1987). Moesch, Kenttä and Mattsson (2015a) highlighted three important functions of nonverbal behavior: expressing spontaneous emotions, expressing emotions based on socially learned rules (Ekman & Friesen, 1969) or learning processes (Bandura, 1977), and displaying behaviors for a specific reason. In a post-shot period with a successful outcome, that being a goal is scored, the player typically express joy as a result of spontaneity (Moesch et al., 2015a). However, socially learned rules can modulate the spontaneity of emotional expressions (Ekman & Frisen, 1969), and therefore affect the nonverbal behaviors expressed after scoring a goal. For example, even a goal scorer of a cracking strike from 30 yards may suppress his emotions as the team is three nil down, because joyous expressions are not appreciated in that specific situation. Subsequently, Bandura (1977) suggested that behaviors can be learned by modeling others. Based on the learning process perspective of Bandura, it can be assumed that a player can express nonverbal emotions as a ritual by coping the nonverbal behaviors of more experienced players after success. Following this reasoning, the behaviors might be expressed without the goal scorer experiencing specific emotions (Moesch et al., 2015a). The third function highlighted by Moesch et al. (2015a) suggested that a possible reason for displaying nonverbal behaviors is that players display the behaviors for a specific reason. In this line of reasoning, nonverbal behaviors as consciously displayed to attain a certain results, such as daunting their opponents or pleasing the fans. Thus, nonverbal behaviors can be considered to be diverse.

Even though the goal scorer is assumed to be affected by his own emotional expressions through internal feedback loops (Price, Petersen & Harmon-Jones, 2012), nonverbal behaviors are recognized not only by the goal scorer himself, but also by teammates, opponents and fans (Furley, Dicks, & Memmert, 2012; Moesch et al., 2015b). Therefore, nonverbal behaviors can serve as nonverbal communication in the presence of others (Riggio & Riggio, 2012). To understand how teammates and opponents could be affected by the nonverbal behaviors displayed by the goal scorer, I used the theoretical framework of the mechanism of *emotional contagion* (Hatfeild, Cacioppo & Rapson, 1994; Kelly & Barsade, 2001). Additionally, I also use the theories

of *impression formation* (see Freeman & Ambady, 2011) and *schema-driven impression formation* (Fiske & Taylor, 1991) to further the understanding of perceived impressions.

Moll et al. (2010) used the process called emotional contagion to explain their finding of how post-shot behaviors affected subsequent performance by teammates and opponents in soccer penalty shootouts. The emotional contagion mechanism suggests that expression of moods and emotions by one person transfer to nearby individuals (Hatfield et al., 1994; Kelly & Barsade, 2001). The potential of transfer of moods and emotions is particularly high when the person is in a close relationship with the other individuals (Hatfield et al., 1994; Kelly & Barsade, 2001), as within a soccer team. The mechanism originates from Hatfield, Cacioppo and Rapson (1992), which showed that people mimic and synchronize facial expressions, postures and movements. Later, Barsade (2002) showed that in an achievement setting contagion of positive emotions lead to improved cooperation, decreased conflict and increased perceptions of task performance. On the other hand, contagion of unpleasant emotions led to the opposite. Barsade (2002) also proposed that emotions expressed with greater intensity led to more contagion due to the heightened attention they attract. This prepossession is based on the term "emotional energy" (Sullins, 1991), which refers to the intensity of an expression, and its communication from one person to another. More recent studies of emotional contagion in social psychology highlighted the importance of group membership, suggesting that a more close and likable relationship between persons resulted in more emotional convergence occurring (for a summary, see van der Schalk et al., 2011). Interestingly, Epstude and Mussweiler (2009) found in between-group effects that perceived positive moods from an out-group (opponent) led to negative moods in the in-group (teammates), and with the effects being reversed when negative moods were displayed by the out-group. In a sport context, Totterdell (2000) revealed that happy moods transferred within a cricket team in a competitive match led to better performance.

The framework of impression formation are less based on group membership, but serves a clear purpose to the current study, in understanding how nonverbal cues can affect teammates and opponents' impressions of the goal scorer. Warr and Knapper (1968) proposed that the perception of others influences judgments about the observed person, the person's abilities and actions, and subsequently leading to affective

responses in the perceiver. In the current study, this implied that the goal scorer's opponents form impressions based on the nonverbal behaviors displayed by the goal scorer. These affective responses are processed cognitively (e.g. the opponents looks confident, they will beat us), and leads to an affective response (e.g. anxiety) (Moesch et al., 2015b). Most of the findings on impression formation in a sports context are based on what is known as *schema-driven impression formation* (Fiske & Taylor, 1991). The theory of schema-driven impression formation is based on the assumption that people due to efficiency use cues to classify persons into certain categories or person schema. Person schemas are defined as an individual's knowledge attributes of a specific type of person (Fiske & Taylor, 1991). Translated to the current study, we can assume that based on the theory of schema-driven impression formation the opponent's (and teammates) classified the goal scorer in to a category based on the nonverbal behaviors displayed after they had scored a goal. Several studies, conducted in individual sports or in one-on-one situations in team sports (penalty kicks), support the importance of nonverbal cues on the formation of impression in sport contexts (Furley & Dicks, 2010; Furley, Dicks & Memmert, 2012; Greenless, Bradley, Thelwell & Holder, 2005a; Greenless, Buscombe, Thelweel, Holder & Rimmer, 2005b; Greenless, Leyland, Thelwell & Filby, 2008).

Despite the need of developing knowledge, the research on nonverbal behavior in sport contexts has until recent years been sparse. However, in recent years a series of *experimental* studies conducted by Greenless and colleagues has shown that *pre*-performance nonverbal behavior influenced performance outcome (Greenless, Bradley, Thelwell & Holder, 2005a; Greenless, Buscombe, Thelweel, Holder & Rimmer, 2005b; Greenless, Leyland, Thelwell & Filby, 2008). For example, Greenless et al. (2005a) reported that by the initial impressions tennis players formed of their opponents they developed an impression formation, which affects their confidence in beating the opponent, positively or negatively. In a soccer study, Greenless et al. (2008) showed that by looking at the goalkeeper for 90% of the time before taking a penalty kick in soccer, the player was judged to take more accurate penalty kicks. The same year, Kamp and Master (2008) demonstrated that the nonverbal posture of a goalkeeper influenced the penalty taker's perception of the goalkeeper's size, and subsequently their shooting behaviors. Even more recently, Furley and colleagues (Furley, Dicks & Memmert, 2012; Furley & Dicks, 2012; Furley, Dicks, Stendtke & Memmert, 2012;

Furley & Schweizer, 2014a; Furley & Schweizer, 2014b; Furley, Moll & Memmert, 2015) have conducted a series of experimental studies on pre-performance nonverbal behaviors and performance. For example, Furley et al. (2012a) found that that penalty kick takers with a dominant body language were perceived more positively by soccer goalkeepers and were expected to perform better than players with a submissive body language did. Futhermore, Furley et al. (2012c) provided the first evidence that goalkeepers initiated their movements later following their observation of hastening and hiding behaviors duration the penalty kick preparation. More recently, Furley et al. (2015) showed that observing pride expressions led teammates to anticipate more positive performance expectations compared to observation of neutral expression. In contrast, observing pride expressions caused opponents to anticipate lower performance expectancies towards their next performance compared with neutral expressions.

The experimental studies conducted on nonverbal behaviors in sport contexts have provided valuable insights, but there are limitations in these studies. As highlighted in Jordet (2009), even though lab-based studies serves a clear purpose in manipulation of certain mechanisms, the great advantage of historical, real-life data is that they have a meaning and a high external validity. This makes the results relatively easy to communicate in an applied manner outside of academia. Also with the heightened potential of being applied back to real life situations (Jordet, 2009).

In a series of *observational* studies, Jordet and colleagues found that self-regulation strategies such as low preparation time and increased avoidance looking before taking a penalty kick were associated with negative performance (Jordet, 2009a; 2009b; Jordet & Hartman, 2008). Even though the link between pressure and the mentioned strategies was more pronounced, the link to performance is highly noticeable. In a *qualitative* study in elite handball, Ronglan (2007) found that perceived that positive nonverbal behaviors was considered by the players as an intensifier on the opponent's feeling of defeat. Additionally, players considered cheering each other and expressing joy collectively during a competitive handball match as crucial to success (Rognlan, 2007).

Even though nonverbal behaviors displayed pre performance has dominated the nonverbal behavioral research in sports, in recent years, *post*-performance research has

gathered growing interest amongst researchers (Moesch, Kenttä & Mattsson, 2015a; Moesch, Kenttä, Bäckström & Mattsson, 2015b; Turner, 2012; Moll, Jordet & Pepping, 2010; Kraus, Huang & Keltner, 2010; Bornstein & Goldschmidt, 2008; Tracy & Matsumoto, 2008; Zeren & Öztekin, 2005; Kneidinger, Maple & Tross, 2001). Despite the growing interest in academia, the research conducted on post-performance behaviors, mainly post-shot (incl. post goal behavior) behaviors has limitations. As stated in Moll et al. (2010 p. 990) "further research is encouraged to examine more precisely the exact mechanisms involved and whether the current findings can be generalized to other settings".

Tracy and Matsumoto (2008) showed that sighted, blind and congenitally blind individuals displayed pride expressions after success at the Olympic and Paralympic Games. Even though Kneidinger et al. (2001) conducted a study on touch and sex differences, the Tracy and Matsumoto (2008) were the first study to look at nonverbal expressions only involving one individual's nonverbal response to success in a sport context without any interaction with others. Bornstein and Goldschmidt (2008) were the first researchers to investigate the psychological aspects of *post goal behavior*. They suggested that the level of cohesion within a team could explain the association between individual nonverbal behaviors displayed after scoring a goal and the ultimate seasonal ranking of teams in soccer. By creating a post-scoring behavioral index scaling from very selfish behavior to very team-oriented behavior, they measured the goal scorer's behaviors based on location of the goal scorer, direction of the goal scorer's attention and number of teammates that the goal scorer made contact with after scoring. Bornstein and Goldschmidt (2008) hypothesized that "a more cohesive team whose players are more team-oriented would be more successful" (p. 120). Findings showed that teams that showed more team-oriented behaviors (e.g. making contact with many teammates, attending to teammates and walking towards the center of the field) ended higher in the seasonal standing than teams with players showing less team-oriented post-scoring behaviors. Additionally, Bornstein and Goldschmidt (2008) found differences in post-scoring behaviors between foreigners and local players, which indicated that foreign players tended to depend less on "rewards" from the crowd. They also found a positive and significant correlation between the post-scoring behavior index and team success for home matches, which indicated that the post-scoring behaviors were affected by the home crowd. The study had clear limitations in its

methodology as the top two teams scored 42.4 % of the videotaped goals, while the bottom two teams contributed with only 6.4 % of the goals. As Bornstein and Goldschmidt (2008) states "this fact obviously affects the reliability of the post score behavior ranking at the team level, since the reliability of this score is directly proportional to the number of goals analyzed for each team" (p. 118).

Subsequently, Moll et al. (2010) examined the association between individual *post-shot behaviors* and the outcome of penalty shootouts held in World Cups and European Championships. The penalty kick taker's nonverbal post-shot behaviors were rated on the presence of distinct and recognized nonverbal behaviors associated with pride and shame (Tracy & Robins, 2007). Moll et al. (2010) showed that celebration with both arms (above head, below head and the combination of both), both hands (made into fists) and an expansion of the chest were associated with winning the penalty shootout. Both arms extended away from the body also made it more likely that the next kicks taken by the opponent were missed. Gazing down as part of the post-shot behavior was related to losing the penalty shootout. The authors interpreted the findings in terms of the mechanism of emotional contagion.

Most recently, Moesch and colleagues (Moesch, Kenttä & Mattsson, 2015a; Moesch, Kenttä, Bäckström & Mattsson, 2015b) have conducted two observational studies on post-shot behaviors in elite handball. Moesch et al. (2015a) developed a sport-specific coding scheme (the Handball Post-Shot Behavior Coding Scheme) to investigate nonverbal behaviors displayed by female handball players in the post-shot period. Based on the coding scheme developed, Moesch et al. (2015b) explored the post-shot behaviors in elite female handball. The results revealed that, on average, 2.77 nonverbal behaviors were displayed after scoring. Matches with more at stake (play-offs) resulted in a higher average of nonverbal behaviors than in regular league games. The more a team was leading by, the higher number of nonverbal behaviors displayed, while the overall amount of nonverbal behaviors displayed by the losing team declined over the course of the match. Moesch et al. (2012b) did not look for effects on future performance or game outcome. However, Moesch et al. (2012b) highlighted the impact nonverbal behaviors in the post-shot period could have on team performance as the most important question for future research. Moesch et al. (2015b) are alongside Kraus et al. (2010) and Kneidinger et al. (2001) the only studies that has explored nonverbal

behaviors in a quantitative design during ongoing matches. While as, Kraus et al. (2010) and Kneidinger et al. (2001) looked at nonverbal behaviors (touch) shown at any point during a match, Moesch et al. (2015b) has provided the only evidence of nonverbal behaviors displayed after a specific action (post-shot) in an ongoing match thus far.

Even though a few studies have investigated post-shot behaviors, they have limited themselves to a few variables (e.g. pride and shame). Even though Bornstein and Goldschmidt (2008) provided a reliable post score behavioral index, they limited themselves to only rating the behaviors on a post-scoring behavioral index based on, at best, a vague empirical justification. Furthermore, Moll and his colleagues (2010) showed interesting finding of nonverbal behaviors related to pride and shame linked with emotional contagion and outcome of penalty shootouts, but the study limited itself by only looking at behaviors related to those two emotions. Recently, Moesch et al. (2015b) provided important information about post-shot behaviors in elite female handball related to match-specific variables. Unfortunately, due to low inter- and intra-reliability scores they were ultimately limited to just a few nonverbal behavioral variables and they did not look for effects on future performance. Therefore, the current study aims to capture the phenomenon of post score behavior (post-shot behaviors after success) as a whole, without being limited to a small range of nonverbal behaviors. To be able to take such a broad, holistic approach, we had to develop a reliable sport-specific coding scheme for nonverbal behaviors displayed in the post score period in soccer. Given the aim of the study, we had to take both nonverbal emotional behaviors and nonverbal non-emotional behaviors, into account. Thus, we had to go beyond the coding scheme developed by Tracy and Robins (2007), and later adapted and used by Moll and colleagues (2010), and beyond the handball-specific coding scheme developed and tested by Moesch et al. (2015a), and used by Moesch, et al. (2015b).

In the current study, we took three different approaches to investigate possible variables for our coding scheme: 1) behaviors associated with emotions, 2) behaviors displayed in response to success in achievement settings and 3) behaviors displayed in response to scoring in the videos. First, we conducted a literature search for distinct emotions in the emotional literature ending up with a large pool of emotions. Based on these emotions, we included all the emotions recognized by Lazarus (2000) as occurring in competitive sport, and added emotions displayed in achievement situations (Whang

& Matsumoto, 2013; Ekman, 2003; Keltner, 1995). A new literature search, with the aim to find studies that associated these emotions with distinct motor expressions and action tendencies revealed 163 different movements (facial expressions, postural expressions, nonverbal behaviors and action tendencies). Due to the fact that these behaviors stem from different type of studies, the approaches and thereby the descriptions of the behaviors are very diverse, and differ in their level of objectivity. Secondly, we searched for all studies containing behaviors displayed in an achievement setting in response to success and failure revealing 65 additional non-emotional nonverbal behaviors, and 25 functional codes (Turner, 2012). Finally, we conducted a run through the videos, which revealed another 92 behaviors, subsequently leaving us with a pool of 345 possible variables for our nonverbal post score behavioral coding scheme in soccer. Given the critique of the lack of objectivity in the behavioral pool, we had to find a system that provided us with a distinct and objective specificity level.

Interestingly, after they reviewed the existing literature on techniques for measuring body movement in emotion expression research finding no consensus on a reliable coding system, Dael, Mortillaro and Scherer (2012) developed the body action and posture coding system (BAP). The BAP-system is designed to describe body movement in nonverbal emotional behavior research on 1) an anatomical level (coding of the anatomical articulation of active movements), on 2) a form level (direction and orientation of movements) and on 3) a functional level (functional movement, movement with a meaning or a set of movements). The BAP system allows to observe and code multiple units that are not mutually exclusive and multiple descriptive levels can overlap in time (Dael et al. 2012). We found the BAP coding system both sophisticated and suitable for the current study, and the BAP coding system became the base of the development of a coding scheme to capture post score behavior. Given the purpose of the current study, we adapted the three-leveled approach, the rational, the structure and the software used by Dael et al. (2012). By using the same approach as Dael et al. (2012), we were able to develop systematic and reliable descriptions to our nonverbal body movement behaviors. The BAP-system gave a clear specificity level (anatomical), which left us able to focus on a range of behaviors.

Dael et al. (2012) only tested the the BAP coding system on a corpus of acted emotion portrayals. Due to the nature of the current study of post score behavior, with

footages from an ecological environment, we had to make substantial adjustments to the BAP-system. Most importantly, the BAP coding system made a distinction between body posture units and body action units (Dael et al., 2012), a distinction that did not correlate well with the nature of post score behavior. In an environment with such a high number of elements (teammates, opponents, audience and shifts in camera angels, camera distance and camera focus), it showed nearly impossible to code reliable in terms of getting the correct start- and end times. Therefore, we expanded the exception Dael and colleagues (2012) made for leg movements, with the same justification, to count for all the body parts in our behavioral coding. The expectation being to combine the action- and posture units due to technical limitations (Dael et al., 2012). For a full overview of the BAP coding system, see Dael et al. (2012).

Following the rationale of this introduction, the aims of the current study were to: 1) develop a reliable coding scheme to capture the phenomenon of "post goal behavior" specifically suited for the game of soccer, 2) provide a detailed description of the post goal behaviors displayed, 3) investigate possible predictors of post goal behaviors, and 4) investigate the relationship between post goal behaviors displayed and game outcome of regular soccer games. The results will be discussed in relation to the theory of emotional contagion and impression formation (incl. schema-driven impression formation).

2. Methods

2.1 Data

The original sample of goals (n = 343), contained all the goals scored by all 16 teams over 120 games in the first half of the 2012 Norwegian Top Division (Tippeligaen). Out of the original sample we had to leave eleven (11) goals out of the final sample due the fact that the goal scorer was not present in the clips. Twenty (20) goals were used for pilot testing, and were therefore excluded. Additionally, errors in the Anvil software left us unable to display a number of video clips in the program. By consequence of the errors, we read the User Manual of Anvil 4.0 (Kipp, 2003) thoroughly, and contacting the program developer, unfortunately, without getting a reply. Subsequently, we made sure that all the goals had the file-format (avi.) and the codecs (Apple Cinepak) suited for the program, which they had. We reasoned that the video, going through four stages of alternation: 1) downloading, 2) converting, 3) change of codecs, and 4) cutting, may had reduced video quality. With the information provided, we chose to exclude the un-displayable goals (n = 114) from our sample. Ultimately, the final sample contained 208 goals (n = 208).

Video images from the sample of goals (n = 343) was acquired from television broadcasting, downloaded, converted and given the suitable video codecs. Subsequently, the clips were cut to make the coder blind to the build-up and quality of the goal scored, and blind to behaviors occurring after the goal scorer made physical contact with a teammate. This practically meant that the first video frame of the clips were in the exact video frame the ball crossed the goal line. The last frame of the clips was in the third video frame after the first physical touch was present. The delay was implemented to make sure that the physical touch was observed by the observer.

The final sample of video clips which displayed post score behavior had a mean duration of 5.39 s (SD 3.05), and the goal scorer was in view for a mean duration of 3.83 s (SD 2.16). The clips were recorded at 25 frames per minute (Dael et al. 2012). In 184 of the clips, the goal scorer was in view at the zero point. A total of 177 clips, did have close up footages of the goal scorer. As advised in Moll and colleagues (2010) we also did analyses on a sample only containing the goal were the standing in the game was equal prior to the goal was scored (n = 90).

2.2 Development of the post goal behavioral coding scheme in soccer (PGB-CS-S)

Moesch et al. (2015a) argues that nonverbal coding schemes in sport contexts need to be sport specific in order to serve its purpose. By consequence of that, we had to test each of the 141 nonverbal behavioral variables in the BAP-system (Dael et al., 2012), to check their relevance to post goal behavioral research in soccer. Simultaneously, we added variables in both 1) the anatomical level, 2) the form level and 3) the functional level based on the behavioral pool provided through literature searches and pilot testing. An expert panel was created for the purpose, and in order to check face validity (Brewer & Jones, 2002). The expert panel consisted of one of the most experienced soccer analysists in Norway, three highly regarded researchers in psychological soccer research, and a soccer coach and player. One of the most important aspects of the post goal behaviors not stemming from emotional research were highlighted to be locomotory behaviors. Fortunately, the "Bloomfield Movement Classification (BMC)" (Bloomfield, Polman & O'Donoghue 2004, p. 23) provided a reliable way to classify the different locomotory behaviors and their direction. However, by consequence that the BMC was classified in an *in-game on-the-ball environment*, we had to rationally pick the behaviors that were relevant for the current study. Bloomfield et al. (2004) also gave a reference to our intensity measures, which were established through pilot testing based on three different approaches: 1) an intensity measure stemming from pain research, 2) an intensity measure stemming from emotion- and biomechanical research (Tracy & Robins, 2007; Dael et al. 2012) and 3) an intensity measure originated from experience. Ultimately, the intensity was measured on a 5-point Likert scale modified from Tracy and Robins (2007) to suit the purpose of the current study. The intensity was measured both continuously (onset and offset times when a change in intensity), and as an overall score of the post goal behaviors. As there are many types of behaviors present in post goal behavior that may have a meaning (Turner, 2012) (e.g. making the sign of the cross, kissing the ring finger) or a set of behaviors expression emblems (Dael et al. 2012) (e.g. airplane celebration) functional behaviors were an important aspect to implement. After checking face validity by using an expert panel, as advise by Brewer and Jones (2002), the project group questioned all the variables and their descriptions based on a number of inclusion and exclusion criteria (e.g. relevant for the purpose, correct specificity level, suited for objective

coding). Ultimately, the final post goal behavioral coding scheme in soccer was finalized.

Thus, in the BAP coding system each body part was coded separately (Dael et al. 2012), that is also how the post goal behavioral coding scheme in soccer (PGB-CS-S) is structured (see table I). The PSB coding scheme is structured into sub-divisions in the following order: whole body locomotion, whole body, trunk, head, face, arms, hands/fingers and shoulders. The subdivisions of whole body locomotion and head also contains direction and orientation of movement in addition to the expressed behaviors. The finger movements contains orientation of their movements in addition to the expressed behaviors. As in Dael et al. (2012) the emblems (functional codes) are listed in the last sub-division. In table 1, the complete PGB coding scheme in soccer is presented, with the behavioral variables in the left column and their descriptions in the right column. An exception is made for the functional codes, as they by nature describe themselves, and therefore an additional description was not needed. In addition to the PGB coding scheme, intensity measures and variables to access the quality of the video footages were also part of the coding routine, but due to their nature of not being nonverbal behaviors, they are not included in the behavioral coding scheme.

Table 2.1: *The post goal behavioral coding scheme in soccer (PGB-CS-S), depicting all 226 variables used in the study.*

Behavioural variables	Short description (explanation)
Whole body locomotion	
Sprint	Moving at maximum effort, rapid motion
Run	Moving at a moderate monotonous pace (slower than sprinting, quicker than jog)
Skip	Moving with small bound-like movements (sideways, forwards or backwards).
Walk	Moving slowly by stepping (incl. stepping when standing up)
Dive	Purposely and controllably propel the body
Slide	Purposively moving along the ground (may involve sliding on knees, side of the hip, chest)
Jump	Purposively springing free from the ground (may involve landing on the ground, in the stands, on a teammate, on a coach, or over the merchandize posters)
Kneeling down	To go down or rest on the knees or a knee

Fall	To non-voluntarily drop or descend under the force of gravity, as to a lower place through loss or lack of support.
Rolling over the ground	To move along the ground by revolving or turning over and over.
No locomotion	Remain on the same spot for more than > 200ms). This may involve standing, sitting, or lying (back/stomach) on the ground
Dance	To move one's feet or body, or both, rhythmically in a pattern of steps (incl. robotics, hip jiggling)
Gymnastic behaviour/expression	Bodily movement displaying a specific exercise typically performed in gymnastics (incl. cartwheel, forward roll, backward roll, summersault)
Turn	A circular movement which causes a (sudden) change in direction
Unscorable	The type of locomotory behavior cannot be distinguished
Direction of locomotion	
The player's locomotory behaviour is directed towards the centre of the pitch	The player moves or stands in direction of a position towards the centre of the pitch
The player's locomotory behaviour is directed towards the goal	The player moves or stands in direction of the goal or towards a position behind the goal
The player's locomotory behaviour is directed towards a corner on the opponent's half	The player moves or stands in direction of a corner on the opponent's half
The player's locomotory behaviour is directed towards one of the sidelines	The player moves or stands towards one of the sidelines
Unscorable	The direction of the player cannot be distinguished
Location	
The player is off the pitch	The player is off the pitch
The player is on the pitch	The player is on the pitch
Orientation of locomotory behaviour	
The player's locomotory behaviour is oriented towards teammates on the pitch	The player's locomotory behaviour is oriented towards teammates on the pitch
The player's locomotory behaviour is oriented towards teammates off the pitch	The player's locomotory behaviour is oriented towards teammates off the pitch
The player's locomotory behaviour is oriented towards the manager/head coach	The player's locomotory behaviour is oriented towards the manager/head coach
The player's locomotory behaviour is oriented towards the supporting staff	The player's locomotory behaviour is oriented towards the supporting staff
The player's locomotory behaviour is oriented towards the own fans	The player's locomotory behaviour is oriented towards the own fans
The player's locomotory behaviour is oriented towards the opposing fans	The player's locomotory behaviour is oriented towards the opposing fans
The player's locomotory behaviour is oriented towards a camera around the pitch	The player's locomotory behaviour is oriented towards a camera around the pitch
The player's locomotory behaviour is oriented towards the ball	The player's locomotory behaviour is oriented towards the ball

The player" locomotory behaviour has no particular orientation	The player's locomotory behaviour has no particular orientation (e.g., when running in 1/4, 1/2 circles)
Unscorable	The orientation of the player's locomotory behaviour cannot be distinguished

Whole body

Whole body moves or is in an erect position	The whole body moves or is in an erect position (anatomical standard position)
Whole body moves or leans forward	The whole body moves or leans towards a forward position relative to the anatomical standard position
Whole body moves or leans backward	The whole body moves or leans towards a backward position relative to the anatomical standard position
Whole body moves or leans towards the left/right	The whole body moves or leans towards a left/right position relative to the anatomical standard position
Unscorable	The whole body movement cannot be distinguished

Trunk

The trunk moves towards or is in an erect position	The trunk moves towards or is in an erect position (part of the anatomical standard position)
The trunk moves towards or is in a bend position	The spine moves or is bend towards a bend position relative to the anatomical standard position
The trunk moves or leans forward	The trunk moves or leans towards a forward position relative to the anatomical standard position
The trunk moves or leans backward	The trunk moves or leans towards a backward position relative to the anatomical standard position
The trunk rotates to the left	The trunk rotates or is rotated towards the left relative to the anatomical standard position
The trunk rotates to the right	The trunk rotates or is rotated towards the right relative to the anatomical standard position
The trunk moves or leans towards the right/left	The trunk moves or leans towards a left/right position relative to the anatomical standard position
The chest moves or is lifted upward or outward	The chest moves or is lifted upward/outward relative to the anatomical standard position
The chest moves or is turned downward or inward	The chest moves or is turned downward/inward relative to the anatomical standard position
Unscorable	The trunk movement cannot be distinguished

Head

The head moves towards or is in a straight position	The head moves towards or is in a straight position (anatomical standard position)
The head moves or is slightly tilted upwards (< 20 degrees)	The head moves or is slightly tilted upwards relative to the standard anatomical position
The head moves or is highly tilted upwards (>20 degrees)	The head moves or is highly tilted upwards relative to the standard anatomical position

The head moves or is tilted downwards	The head moves or is tilted downwards relative to the standard anatomical position
The head turns or is turned to the left	The head turns or is turned towards a left position relative to the standard anatomical position
The head turns or is turned to the right	The head turns or is turned towards a right position relative to the standard anatomical position
The head tilts or is tilted to the left	The head tilts or is tilted towards a left position relative to the standard anatomical position
The head (tilts) is tilted to the right	The head tilts or is tilted towards a right position relative to the standard anatomical position
The head moves or is moved forwards	The head moves or is moved towards a forward position relative to the standard anatomical position
The head moves or is moves backwards	The head moves or is moved towards a backward position relative to the standard anatomical position
Head shake up-down	The head repeatedly moves up- and down
Head shake side-to-side	The head repeatedly moves from left- to right or vice versa.
Head direction	
The face is directed towards the centre of the pitch	The face moves in direction or is directed towards the centre of the pitch
The face is directed towards the goal	The face moves in direction of or is directed towards the goal or a position behind the goal
The face is directed towards a corner on the opponent's half	The face moves in direction of or is directed towards a corner on the opponent's half
The face is directed towards one of the side-lines	The face moves in direction or is directed towards one of the side-lines
Head orientation	
The face is oriented towards the goal	The face is oriented towards the goal
The face is oriented towards teammates on the pitch	The face is oriented towards teammates on the pitch
The face is oriented towards teammates off the pitch	The face is oriented towards teammates off the pitch
The face is oriented towards the manager/head coach	The face is oriented towards the manager/ head coach
The face is oriented towards the supporting staff	The face is oriented towards the supporting staff
The face is oriented towards own fans	The face is oriented towards the own fans
The face is oriented towards opposing fans	The face is oriented towards the opposing fans
The face is oriented towards a camera	The face is oriented towards a camera around the pitch
The face is oriented towards the ball	The face is oriented towards the ball
The face is oriented away from this teammates	The face is oriented away from his teammates
The face is oriented towards the sky	The face is oriented towards the sky
The face is oriented towards the ground	The face is oriented towards the ground

Unscorable	The orientation of the face cannot be distinguished

Face

Eyes are widened	The eyes are widened
Eyes are constricted	The eyes are constricted
Eyes are closed	Both eyes are closed (<200 ms)
Brows are raised	The brows are raised
Brows are lowered	The brows are lowered
Brows are drawn together	The brows are drawn together
Lips are pressed together	The lips are pressed together
Lips are parted	The lips are parted
Lips corners are pulled upward	The corners of the lips are pulled upwards
Lips corners are lowered	The corners of the lips are lowered
Mouth is open	The mouth is open
Mouth is closed	The mouth is closed (anatomical standard position)
Clenched teeth	The teeth are tightly squeezed together
Tongue out of mouth	The tongue sticks out of the players' mouth
Jaw drop	The jaw drops or is dropped down
Suppressed smile	The corners of the lips are pulled upward, the mouth is closed, and the lips are pressed together
Small smile	The corners of the lips are pulled upwards and the mouth is closed
Large smile	The corners of the lips are pulled upwards, the mouth is open, the lips are parted, eye brow move down, narrow eye aperture
Eyes are not visible	The eyes are not visible
Entire face not visible	The entire face is not visible
Facial expressions unscorable	Facial expression cannot be distinguished

Arm

Left arm is straightened or is straight (= 180 degrees)	The left arm moves to or is held in a straightened position of 180 degrees
Left arm is bend or bends >90 degrees	The left arm moves to or is held in a bend position of >90 degrees
Left arm is bend or bends ≤ 90 degrees	The left arm moves to is held in a bend position of ≤ 90 degrees
Left arm moves or is limp at side	The left arm moves to or hangs at the side of the body
Left arm pressed at side	The left arm forcefully moves to or is pressed to the side of the body
Left arm moves or is extended away from the body	The left arm moves or is extended away from the body

Left arm moves to or is held in front of the body/face	The left arm moves towards or is held in a position in front of the body/face
Left arm moves or is held behind the body	The left arm moves towards or is held in a position behind the body
Left arm moves or is held to the left of the body	The left arm moves or is held to the left of the body
Left arm moves or is held to the right of the body	The left arm moves or is held to the right of the body
Left arm moves or is raised above the head	The left arm moves or is raised above the head
The left arm repeatedly moves up and down	The left arm repeatedly moves up and down
The left arm repeatedly moves back and forward	The left arm repeatedly moves back and forward
The left arm repeatedly moves side to side	The left arm repeatedly moves side to side
Left arm unscorable	The movement of the left arms cannot be distinguished
Right arm is straightened or is straight (= 180 degrees)	The right arm moves to or is held in a straightened position
Right arm is bend or bends >90 degrees	The right arm moves to or is held in a bend position of >90 degrees
Right arm is bend or bends ≤ 90 degrees	The right arm moves to is held in a bend position of ≤ 90 degrees
Right arm moves or is limp at side	The right arm moves to or hangs at the side of the body
Right arm pressed at side	The right arm forcefully moves to or is pressed to the side of the body
Right arm moves or is extended away from the body	The right arm moves or is extended away from the body
Right arm moves to or is held in front of the body/face	The l right arm moves towards or is held in a position in front of the body/face
Right arm moves or is held behind the body	The right arm moves towards or is held in a position behind the body
Right arm moves or is held to the left of the body	The right arm moves or is held to the left of the body
Right arm moves or is held to the right of the body	The right arm moves or is held to the right of the body
Right arm moves or is raised above the head	The right arm moves or is raised above the head
The right arm repeatedly moves up and down	The right arm repeatedly moves up and down
The right arm repeatedly moves back and forward	The right arm repeatedly moves back and forward
The right arm repeatedly moves side to side	The right arm repeatedly moves side to side
Right arm unscorable	The movement of the right arm cannot be distinguished
Arms crossed in front of the body	The arms are crossed in front of the body
The arms move symmetrically or are symmetrically aligned	Both arms move or are aligned in a symmetrical fashion
The arms move a-symmetrically or are a-symmetrically aligned	Both arms move or are aligned in a a-symmetrical fashion

Hand

Left hand opens or is open	The left hand opens up or is held open

Left hand moves or is held in a fist	The left hand moves or is held in a fist
Left hand moves or is held in a cup	The left hand moves or is held in a cup
The left hand repeatedly rotates to the left and right	The left hand repeatedly rotates to the left and right
The left hand repeatedly opens and closes	The left hand repeatedly opens and closes
Left hand unscorable	The left hand movement cannot be distinguished
Right hand open	The right hand opens up or is held open
Right hand in fist	The right hand moves or is held in a fist
Right hand in cup	The right hand moves or is held in a cup
The right hand repeatedly rotates to the left and right	The right hand repeatedly rotates to the left and right
The right hand repeatedly opens and closes	The right hand repeatedly opens and closes
Right hand unscorable	The right hand movement cannot be distinguished
Hand – self touch	
Left hand on hip	The left hand rests on the hip
Left hand touches face	The left hand touches the face
Left hand touches head	The left hand touches the head (excl. face)
Left hand covers face	The left hand cover the face (incl. eyes)
Right hand on hip	The right hand rests on the hip
Right hand touches face	The right hand touches the face
Right hand touches head (excl. face)	The right hand touches the head (excl. face)
Right hand covers face (incl. eyes)	The right hand cover the face (incl. eyes)
Clapping	The palms of each hand repeatedly strike against one another
Unscorable	Self-touching behaviours cannot be distinguished
Hand – manipulators	
Left hand touches shirt	The left hand touches the shirt
Left hand touches badge on shirt	The left hand touches the badge on the shirt
Left hand touches the ground	The left hand touches the ground
Left hand touches the goal	The left hand touches the goal (incl. the post, the net)
Left hand touches the ball	The left hand touches the ball
Left hand touches the corner flag	The left hand touches the corner flag
Left hand touches shoe	The left hand touches one of the player's shoes
Right hand touches shirt	The right hand touches the shirt
Right hand touches badge on shirt	The right hand touches the badge on the shirt
Right hand touches the ground	The right hand touches the ground
Right touches the goal	The right hand touches the goal (incl. the post, the net)

Right hand touches the ball	The right hand touches the ball
Right hand touches the corner flag	The right hand touches the corner flag
Right hand touches shoe	The right hand touches one of the player's shoes
Unscorable	Manipulating behaviours cannot be distinguished

Finger

What

All fingers on left hand extended	All fingers straighten or is straightened
The left thumb is extended	The left thumb straightens or is straightened
The left index finger is extended	The left index finger straightens or is straightened resulting in the index finger being extended
The left middle finger is extended	The left middle finger straightens or is straightened
The left ring finger is extended	The left ring finger straightens or is straightened
The left little finger is extended	The left little finger straightens or is straightened
All fingers on right hand extended	All fingers straightens or is straightened
The right thumb is extended	The right thumb straightens or is straightened
The right index finger is extended	The right index finger straightens or is straightened resulting in the index finger being extended
The right middle finger is extended	The right middle finger straightens or is straightened
The right ring finger is extended	The right ring finger straightens or is straightened
The right little finger is extended	The right little finger straightens or is straightened
Unscorable	Fingers cannot be distinguished

Finger(s) orientation

Finger is oriented towards teammates on the pitch	The finger(s) is (are) oriented towards teammates on the pitch
Finger is oriented towards teammates off the pitch	The finger(s) is (are) oriented towards teammates off the pitch
Finger is oriented towards the manager/head coach	The finger(s) is (are) oriented towards the manager/head coach
Finger is oriented towards the supporting staff	The finger(s) is (are) oriented towards the supporting staff
Finger is oriented towards the own fans	The finger(s) is (are) oriented towards the own fans
Finger is oriented towards the opposing fans	The finger(s) is (are) oriented towards the opposing fans
Finger is oriented towards a camera around the pitch	The finger(s) is (are) oriented towards a camera around the pitch
Finger is oriented towards the sky	The finger(s) is (are) is pointed upwards and oriented towards the sky
Finger is oriented towards the ground	The finger/thumb is pointed downwards and oriented towards the ground
Finger is oriented towards the self (incl. name	The finger/thumb is oriented towards the self (incl. name
Finger is oriented towards the ball	The finger/thumb is oriented towards the ball

Shoulder

Left shoulder moves or is lifted upward	The left shoulder moves or is lifted towards an upward position relative to the anatomical position
Left shoulder moves or is dropped downward	The left shoulder moves or is dropped downwards relative to the anatomical position
Left shoulder moves or is put forward	The left shoulder moves or is put towards a forward position relative to the anatomical position
Left shoulder moves or is pulled backward	The left shoulder moves or is put towards a backward position relative to the anatomical position
Right shoulder moves or is lifted upward	The right shoulder moves or is lifted towards an upward position relative to the anatomical position
Right shoulder moves or is dropped down	The right shoulder moves or is dropped downwards relative to the anatomical position
Right shoulder moves or is put forward	The right shoulder moves or is put towards a forward position relative to the anatomical position
Right shoulder moves or is pulled backward	The right shoulder moves or is put towards a backward position relative to the anatomical position
Shoulders moves symmetrical	The shoulders move in a symmetrical fashion
Shoulders moves asymmetrical	The shoulders move in an asymmetrical fashion
Unscorable	Shoulders cannot be distinguished

Functional codes - emblems

Self-referential/egotistical

Directing hands over head to point out own printed name with finger(s)

Pointing right/left index finger towards the self

Hand(s) in cup behind ears

The index finger is put or held against the lips

Banging with a fist/flat hand on the chest

Acts of love or gratitude

Expressing a love sign

Touching or holding the club badge

Kissing the club badge

Kissing palm of the hand/fingers/wrist

Kissing the ring finger

Kissing the ground

Kissing the ball

Pointing towards the sky

Displaying a 2nd skin
Making the sign of the cross
A cradle rocking movement
Sucking a baby pacifier/thumb
Kissing tattoo
Other
The player moves away from his teammates
Stand still and display a statue
Display a sport-related behaviour
Punching motion
Salute
Airplane
Kicking the ball

2.3 Coding procedure

The Anvil software (Kipp 2001; 2003a; 2003b; 2007; 2012; 2014), a time annotation research tool, allowing to code multi layered time annotations was used for the behavioral coding. The specification editor in Anvil was used to integrate our coding scheme to the software by creating an XML-file. Anvil implements the coding scheme into a graphical user interface (see Fig. 2.1). The set-up allows the coder to assign codes specifying the start and the end time of a given behavior. The video clips can be watched frame by frame, and at different speeds. As in Dael et al. (2012), the variables were aligned in such a way that they could co-occur at the same point in time. In addition to the behavioral codes presented in table I, basic information about the video quality (start time, end time, goal scorer in view and making physical contact), and the intensity measures were coded in Anvil.

One trained observer coded the PGB coding scheme in soccer using the Anvil software, guided by the definitions and the coding guidelines provided (see Appendix F for a full presentation of the coding guidelines of the PGB-CS-S). The Anvil software was tested by conducting a pilot test consisting of 20 goals from the sample. The pilot test was completed by two observers, both with experience with the rating of observational data into a digital software. The pilot test led to a thorough discussion in

the expert panel, and subsequently minor alternations and add-ons to the coding guidelines were implied. The implementation of the coding scheme into the Anvil software was checked, and minor alternations were made before the coding commenced. The observer watched the entire clip at normal speed, before commencing into manually scrolling through the videos frame by frame to detect the onset and offset codes for the different behaviors. The coding procedure for a post goal period followed a fixed order of coding: basic video information, intensity measure, behavioral codes (one body part at the time) and functional codes. At the end of each post score period, the coder checked that all the segments (tracks in Anvil) were coded.

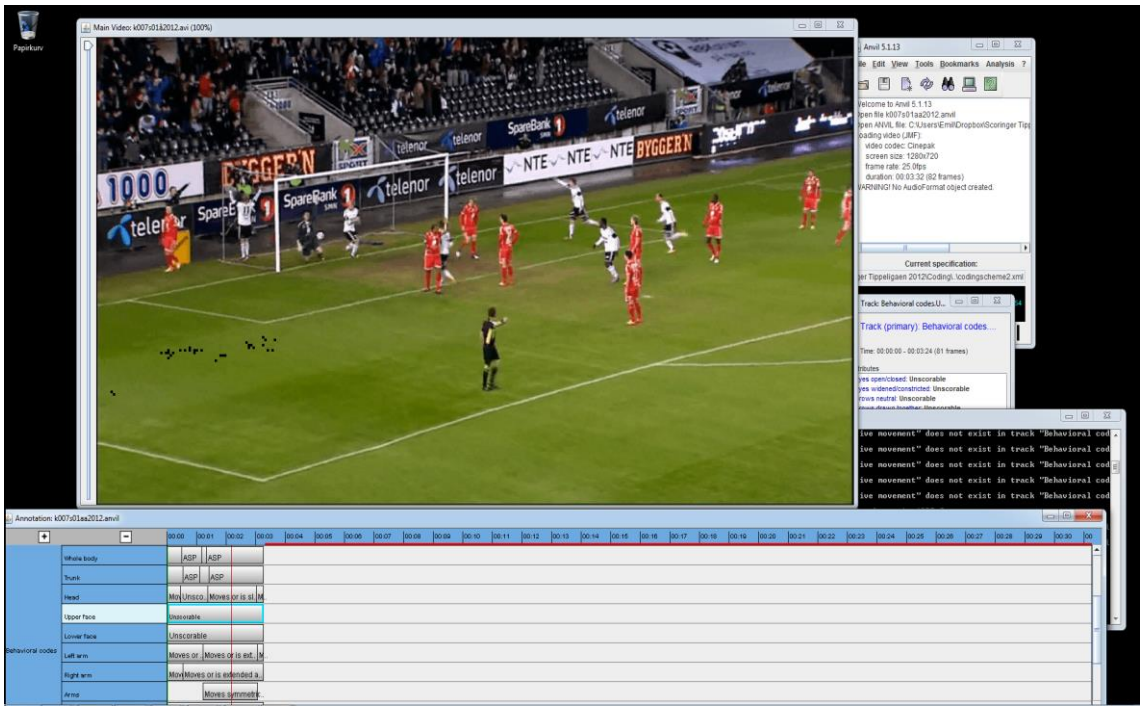

Figure 2.1: *The Anvil coding set-up. For further insight, see Appendix G.*

Interesting contextual variables (e.g. game outcome and standing in the match prior to the goal was scored) were coded separately using Microsoft Access. For a full overview of the contextual variables, see Appendix A.

2.4 Data analysis

After the behavioral coding was finalized frequencies were obtained using the Anvil software. Based on the histograms provided, a discussion in the expert panel led to the exclusion of the following sub-divisions of the PGB coding scheme: all facial expressions, the shoulder movements, the whole body posture and all orientation of movement. Some variables within the sub-divisions of the hand and finger were also excluded. The variables were excluded from further analysis due to lack of visibility, lack of occurrence and/or lack of relevance. Subsequently, the visibly, occurring and relevant data were exported from the Anvil software, into Microsoft Excel and manually plotted into SPSS. The contextual variables were exported from Microsoft Access via Microsoft Excel, and copied into SPSS, completing the SPSS-data file. For all variables except the intensity measures, the values were 0 for *absence* and 1 for *presence* (nominal data). The intensity measures were rated on a 5-point Likert scale (ordinal data).

A concern in observational studies is whether one observer agree on the coding decisions at different time points (Furr & Funder 2007). To check for this bias we conducted intra-rater agreement tests using the "Coder Agreement"-analysis in the Anvil software. Mean Cohen's kappa values for categories of all the behavioral codes in the final sample were obtained (see Appendix B). The re-test was conducted on 12% (25 randomly selected goals) of the final sample as Moesch et al. (2015a), and conducted six weeks after the initial coding was finalized to ensure memory lapse (Cooper, Heron & Heward, 2007). We follow the interpretation of the kappa values used by Dael et al. (2012): Fleiss (1981) consided a kappa value between 0.40 and 0.60 as fair, between 0.60-0.75 as good and over 0.75 as excellent. Bakeman and Gottman (1987) put some concern in kappa of less then 0.70. The results of the intra-rater agreement tests are presented in the result section.

To explore and capture the phenomenon of post goal behavior we had to get as much descriptive information as possible. The descriptive statistics were calculated using SPSS. We ran frequency counts for all the behavioral variables in the data set. By a consequence of coding on an anatomical level we also had the opportunity to compute variables (e.g. to create behaviors investigated by Moll et al. (2010) and Moesch et al. (2015b)). Subsequently, after gathering the descriptive information of the post goal

behaviors, we looked for associations in the data set. As Moll et al. (2010) found significant associations between their nonverbal behaviors and game outcome in penalty shootouts, I used these variables (7) for the initial set of tests. As the data available were nominal, I used chi-square tests to test for associations. Subsequently, chi-square tests were conducted on all the behavioral variables (13) mentioned by Moll et al. (2010). To explore the entire phenomenon of post goal behaviors an exploratory set of tests were conducted. Chi-square tests were ran linking the rest of the behavioral variables (76) in the data set with game outcome in regular soccer games.

Furthermore, we used the significant findings and the tendencies from the association tests linking post goal behaviors to game outcome, and conducted chi-square tests using a sample of the goals were the standing was equal prior to the goal was scored (n = 90) as Moll et al. (2010). Furthermore, we ran tests to further the understanding of the conditions leading to certain post goal behaviors by looking at the relationship between the standing in the match prior to the goal was scored, and the post score behaviors that already had shown a significant association or a tendency to be linked with the game outcome.

When running multiple association tests, Bonferroni corrections stemming from Bonferroni (1936, cited in Bland & Altmann, 1995) is often used to adjust the *p* value for the number of statistical test performed. The Bonferroni method corrects for the heightened probability of significant results due to change when conduction multiple tests on a single data set (Bland & Altmann, 1995). If a null hypothesis is true, a significant different will be observed by chance once in 20 trails, according to the Bonferroni method. To adjust for the heightened likelihood of significant results due to chance, the Bonferroni method introduces the following adjustment of the significance level: (alpha) = 0.05 / (kappa) (Bland & Altmann, 1995).

On the other hand, the Bonferroni method has received critiqued for being too conservative (Perneger, 1998; Narum, 2006), and for being used uncritically with no rationale or discussion (Armstrong, 2014). The main weakness is that the interpretation of a finding depends on the number of other tests performed, which by using common sense seems irrelevant (Pernenger, 1998). This means that the likelihood of type II errors, being that important differences are deemed non-significant, are also increased

by using the Bonferroni method. Perneger (1998) suggested that simply describing what was done and why, and discussing the possible interpretations of each results should provide the reader with enough information to reach a reasonable conclusion without the help of adjustments based on the Bonferroni method. Armstrong (2014) suggested that the Bonferroni correction or similar methods should be considered if; 1) a single test of the null hypothesis that all tests are not significant is required, 2) it is imperative to avoid a type I error and 3) when a large number of tests are carried out without preplanned hypotheses. In the current study, we controlled for multiple tests by using the Bonferroni corrections, but we also discussed possible interpretations of the results without considering the corrections, due to the critique given (Perneger, 1998; Narum, 2006; Armstrong, 2014).

Bearing in mind that all our behavioral variables were nominal data, we did not have many options to look for correlations. Our total intensity measure however, was measured on a 5-point Likert scale (ordinal scale) scaling from very low intensity (1) to very high intensity (5), and was therefore suited for correlation analyses. First, I examined the hypothesis that the total intensity measure predicted game outcome in regular soccer games. Subsequently, I ran correlation test inking the total intensity measure with all the contextual variables in the data set. Ultimately, I conducted simple linear regression analyses to examine the direction of the significant correlations.

3. Results

3.1 The intra-rater agreement analysis

The Cohen's kappa coefficients were measured at the lowest threshold used by Dael et al. (2012), 0.4 ms. In the present study, kappa values for the behavioral variables was found with a range from 0.70 to 0.97, which indicates good to excellent agreement. For the functional variables the range was 0.66-0.67, which indicates good agreement. See Appendix B for a detailed overview of the intra-rater agreement analyses.

3.2 Descriptive results of post goal behavior

A presentation of the descriptive results of the post goal behaviors displayed follows. All the descriptive results are presented in percentages[1].

In figure 3.1, the frequencies for the total intensity are presented. The total intensity measure represented the *overall* intensity of the post score behaviors displayed after a goal was scored. The intensity was measured on a 5-point Likert scale ranging from very low intensity to very high intensity. The occurrences had a normal

[1] Each variable are measured on occurrence, to be either present (yes) or not present (no). Be aware when reading the results that all the nonverbal behaviors in the PGB-CS-S (see table 3.1) can occur at different time point during the same post goal period, which means that the percentages of occurrences can exceeds 100% in all the sub-divisions of the coding scheme. By consequence, this leaves none of the nonverbal behaviors mutually exclusive within a post goal period, and therefore none of the occurrences of *behaviors* adds up to a total of 100%. However, the intensity measure does add up 100%, as it is the single variable that was only rated once in each post goal period.

distribution), with a mean of 2.99 and a standard deviation of 0.965 as central tendencies.

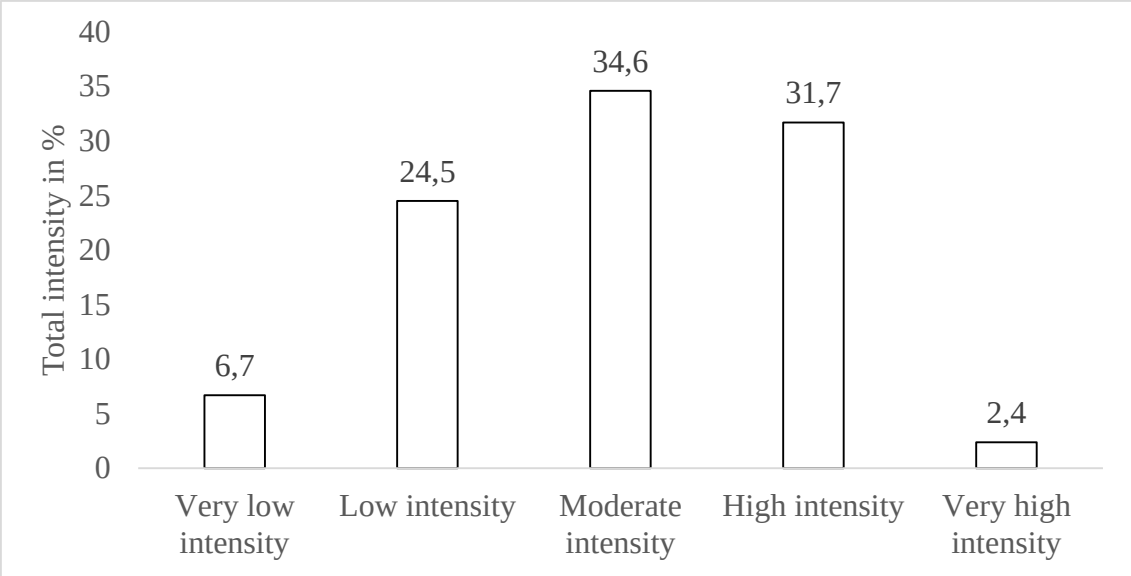

Figure 3.1: *The frequencies of the total intensity measure. The bars represent (from the left): very low intensity, low intensity, moderate intensity, high intensity and very high intensity.*

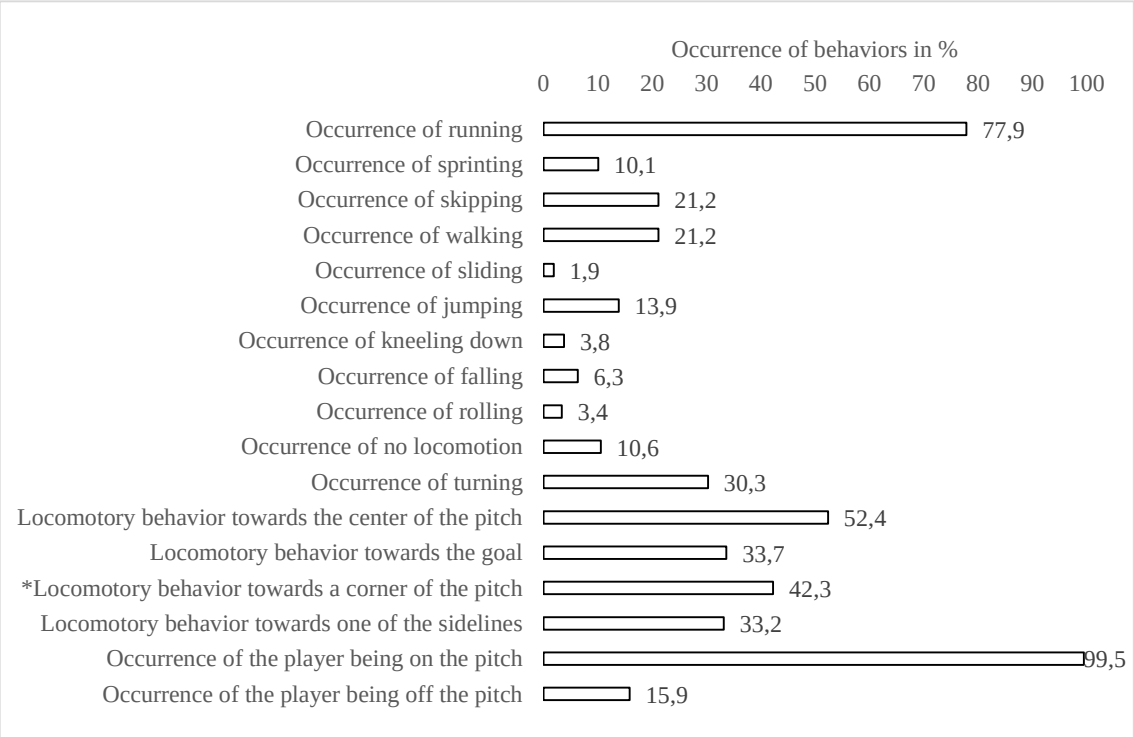

Figure 3.2: *The occurrences of the whole body locomotory behaviors in percentages. The figure presents (from the top: locomotory behaviors, direction of behavior and location of the behavior. *A corner on the opponents half.*

In figure 3.2, the locomotory behaviors are presented. The most common *locomotory behavior* in post score behavior was running, being present in 77.9% of the goals (n = 208). In just 10.1% of the goals sprinting was present. The *direction* of the locomotory behaviors, and the location of the goal scorer is also presented. In 52.4% of the goals the locomotory behavior were directed towards the center of the pitch. Additionally, the goal scorer was located off the pitch in 15.9% of the goals.

In figure 3.3, the *trunk- and head* behaviors are presented. Notably, the trunk was lifted upward and outward in 70.7% of the goals. Furthermore, the *head* had these occurrences on relevant variables: head slightly tilted upward (43.3%), head tilted downward (42.3%) and head highly tilted upward (11.5%) was present in 11.5% of the goals. The head directions are also presented in figure 3.

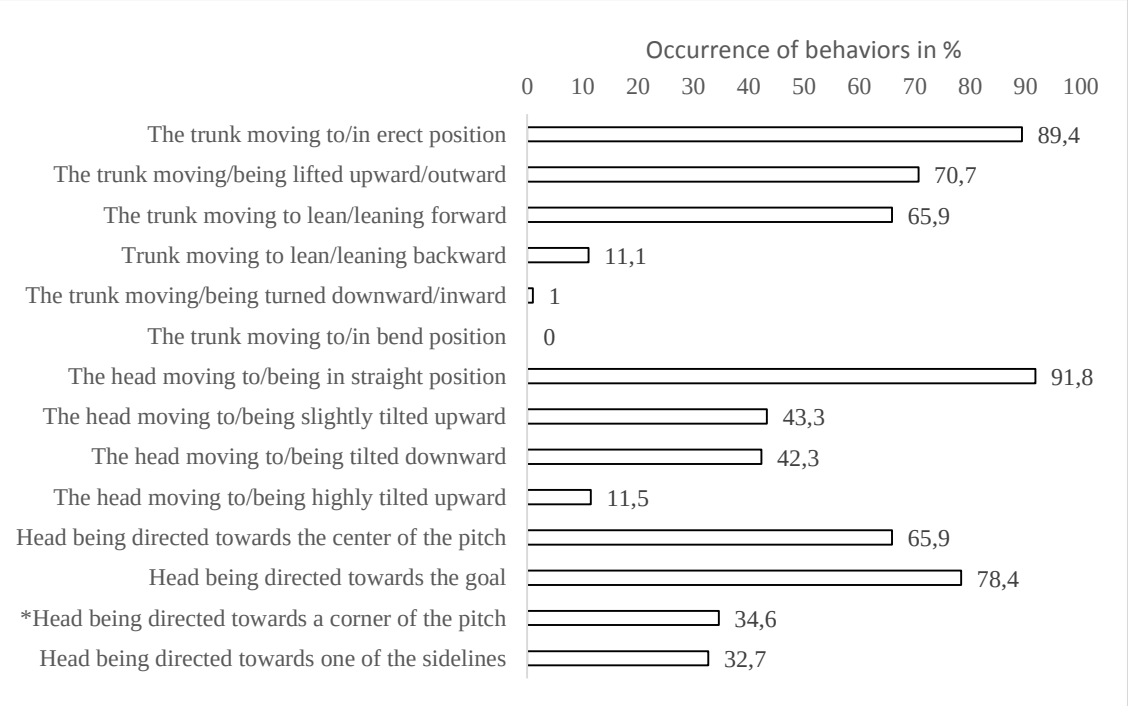

Figure 3.3: *The occurrences of trunk and head behaviors in percentages. The table includes (from the top): trunk behaviors, head behaviors and head directions. *A corner on the opponents half.*

In figure 3.4, the behavioral *arm* behaviors are presented. In summary, the most relevant *left arm* movements had the following occurrences: extended away from the body above head (34.1%), extended away from the body below head (74.5%) and extended away from the body in front of the body below head (18.8%). Additionally, the left arm was straight in 29.3% of the goals, bend less than 90 degrees in 47.6% and

bend more than 90 degrees in 22.1% of the goals. As for the *right arm*, these relevant occurrences were present: extended away from the body above head (13.9%), extended away from the body below head (63.9%) and extended away from the body in front of the body below head (14.9%). Additionally, the right arm was straight in 37.5% of the goals, bend less than 90 degrees in 60.6% and bend more than 90 degrees in 35.1% of the goals. In just 3.4% of the 208 goals, *both arms* were extended away from the body above the head at the same time. If we look at the same behavior *below* the head, that behavior occurred in 48.6% of the goals. Combined, both arms extended away from the body at the same time occurred in 50 % of the goals. In the category where we combined left and/or right arm movement there was an occurrence of one or two extended arms in 89.9 % of the goals.

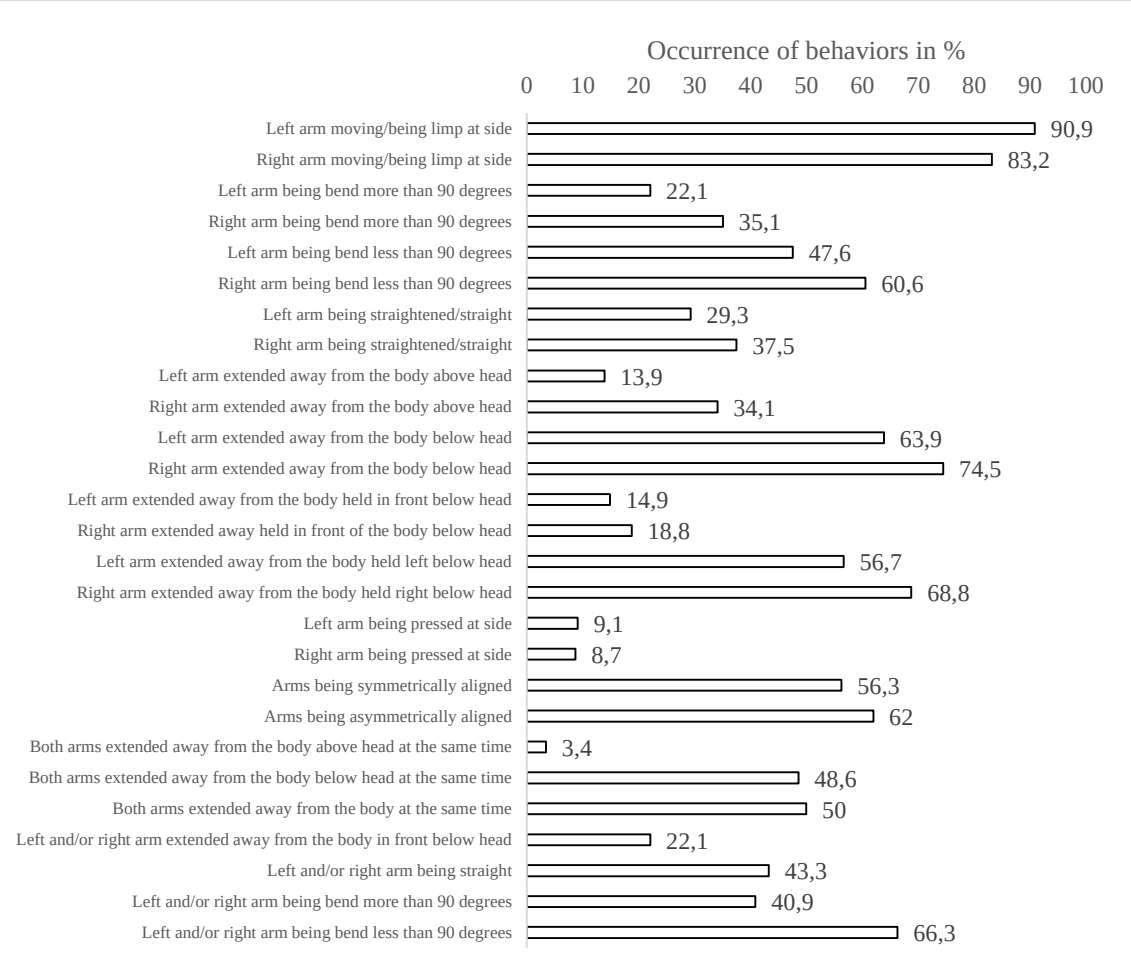

Figure 3.4: *The occurrences of the arm behaviors in percentages. The table includes (from the top):comparison of left and right arm behaviors, behaviors with both arms at the same time and left and/or right arm behaviors.*

In figure 3.5, the *hand* and *finger* behaviors are presented. The occurrence of the most relevant post score behaviors of the *left hand* was: in a fist (19.7%), index finger extended (13.5%) and all fingers extended (5.8%). Additionally, the occurrence of the most relevant post score behaviors of the *right hand* was: in a fist (38.0%), index finger extended (18.5%) and all fingers extended (7.2%). Both hand were in fists at the same time in 18.3% of the goals, all the fingers on both hands were extended at the same time in 5.3% of the goals. The left and/or right was in fist in 39.4 % of the goals. Additionally, in 25% of the goals the left and/right index finger was extended, and in 20.2 % of the goals the goal scorer touched something with either left and/or right.

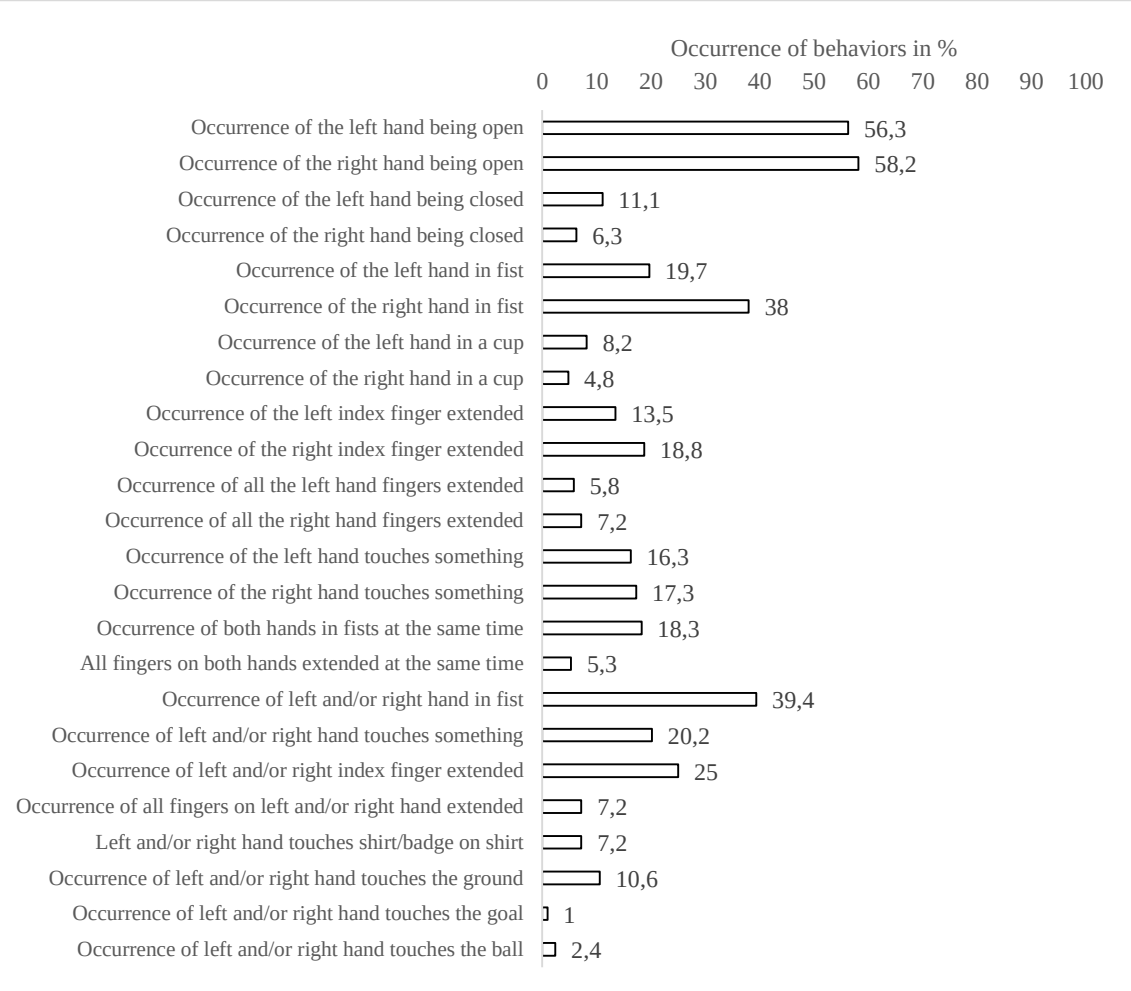

Figure 3.5: *The occurrences of the hand and finger behaviors. The table includes (from the top): comparison of left and right hand- finger behaviors, both hands/all finger behaviors at the same time, left and/or right hand- or finger behaviors.*

In figure 6, the *functional behaviors* are presented. The most relevant functional behaviors had the following occurrences: punching motion (12.5%), vocalization (12.0%), airplane (12.0%) and moving away from teammates (10.1%).

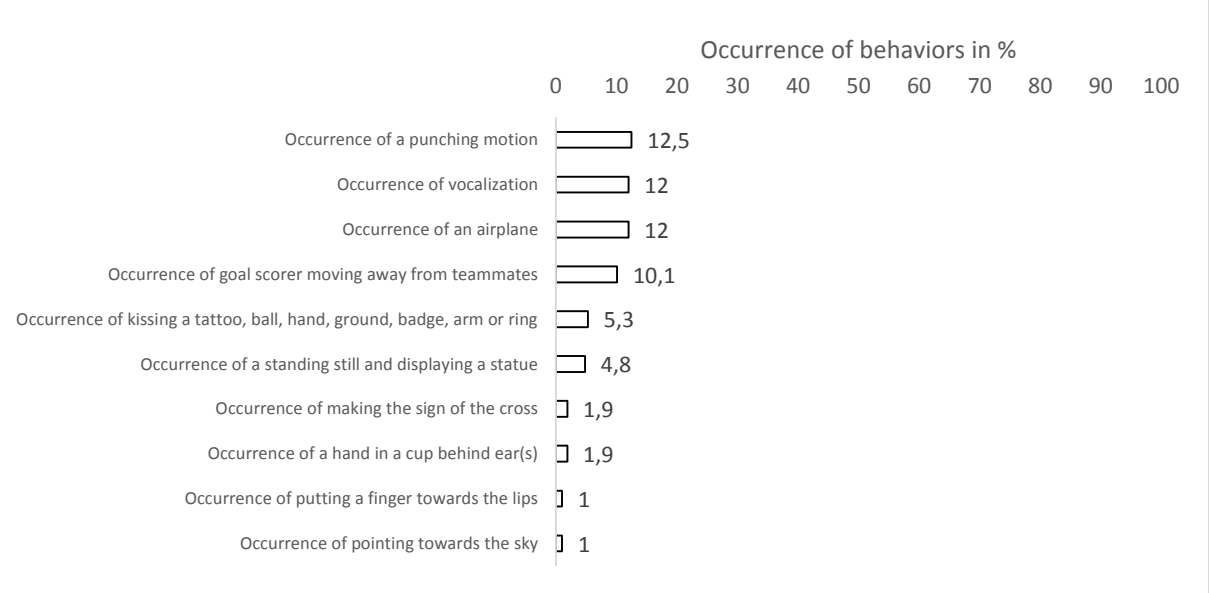

Figure 3.6: *The occurrences of the functional behaviors (emblems).*

3.3 Predictors of post goal behavior

To further understand the conditions that led to certain post goal behaviors, we investigated the relationship between the standing in the match prior to the goal was scored and the post goal behaviors displayed. The results are presented in table 2. Display of the following behaviors occurred more often when the standing in the match were positive: right arm extended away held in front of the body below head and both arms extended away from the body below head at the same time. Contrarily, display of the following behaviors occurred more often when the standing in the match were negative: locomotory behavior towards the center of the pitch and left and/or right hand touches the ball.

Additionally, there are also a *tendencies* that the following behaviors are associated with the standing in the match prior to the goal was scored: right arm being bend less than 90 degrees and both arms being extended away from the body at the same time were more frequent when the standing was positive, while as head being

directed towards the center of the pitch and arms being asymmetrically aligned being more frequent when the standing was negative. After I used the Bonferroni corrections ((alpha = 0.05/25 = 0.002), *none of the findings were significant at p < 0.05.*

Table 3.1: *Chi square test results of the behavioral variables that were in significant association (p<0.05) or showed tendencies of being associated with game outcome when all the goals were included prior to the Bonferroni corrections, and the standing in the match prior to the goal was scored are presented.*

		Standing in the match prior to the goal was scored								
Behavior		-2	-1	0	+1	+2	X2	Df	P-value	φ
Occurrence of locomotory behavior towards the center of the pitch	Y	18	21	43	17	10	13,227	4	0,010	0,252
	N	2	18	47	21	11				
Occurrence of the trunk moving to lean/leaning backward	Y	2	6	9	5	1	1,884	4	0,757	0,095
	N	18	33	81	33	20				
Occurrence of head being directed towards the center of the pitch	Y	18	25	57	21	16	8,388	4	0,078	0,201
	N	2	14	33	17	5				
Occurrence of left arm being bend less than 90 degrees	Y	8	16	48	17	10	2,450	4	0,654	0,109
	N	12	23	42	21	11				
Occurrence of left arm extended away from the body above head	Y	0	3	16	7	3	6,251	4	0,181	0,173
	N	20	36	74	31	18				
Occurrence of left arm extended away from the body held in front below head	Y	2	5	14	4	6	4,210	4	0,378	0,142
	N	18	34	76	34	15				
Occurrence of right arm being bend more than 90 degrees	Y	9	12	36	10	6	3,810	4	0,432	0,135
	N	11	27	54	28	15				

Occurrence of right arm being bend less than 90 degrees	Y	12	21	63	17	13	8,097	4	0,088	0,197
	N	8	18	27	21	8				
Occurrence of right arm extended away from the body below head	Y	15	31	70	23	16	4,962	4	0,291	0,154
	N	5	8	20	15	5				
Occurrence of right arm extended away held in front of the body below head	Y	2	7	16	5	9	9,868	4	0,043	0,218
	N	18	32	74	33	12				
Occurrence of arms being asymmetrically aligned (Missing, n = 5)	Y	17	27	52	19	14	15,117	8	0,057	0,270
	N	0	9	33	14	5				
Occurrence of both arms extended away from the body below head at the same time	Y	5	23	47	14	12	9,329	4	0,053	0,212
	N	15	16	43	24	9				
Occurrence of both arms extended away from the body at the same time	Y	5	23	49	15	12	9,080	4	0,059	0,209
	N	15	16	41	23	9				
Occurrence of left and/or right arm extended away from the body in front below head	Y	3	9	19	6	9	6,790	4	0,147	0,181
	N	17	30	71	32	12				
Occurrence of left and/or right arm being bend more than 90 degrees	Y	10	14	39	15	7	1,839	4	0,765	0,094
	N	10	25	51	23	14				
Occurrence of the left hand being closed	Y	3	3	10	5	2	0,986	4	0,912	0,069
	N	17	36	80	33	19				
Occurrence of the left hand in a cup	Y	5	4	4	2	2	9,918	4	0,042	0,218
	N	15	35	86	36	19				

Occurrence of the left hand not being open	Y	8	13	29	16	6	1,793	4	0,774	0,093
	N	12	26	61	22	15				
Occurrence of the left hand being closed or in a cup	Y	8	6	14	7	4	6,825	4	0,145	0,181
	N	12	33	76	31	17				
Occurrence of the right hand being open	Y	12	21	56	23	9	3,045	4	0,550	0,121
	N	8	18	34	15	12				
Occurrence of all the right hand fingers extended	Y	0	4	8	3	0	4,132	4	0,388	0,141
	N	20	35	82	35	21				
Occurrence of left and/or right hand in fist	Y	9	14	38	16	5	3,017	4	0,555	0,120
	N	11	25	52	22	16				
Occurrence of all fingers on left and/or right hand extended	Y	0	4	8	3	0	4,132	4	0,388	0,141
	N	20	35	82	35	21				
Occurrence of left and/or right hand touches the ball	Y	2	3	0	0	0	13,238	4	0,010	0,252
	N	18	36	90	38	21				
Occurrence of a punching motion	Y	3	7	10	4	2	1,637	4	0,802	0,089
	N	17	32	80	34	19				

*The columns on the table represents, from the right: the post score behavior display, occurrence-labels (yes/no), the goal scorer's team being two or more goals behind (-2), one goal behind (-1), the standing is equal (0), one goal ahead (+1) and two goals or more ahead (+2), the chi-square value (X2), degrees of freedom (df), the significance of the finding (p-value) and phi-coefficient (**φ**).*

After conduction simple linear regression analysis, the current study revealed that the following contextual variables predicted the total intensity of the post goal behavior:

First, the possible influence attendance at stadium had on the total intensity was examined. The results suggested that the higher attendance at the stadium, the higher intensity of the post goal behavior, as indicated in correlations $R^2 = .124$, $b = .124$, $p < 0.10$.

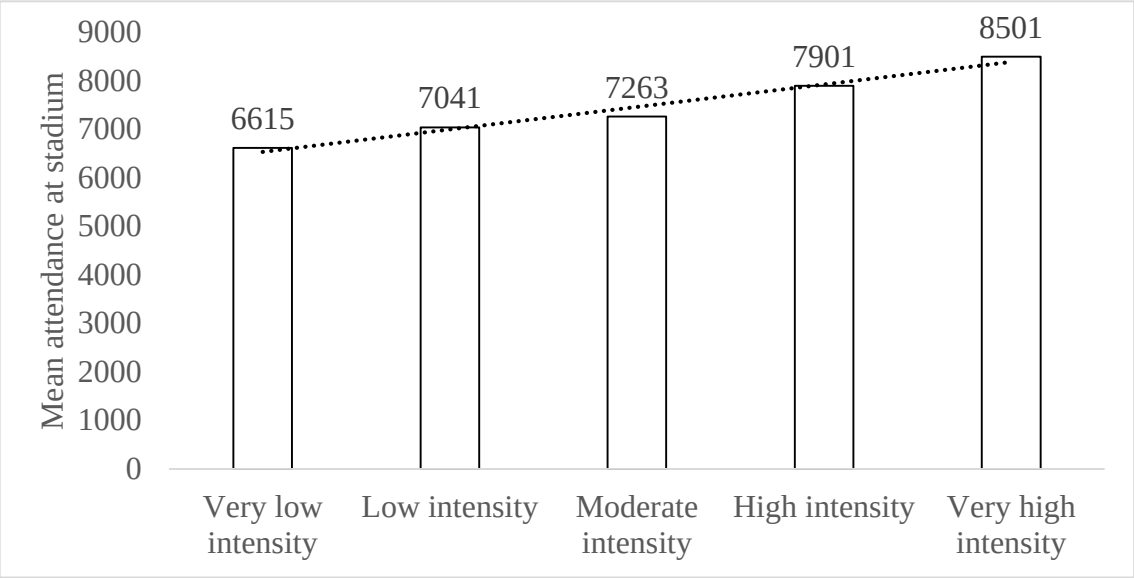

Figure 3.7: *A graphical presentation of the mean attendance at the stadiums in bars showing the distribution of the total intensity of the post goal behaviors.*

Secondly, the possible influence the number of times the scoring team regained the ball before the goal had on the total intensity measure. The results revealed that the higher number of times the team regained the ball, the higher intensity of the post score behavior, shown by the correlations $R^2 = .150$, $b = .150$, $p < 0.05$.

Thirdly, I examined how type or break down attack influenced the total intensity measure. The results revealed that the type of break down attack significantly predicted total intensity, as indicated in correlations $R^2 = .192$, $b = .192$, $p < 0{,}01$. Goals scored after out-maneuvering a team in balance (see the black bar in figure 3.8), led to more intense post goal behavior.

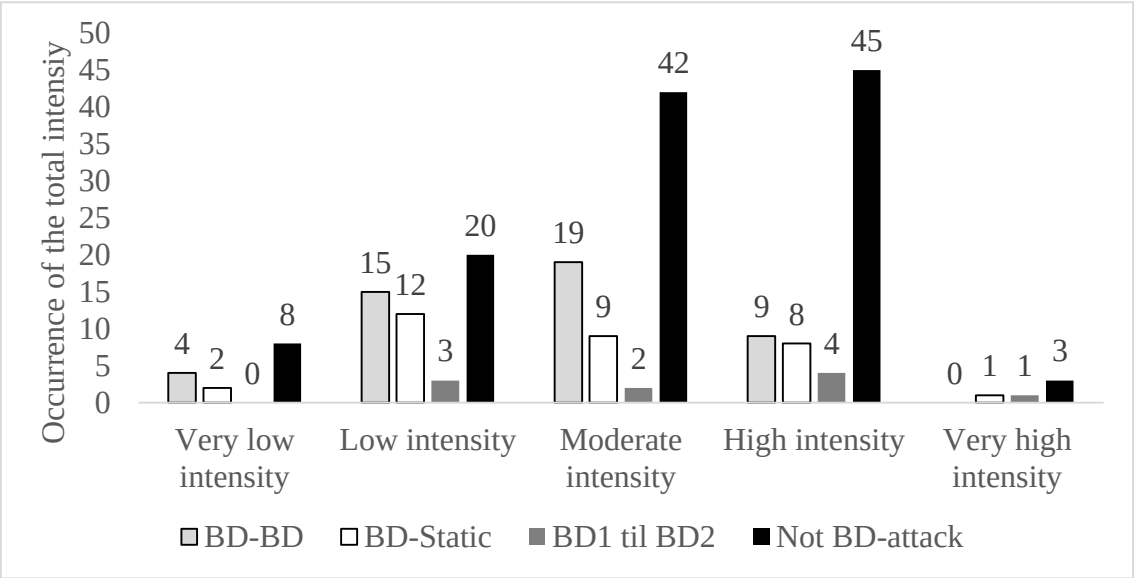

Figure 3.8: *A graphic presentation of the distribution of the total intensity and the type BD-attacks.*

Fourthly, I examined how the type of set piece to start the attack influences the total intensity of the post goal behavior. The results revealed that the type of dead-ball to start the attack significantly predicted the intensity, as indicated in the correlations R2 = .15, b = -.165, $p < 0,05$. To start an attack that led to a goal with set pieces originating far away from the goal (kick-off and goal-kick), led to more intense post goal behavior than set pieces taken from a closer distance to the goal (corner-kick, penalty kick).

3.4 Post score behavior and game outcome

In table 3, all the post score behaviors found to be in significant association with game outcome at $p < 0.05$ are presented. All behavioral variables were tested following the rational order presented in the data analysis section (see Appendix E for a detailed presentation). Display of the following post goal behaviors gave the goal scorer a heightened likelihood of being on the *winning* team: left arm extended away from the body held in front below head, left and/or right arm extended away from the body in front below head, and both arms extended away from the body at the same time. On the contrary, display of the following behaviors gave the goal scorer a heightened likelihood of being on the *loosing* team: locomotory behavior towards the center of the pitch, head being directed towards the center of the pitch, right arm being bend more than 90 degrees, left and/or right arm being bend more than 90 degrees and left and/or

right hand touches the ball. After I used the Bonferroni corrections (alpha = 0.05/7 = 0.007, alpha = 0.05/13 = 0.004, alpha = 0.05/76 = 0.0007) *none of the findings were significant at $p < 0.05$*. The variables left hand in a cup, left hand being closed or in a cup and occurrence of a punching motion seems to have associations both ways, and therefore it is likely that these variables were significant due to change.

Table 3.1: *Chi-square test results of all behavioral variables in post goal behaviors significantly associated with game outcome (win, draw or loose) when all the goals (n = 208) were included, prior to the Bonferroni corrections.*

		Game outcome						
Behavior		*W*	*D*	*L*	X_2	*Df*	*P-value*	φ
Occurrence of locomotory behavior towards the center of the pitch	Y	57	21	31	9,689	2	0,008	0,216
	N	70	17	12				
Occurrence of head being directed towards the center of the pitch	Y	76	26	35	6,772	2	0,034	0,180
	N	51	12	8				
Occurrence of left arm extended away from the body held in front below head	Y	25	1	5	7,166	2	0,028	0,186
	N	102	37	38				
Occurrence of right arm being bend more than 90 degrees	Y	42	9	22	7,274	2	0,026	0,187
	N	85	29	21				
Occurrence of both arms extended away from the body at the same time	Y	73	14	17	7,358	2	0,025	0,188
	N	54	24	26				
Occurrence of left and/or right arm extended away from the body in front below head	Y	34	3	9	6,095	2	0,047	0,171
	N	93	35	34				

Occurrence of left and/or right arm being bend more than 90 degrees	Y	52	10	23	6,164	2	0,046	0,172
	N	75	28	20				
Occurrence of the left hand in a cup	Y	6	3	8	8,251	2	0,016	0,199
	N	121	35	35				
Occurrence of the left hand being closed or in a cup	Y	22	3	14	8,491	2	0,014	0,202
	N	105	35	29				
Occurrence of left and/or right hand touches the ball	Y	0	2	3	8,285	2	0,016	0,200
	N	127	36	40				
Occurrence of a punching motion	Y	11	4	11	8,574	2	0,014	0,203
	N	116	34	32				

The columns in the table represents, from the left: the post score behavior displayed, occurrence-labels (yes/no), the game outcome in descriptive numbers (win, draw, loose), the chi-square value (X**2**), degrees of freedom (df), the significance of the finding (p-value) and phi-coefficient (***φ***).

In addition to the significant associations presented in table 3, quite a few post goal behaviors showed *tendencies* of being associated with game outcome. These behaviors are presented in table 4 in the same structure as table 3.

Table 3.3: *Chi-square test results of all behavioral variables in post goal behaviors that showed tendencies of being associated with game outcome (win, draw or loose) when all the goals (n = 208) were included, prior to the Bonferroni corrections.*

	Game outcome						
Behavior	*W*	*D*	*L*	X_2	*Df*	*P-value*	φ

Occurrence of the trunk moving to lean/leaning backward	Y	11	8	4	4,736	2	0,094	0,151
	N	116	30	39				
Occurrence of left arm being bend less than 90 degrees	Y	68	17	14	5,824	2	0,054	0,167
	N	59	21	29				
Occurrence of left arm extended away from the body above head	Y	22	5	2	4,323	2	0,115	0,144
	N	105	33	41				
Occurrence of right arm being bend less than 90 degrees	Y	84	19	23	4,332	2	0,115	0,144
	N	43	19	20				
Occurrence of right arm extended away from the body below head	Y	95	24	36	4,506	2	0,105	0,147
	N	32	14	7				
Occurrence of right arm extended away held in front of the body below head	Y	29	2	8	5,929	2	0,052	0,169
	N	98	36	35				
Occurrence of arms being asymmetrically aligned (Missing, n = 18)	Y	72	23	34	8,540	4	0,074	0,203
	N	44	12	5				
Occurrence of both arms extended away from the body below head at the same time	Y	70	14	17	5,678	2	0,058	0,165
	N	57	24	26				
Occurrence of the left hand being closed	Y	17	0	6	5,791	2	0,055	0,167
	N	110	38	37				
Occurrence of the left hand not being open	Y	44	8	20	5,777	2	0,056	0,167
	N	83	30	23				

Occurrence of the right hand being open	Y	76	16	29	5,696	2	0,058	0,165
	N	51	22	14				
Occurrence of all the right hand fingers extended	Y	11	4	0	4,365	2	0,113	0,145
	N	116	34	43				
Occurrence of left and/or right hand in fist	Y	47	12	23	4,851	2	0,088	0,153
	N	80	26	20				
Occurrence of all fingers on left and/or right hand extended	Y	11	4	0	4,365	2	0,113	0,145
	N	116	34	43				

The columns in the table represents, from the left: the post score behavior displayed, occurrence-labels (yes/no), the game outcome in descriptive numbers (win, draw, loose), the chi-square value (X^2), degrees of freedom (df), the significance of the finding (p-value) and phi-coefficient (φ).

Subsequently, we conducted the same associational tests as Moll et al. (2010), only including goals were the standing was equal prior to the goal was scored (n = 90). All the behaviors that showed significant association with game outcome when all the goals (n = 208) was included in the sample were tested (see table 3 and table 4).

Display of the following behaviors after a goal when the standing was equal prior to the goal was scored gave the goal scorer heightened likelihood of being in the winning team: right arm being bend less than 90 degrees and both arms extended away from the body at the same time. Contrarily, display of the following behaviors after a goal scored when the standing was equal prior to the goal was scored gave the goal scorer heightened likelihood of being in the *loosing* team: right hand being open. Additionally, the display of the quite a few behaviors showed *tendencies* of being associated with game outcome when the standing in the match was equal prior to the goal was scored. After I used the Bonferroni corrections ((alpha = 0.05/25 = 0.002), *none of the findings were significant at $p < 0.05$*. The variables left and/or right arm

extended away from the body in front below head seems to have associations both ways, and therefore it is likely that the variable was significant due to change.

Table 3.4: *Chi square test results of the behavioral variables that were in significant association (p<0.05) or showed tendencies of being associated with game outcome when all the goals were included prior to the Bonferroni corrections, linked with game outcome in all the goals were the standing was equal prior to the goal was scored (n = 90).*

		Game outcome						
Behavior		*W*	*D*	*L*	X^2	*Df*	*P-value*	φ
Occurrence of locomotory behavior towards the center of the pitch	Y	28	7	8	3,400	2	0,183	0,194
	N	33	11	3				
Occurrence of the trunk moving to lean/leaning backward	Y	6	3	0	2,113	2	0,348	0,153
	N	55	15	11				
Occurrence of head being directed towards the center of the pitch	Y	35	13	9	3,163	2	0,206	0,187
	N	26	5	2				
Occurrence of left arm being bend less than 90 degrees	Y	36	8	4	2,636	2	0,268	0,171
	N	25	10	7				
Occurrence of left arm extended away from the body above head	Y	11	4	1	0,814	2	0,666	0,095
	N	50	14	10				
Occurrence of left arm extended away from the body held in front below head	Y	12	0	2	4,160	2	0,125	0,215
	N	49	18	9				
Occurrence of right arm being bend more than 90 degrees	Y	24	5	7	3,692	2	0,158	0,203
	N	37	13	4				

Occurrence of right arm being bend less than 90 degrees	Y	48	10	5	7,137	2	0,028	0,282
	N	13	8	6				
Occurrence of right arm extended away from the body below head	Y	49	12	9	1,619	2	0,445	0,134
	N	12	6	2				
Occurrence of right arm extended away held in front of the body below head	Y	13	0	3	5,091	2	0,078	0,238
	N	48	18	8				
Occurrence of arms being asymmetrically aligned (Missing, n = 5)	Y	36	10	6	1,790	4	0,774	0,141
	N	21	8	4				
Occurrence of both arms extended away from the body below head at the same time	Y	35	5	7	5,535	2	0,063	0,248
	N	26	13	4				
Occurrence of both arms extended away from the body at the same time	Y	37	5	7	6,484	2	0,039	0,268
	N	24	13	4				
Occurrence of left and/or right arm extended away from the body in front below head	Y	16	0	3	6,027	2	0,049	0,259
	N	45	18	8				
Occurrence of left and/or right arm being bend more than 90 degrees	Y	27	5	7	3,642	2	0,162	0,201
	N	34	13	4				
Occurrence of the left hand being closed	Y	7	0	3	5,167	2	0,075	0,240
	N	54	18	8				
Occurrence of the left hand in a cup	Y	2	2	0	2,591	2	0,274	0,170
	N	59	16	11				

Occurrence of the left hand not being open	Y	20	4	5	1,715	2	0,424	0,138
	N	41	14	6				
Occurrence of the left hand being closed or in a cup	Y	9	2	3	1,450	2	0,484	0,127
	N	52	16	8				
Occurrence of the right hand being open	Y	40	6	10	10,533	2	0,005	0,342
	N	21	12	1				
Occurrence of all the right hand fingers extended	Y	5	3	0	2,454	2	0,293	0,165
	N	56	15	11				
Occurrence of left and/or right hand in fist	Y	26	7	5	0,133	2	0,936	0,038
	N	35	11	6				
Occurrence of all fingers on left and/or right hand extended	Y	5	3	0	2,454	2	0,293	0,165
	N	56	15	11				
Occurrence of left and/or right hand touches the ball	Y	X	X	X	X	X	X	X
	N	X	X	X				
Occurrence of a punching motion	Y	5	2	3	3,434	2	0,180	0,195
	N	56	16	8				

The columns in the table represents, from the left: the post score behavior displayed, occurrence-labels (yes/no), the game outcome in descriptive numbers (win, draw, loose), the chi-square value (X^2), degrees of freedom (df), the significance of the finding (p-value) and phi-coefficient (φ).

Ultimately, I examined the hypothesis that total intensity measure predicted game outcome in regular soccer games. The findings showed that the higher intensity of the post score behavior, the higher chance that the player was on a team that ended up winning the match, as indicated by the correlations $R^2 = .143$, b = -.143, p = <0.05.

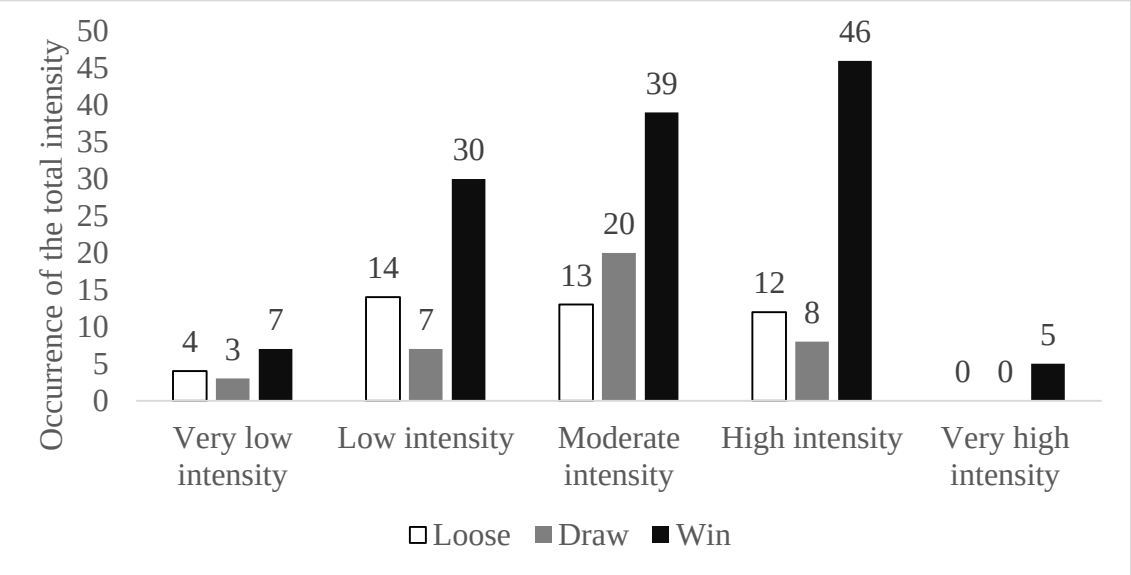

Figure 3.9: *A graphical presentation of the distribution of the total intensity and game outcome.*

4. Discussion

In general, quantitative research of nonverbal behaviors in on-going sport competitions or matches are sparse. More specifically, previous research on the topic of post-shot behaviors (Moesch et al. 2015b; Moll et al. 2010; Bornstein & Goldschmidt, 2008) has limited their studies to investigating just a few variables. Therefore, the purpose of the current study was to: 1) develop a reliable coding scheme to capture the phenomenon of "post goal behavior" specifically suited for the game of soccer, 2) provide a detailed description of the post goal behaviors displayed, 3) investigate possible predictors of post goal behaviors, and 4) investigate the relationship between post goal behaviors displayed and game outcome of regular soccer games. The results will be discussed in relation to the theory of emotional contagion and impression formation (incl. schema-driven impression formation).

4.1 The post goal behavioral coding scheme in soccer (PGB-CS-S)

The intra-rater agreement analysis revealed that the post goal behavioral coding scheme in soccer (PGB-CS-S) was suited as a tool to investigate the phenomenon of post goal behaviors in soccer in an objective manner. The kappa values for the behavioral variables in the present study ranged from 0.70 to 0.97, which indicated good to excellent agreement. The range of the functional variables (emblems) were 0.66-0.67 indicating good agreement. Dael et al. (2012) showed inter-rater agreements ranging from 0.47 until 1.0 at the same threshold (4 ms) as the analysis conducted in the present study. Even when they increased their threshold to 40 ms their range were still 0.62-1.0. Comparing these kappa values indicates that the PBG-CS-S used in the current study is superior to the original BAP system. In additional comparison, Moll et al. (2010) had the range 0.32-0.94 in their inter-rater agreement analysis, and had to exclude the behavior "torso pushed out" due to only slight agreement.

Additionally, Moesch et al. (2015a) has developed a handball specific coding scheme (H-PSB-CS) for post-shot behaviors. Due to bad inter- and intra-rater agreements, the coding scheme, which consisted of 27 behaviors in the preliminary stages, ended up with just 11 behaviors in the final version. Moesch et al. (2015a) stated that most of the low inter- and intra-rater agreements were due to cross coding. The

main difference between the PGB-CS-S developed in this study, and the H-PSB-CS developed by Moesch et al. (2015a) is the level of specificity. It is likely to believe that because of the choice of rating on an anatomical level based on the BAP-system developed by Dael et al. (2012), the present study has managed, as the first study on nonverbal behaviors in post-performance behaviors, to develop objective coding descriptions that left us enable to code reliably throughout the PGB coding scheme in soccer containing 226 nonverbal behavioral variables.

4.2 Descriptive results of post goal behavior

The discussion of the descriptive results follows the same structure as the PGB-CS-S. First, the descriptive results of the whole body locomotion variables (figure 3.2) revealed that in 77.9% of the goals the goal scorer was running. This was by far the most frequent locomotory behavior, which seems logical as most goals are scored while running. That being said, the fact that behaviors like jumping (13.9%), kneeling down (3.8%) rolling (3.4%) and sliding (1.9%) were present shows that there is a diversity in the locomotory behaviors in post goal behaviors. These locomotory behaviors might be expressed due to spontaneity (Tracy & Matsumoto, 2008). Furthermore, moving towards the center of the pitch (52.4%) was the most common direction of the locomotory behavior. This seems logical, as the goal scorer needs to get back to his own half for the game to commence. Bornstein and Goldschmidt (2008) labeled this behavior as a team-oriented behavior. Contrarily, locomotory behavior towards one of the corners on the opponents half was present in 42.3% of the goals, locomotory behavior towards the goal was present in 33.7% of the goals, and either or was present in 63% of the goals. This might be due to the fact that the fans often is located in the corners or behind the goal, which were true in 76.4% of the goals. Expanding this examination, the goal scorer moved off the pitch in 15.9% of the goals. These behaviors, which could be interpreted as irrational movement patterns in regard to the fact that the goal scorer needs to get back to his own half for the game to commence, might show that the goal scorer had an urge to attend to and possible interact with the fans, as highlighted to be an individualistic post-scoring behavior by Bornstein and Goldschmidt (2008). In the light of the theory of *emotional contagion*, these post goal behaviors might show that the goal scorer was transferring his expressions to nearby individuals, here the fans. When the former Chelsea skipper Frank Lampard scored his 100th goal for Chelsea, he displayed a second skin stating: *"100 not out. They were all*

for you. Thanks!", and in a post-match interview, he explained: *"I was merely saying the goals were for the fans, for the support I've had"* (Cross, 2008). This might indicate that the relationship between the fans and goal scorer should not be underestimated in the given context. These directions of locomotory behavior can also be interpreted as a ritual or a learned behavior (Bandura, 1977), as in 23.6%, no supporting fans were located behind the goal, or in the corners on the opponents half.

Subsequently, the trunk and head behaviors (figure 3.3) showed that the trunk was lifted upward and outward in 70.7% of the goals. Compared to the findings of Moll et al. (2010) where the "chest expanded" behavior was present in only 14.8% of their goals, the findings in the present has a high number of occurrences. This huge difference might be caused by that fact that when players run, the trunk tend to be lifted as part of the running technique. It is also likely to believe that the post goal behaviors in an on-going match involves more locomotory behaviors than after a goal is scored in a penalty shootout. This is acknowledge by Moesch et al. (2015b), which labels penalty shootout to be "a very static and standardized situation" (p. 97). Furthermore, the head was slightly tilted upward in 43.3% of the goals. In Moll et al. (2010) the head was slightly tilted in only 24.5% of the goals. Notably, the environment surrounding the goal scorer is different in an on-going match, compared to a penalty shootout, were the other players (excl. the goalkeeper) need stay on the other half of the pitch when the penalty kick is executed. The contextual variables of the number of teammates and opponents in the 18-yard box when the goal was scored revealed that a mean of 3.35 teammates were in the 18-yard box when the goal was scored, and a mean of 6.79 opponents were in the 18-yard box when the goal was scored. The fact that post goal behaviors in on-going matches involved more players could explain the higher occurrence of head movement. An other factor to take into consideration is that the stands in soccer are elevated from the pitch. On the contrary, the goal scorers head was tilted downward in 42.3% of the goals. Compared to Moll et al. (2007) were the goal scorer gazed down in 72.2% of the goals, the occurrence of this behavior was less frequent in on-going matches. The high number of teammates and opponents in the 18-yard box when the goal was scored could also explain this behavior, as it increases the number of possible objects to orient the head (gaze) towards. The most frequent head direction were head being directed towards the goal (78.4%), which seem logical. A goal is the most significant part of a soccer game, and the goal scorer will surely check if the ball crossed the line. Then, the

“head being directed towards the center of the pitch”-variable is more interesting being present in 65.9% of the goals compared to the locomotory behaviors towards the center of the pitch only being present in 52.4% of the goals. A possible explanation could be that even though the goal scorer is moving towards the corner or the dead line to possibly attend to the fans, he is also interested in where his teammates are located in order to organize a collective celebration of the goal. In terms of the emotional contagion mechanism, this could be explained by the heightened potential of contagion when the person is in a close relationship with the other individuals (Hatfield et al., 1994). When attending to both teammates and fans the number of members in the group increases, and the potential of contagion thereby increases.

The arm behaviors (figure 3.4) showed that left and/or right arm were extended away from the body in 89.9% of the goals. This indicates that nearly 9 out of 10 goals had arm behaviors that deviate from standard arm movements of running or standing still (the anatomical standard position), which again indicates that most likely approximately 9 out of 10 goals were *celebrated* using the arms. On the contrary, it seems that approximately 10% of the goals did not include any celebratory post goal behaviors. This finding is in line with the findings of Moesch et al. (2015b) were none nonverbal behaviors were observed in 6.4% of the post-shot periods. Furthermore, more arm behaviors were displayed with the right arm compared to the left, which make sense in regards to the fact that most human have the right side as dominant. Both arms extended above the head at the same time were only present in 3.4% of the goals, while in Moll et al. (2010) 39.7% of the goals had this behavior. Again, a quite different finding in an on-going match compared to a penalty shootout. Logically you can assume that the importance of the situation and timing of the incidents has something to do with this. This assumption is supported by the finding in Moesch et al. (2015b), that revealed that more post-shot behaviors were displayed in play-off matches (higher stakes) compared to league matches. In a penalty shootout, the team is so reliant on the individual players’ success, and that might lead to more post goal behaviors (e.g. the pride expression of both arms extended above the head) (Tracy & Robins, 2007). When looking at right and left arm separately, the right arm was extended above the head in 34.1% of the goals, and the left arm in 13.9% of the goals. Notably, the present study has acknowledge arms being “pressed at side” as a way to express a celebratory behavior using the arms in the post goal period. These variables was present in 9.1% of

the goals with the left arm, and in 8.7% of the goals with the right arm. Having said that, the occurrences of the arm behaviors indicates that extended arms should be seen as the most frequent, and possibly the most influential arm behaviors in post goal behavior. This might have to do with expansion and subsequently the effect of dominance, which will be discussed later, in relation to the relationship between the post goal behaviors and game outcome.

The next section describes the hand and finger behaviors (figure 3.5). One or both hands were in a fist or in fists in 39.4% of the goals. Compared to Moll et al (2010) that had one or two fists occurring in 58.2% of the goals it is again a reduced occurrence in post goal behavior stemming from regular games in soccer. In handball, Moesch et al. (2015b) revealed that one or two fists were displayed 0.50 times per post-shot period on average. In addition to the fist-variables in Moll et al. (2010) we acknowledged an extended index finger and the behavior of all the fingers extended on one or two hands to be celebratory behaviors using the fingers. Having one or two index fingers extended (*only* the index finger) occurred in 25% of the goals. This variable might be justified as a learned behavior after modeling other more experienced athletes (Bandura, 1977), Ronaldo Luis Nazario de Lima perhaps being the prime modulator. Having all fingers extended on one or two hands occurred in 7.2% of the goals.

Finally, the functional variables (figure 3.6) also referred to as emblems will be addressed. None of the behaviors occurred in more than 12.5% of the goals, which indicates that none of the behaviors stands out. Having said that, the fact that at least one of the emblems occurred in 49.5% of the goals in the present study, indicates that they should be acknowledged as an important group of post goal behaviors. Unfortunately, we had to exclude the facial expressions from the data used in the present study.

In summary, the current study gives a detailed description of the nonverbal behaviors that occurred in the post goal period in regular soccer games (excl. facial expressions). The celebratory behaviors of the arms and hands showed in general lower occurrences in regular soccer matches compared to the post goal behaviors displayed in a penalty shootout (Moll et al. 2010). This finding is supported by the finding in Moesch et al. (2015b), that revealed that more post-shot behaviors was displayed in

play-off matches (higher stakes) compared to league matches. Bornstein and Goldschmidt (2008) also highlighted that a winning goal in an important match is more likely to be celebrated. On another note, the findings differs from the finding in Moesch et al. (2015b) that showed that the number of post-shot behaviors decreased during the course of the match. The fact that break of 5-10 minutes is present prior to a penalty shootout might explain this difference. Contrarily, "chest lifted upward and inward", and "head slightly tilted upward" had a higher occurrence in comparison to the same behaviors in penalty shootouts (Moll et al. 2010). In the present study, new post goal behaviors were identified and coded: arms being pressed at side, index finger extended, all fingers extended, and the functional behaviors as a group of behaviors.

4.3 Predictors of post goal behavior

To further the understanding of post goal behaviors the present study examined possible predictors of post goal behaviors. After using the Bonferroni corrections, none of the significant findings of the chi-square tests were significant at $p<0.05$. However, with the Bonferroni being criticized for being too conservative (Pernenger, 1998; Narum, 2006) we allow ourselves to speculate. Prior to the Bonferroni corrections the locomotory behavior towards the center of the pitch was significantly associated with the standing in the match prior to the goal was scored being negative (the goal scorer's team was trailing by one or more goals). Logically, this seems to make sense. The aim of every soccer games is for a team too at least gain a point from the game, which will leave the goal scorer prone to get back to his own half to restart the game. Additionally, the post goal behavior "left and/or right arm touched the ball" was also associated with the standing in the match being negative. With the same reasoning, the aim to get a result (a point or better) from the match makes the goal scorer prone to collect the ball to get the game back in to action.

Furthermore, attendance at the stadium significantly predicted the total intensity of the post goal behaviors displayed. A simple linear regression revealed that the higher attendance at the stadium, the higher intensity of the post goal behaviors. It is likely to believe that a higher attendance expresses higher intensity than a lower attendance. The mechanism of emotional contagion could give an explanation, as Barsade (2002) revealed that a greater intensity of expressions led to an elevated potential for contagion. Furthermore, the higher number of times the team regained the ball, the higher intensity

of the post goal behaviors was displayed. Goal scored after out-maneuvering a team in numeric balance also led to more intense post goal behavior. Attacks that starts with a dead-ball situation far away from the goal (goal-kick and kick-off) led to more intense post goal behaviors compared to dead-ball situations closer to the goal (corner-kick and penalty-kick). These three predictors seems to indicate that the more effort that is put into the build-up to the goal at team level, the more intensity of the post goal behaviors. Interestingly, individual efforts such as goal rating skill, the distance the goal was scored from, and number of touches prior to goal was scored, did not predict the intensity. This seems to indicate that for the intensity of the post goal behaviors, team efforts plays a bigger role than individual efforts prior to the goal is scored. The framework of team cohesion used by Bornstein and Goldschmidt (2008) gives support to this indication. Carron and Brawley (2000) characterize soccer as an "interactive dependence"-sport where all member of a team rely on each other's action during the entire competition. In this category, the team rely heavily on cohesion to success. It is likely to believe that such a mechanism can explain why the predictors of intense post goal behaviors involved team effort.

4.4 Post goal behaviors and game outcome

The results of the chi-square tests after the Bonferroni corrections were conducted showed that none of the findings associating post goal behaviors with game outcome were significant at $p<0.05$. This is different compared to Moll et al. (2010), thus results revealed that the players were more likely to be in the team that won the penalty shootout after display of the following celebratory moves: both arms extended out from the body below head-height or raised above the head, both arms raised above the head, both arms below the head, both hands made into fists and chest expanded. This might indicate that post goal behaviors play a less greater role during regular soccer games compared to the high stakes nature of a penalty shootout. This assumption is supported by the finding of Moesch et al. (2015b), which found that more post-shot behaviors was displayed during the play off compared to games in the regular season. Another explanation can be that the post goal behaviors that are important in regular games are the once expressed by teammates, or even the supporting fans. In the manner of significant findings, it is also important to address the fact that Moll et al. (2010) did not use Bonferroni corrections.

Due to the critique of the Bonferroni corrections of being too conservative (Pernanger, 1998; Narum, 2006), some of the significant associations found prior to the corrections will be discussed. For example, both arms extended away from the body at the same time (same as both arms extended out from the body below head-height or raised above the head in Moll et al. (2010)) were significantly associated with game outcome prior to the corrections, in both the chi-square test including all the goals, and in the test that included only the goals were the standing was equal prior to the goal was scored. This resemblance with previous findings might indicate that celebratory behaviors where both arms are extended out from the body enhances the likelihood of the player to be on the winning team of a soccer game, both in a regular game and in a penalty shootout regardless. This behavior is also been demonstrated to express the self-conscious emotion of pride (Tracy & Robins, 2004). Subsequently, the results are in accordance with the idea that display of pride is a way to inform others of an individual achievement (Tracy & Robins, 2007). As, Moll et al. (2010) the present study offer two mechanisms to explain the current findings of behaviors which gave the goal scorer a heightened likelihood of being on the team that ultimately won the game. First, the post goal behaviors displayed had a positive effect on teammates and supporting fans, and secondly, the post goal behaviors displayed had a negative impact on the opposition. Based on the mechanisms of emotional contagion, expressions by the goal scorer induces emotions in the people that observe the expressed behaviors (Hatfield et al., 1994). Van der Schalk (2011) showed that a more close and likeable relationship between persons led to more emotional convergence occurring. Even more relevant to the present study, were the findings made by Totterdell (2000), which revealed that positive moods resulted in enhanced performance in elite cricket. The theory of impression formation can add to the understanding of these behaviors. Warr and Knapper (1968) proposed that perceptions of others influences judgments about the observed person, and subsequently leading to affective responses. Fiske and Taylor (1991) highlights schema-driven impression formation as an efficiently way to categorizes persons into certain categories by using cues. First, the post goal behaviors displayed had a positive effect on teammates and supporting fans. Both arms extended away from the body at the same time is an expression of pride. Following the process of emotional contagion, I can suggest that the expression of that particular behavior led to an increased feeling of dominance and self-esteem within the self of the goal scorer. Based on the theory of schema-driven impression formation, teammates made an

impression of the expressed behavior, and thereby categorized the goal scorer as "dominant" (e.g. powerful, expanded, strong). This impression and the suggestion that the feeling of dominance were perceived by teammates through the mechanism of emotional contagion, could subsequently affect the teammate's future performance; leading the team into victory. I can also suggest that the supporting fans could perceive in the same way, and by consequence of that increase the intensity of their cheering. Secondly, the opponent players and fans can, by perceiving positive moods in the team that scored the goal and create impressions of a dominant opponent lower their future performance and the intensity of the cheers from the audience. These two mechanisms in partnership can explain the association between extending both arms away from the body and the heightened likelihood of being on the team that ultimately win the game.

Contrarily, the following behaviors were significantly associated with a heightened likelihood of being on the loosing team in regular soccer games: locomotory behavior towards the center of the pitch, head being directed towards the center of the pitch, right arm being bend more than 90 degrees and left and/or right arm being bend more than 90 degrees. These variables has not been coded in previous research, and with the Bonferroni correction judging them not being significant, these interpretations should be regarded as speculations. The pattern in these behaviors is that no expansion or signs of dominance seems to be present.

Ultimately, the results revealed that the higher intensity of the post goal behaviors, the higher change the player had of being in the team that ultimately won the game. This is the only significant finding that showed that post goal behaviors have an effect on team performance in regular soccer games. I suggest based on the already mentioned theories of emotional contagion and schema-driven impression formation that intense post goal behavior could lead to contagion of power and energy. Barsade (2002) proposed that expressions with greater intensity led to more contagion due to the heightened attention they attract. If the goal scorer adds intense post goal behaviors to an already close relationship between the people within the team, it seems reasonable to believe that the potential of contagion is elevated. If we also add in that the supporting fans increases the intensity of their cheering and support, it is easy to anticipate that confidence, energy and the feeling of dominance are elevated within the team and the supporting fans.

4.5 Limitations and future research

The present study is limited by the fact that only occurrence are taken into account. For example, Moesch et al. (2015b) interpret frequencies of post-shot behaviors. The present study solely focus in the individual responses of the goal scorer. No team interaction variables were coded. For example, Moesch et al. (2015b) included touch behaviors in their study. No description of facial expressions were obtained to due the video quality of the footages used. No inter-rater agreement analysis were conducted.

However, it is important to acknowledge the possibility that the findings in the present study is just the "tip of the iceberg" in this field of research. There is a lot more just in the data acquired in this coding procedure. The data files contain frequencies of all post goal behaviors, duration of all post goal behaviors, the time-alignment of all the behaviors, and how the intensity of the behaviors change within a given post goal period. This article should be regarded as a starting point, and hopefully other researchers continues the trail towards a more complex understanding of *post goal behaviors* in soccer.

4.6 Conclusion

The present study has furthered the knowledge of nonverbal behaviors in sport contexts by providing a coding scheme to reliably code post-performance nonverbal behaviors in the context of post goal behaviors in regular soccer games. Furthermore, the present study has described the phenomenon of post goal behaviors in regular games in soccer in detail. We have revealed significant evidence of four different predictors of elevated intensity of post goal behaviors.

Most importantly, the present study has revealed that the intensity of the post goal behaviors displayed predicted game outcome in regular soccer games. The higher intensity of the post goal behaviors, the higher chance of being on the team that ultimately wins the game.

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Table overview

Figure overview

Abbreviations

E.g.	For example
PGB-CS-S	The Post Goal Behavioral Coding Scheme in Soccer
PGB	Post Goal Behavior

Appendix A

The full list of the contextual variables

The minute were the goal was scored (0-90 min)
Number of goals home team before
Number of goals away team before
Number of goals home team after the goal
Number of goals away team after the goal
Number of goals home team at full time
Number of goals away team at full time
The goal is scored at home or away from home
Standing in the match prior to the goal is scored
Goal scored by winning, draw or losing team at full time (game outcome)
Attendance at stadium
Stadium capacity
The goal was scored in a local derby
The goal was an own goal
The goal was scored by a sub

Goal scorers nationality

The players position on the pitch

Goal skill rating (1 – 2 - 3)

Number of team mates in the 18 yard box when goal scored

Number of opposition in the 18 yard box when goal scored

Fans behind the goal on the same side as the goal is scored

Fans in one of or both of the corners on the same side as the goal is scored

Type Break Down-attack

Type Dead Ball-attack

Type Dead Ball-start of the attack

Sone of attack start

Corridor of attack start

Number of passes in the team before the goal

Number of touch in the team before the goal

Number of times of regaining the ball before the goal

Artificial or natural grass

Length of attack (sec)

First goal

First goal and outcome

Finishing technic

Area of the finish

Body part used to finish

The touch number of the finish

Pressing climate when finishing

Appendix B

Table B.1. *Kappa coefficients for all the post score behaviors included in the final sample (N = 208). The nonverbal behaviors presented in the coding scheme are divided into categories (attributes) used in Anvil. See the coding guidelines in the Appendix for additional information.*

	Temporal duration
	Kt1
Category	40 ms
Video quality	0.97
Physical touch	0.94
Total intensity measure	0.87
Locomotory behavior	0.88
Location of locomotory behavior	0.94
Direction of locomotory behavior	0.86
Trunk erect position (ASP)	0.78
Trunk lean forward/backward	0.77
Trunk chest	0.75
Head tilt up/down	0.70
Head forward/backward	0.82

Direction of head movement	0.83
Left arm limp/extended/pressed	0.86
Left arm held left/right	0.92
Left arm held in front/behind	0.86
Left arm raised above head	0.95
Left arm straight/bend	0.89
Right arm limp/extended/pressed	0.77
Right arm held left/right	0.85
Right arm held in front/behind	0.80
Right arm raised above head	0.92
Right arm straight/bend	0.85
Alignment of arms	0.82
Left hand movements	0.76
Left hand manipulators	0.85
Left finger movements	0.83
Right hand movements	0.71
Right hand manipulators	0.78

Right finger movements	0.77
Functional codes whole body	0.66
Functional codes face	0.66
Functional codes arm(s)	0.67
Functional codes hand(s)	0.67
Functional codes finger(s)	0.67
Functional code away from teammate(s)	0.67

Appendix C

Table C.1: *Occurrences and central tendencies of the overall total intensity measure (n = 208).*

Very low intensity	**6,7%**
Low intensity	24,5%
Moderate intensity	34,6%
High intensity	31,7%
Very high intensity	2,5%
Mean	*2,99*
Standard deviation	*0,965*

Appendix D

Table I. Occurrences of all reliable coded behavioral variables of the post score behavioral coding scheme in soccer.

Behavior	*Yes %*	*No%*
Locomotion		
Occurrence of running	77,9	22,1
Occurrence of sprinting	10,1	89,9
Occurrence of skipping	21,2	78,8
Occurrence of walking	21,2	78,8
Occurrence of sliding	1,9	98,1
Occurrence of jumping	13,9	86,1
Occurrence of kneeling down	3,8	96,2
Occurrence of falling	6,3	93,8
Occurrence of rolling	3,4	96,6
Occurrence of no locomotion	10,6	89,4
Occurrence of turning	30,3	69,7
Other	1	99
Direction of locomotion		
Occurrence of locomotory behavior towards the center of the pitch	52,4	47,6
Occurrence of locomotory behavior towards the goal	33,7	66,3

Occurrence of locomotory behavior towards a corner of the opponent's half	42,3	57,7
Occurrence of locomotory behavior towards one of the sidelines	33,2	66,8
Location of goal scorer		
Occurrence of the player being on the pitch	99,5	0,5
Occurrence of the player being off the pitch	15,9	84,1
Trunk		
Occurrence of the trunk moving to/in erect position	89,4	10,6
Occurrence of the trunk moving/being lifted upward/outward	70,7	29,3
Occurrence of the trunk moving to lean/leaning forward	65,9	34,1
Occurrence of the trunk moving to lean/leaning backward	11,1	88,9
Occurrence of the trunk moving/being turned downward/inward	1	99
Occurrence of the trunk moving to/in bend position	0	100
Head		
Occurrence of the head moving to/being in straight position	91,8	8,2
Occurrence of the head moving to/being slightly tilted upward	43,3	56,7
Occurrence of the head moving to/being tilted downward	42,3	57,7
Occurrence of the head moving to/being highly tilted upward	11,5	88,5
Head direction		
Occurrence of head being directed towards the center of the pitch	65,9	34,1
Occurrence of head being directed towards the goal	78,4	21,6

Occurrence of head being directed towards a corner of the opponent's half	34,6	65,4
Occurrence of head being directed towards one of the sidelines	32,7	67,3
Left arm		
Occurrence of left arm moving/being limp at side	90,9	9,1
Occurrence of left arm being bend more than 90 degrees	22,1	77,9
Occurrence of left arm being bend less than 90 degrees	47,6	52,4
Occurrence of left arm being straightened/straight	29,3	70,7
Occurrence of left arm extended away from the body above head	13,9	86,1
Occurrence of left arm extended away from the body below head	63,9	36,1
Occurrence of left arm extended away from the body held in front below head	14,9	85,1
Occurrence of left arm extended away from the body held left below head	56,7	43,3
Occurrence of left arm being pressed at side	9,1	90,9
Right arm		
Occurrence of right arm moving/being limp at side	83,2	16,8
Occurrence of right arm being bend more than 90 degrees	35,1	64,9
Occurrence of right arm being bend less than 90 degrees	60,6	39,4
Occurrence of right arm being straightened/straight	37,5	62,5
Occurrence of right arm extended away from the body above head	34,1	65,9
Occurrence of right arm extended away from the body below head	74,5	25,5

Occurrence of right arm extended away held in front of the body below head	18,8	81,3
Occurrence of right arm extended away from the body held right below head	68,8	31,3
Occurrence of right arm being pressed at side	8,7	91,3
Both arms		
Occurrence of arms being symmetrically aligned (Missing, n = 18)	56,3	35,1
Occurrence of arms being asymmetrically aligned (Missing, n = 18)	62	29,3
Occurrence of both arms extended away from the body above head at the same time	3,4	96,6
Occurrence of both arms extended away from the body below head at the same time	48,6	51,4
Occurrence of both arms extended away from the body at the same time	50	50
Left and/or right arm		
Occurrence of left and/or right arm extended away from the body in front below head	22,1	77,9
Occurrence of left and/or right arm being straight	43,3	56,7
Occurrence of left and/or right arm being bend more than 90 degrees	40,9	59,1
Occurrence of left and/or right arm being bend less than 90 degrees	66,3	33,7
Left hand		
Occurrence of the left hand being open	56,3	43,8
Occurrence of the left hand being closed	11,1	88,9
Occurrence of the left hand in fist	19,7	80,3

Occurrence of the left hand in a cup	8,2	91,8
Occurrence of the left index finger extended	13,5	86,5
Occurrence of all the left hand fingers extended	5,8	94,2
Occurrence of the left hand touches something	16,3	83,7
Right hand		
Occurrence of the right hand being open	58,2	41,8
Occurrence of the right hand being closed	6,3	93,8
Occurrence of the right hand in fist	38	62
Occurrence of the right hand in a cup	4,8	95,2
Occurrence of the right index finger extended	18,8	81,2
Occurrence of all the right hand fingers extended	7,2	97,8
Occurrence of the left hand touches something	17,3	82,7
Both hands		
Occurrence of both hands in fists at the same time	18,3	81,7
Occurrence of all fingers on both hands extended at the same time	5,3	94,7
Left and/or right hand		
Occurrence of left and/or right hand in fist	39,4	60,6
Occurrence of left and/or right hand touches something	20,2	79,8
Occurrence of left and/or right index finger extended	25	75
Occurrence of all fingers on left and/or right hand extended	7,2	92,8

Occurrence of left and/or right hand touches shirt/badge on shirt	7,2	92,8
Occurrence of left and/or right hand touches the ground	10,6	89,4
Occurrence of left and/or right hand touches the goal	1	99
Occurrence of left and/or right hand touches the ball	2,4	97,6
Functional codes		
Occurrence of the total of all functional codes	49,5	50,5
Occurrence of a punching motion	12,5	87,5
Occurrence of vocalization	12	88
Occurrence of an airplane	12	88
Occurrence of goal scorer moving away from teammates	10,1	89,9
Occurrence of kissing a tattoo, ball, hand, ground, badge, arm or ring	5,3	94,7
Occurrence of a standing still and displaying a statue	4,8	95,2
Occurrence of making the sign of the cross	1,9	98,1
Occurrence of a hand in a cup behind ear(s)	1,9	98,1
Occurrence of putting a finger towards the lips	1	99
Occurrence of pointing towards the sky	1	99
Occurrence of goal scorer inviting teammate(s) by extending arm(s)	46,6	53,4
Others	2,9	97,1

Appendix E

Table E.1: *Chi-square tests of all behavioral variables in post score behavior (N = 208) associated with game outcome (win, draw or loose).*

		Game outcome						
Behavior		*W*	*D*	*L*	X_2	*Df*	*P-value*	φ
Locomotion								
Occurrence of running	Y	98	30	34	0,098	2	0,952	0,022
	N	29	8	9				
Occurrence of sprinting	Y	16	3	2	2,483	2	0,289	0,109
	N	111	35	41				
Occurrence of skipping	Y	25	6	13	2,945	2	0,229	0,119
	N	102	32	30				
Occurrence of walking	Y	29	7	8	0,553	2	0,759	0,052
	N	98	31	35				
Occurrence of sliding	Y	3	1	0	1,074	2	0,584	0,072
	N	124	37	43				
Occurrence of jumping	Y	16	4	9	2,311	2	0,315	0,105
	N	111	34	34				
Occurrence of kneeling down	Y	3	2	3	2,102	2	0,350	0,101

	N	124	36	40				
	Y	10	1	2				
Occurrence of falling					1,608	2	0,447	0,088
	N	117	37	41				
	Y	2	2	3				
Occurrence of rolling	N				3,397	2	0,183	0,128
		125	36	40				
	Y	17	2	3				
Occurrence of no locomotion					2,783	2	0,249	0,116
	N	110	36	40				
	Y	38	11	14				
Occurrence of turning					0,145	2	0,930	0,026
	N	89	27	29				
Direction of locomotion								
	Y	57	21	31				
Occurrence of locomotory behavior towards the center of the pitch					9,689	2	0,008	0,216
	N	70	17	12				
	Y	41	12	17				
Occurrence of locomotory behavior towards the goal					0,846	2	0,655	0,064
	N	86	26	26				
	Y	56	16	16				
Occurrence of locomotory behavior towards a corner of the opponent's half					0,625	2	0,732	0,055
	N	71	22	27				
	Y	48	10	11				
Occurrence of locomotory behavior towards one of the sidelines					3,148	2	0,207	0,123
	N	79	28	32				
Location of goal scorer								
Occurrence of the player being on the pitch	Y	126	38	43	0,641	2	0,726	0,056

	N	1	0	0				
	Y	20	6	7				
Occurrence of the player being off the pitch					0,007	2	0,997	0,006
	N	107	32	36				
Trunk								
	Y	113	32	41				
Occurrence of the trunk moving to/in erect position					2,715	2	0,257	0,114
	N	14	6	2				
	Y	90	25	32				
Occurrence of the trunk moving/being lifted upward/inward					0,731	2	0,694	0,059
	N	37	13	11				
	Y	82	27	28				
Occurrence of the trunk moving to lean/leaning forward					0,561	2	0,755	0,052
	N	45	11	15				
	Y	11	8	4				
Occurrence of the trunk moving to lean/leaning backward					4,736	2	0,094	0,151
	N	116	30	39				
	Y	1	0	1				
Occurrence of the trunk moving/being turned downward/inward					1,250	2	0,535	0,078
	N	126	38	42				
	Y	X	X	X				
Occurrence of the trunk moving to/in bend position					X	X	X	X
	N							
Head								
	Y	117	35	39				
Occurrence of the head moving to straight position					0,092	2	0,955	0,021
	N	10	3	4				
Occurrence of the head moving to/being slightly tilted upward	Y	57	13	20	1,589	2	0,452	0,087

	N	70	25	23				
Occurrence of the head moving to/being tilted downward	Y	52	15	21	0,973	2	0,615	0,068
	N	75	23	22				
Occurrence of the head moving to/being highly tilted upward	Y	16	6	2	2,811	2	0,245	0,116
	N	111	32	41				
Head direction								
Occurrence of head being directed towards the center of the pitch	Y	76	26	35	6,772	2	0,034	0,180
	N	51	12	8				
Occurrence of head being directed towards the goal	Y	100	27	36	1,937	2	0,380	0,096
	N	27	11	7				
Occurrence of head being directed towards a corner of the opponent's half	Y	47	12	13	0,841	2	0,657	0,064
	N	80	26	30				
Occurrence of head being directed towards one of the sidelines	Y	43	11	14	0,321	2	0,852	0,039
	N	84	27	29				
Left arm								
Occurrence of left arm moving/being limp at side	Y	115	33	41	1,798	2	0,407	0,093
	N	12	5	2				
Occurrence of left arm being bend more than 90 degrees	Y	30	5	11	2,237	2	0,327	0,104
	N	97	33	32				
Occurrence of left arm being bend less than 90 degrees	Y	68	17	14	5,824	2	0,054	0,167

	N	59	21	29			
Occurrence of left arm being straightened/straight	Y	38	9	14	0,822	2	0,663	0,063
	N	89	29	29				
Occurrence of left arm extended away from the body above head	Y	22	5	2	4,323	2	0,115	0,144
	N	105	33	41				
Occurrence of left arm extended away from the body below head	Y	84	22	27	0,894	2	0,640	0,066
	N	43	16	16				
Occurrence of left arm extended away from the body held in front below head	Y	25	1	5	7,166	2	0,028	0,186
	N	102	37	38				
Occurrence of left arm extended away from the body held left below head	Y	74	21	23	0,340	2	0,844	0,040
	N	53	17	20				
Occurrence of left arm being pressed at side	Y	12	4	3	0,345	2	0,842	0,041
	N	115	34	40				
Right arm								
Occurrence of right arm moving/being limp at side	Y	103	31	39	2,198	2	0,333	0,103
	N	24	7	4				
Occurrence of right arm being bend more than 90 degrees	Y	42	9	22	7,274	2	0,026	0,187
	N	85	29	21				
Occurrence of right arm being bend less than 90 degrees	Y	84	19	23	4,332	2	0,115	0,144
	N	43	19	20				

Occurrence of right arm being straightened/straight	Y	44	17	17	1,367	2	0,505	0,081
	N	83	21	26				
Occurrence of right arm extended away from the body above head	Y	41	16	14	1,315	2	0,518	0,080
	N	86	22	29				
Occurrence of right arm extended away from the body below head	Y	95	24	36	4,506	2	0,105	0,147
	N	32	14	7				
Occurrence of right arm extended away held in front of the body below head	Y	29	2	8	5,929	2	0,052	0,169
	N	98	36	35				
Occurrence of right arm extended away from the body held right below head	Y	86	24	33	1,895	2	0,388	0,095
	N	41	14	10				
Occurrence of right arm being pressed at side	Y	10	3	5	0,607	2	0,738	0,054
	N	117	35	38				
Both arms								
Occurrence of arms being symmetrically aligned (Missing, n = 18)	Y	79	20	18	6,325	4	0,176	0,174
	N	37	15	21				
Occurrence of arms being asymmetrically aligned (Missing, n = 18)	Y	72	23	34	8,540	4	0,074	0,203
	N	44	12	5				
Occurrence of both arms extended away from the body above head at the same time	Y	6	1	0	2,282	2	0,320	0,105
	N	121	37	43				
Occurrence of both arms extended away from the body below head at the same time	Y	70	14	17	5,678	2	0,058	0,165

	N	57	24	26			
Occurrence of both arms extended away from the body at the same time	Y	73	14	17	7,358	2	0,025	0,188
	N	54	24	26				
Left and/or right arm								
Occurrence of left and/or right arm extended away from the body in front below head	Y	34	3	9	6,095	2	0,047	0,171
	N	93	35	34				
Occurrence of left and/or right arm being straight	Y	52	17	21	0,856	2	0,652	0,064
	N	75	21	22				
Occurrence of left and/or right arm being bend more than 90 degrees	Y	52	10	23	6,164	2	0,046	0,172
	N	75	28	20				
Occurrence of left and/or right arm being bend less than 90 degrees	Y	90	22	26	3,044	2	0,218	0,121
	N	37	16	17				
Left hand								
Occurrence of the left hand being open	Y	74	18	25	1,491	2	0,475	0,085
	N	53	20	18				
Occurrence of the left hand being closed	Y	17	0	6	5,791	2	0,055	0,167
	N	110	38	37				
Occurrence of the left hand in fist	Y	27	5	9	1,264	2	0,532	0,078
	N	100	33	34				
Occurrence of the left hand in a cup	Y	6	3	8	8,251	2	0,016	0,199

	N	121	35	35				
	Y	17	4	7				
Occurrence of the left index finger extended					0,575	2	0,750	0,053
	N	110	34	36				
	Y	10	2	0				
Occurrence of all the left hand fingers extended					3,685	2	0,158	0,133
	N	117	36	43				
	Y	20	7	7				
Occurrence of the left hand touches something					0,153	2	0,926	0,027
	N	107	31	36				
	Y	44	8	20				
Occurrence of the left hand not being open					5,777	2	0,056	0,167
	N	83	30	23				
	Y	22	3	14				
Occurrence of the left hand being closed or in a cup					8,491	2	0,014	0,202
	N	105	35	29				
Right hand								
	Y	76	16	29				
Occurrence of the right hand being open					5,696	2	0,058	0,165
	N	51	22	14				
	Y	10	1	2				
Occurrence of the right hand being closed					1,608	2	0,447	0,088
	N	117	37	41				
	Y	45	12	22				
Occurrence of the right hand in fist					4,183	2	0,123	0,142
	N	82	26	21				
	Y	5	1	4				
Occurrence of the right hand in a cup					2,502	2	0,286	0,110
	N	122	37	39				

Occurrence of the right index finger extended	Y	22	10	7	1,770	2	0,413	0,092
	N	105	28	36				
Occurrence of all the right hand fingers extended	Y	11	4	0	4,365	2	0,113	0,145
	N	116	34	43				
Occurrence of the left hand touches something	Y	23	6	7	0,150	2	0,928	0,027
	N	104	32	36				
Both hands								
Occurrence of both hands in fists at the same time	Y	24	5	9	0,902	2	0,637	0,066
	N	103	33	34				
Occurrence of all fingers on both hands extended at the same time	Y	9	2	0	3,221	2	0,200	0,124
	N	118	36	43				
Left and/or right hand								
Occurrence of left and/or right hand in fist	Y	47	12	23	4,851	2	0,088	0,153
	N	80	26	20				
Occurrence of left and/or right hand touches something	Y	25	8	9	0,052	2	0,974	0,016
	N	102	30	34				
Occurrence of left and/or right index finger extended	Y	30	11	11	0,452	2	0,798	0,047
	N	97	27	32				
Occurrence of all fingers on left and/or right hand extended	Y	11	4	0	4,365	2	0,113	0,145
	N	116	34	43				

Occurrence of left and/or right hand touches shirt/badge on shirt	Y	9	3	3	0,033	2	0,984	0,013
	N	118	35	40				
Occurrence of left and/or right hand touches the ground	Y	16	3	3	1,427	2	0,490	0,083
	N	111	35	40				
Occurrence of left and/or right hand touches the goal	Y	1	0	1	1,250	2	0,535	0,078
	N	126	38	42				
Occurrence of left and/or right hand touches the ball	Y	0	2	3	8,285	2	0,016	0,200
	N	127	36	40				
Functional codes								
Occurrence of the total of all functional codes	Y	63	17	23	0,619	2	0,734	0,55
	N	64	21	20				
Occurrence of a punching motion	Y	11	4	11	8,574	2	0,014	0,203
	N	116	34	32				
Occurrence of vocalization	Y	15	2	8	3,409	2	0,182	0,128
	N	112	36	35				
Occurrence of an airplane	Y	14	7	4	1,892	2	0,388	0,095
	N	113	31	39				
Occurrence of goal scorer moving away from teammates	Y	14	4	3	0,589	2	0,745	0,053
	N	113	34	40				
Occurrence of kissing a tattoo, ball, hand, ground, badge, arm or ring	Y	7	2	2	0,048	2	0,976	0,015

	N	120	36	41				
	Y	8	0	2				
Occurrence of a standing still and displaying a statue					2,539	2	0,281	0,110
	N	119	38	41				
	Y	3	0	1				
Occurrence of making the sign of the cross					0,912	2	0,634	0,066
	N	124	38	42				
	Y	4	0	0				
Occurrence of a hand in a cup behind ear(s)					2,601	2	0,272	0,112
	N	123	38	43				
	Y	2	0	0				
Occurrence of putting a finger towards the lips					1,288	2	0,525	0,079
	N	125	38	43				
	Y	1	1	0				
Occurrence of pointing towards the sky					1,571	2	0,456	0,087
	N	126	37	43				
	Y	64	14	19				
Occurrence of goal scorer inviting teammate(s) by extending arm(s)					2,289	2	0,318	0,105
	N	63	24	24				

The columns in the table represents, from the left: the post score behavior displayed, occurrence-labels (yes/no), the game outcome in descriptive numbers (win, draw, loose), the chi-square value (X^2), degrees of freedom (df), the significance of the finding (p-value) and phi-coefficient (φ).

Appendix F

The post goal behavioral coding scheme in soccer (PGB-CS-S)

Coding guidelines

Table of contents

1 General guidelines

Observer bias. Keep the coding manual at hand during the entire coding period to avoid observer bias.

Behavior/movement. Each behavioral code represents (a combination) of a posture and/or action of a particular body part. A posture is a particular resting position of a body part (e.g., a goal scorer has his arm raised above his head) whilst an action involves a movement of a body part towards a particular resting position (e.g., a goal scorer raises his arm above his head).

Direction and location. The locomotion of the whole body, and the head can move/be held in a particular direction – i.e., the face is directed towards the center of the pitch. The zone map (Figure 1) should be used to determine the direction. The player can be on or off the pitch.

Orientation. The locomotion of the whole body, the head, and the finger can have a particular orientation – i.e., the finger can be pointed towards a teammate on the pitch. If there are several objects aligned in the GS orientation line, the *nearest* object should be coded as orientation of behavior.

Functional codes. The functional codes involve a sequence of behaviors with a specific meaning.

Unclear. If a behavior/movement is unclear, invisible or too small to categorize, the behavior is coded as unscorable. If weaknesses in the coding scheme or in the coding guidelines are discovered during the coding, please note these in the coding log.

Start of coding. Coding commences the first frame the goal scorer is in view.

Stop coding. Coding stops when the goal scorer is no longer visible (replay starts) or when the goal scorer makes physical contact with another individual (e.g., teammate, coach, supporters). Commence coding if the goal scorer comes back into the picture.

Time coding.

Behaviors: Generally, the onset is the frame where a subsequent frame shows a change in position of a body part - the start of a movement of a body part towards a particular resting position (a goal scorer raises his arm above his head). The behavior/movement continues when the particular body part is no longer moving and is in the particular resting position (the goal scorer has his arms raised above his head). The offset is the frame where a subsequent frame shows a change from resting position of a particular body part (a goal scorer has his arm raised above his head and moves his hands towards). Thus, the behavior then ends when there is movement following non-movement. The offset may also be the frame where a subsequent frame shows a change of movement of a particular body part (a goal scorer raises his arm above his head changes to a goal scorer moving his arm to the right of his body). Then the behavior ends when there is a change in movement.

With coding commencing the first frame the goal scorer is in view, the first frame could show a posture or an action of a particular body part. In this instance, the onset is the first frame. When the first frame shows a posture, the offset is the frame where a subsequent frame shows a change from this resting position. When the first frame shows an action (towards a particular resting position), the offset is the frame where a subsequent frame shows a change of movement or shows a change from the obtained resting position.

For *locomotion,* the onset is the frame where a subsequent frame shows a difference in this particular behavior (movement). The offset is the frame where a subsequent frame shows that this particular behavior is no longer displayed.

Direction. The onset is the frame where a subsequent frame shows a locomotory behavior or a body part being directed towards a certain area. The offset is the frame where a subsequent frame shows a change in direction.

Orientation. The onset is the frame where a subsequent frame shows a locomotory behavior or a body part having a particular orientation. The offset is the frame where a subsequent frame shows a change in orientation.

Functional codes. The onset is the frame where a subsequent frame shows the start of this particular code. The offset is the frame where a subsequent frame shows this particular code is no longer displayed.

Simultaneous coding. Body parts can move simultaneously and/or body parts can be held in a particular posture simultaneously (head tilted upwards, shoulders backward). Focus on one body part at the time.

Multidirectional. A single movement can involve changes in multiple directions. Code all directions.

Behavioral repetition is coded as one element or segment. Several directions (up-down) can be involved but they need to be present in every repeated movement/behavior. In this case, the onset is the frame where a subsequent frame shows a change in position of a particular body part with movement towards a particular resting position. The offset is the frame that shows a change from the resting position of a particular body part after the movement has repeatedly occurred and is eventually held in a particular resting position (i.e., the arm with the hand in fist raised above the head and repeatedly moved up and down until the arm is held raised above the head).

Camera view change. When the camera view changes and, consequently, the goal scorer is no longer visible, the frame at which this happens should be coded the offset time for every behavior observed at that time point. If a particular behavior is still

displayed after the goal scorer is back in view, the frame in which the goal scorer is back in view is the onset time of a new behavior.

Passive and active. The behavioral codes only apply to movement and/or postural alignment caused by muscle contraction and not passive movement and/or postural alignment caused by any connected body part. For example, the trunk leaning forward may cause the head to lean downward but this is passive and only the movement/postural alignment of the trunk should be coded. Thus, artifact behaviors due to movement/postural display of other body parts should not be coded.

Order of coding.

1. Provide basic information.
2. Rate the intensity of the behavioral display (see specific guidelines).
3. Focus on the locomotory behavior first and then focus on one body part at the time following the order of the attached coding scheme: whole body, trunk, head, face, arms, shoulders, hands and fingers.
4. Distinguish whether the body part is actively moving and/or being held in a particular posture, or whether the body part is an artifact.
5. For each body part, determine ‘what behavior is occurring, and if applicable its direction and/or orientation. Code the onset and offset time points.
6. Following, assess the existence of the functional codes, and determine the onset and offset time points.
7. All behavioral coding ends when there is physical contact between the goal scorer and any other person on or off the pitch, or when the GS is no longer in view. When the goal scorer returns in the view, behavioral coding commences again.

8. Before ending the behavioral coding, make sure all segments in the coding scheme have been coded.

Anatomical standard position (ASP). All behavioral codes are coded relative to the anatomical standard position. Still, to allow for continuous coding, the ASP is coded for each body part (see Table 1 for the ASP's of each body part). Be aware of this reference frame particularly when the expresser is not facing the camera (see specific guidelines).

Table 1. Anatomical standard positions for each body part.

Body part	**Anatomical standard position**
Whole body	The whole body moves towards or is in an erect position
Trunk	The trunk moves towards or is in an erect position
Head	The head moves towards or is in a straight position
Eyes	The eyes are open
Brows	The brows are in a neutral position
Mouth	The mouth is closed
Arm (left / right)	The left/right arm moves towards or hangs at the side of the body
Hand (left/right)	The left/right hand is opened or is open
Fingers	All fingers are extended
Shoulder (left/right)	The shoulder is in a neutral position

2 ANVIL specific guidelines

ANVIL

ANVIL, a multi-layered video annotation tool, is used to carry out the coding. The coding scheme and guidelines have been specified in an XML file. ANVIL implements this file for coders to use. Any issues with the ANVIL software should be noted in the coding log.

Behaviors (or movements)

Direction. When the picture includes a fraction of the pitch, the direction can still be coded if any of the official lines are visible. For example, if the goal scorer runs parallel to the sidelines he is either; running towards center of the pitch or the goal. Furthermore, if previous images have shown that the goal scorer has his back to the goal or the center of the pitch the final direction can be determined.

Orientation. Generally, the object a goal scorer is orientated towards should be in view in order to code orientation. However, if the object is not in view at a specific point in time, but has been visible or becomes visible at a later point in time, the goal scorers' orientation can be coded. For example, a player may be running towards the sidelines but the own fans are not in view at that time point but become visible at a later time point.

- Coders should code unscorable when it is impossible to see where he is oriented, or impossible to see because of visibility.
- Coders should code no particular orientation when they observe locomotory behavior, the head, or the finger(s) which is not oriented towards anything in particular.

Basic information. In ANVIL, the basic information is coded in two tracks: 1) GS in view (close up- and long distance footages) and 2) who the goal scorer makes physical contact with.

Intensity. In ANVIL, the intensity of the behavioral response is coded in two tracks: 1) Intensity scale and 2) Total intensity.

- On the *intensity scale track,* coders rate the intensity of the behavioral response on an ordinal (5-point) intensity scale in terms of execution. The intensity scale ranges from 1 (very low intensity) to 5 (very high intensity). Coders should rate the intensity continuously considering that changes in intensity may occur throughout the video. The onset is coded when the player's behaviour or movement suggests a particular intensity. The offset is coded when the players' behaviour or movement stops at that particular intensity.
- On the *total intensity track,* coders give one overall rating for the intensity of the behavioral response displayed by the goal scorer throughout the video on an ordinal (5-point) intensity scale in terms of execution. The intensity scale ranges from 1 (very low intensity) to 5 (very high intensity). .

Locomotion. In ANVIL, locomotion is coded in one track with four value-sets: locomotory behavior, location, direction and orientation. The coding follows the guidelines for coding behavior(s), direction and orientation.

- Be aware that as a consequence of the goal scorers' locomotory behavior, the anatomical standard position (ASP) will change. How to code this will be further described in the different body segments below.
- When the legs are not visible, locomotory behavior can still be distinguished focusing on the speed of movement of the player in relation to the background. When uncertain, code unscorable.

- Notice that no locomotion may occur when a goal scorer is standing, sitting, being on one's knees, and/or lying down on the ground.
- With regards to coding orientation to the crowd, coders can use two factors to distinguish between own and opposing fans: the clothing (e.g., color, emblem, name) and behavior (e.g., jumping, raising both arms in the air, touching).

Whole body. In ANVIL, the whole body is coded in one track with four value-sets: erect position, lean forward/backward, bend forward/backward, and left/right.

- Be aware that the whole body needs to be visible to code the whole body otherwise coders should refrain from doing so and code unscorable.
- Be aware that when running you tend to lean slightly forward to gain speed. The ASP is the erect position, and running with the body slightly leaning forward should be coded as leaning slightly forward.
- Be aware that when sprinting you tend to lean forward to gain speed. The ASP is still the erect position, and sprinting with the body leaning forward should be coded as leaning forward.
- Notice that when jumping the goal scorer shifts his behaviors frequently.
- When the goal scorer is sitting, make sure you code in relation to the anatomical standard position.

Trunk. In ANVIL, the trunk is coded in one track with five value-sets: erect, lean forward/backward, bend forward/backward, lean left/right, rotation and chest.

- See whole body for specific coding guidelines.

Head. In ANVIL the head is coded in one track with seven value-sets: tilt up/downward, forward/backward, tilt left/right, tilt up/down, turn, shake, direction and orientation.

- Code the ASP of the head in relation to the whole body and trunk. A goal scorer may be leaning forward and as a consequence, the head is leaning forward. In this instance, coders should be aware that the head is erect in relation to the whole body position and coders should therefore code the head being in the ASP.
- Movement of the neck can help identify forward/backward head movement – e.g., a particular instance when this may occur is when the GS is orienting his behavioral response towards the crowd.
- In rear view up/down movements can still be determined from two factors: the GS height, and which part of his scull is visible. For example, if the GS's height increases and the GS's not straightened his knees, hip, or back he has moved his head upwards. In addition, upwards head movement can also be determined if the GS's head moves in such a way that more of the top of the scull becomes visible and less of the neck becomes visible.

Upper face. In ANVIL, the upper face is coded in one track with five value-sets: eyes open/closed, eyes widened/constricted, brows neutral, brows raised/lowered and brows drawn together.

- The eyes can be widened or constricted only when the eyes are open.
- The brows can only be drawn together when they are lowered as well – coders should code both.

Lower face. In ANVIL, the lower face is coded in one track with five value-sets: mouth, lips parted/pressed, lip corners, smile and jaw

- Be aware that the lips need to be pressed together like an actual movement for this element to be coded.
- A jaw drop may occur when a GS uses a vocalization in his behavioral response

Left/right arm. In ANVIL, the left arm is coded in one track with six value-sets: limp/extended/ pressed, held left/right, held in front/behind, raised above head, straight/bend, and repetitive movement. The ASP of the arms occurs when the arms move or are limp at side.

- Please be aware that in running and sprinting the ASP is: 1) the arms move rhythmically diagonally to the legs, from the front of the body to the back of the body 2) there is a bend in the elbow joint that may be extended when the arm is behind the body and may contracted when in front of the body. The arms will move asymmetrical in reference to each other.
- When the arm moves repeatedly in a certain manner (up-down it may happen that the arm is bend >90 degrees (e.g., when going up) for some time and bend <90 degrees (e.g., when going down) for some time. It may then be difficult to code the extent to which the arm is bend. Coders should base their judgment then on which position the arm is moving towards.
- Consider that arm movement due to a particular form of locomotion (e.g., jump) should be coded as ASP.
- Unless the arm movement is the ASP at a particular time point, code the arm extended away from the body or arms pressed at side
- An arm can be held in front of the body or to either side of the body but can be held both in front of the boy as well to the side of the body.
- Be aware that in coding the extent to which the arms are bend, a straight arm refers to 0 degrees of bending. The lesser the arm is straightened, the more degrees of bending occurs.

Arms. In ANVIL, the arms are coded in one track with one value-set: arms. When the arms are limp at side, coders can refrain from coding whether the arms are symmetrical or a-symmetrical.

Shoulders (left/right). In ANVIL, the left/right shoulder is coded in one track with three value-sets: neutral position, shoulder up/down, shoulder forward/backward.

- Oftentimes, the shoulder(s) move as a consequence of movement of the arms. In this case, the shoulder movement is thus an artefact of arm movement. When this happens, the shoulder should be coded as 'none'.

Hands and fingers (left/right). In ANVIL, the left/right hand and left/right fingers are coded in one track with the following value-sets: hand movement, hand self-touch, hand manipulators, hand repetitive movement, finger movement, and finger orientation.

- When the GS expresses finger movement(s)/behavior(s), coders should refrain from coding any hand movement. For example, when the right index finger is extended and the hand is held in a cup, coders only code the extension of the index finger. The hand movement is coded as 'none'
- All fingers extended should only be coded when the fingers are extended and fully straightened with the use of muscle power. Again, despite the hand being open, the hand movement should not be coded.

Functional codes. In ANVIL, the functional codes are coded in one track with five value-sets: whole body, face, arms, hand, fingers, and away from teammates.

3 Attachments

Figure F.1. Zone map - how to code direction.

Appendix G

The post goal behavioral coding scheme in soccer (PGB-CS-S)

The Outline of the PGS-CS-S in Anvil

The specification file in Anvil will contain *time line annotations* supplying us with continuous and ordinal scale data of all the variables in *the post goal behavioral coding scheme in soccer*. In Anvil the annotations will be put into segments based on the set-up in the coding scheme. These segments are in Anvil located in ***groups (G)***. Each ***group*** will again contain ***tracks (T)*** which again will contain one or more ***value sets (VS)*** of ***attributes (A)***. Variables could be annotated as a single track, in a single attribute or in a *value set* of attributes. These distinctions will come clear to you as you work your way through the outline. Using various ways to prepare the Anvil specification file, we will make the *time line annotation board* user-friendly, which again will make coding efficient and reliable. To use both *tracks* and *attributes* to maximize user-friendliness will not affect output data.

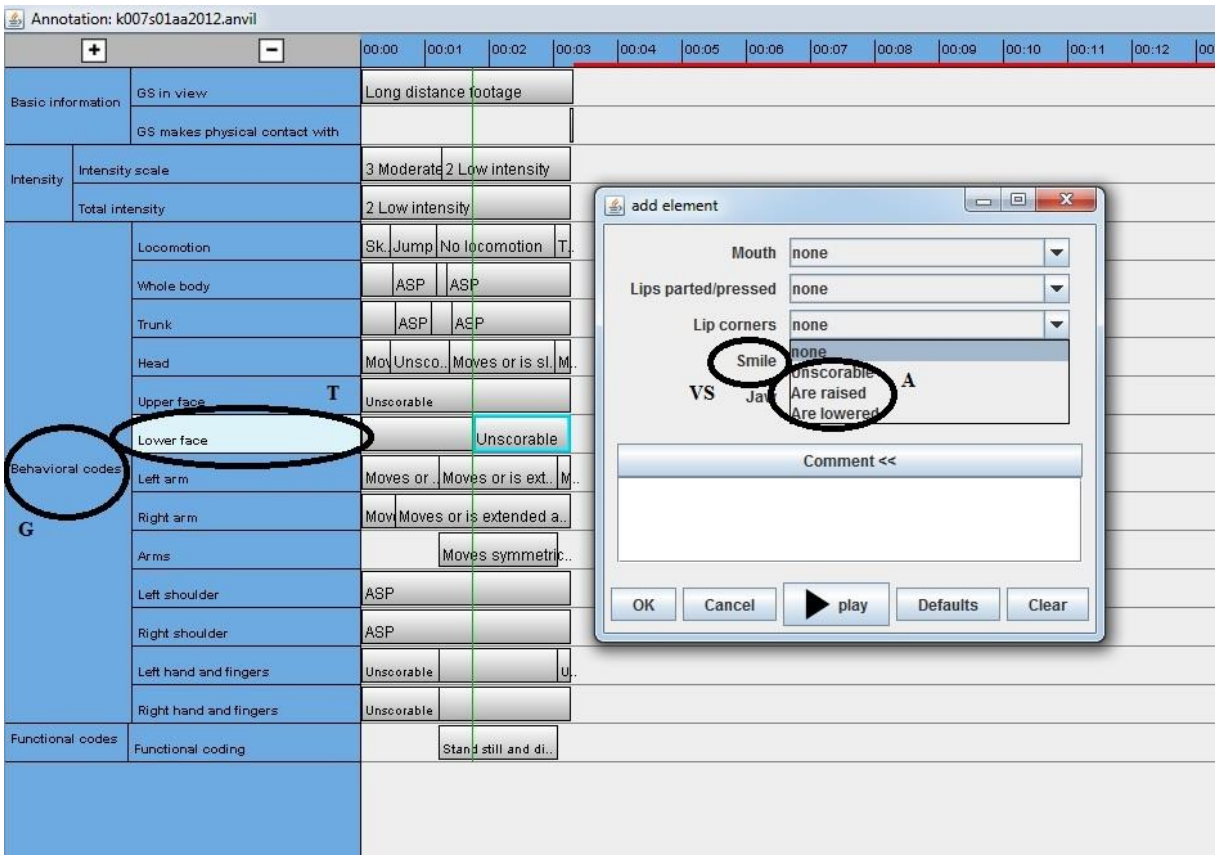

Figure G.1: *A graphic presentation of the outline of the PGS-CS-S in Anvil. G = groups, T = tracks, VS = valueset, A = attributes.*

<u>The Anvil outline of the PGS-CS-S in detail</u>

G1: Basic information

T1: Goal scorer in view (by coding this variable we will, implicit, get data from the rest of the basic information video segment variables excl. physical contact)

T2: Goal scorer makes physical contact with

VS1: Physical contact

A1: Teammate on pitch

A2: Teammate off the pitch

A3: Manager/head coach

A4: Supporting staff

A5: Supporters own team

A6: Supporters opposing team

A7: Member opposing team

A8: Camera

A9: Unscorable

G2: Behavioral codes

T1: Locomotion

VS1: Locomotory behavior

A1: Sprint

A2: Run

A3: Skip

A4: Walk

A5: Dive

A6: Slide

A7: Jump

A8: Kneeling down

A9: Fall

A10: Rolling over the ground

A11: No locomotion

A12: Dance

A13: Gymnastic expression

A13: Turn

A14: Unscorable

VS2: Direction

A1: Is directed towards the center of the pitch

A2: Is directed towards the goal

A3: Is directed towards a corner on the opponent half

A4: Is directed towards the sidelines

A5: Unscorable

VS3: Location

A1: Is on the pitch

A2: Is off the pitch

A3: Unscorable

VS4: Orientation

A1: Is oriented towards his teammates on the pitch

A2: Is oriented towards his teammates off the pitch

A3: Is oriented towards his manager/head coach

A4: Is oriented towards the supporting staff

A5: Is oriented towards own fans

A6: Is oriented towards the opposing fans

A7: Is oriented towards a camera around the pitch

A8: Is oriented towards the ball

A9: Has no particular orientation

A10: Unscorable

T2: Whole body

VS1: Whole body forward/backward

A1: Moves or is in an erect position

A2: Moves or leans forward

A3: Moves or leans backward

A4: Unscorable

VS2: Whole body left/right

A1: Moves or leans towards the left/right

A2: Unscorable

T3: Trunk

VS1: Trunk erect/bend

A1: Moves towards or is in an erect position

A2: Moves towards or is in a bend position

A3: Unscorable

VS2: Trunk forward/backward

A1: Moves or leans forward

A2: Moves or leans backward

A3: Unscorable

VS3: Trunk rotation

A1: Rotates or is rotated to the left

A2: Rotates or is rotated to the right

A3: Unscorable

VS4: Trunk lean left/right

A1: Moves or leans towards the left/right

A2: Unscorable

VS5: Chest

A1: Moves or is lifted upward and/or outward

A2: Moves or is turned downward and/or inward

A3: Unscorable

T4: Head

VS1: Head tilt up/down

A1: Moves towards a straight position or is straight

A2: Moves or is slightly tilted upwards (<20 degrees)

A3: Moves or is highly tilted upwards (>20 degrees)

A4: Moves or is tilted downwards

A5: Unscorable

VS2: Head turn

A1: Turns or is turned to the left

A2: Turns or is turned to the right

A3: Unscorable

VS3: Head tilt left/right

A1: Tilts or is tilted to the left

A2: Tilts or is tilted to the right

A3: Unscorable

VS4: Head forward/backward

A1: Moves or is moved forward

A2: Moves or is moved backward

A3: Unscorable

VS5: Head shake

A1: Shake up-down

A2: Shake side-to-side

A3: Unscorable

VS6: Direction

A1: Is directed towards the centre of the pitch

A2: Is directed towards the goal

A3: Is directed towards a corner on the opponent half

A4: Is directed towards the sidelines

A7: Unscorable

VS7: Orientation

A1: Is oriented towards his teammates on the pitch

A2: Is oriented towards his teammates off the pitch

A3: Is oriented towards his manager/head coach

A4: Is oriented towards the supporting staff

A5: Is oriented towards own fans

A6: Is oriented towards the opposing fans

A7: Is oriented towards a camera around the pitch

A8: Is oriented towards the ball

A9: Has no particular orientation

A10: Is oriented towards the ground

A11: Is oriented towards the sky

A10: Unscorable

T5: Upper face

VS1: Eyes

A1: Are widened

A2: Are constricted

A3: Are closed

A4: Unscorable

VS2: Brows

A1: Are raised

A2: Are lowered

A3: Are drawn together

A4: Unscorable

T6: Lower face

VS3: Lips

A1: Are pressed together

A2: Are parted

A3: Corners are raised

A5: Corners are lowered

A6: Unscorable

VS4: Mouth

A1: Is open

A2: Is closed

A3: Clenched teeth

A4: Tongue out of mouth

A5: Unscorable

VS5: Jaw

A1: Drop

A2: Unscorable

VS6: Smile

A1: Suppressed smile

A2: Small smile

A3: Large smile

A4: Unscorable

T7: Left arm

VS1: Arm straight/bend

A1: Is straightened or is straight (=180 degrees)

A2: Is bend or bends (>90 degrees)

A3: Is bend or bends (<90 degrees)

A4: Unscorable

VS2: Arm limp/pressed/extended

A1: Moves or is limp at side

A2: Pressed at side

A3: Moves or is extended away from the body

A4: Unscorable

VS3: Arm held

A1: Moves to or is held in front of the body or face

A2: Moves to or is held behind the body

A3: Moves to or is held to the left of the body

A4: Moves to or is held to the right of the body

A5: Moves to or is raised above the head

A6: Unscorable

VS4: Arm repetitive movement

A1: Repeatedly moves up-down

A2: Repeatedly moves back-forward

A3: Repeatedly moves side-to-side

A4: Unscorable

T7: Right arm

VS1: Arm straight/bend

A1: Is straightened or is straight (=180 degrees)

A2: Is bend or bends (>90 degrees)

A3: Is bend or bends (<90 degrees)

A4: Unscorable

VS2: Arm limp/pressed/extended

A1: Moves or is limp at side

A2: Pressed at side

A3: Moves or is extended away from the body

A4: Unscorable

VS3: Arm held

A1: Moves to or is held in front of the body or face

A2: Moves to or is held behind the back

A3: Moves to or is held to the left of the body

A4: Moves to or is held to the right of the body

A5: Moves to or is raised above the head

A6: Unscorable

VS4: Arm repetitive movement

A1: Repeatedly moves up-down

A2: Repeatedly moves back-forward

A3: Repeatedly moves side-to-side

A4: Unscorable

T8: Arms

VS1: Arms

A1: Crossed in front of the body

A2: Moves symmetrically or are symmetrically aligned

A3: Moves asymmetrically or are asymmetrically aligned

A4: Unscorable

T9: Left hand

VS1: Hand movement

A1: Opens or is open

A2: Moves or is held in a fist

A3: Moves or is held in a cup

A4: Unscorable

VS2: Hand repetitive movement

A1: Repeatedly rotates to the left and right

A2: Repeatedly opens and closes

A3: Unscorable

VS3: Hand self-touch

A1: On hip

A2: Touches face

A3: Touches head

A4: Covers face

A5: Unscorable

VS4: Hand manipulators

A1: Touches shirt

A2: Touches badge on shirt

A3: Touches the ground

A4: Touches the goal

A5: Touches the corner flag

A6: Touches the shoe

A7: Unscorable

T9: Right hand

VS1: Hand movement

A1: Opens or is open

A2: Moves or is in a fist

A3: Moves or is held in a cup

A4: Unscorable

VS2: Hand repetitive movement

A1: Repeatedly rotates to the left and right

A2: Repeatedly opens and closes

A3: Unscorable

VS3: Hand self-touch

A1: On hip

A2: Touches face

A3: Touches head

A4: Covers face

A5: Unscorable

VS4: Hand manipulators

A1: Touches shirt

A2: Touches badge on shirt

A3: Touches the ground

A4: Touches the goal

A5: Touches the corner flag

A6: Touches the shoe

A7: Touches the ball

A8: Unscorable

T10: Left fingers

VS1: Finger action

A1: Thump extended

A2: Index finger extended

A3: Middle finger extended

A4: Ring finger extended

A5: Little finger extended

A6: All fingers extended

A7: Unscorable

VS2: Orientation

A1: Is oriented towards his teammates on the pitch

A2: Is oriented towards his teammates off the pitch

A3: Is oriented towards his manager/head coach

A4: Is oriented towards the supporting staff

A5: Is oriented towards the fans

A6: Is oriented towards the opposing fans

A7: Is oriented towards a camera around the pitch

A8: Is oriented towards the ball

A9: Is oriented nowhere

A10: Is oriented towards the turf

A11: Is oriented towards the sky

A12: Is oriented towards the self

A13: Unscorable

T11: Right fingers

VS1: Finger action

A1: Thump extended

A2: Index finger extended

A3: Middle finger extended

A4: Ring finger extended

A5: Little finger extended

A6: All fingers extended

A7: Unscorable

VS2: Orientation

A1: Is oriented towards his teammates on the pitch

A2: Is oriented towards his teammates off the pitch

A3: Is oriented towards his manager/head coach

A4: Is oriented towards the supporting staff

A5: Is oriented towards the fans

A6: Is oriented towards the opposing fans

A7: Is oriented towards a camera around the pitch

A8: Is oriented towards the ball

A9: Is oriented nowhere

A10: Is oriented towards the turf

A11: Is oriented towards the sky

A12: Is oriented towards the self

A13: Unscorable

T12: Left shoulder

VS1: Shoulder movement

A1: Moves or is lifted upward

A2: Moves or is lifted downward

A3: Moves or is put forward

A4: Moves or is pulled backward

A5: Unscorable

T13: Right shoulder

VS1: Shoulder movement

A1: Moves or is lifted upward

A2: Moves or is lifted downward

A3: Moves or is put forward

A4: Moves or is pulled backward

A5: Unscorable

T14: Shoulders

VS1: Shoulders

A1: Moves symmetrical

A2: Moves asymmetrical

A3: Unscorable

G3: Functional codes

T15: Functional codes

VS1: Self-referential

A1: Directing hands over head to point out own printed name with finger(s)

A2: Pointing index finger(s) towards the self

A3: Hand(s) in cup behind ears

A4: The index finger is put or held against the lips

A5: Banging with a fist or flat hand on his chest

VS2: Acts of love or gratitude

A1: Expressing a love sign

A2: Touching or holding the club badge

A3: Kissing the club badge

A4: Kissing the ring finger

A5: Kissing palm of the hand/fingers/wrist

A6: Kissing the ground

A7: Kissing the ball

A8: Displaying a 2nd skin

A9: Making the sign of the cross

A10: A cradle rocking movement

A11: Sucking a baby pacifier/thumb

A12: Kissing a tattoo

VS3: Others

A1: Salute

A2: Stand still and display a statue

A3: Display a sport-related behavior

A4: Punching motion

A5: Airplane

A6: Kicking the ball

A7: Moves away from his teammates