The observational analysis of elite coaches within youth soccer: The importance of performance analysis

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Abstract

This study investigated the observational capabilities of experienced elite coaches whilst focusing upon soccer specific actions and playing positions within elite youth soccer. Six soccer coaches assessed the performances of ten youth soccer players (across 8 matches) on their short/long passing, tackling, shooting, heading and dribbling. Analysis was undertaken on an overall, quality, and positional grouping basis. Mean observational accuracy was 38.8%, with successful shooting (78.6%) and passing (29.9%) illustrating the range. The limited effective observation of dribbling (37.2%), often considered a separating factor within talent identification, highlights the need for objective measures to aid such processes. Positional grouping analysis elicited ~20% more effective observation for unsuccessful compared with successful actions. The poor level of observational accuracy identified herein has significant implications on talent identification assessments devoid of post-performance analyses. The findings reinforce the importance of performance analysis in the provision of highly accurate and comprehensive augmented feedback within the coaching process.

Keywords

Introduction

The early identification of young and talented athletes has become ever more important throughout sport, most notably within soccer[1,2]. Elite soccer clubs selectively enroll promising players at a relatively early age and provide specialised programmes, with the goal of developing and perfecting playing ability towards professional status in adulthood[3]. As a consequence, the identification and development of future elite performance is a respected area within sport sciences[4]. In order to reach 'elite' status it is important for individuals to receive appropriate and accurate feedback in order to facilitate appropriate cognitive and motor skill acquisition and development[5,6]. Feedback is seen as a critical component of both individual and team development[7,8]. Traditionally based upon coaches own subjective visual observations, feedback is however inevitably influenced by a number of confounding variables, such as; the speed of the game, the number of athletes involved, and emotional and playing ability bias towards these athletes[2,9,10,11,12], all of which inhibit a coach's ability to successfully and objectively recollect, analyse and appraise a sporting performance.

The limitation of coaching recollection was highlighted within the seminal work of Franks and Miller[9]. The study assessed student recollection following a sporting performance identifying post-match recollection of ~ 42 %. Laird and Waters[13] furthered the research within this area by introducing soccer coaches into the process in

contrast to the physical education students studied within Franks and Miller[9]. The findings of the study provide evidence that coaches with domain specific experience demonstrate higher accuracy in the recollection of critical events (59 %), such as; possessions, set pieces and goalkeeper contact than their inexperienced counterparts. Evans, Whip and Lay[14] suggested experts retain, recall and recognise significantly more information about structured game situations in comparison to their sub-elite counterparts when the information is presented within their sports specific domains. Clearly, despite the observed increase in recollection, limited remembrance still exists irrespective of coaching experience, indicating a wide scope of meaningful data being overlooked or misinterpreted during performance appraisal. Furthermore, the problem of appraising specific actions in team sports becomes even more complex when mini-performances must be; 1) judged within the context of the team, 2) considered against the strengths or weaknesses of their peers and 3) considered against the opposition[15].

To date, past coach recollection research within soccer[9,13] has focused on limited match time utilised for analysis (i.e. one half of a soccer match: ~ 45 min). One could argue that the results are only specific to the 45 minutes used for analysis and therefore generalising for a wider soccer and coaching environment is clearly questionable. The participants (i.e. soccer coaches and 3rd year physical education students) in both studies could be considered relatively inexperienced due to possessing generally low-level (i.e.

1 or 2), or in some cases, no soccer coaching qualifications and/or years of coaching experience (mean: < 2.7 years). Furthermore, the research incorporated possessions, set pieces and goalkeeper contact (arguably team performance assessment measures) in contrast to more specific player assessment criteria such as; passing, tackling, shooting etc. that would more likely contribute to future individual player assessments. The accurate appraisal of a player's performance based upon their positional demands, combined with feedback presented in an appropriate and specific manner, is considered key to individual player development and progression[5]. Given the importance of accurate and objective feedback within the coaching process, there is a paucity of research investigating and quantifying the ability of experienced soccer coaches to successfully observe and recollect specific technical variables considered key to successful soccer performance.

Therefore, the purpose of this study was to quantify and assess the observational analysis capabilities of experienced elite coaches whilst focusing upon 1) soccer specific technical actions and 2) individual soccer positions and positional groupings within competitive elite youth soccer matches.

Methods

Participants

Following institutional ethical approval, six elite male soccer coaches (Age; 48.8 ± 5.3) with greater than 12 years elite youth coaching experience were recruited within the study. The participants were required to be currently or previously employed as a coach within a professional centre of excellence (CofE) or academy establishment.

Design and identification of analysis variables

The participating players (n = 10) were split into 5 groups based upon their individual playing position. The groups consisted of Full Backs (Right Back and Left Back), Central Defenders (Right Central Defender and Left Central Defender), Wide Midfielders (Left Midfield and Right Midfield), Central Midfielders (Left Central Midfield and Right Central Midfield) and Forwards (Left Forward and Right Forward). Eight U18 elite academy soccer matches were used for the analysis and key technical skills (variables) required within soccer performance were identified in conjunction with the participating coaches. The identified variables were successful and unsuccessful; tackling, short passing, long passing, shooting, dribbling and heading. Furthermore, operational definitions were developed and employed to maintain consistency throughout data analysis[16], with each definition being adapted (in consultation with the participating coaches) or adopted from previous research[17,18]. Two disinterested

academy soccer coaches, whom were blind to the study's aims and objectives, confirmed the face validity of the analysis variables and accompanying operational definitions.

Data collection procedures

Each coach was required to view all eight (U18) soccer matches (90 min) and provide observational analysis (i.e. the quantity and quality) of each player's respective skill performance post-match. Matches were viewed twice a week (i.e. Sunday and Wednesday), where possible, until completion (i.e. 4 weeks). If coaches were unable to attend a specific session due to other commitments, an alternative arrangement was made to ensure match viewing was undertaken. However, a separate arrangement was only required on one occasion for two participant coaches, whereby viewing was arranged for the following day. As many of the coaches employed note taking during a standard match day, the study's design permitted the use of their typical notation techniques during match analysis (e.g. player A dived into tackles too much).

Each match was then analysed post-match by an analyst using Gamebreaker (version 9.8; Sportstec, NSW, Australia). This process was to attain an objective assessment based on video evidence for each analysed variable throughout the respective matches. The analysis produced through Gamebreaker was to be considered the 'true'

performance outcome within the study due to the increased level of accuracy enabled from the pause and rewind functions. Once a match was analysed, the raw data from both Gamebreaker and the coaches was transferred into an excel spreadsheet in order to quantify and assess the observational capabilities of the coaches in relation to each analysed variable. Further comparisons to assess the potential differences in the identification of successful and unsuccessful actions were undertaken. Finally, observational analysis in relation to the five positional groups was assessed. All results are presented as mean values where appropriate; furthermore, the effectiveness of the undertaken observational analysis was assessed using the percentage error (%Error) calculation.

System reliability

To ensure acceptable reliability, both intra- and inter-observer agreement for each individual variable analysed was assessed. The lead researcher analysed all matches (n = 8) on a test re-test basis in accordance with the developed operational definitions. The subsequent re-test was carried out under the same conditions with at least four weeks separating testing sessions in order to negate any potential memory recall effects. A second analyst with approximately 10 years of football analysis experience analysed the same set of eight matches to enable inter-observer reliability assessments to be conducted. Using the method proposed by Cooper[19], each individual skill variable (i.e.

passing/tackling etc.) was separately analysed using two-minute time cells for the duration of the 90 minutes (45 x 2), with extra time cells added for additional time. Intra- (e.g. see Table 1) and inter-observer reliability was > 95 % for all indicators assessed, therefore the researcher was confident of consistent and reliable coding throughout.

Table 1. Summarised intra-observer reliability for all analysed variables

Variable	Median (sign test P)	PA (%)	95% CI (%)	PA ± 1 (%)	95% CI (%)
S. Short Pass	0.0 (1.00)	96	90 to 100	100	100 to 100
U. Short Pass	0.0 (1.00)	98	94 to 100	100	100 to 100
S. Long Pass	0.0 (1.00)	100	100 to 100	100	100 to 100
U. Long Pass	0.0 (1.00)	98	94 to 100	100	100 to 100
S. Dribble	0.0 (1.00)	98	94 to 100	100	100 to 100
U. Dribble	0.0 (1.00)	98	94 to 100	100	100 to 100
S. Shot	0.0 (1.00)	100	100 to 100	100	100 to 100
U. Shot	0.0 (1.00)	100	100 to 100	100	100 to 100
S. Header	0.0 (1.00)	100	100 to 100	100	100 to 100
U. Header	0.0 (1.00)	98	94 to 100	100	100 to 100
S. Tackle	0.0 (1.00)	96	90 to 100	100	100 to 100
U. Tackle	0.0 (1.00)	96	90 to 100	100	100 to 100

Note: PA = Perfect Agreement. CI = Confidence Interval. S. = Successful. U. = Unsuccessful.

Results

The analysed coaches identified a total of 1730 (1165 successful and 565 unsuccessful) actions compared to the 4463 (3415 successful and 1048 unsuccessful) during post match video analysis. These results demonstrated effective observational analysis (coaching recollection) of 34.1 % and 53.9 % for successful and unsuccessful actions respectively. Overall, the agreement between the coaching group and the video analysis within the current study was 38.8 %. The shooting variable demonstrated the greatest degree of agreement (75.7 %), whereas short passing produced the smallest (35.2 %) (Table 2).

Table 2. Percentage recall and mean recorded values for the six analysed variables in relation to the overall actions performed

Variable	Video	Coaches	Recall %
Tackle	76.6	33.8	44.1
Dribble	89.0	33.1	37.2
Short Pass	247.3	87.1	35.2
Long Pass	44.6	18.4	41.3
Shot	10.3	7.8	75.7
Header	90.1	36.1	40.1

The coaches recalled successful shooting accurately for over three quarters (78.6 %) of the total successful shooting actions identified within video analysis. Short passing (27 %) demonstrated the greatest difference between the effective observation of successful and unsuccessful actions, with long passing (3.8 %) illustrating the smallest. The recollection was greater for all unsuccessful actions except in the case of the shooting variable, whereby recollection of successful actions was 4.7 % greater. Again, shooting illustrated the greatest degree of correct observation for both successful and unsuccessful performance. Furthermore, the coaches were poorer at recalling successful actions, with 5/6 variables demonstrating < 50 % recollection. In contrast, 4/6 analysed variables within the unsuccessful sub-category produced > 50 % recollection (Table 3).

Table 3. Percentage recall and mean recorded values for the six analysed variables in relation to successful and unsuccessful actions

Variable	Successful Actions			Unsuccessful Actions		
	Video	Coaches	Recall %	Video	Coaches	Recall %
Tackle	54.6	23.4	42.9	22.0	10.4	47.3
Dribble	77.4	26.4	34.1	11.6	6.8	58.6
Short Pass	198.4	59.4	29.9	48.9	27.8	56.9
Long Pass	22.9	9.0	39.3	21.8	9.4	43.1
Shot	5.6	4.4	78.6	4.6	3.4	73.9
Header	68.0	23.1	34.0	22.1	13.0	58.8

The greatest level of overall performance recollection (both successful and unsuccessful actions) was identified for the Full Backs' positional group with 40.6 % of actions being observed and recalled accurately by the coaches. In contrast, Wide Midfielders demonstrated the lowest recollection (35.1 %). Furthermore, coach recollection of the Central Defenders, Central Midfielders and Forwards was 39.5 %, 40.4 % and 37.3 % respectively for total actions performed. Recollection for the Central Midfielders was greater (5.3 %) in comparison to the Wide Midfielders, whereas the opposite was marginally illustrated for the respective defensive positions (Full Backs 1.1 % greater). The recollection in relation to the positional groupings illustrated an average of ~ 20 %

greater recollection for unsuccessful actions compared with successful actions. The poorest degree of observational analysis was identified for the Wide Midfielders (Successful: 30.5 and Unsuccessful: 49.0 %).

Table 4. Percentage recall and mean recorded values for successful and unsuccessful actions in relation to the five analysed positional group

Positional	Successful Actions			Unsuccessful Actions		
Grouping	Video	Coaches	Recall %	Video	Coaches	Recall %
Full Backs	95.5	35.4	37.1	26.1	14.0	53.6
C. Def	93.1	33.0	35.4	22.4	12.6	56.3
W. Mid	75.5	23.0	30.5	25.5	12.5	49.0
C. Mid	92.4	32.1	34.7	29.5	17.1	58.0
Forwards	70.4	22.1	31.4	27.5	14.4	52.4

Note: C. Def = Central Defenders. W. Mid = Wide Midfielders. C. Mid = Central Midfielders.

Discussion

The purpose of this investigation was to quantify and assess the observational analysis capabilities of experienced elite coaches whilst focusing upon 1) soccer specific technical actions and 2) individual positions and positional groupings within competitive youth soccer matches. The main findings of the study highlight the

considerably limited observational analysis capabilities of elite coaches when compared with the effective implementation of video analysis. Furthermore, the differences identified herein varied considerably with respect to both, the: 1) positional grouping and 2) performance variable analysed.

The markedly more effective observation and recollection of shooting in comparison to the other variables analysed is, at least in part, attributed to the variable itself, more specifically, the frequency which such a variable occurs within a competitive soccer match. The frequency of a shot (10.3 per match) occurring within the analysed soccer matches was low in comparison to the passing (247.3 per match) variable. Consequently, a shot may be interpreted as a key and important aspect of a soccer match whereby goals are often scored; therefore coaches may direct a greater degree of (sub)conscious attention towards such actions. In addition, the infrequent performance of a shot may have enabled coaches to much more easily 'chunk' this aspect of performance, enabling coaches to recall shooting with greater ease and accuracy post match[14,20]. This finding was similar to that of Laird and Waters[13] whereby shooting demonstrated the greatest degree of recollection across all participant coaches analysed.

Previous research on game specific skills has identified technical skills such as dribbling to be a differentiating factor between player ability levels[21,22,23,24]. Many

crucial moments of a soccer match, like winning possession of the ball, dribbling around an opposing player or scoring a goal all require a developed set of technical skills[23]. It is therefore not surprising that the development of dribbling proficiency is recognised as a central factor in the development of young soccer players[23]. However, the effective recall and analysis of the dribbling skill within the current study was 37.2 %, the second lowest for the six analysed variables. This result suggests that despite dribbling playing a significant role within talent identification, the accurate appraisal of such a skill is however extremely difficult. As the elite coaches demonstrate an extremely unreliable and inaccurate appraisal of dribbling, assessing such a skill within a competitive match environment in order to separate player ability and identify future athletes presents clear issues.

In many team sports, it has been suggested that coaches observe and interact more with effective players (based upon match time involvement), provide more feedback (instructional, positive and negative) and give more positive evaluations when compared to non-effective players[25]. Although the quantification of effective players (in terms of minutes played) was not specifically undertaken within the current study, the coaches may have perceived the players performing superior to their peers in early matches to perform superior also in subsequent matches, especially following an initial 'high-level' or 'exceptional' performance. Furthermore, despite attempting to assess

each player performing the individual skills, irrespective of teammate performance, individual playing ability and previous performance, the potentially inevitable comparison of the perceivably *stronger* players to the *weaker* players could have occurred. Worsfold[2] previously demonstrated coach behaviour to vary in relation a player's status within the team. This potential, even if sub-conscious, difference in coaching behaviour may have produced underestimations (*weaker* players) or overestimations (*stronger* players) in the skill performance analyses. Overall, the behavioural differences identified within Worsfold's[2] research and the subsequent paucity of recollection identified herein has implications for future talent identification and development within elite youth soccer academies.

The overall differences between similar positional groups (e.g. Central and Wide Midfielders) advocate that comparisons should only be made within positional groups, rather than throughout team performance. This suggestion is mirrored by the work of James[26] and Heasman[12]. James[26] suggested that comparisons made between different positions demonstrate a distorted impression of player performance unfavourably for both, the coach(es) and the player(s) in question. Furthermore, various skills such as shooting are arguably more vital to successful performance within attacking related positions (e.g. strikers) in contrast to defensive positions (e.g. central defenders). Therefore, tailoring player assessment criteria based upon their specific positional

demands should be considered key to creating any future effective and objective methods of assessing player performance. In addition, Taylor[27] suggested role variations exist within similar positions (e.g. Central Defensive Midfielder and Central Attacking Midfielder), however, this aspect was not assessed within the current study and warrants further investigation.

Future research should develop upon the current study by initially increasing the number of coaches analysed in order to enable comparisons between various levels of soccer coaching experience (i.e. novice, intermediate, experienced) to be made. Given a primary role of a sports coach is to observe and assess sporting performance, an investigation into the observational analysis at various coaching levels may begin to highlight whether effective observation and recall is developed with further experience and/or coaching knowledge within soccer. Furthermore, player identification, development and performance appraisal is arguably a broader concept than the six basic soccer skills analysed herein. The six variables utilised within the current study could be considered the starting point within the quantification and assessment of coaching and observational analysis in relation to individual technical actions. However, observational analysis when assessed in relation to a wider degree of performance variables should logically deteriorate (i.e. due to the requirement of focusing upon a greater number of performance aspects), therefore the development of techniques to

improve the effectiveness of soccer coaching observations, although potentially difficult, may in turn be warranted. The human brain may never be able to accurately, objectively and effectively observe and assess 100 % of actions performed at the required speed for error-free feedback to be constructed. Therefore, given the widespread use and clear importance placed upon performance analysis by coaches within the recollection and feedback process, future research should attempt to facilitate more effective data collection and delivery (from the analyst/coaches) methods. Such techniques should have the overriding aim of optimising the impact of performance analysis within future feedback sessions by enabling greater athlete/coach information retention.

Conclusion

The results of the current study demonstrate limited observational analysis capability (38.8 %) when assessing technical skill performance on a quantity and quality (successful and unsuccessful) basis for both, the; 1) individual variables and 2) positional groupings employed. Furthermore, the importance the brain attaches to certain activities may well explain the greater level of remembrance regarding unsuccessful actions (i.e. coaches are required to seek out and perfect performance errors thus (sub)consciously direct greater attention to unsuccessful performance) and shooting performance (i.e. shooting is related to goal scoring opportunities and in turn

winning). The limited appraisal of the dribbling variable, which has been concluded within various studies[22,23,24] as a significant separating factor within talent identification and development amongst adolescent soccer players, highlights the need for objective measures to assist future player assessment and review processes within the soccer-coaching environment. Failure to integrate objective measures, where possible, has the potential risks of future elite soccer players not progressing through youth systems due to the inabilities and/or difficulties of accurately and consistently appraising key aspects of performance. Clearly, the overall lack of observational capability identified herein and within previous studies[9,13] has significant implications on the accuracy and specificity of feedback delivered to the athletes. The findings reinforce the importance and potential of the performance analysis domain in providing highly accurate, comprehensive and objective information to enable coaches to better interpret the complex nature of a sports performance, facilitate more effective decision-making and further improve the quality and provision of augmented feedback within the coaching process.

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