EXCESSIVE USE OF THE PREFERRED FOOT IN ON-THE-BALL SKILLS EXECUTION COMPROMISES PERFORMANCE AND TACTICAL BEHAVIOUR OF FOOTBALL PLAYERS

Marcos Antônio Mattos dos Reis[1,2], Grégory Hallé Petiot[3], and Marcos Bezerra Almeida[1]

[1]Laboratory of Study and Research in Performance in Exercise and Sport, Postgraduate Program in Physical Education, Federal University of Sergipe, São Cristóvão, Brazil
[2]Higher School of Physical Education, University of Pernambuco, Recife, Brazil
[3]Department of Physical Education, Laval University, Quebec, Canada

Original scientific paper
DOI 10.26582/k.55.2.10

Abstract:

This study aimed to compare tactical behaviour and performance of football players with different on-the-ball skills execution functional technical asymmetry levels and to verify whether functional technical and tactical performance indexes of football players are associated. The sample included 59 football players (14.2 ± 1.5 years of age). FUT-SAT and SAFALL-FOOT were used as instruments for performance analysis. Participants were divided in two groups: higher and lower functional technical asymmetry. Student's *t*-test was used to compare the behaviour and tactical performance of the groups, and the Pearson test was used to verify associations between functional technical asymmetry and tactical performance indexes. A significance level of 5% was adopted. The higher functional technical asymmetry group showed less tactical efficiency (t_{57} = 1.9; p = .05; d = .17) and low performance results in the execution of defensive actions (t_{57} = 2.1; p = .04; d = .55; t_{57} = 2.1; p = .04; d = .61) compared to the lower functional technical asymmetry group. No association was found between the functional technical asymmetry and tactical performance indexes (r = -.06; p = .66). It is concluded that the levels of functional technical asymmetry affected the behaviour and tactical performance of players although functional technical asymmetry and tactical performance indexes values were not associated. Future investigations may verify how football players with high and low levels of functional technical asymmetry change their behaviour and tactical performance from different kinds of training.

Key words: *decision-making, motor behaviour, motor skills, performance analysis, team sports*

Introduction

To perform in the game, football players are required to synchronise their actions and respond to the constraints of space-time that are created by the opponents. More specifically, in the area of motor behaviour, coordination refers to an emergent state produced by self-organising processes and the constraints that shape the degrees of freedom to perform tasks (Newell, 1985; Orth, van der Kamp, Memmert, & Savelsbergh, 2017; Profeta & Turvey, 2018). Both interpersonal and intrapersonal coordination patterns can be observed in team sports, including football (Araújo & Davids, 2016; Davids, Araújo, Correira, & Vilar, 2013). The interpersonal coordination consists in the macrostructure (teams) formed through the interaction of microstructures of the system (players, dyads, or subgroups) (Araújo & Davids, 2016; Caetano, Souza, Bueno, Cunha, & Moura, 2020; Corrêa, Alegre, Freudenheim, Santos, & Tani, 2012; Santos, Duarte, Davids, & Teoldo, 2018). On the other hand, intrapersonal coordination reflects both the behaviour and the performance of football players, which arise from the response to constraints in their tactical, technical, physical, and psychological capabilities (Bradley & Ade, 2018; Davids, et al., 2013; Filetti, Ruscello, D'Ottavio, & Fanelli, 2017; McGuckian, Beavan, Mayer, Chalkley, & Pepping, 2020).

Football players perform on-the-ball and off-the-ball skills to deal with the situations emerging in each play, which reflect their tactical behaviour. Theoretically, the tactical behaviour reflects how players manage the playing space through the multiple cooperation and opposition interactions (Corrêa, et al., 2012; Costa, Silva, Greco, & Mesquita, 2009; Reis & Almeida, 2019; Reis, Vasconcellos, & Almeida, 2017). Conceptu-

ally, tactical behaviour is a set of intentional and purposeful actions aimed at solving motor problems in the performance environment (Reis, et al., 2017, 2019). Thus, tactical behaviour might be assessed through efficiency and tactical effectiveness, which refer to the successful execution of each motor skill on and off-the-ball and the overall performance in the execution of these motor actions, respectively (Costa, et al., 2009, 2011).

A key factor of success in the execution of skills when players have the possession of the ball, such as passing, dribbling, and tackling, is the balance between preferred and non-preferred foot utilisation. An unbalanced foot utilisation is defined as functional technical asymmetry (FTA) (Guilherme, Garganta, Graça, & Seabra, 2015a; Oliveira, Graça, Seabra, & Garganta, 2012). Praça, Soares, Matias, Costa, and Greco (2015) found a low correlation between tactical performance and on-the-ball skills execution. However, on-the-ball skills were assessed in drills designed to isolate technique performance, and therefore did not reflect the real-game environment (Aquino, et al., 2016). In addition, FTA was not assessed in that study.

Carey et al. (2001) found that 1998 FIFA World Cup players used their right foot more often when performing on-the-ball skills. Although the preferred/non-preferred foot usage was highly unbalanced, players presented a similar level of performance when using the non-preferred foot. However, the study did not include data on the players' tactical behaviour and performance.

Marcori et al. (2022) investigated the effect of positional constraints on functional asymmetry of the lower limbs in European football. Specifically, the results of the study showed that the greater the distance from the target, the greater the frequency of using the preferred foot in the execution of the kicking motor skill. In another study, Verbeek, Elferink-Gemser, Jonker, Huijgen, and Visscher (2017) investigated whether foot preference in performing motor skills on-the-ball would affect player selection in youth football. The results of the study showed that the preference for the left foot increased the probability of success in the selection of players in youth football.

Despite the careful previous investigations (Carey, et al., 2001; Marcori, et al., 2022; Praça, et al., 2015; Verbeek, et al., 2017), some key aspects still need clarification. For instance, it is not clear yet to what extent the FTA level could affect behaviour and tactical performance, and if FTA levels and tactical performance are correlated. These answers would allow a better understanding of how football players locate themselves on the field to facilitate the reception of the ball based on their either preferred or non-preferred foot. Thereafter, football teachers/coaches could stimulate tactical improvements as well as the use of the non-preferred foot when performing on-the-ball skills (Guilherme, et al., 2015a).

Thus, the aim of this study is two-fold: (1) to compare tactical behaviour and performance of football players with different on-the-ball skills execution FTA levels; and (2) to verify whether FTA and tactical performance index TPI of football players are associated. The hypothesis suggests that the lower the FTA, the better the performance and tactical behaviour, meaning an inverse correlation between tactical performance indices and functional asymmetry.

Methods

Participants

The sample was composed of 59 U-13, U-15, and U-17 male football players (14.20 ± 1.55 years and 7.52 ± 2.50 years of practice time with frequency of three training days a week involving tactical, technical, and physical drills), being 46 right-footers and 13 left-footers. The sample size was calculated using the following equation:

$$[z^2 * p(1\text{-}p)] / e^2$$

where z = z score, e = margin of error, and p = standard deviation. The GPower Software was used for this procedure.

The football players were randomly selected. As an inclusion criterion, participants were officially affiliated to their respective local football federation where data was collected. As an exclusion criterion, any injured player would be excluded from the sample, although no exclusion has been reported.

Parents and/or legal guardians read and signed a consent form to authorise players to take part in the study. Research project was approved by the ethics committee on human research at a local university. All procedures followed the guidelines stated in the resolution of the Declaration of Helsinki.

Experimental design

In a correlational and transversal design, young football athletes were asked to perform two tests in a small-sided game format to determine FTA and TPI. All assessments took place in players' respective training environments, on two different occasions, 48 h apart.

Tactical assessment

The tactical behaviour was assessed using the System of Tactical Assessment in Soccer (FUT-SAT) (Costa, Garganta, Greco, Mesquita, & Maia, 2011) (Figure 1A). FUT-SAT identifies 10 core tactical principles (Costa, et al., 2009) (Table 1) and allows the calculation of the emerging variables.

The number of tactical actions, the percentage of successful tactical actions and the number of unsuccessful tactical actions are all variables that

Table 1. Tactical principles and the spatial references

Tactical principles	Definition	Spatial references
	The offensive phase of the game of football	
Penetration	Action that ruptures the opponent's defensive lines (i.e., dribbling)	Player in ball possession advances towards the goal
Offensive coverage	Action that aims to create a pass vector around the ball carrier and/or decrease the opponent's pressure about it	Player not in ball possession and inside the centre of play Player not in ball possession, outside the centre of play, and positioned in parallel to the less offensive half of the centre of play
Width and length	Action that aims to create a pass vector for the ball carrier along the width and length of the field (i.e., player not in ball possession) Action that aims to gain decision-making time when the player is in ball possession	Player not in ball possession, outside the centre of play, and between the ball and the last defensive line in front of the goal Player in ball possession in the direction of own goal or the sides of the field
Depth mobility	Action performed in the opponent's last defensive line that aims to create a pass vector in width and length, to increase the forward coverage area of one's own team	Action taken outside the centre of play, between the opponent's last defensive transversal line and the goal
Offensive unity	Action that aims to create backward pass line for the ball carrier	Action taken outside the centre of play and behind the ball line
	The defensive phase of the game of football	
Delay	Offering primary opposition to the opponent in ball possession	First player after the ball carrier, and inside the centre of play
Defensive coverage	Offering secondary opposition to the ball carrier	Second player after the ball carrier and inside the centre of play
Defensive balance	Action that aims to obstruct the pass line of the ball carrier, occupying critical areas of the field (outside the centre of play) Action that aims to follow the ball carrier behind the ball line (inside the centre of play)	Player outside the centre of play in areas close to the ball localization. Player inside the centre of play in the less offensive half.
Concentration	Action that aims to protect one's own goal	Player outside the centre of play in on zone near ball localization.
Defensive unity	Action that allows the team to decrease the distance between the defensive transversal lines, and compacting them by decreasing the interpersonal distance	Player in front of the ball line and out of the centre of play Player is behind the ball, out of the centre of play, and distance between two sectors of ball localization

reflect the level of tactical efficiency. The tactical performance indexes are scales of tactical effectiveness ranging from 0 to 100 points (arbitrary unit). Those indexes are calculated using the following equation:

TPI = tactical action (principle executed × principle executed successful or unsuccessful × localisation of tactical action × result of the tactical action) / numbers of tactical actions (Costa, et al., 2011).

The localisations of actions on the field discriminate between defensive and offensive halves. The result of each tactical action is scaled from 1 to 5 points where a goal scored and recovery of ball possession were the highest scores obtained for the offence and the defence, respectively.

A Sony W830 camera (20.1 megapixel, high definition; Japan), supported by a professional tripod (Sl-2111, 1.20 m), was used to record the games. The video files were further transferred to a notebook. The Soccer Analyzer® software performed tactical analysis and the data were transcribed to a Windows® Excel spreadsheet (Costa, et al., 2011).

Analysis of on-the-ball skills FTA levels

The System of Assessment of Functional Asymmetry of the Lower Limbs in Football (SAFALL-FOOT) was used to identify the levels of FTA in the on-the-ball skills execution. SAFALL-FOOT consists of a 2 x 10 min (split by a 5-min recovery interval) small-sided game (Figure 1B). The performance of preferred and non-preferred feet was assessed based on six categories of actions: 1. tackle and interception; 2. ball control; 3. pass; 4. driving/protection of the ball; 5. dribble/feint; 6. strike on

goal. These six categories are divided into thirty-two subcategories associated with variables that determine the level of effectiveness of the on-the-ball skills execution.

The formulas to found the utilisation index of both feet were the following:

a) preferred foot = index of the positive subcategories of the preferred foot + index of the negative subcategories of the preferred foot / sum of the actions of the subcategories of preferred foot and non-preferred foot;
b) non-preferred foot = index of the positive subcategories of the non-preferred foot + index of the negative subcategories of the non-preferred foot / sum of the actions of the subcategories of preferred foot and non-preferred foot.

From that, the functional technical asymmetry index (IFTA) was obtained calculating the difference between the subcategories preferred and non-preferred feet utilisation indices in an ordinal scale of 0 to 10 points (Guilherme, Garganta, Graça, & Seabra, 2015b; Oliveira, et al., 2012).

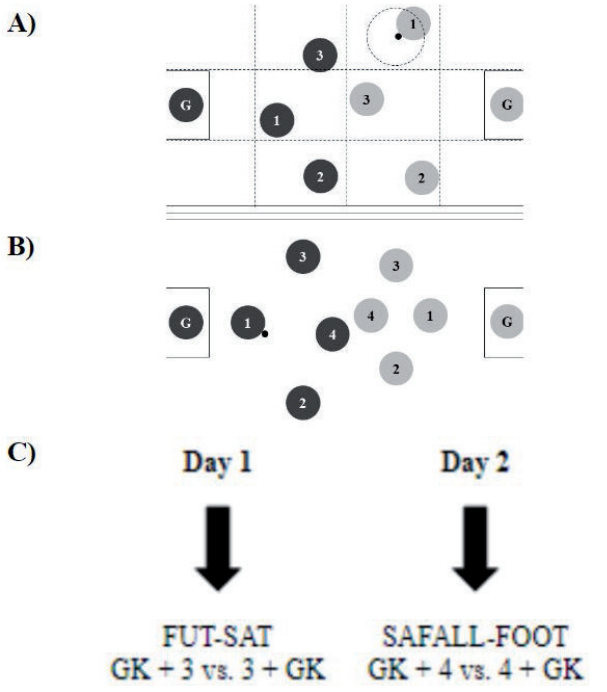

Figure 1. A) FUT-SAT consists of small-sided games (GK + 3 vs. 3 + GK) that last for 4 minutes and are played on a 36 m × 27 m field. The following spatial references are used to identify tactical principles: four sectors, three corridors, twelve zones, and the game centre, which has the ball as its epicentre. The camera was placed on a professional tripod and in a diagonal position that was higher than the field of play; this facilitated the subsequent analysis of the video recordings (Costa, et al., 2011).
B) SAFALL-FOOT consists of small-sided games (GK + 4 vs. 4 + GK) that last for 20 minutes and are played in a 45 m × 29 m field. The camera was placed on a professional tripod and in a central position that was higher than the field of play; this facilitated the subsequent analysis of the video recordings (Oliveira, et al., 2012). C) Timeline of data collection procedures.

Data analysis

The participants were allocated into two groups according to the median of the IFTA: higher IFTA (n = 29; 23 right footers and six left footers) and lower IFTA (n = 30; 23 right footers and seven left footers). The data are presented as mean ± standard deviation. All calculations were made in SPSS 20.0 (IBM, USA), considering a level of significance of .05.

Analysis of intra-rater reliability

The analysis of intra-rater agreement was performed with ~10% of all the skills performed on and off-the-ball, which were selected randomly. The Kappa index (κ) showed a high degree of agreement for both procedures (FUT-SAT: $\kappa = .88$, $p < .01$; SAFALL-FOOT: $\kappa = .97$, $p < .01$) (Robinson & O'Donoghue, 2007).

Group comparisons

The normality of data distribution was tested by Kolmogorov-Smirnov test ($p > .05$). Student's *t*-test for independent samples compared groups' results. Cohen's *d* was used as the effect size with the following classification: small ($d \leq .2$), medium ($d = .5$) and high ($d \geq .8$) (Dancey & Reidy, 2013).

Correlational analysis

The Pearson correlation test was used to assess the correlation between IFTA and tactical performance as well as between the IFTA and indices of the preferred and non-preferred foot.

Results

Group comparisons

A total of 6539 on and off-the-ball actions (3236 tactical actions and 3303 technical skills) performed in 18 small-sided games have been assessed. The mean of the index of preferred foot utilisation was 6.2 ± 1.1 points, while the non-preferred foot was 1.3 ± 0.7 point. The higher IFTA group had 6.2 ± 0.8 points, and the smaller IFTA group had 3.6 ± 1.0 points ($t_{57} = 11.1$; $p < .001$; $d = .35$).

The higher IFTA group presented lower tactical actions successfulness ($t_{57} = 1.9$; $p = .05$; $d = .17$). Plus, the defensive principle of *delay* showed a lower performance index ($t_{57} = 2.1$; $p = .04$; $d = .55$), as well as the *defensive coverage* principle presented a greater number of unsuccessful executions ($t_{57} = 2.1$; $p = .04$; $d = .61$). This same group still performed the defensive *concentration* more often ($t_{57} = 2.9$; $p = .01$; $d = .77$) and executed a greater number of unsuccessful actions of *offensive unity* ($t_{57} = 2.6$; $p = .01$; $d = .64$) (Table 2).

Players showed a higher index of use of the right foot (5.1 ± 2.4 points) than the left foot (2.4

Table 2. Means and standard deviations for the numbers of tactical actions (first line), percentages of successful tactical actions (second line), numbers of unsuccessful tactical actions (third line) and tactical performance index (fourth line), for every tactical principle and level of functional technical asymmetry (FTA)

	FTA higher	FTA lower	*p*	*d*
Actions	5.40 ± 4.64	5.52 ± 4.90	.83	.02
	82.2 ± 27.4	86.6 ± 24.2	**.05***	.17
	.80 ± 1.31	.61 ± 1.20	.11	.16
	42.82 ± 7.79	43.79 ± 6.21	.64	.13
Offensive actions	26.48 ± 9.99	28.3 ± 8.2	.45	.20
	90.24 ± 9.71	93.05 ± 6.33	.19	.35
	2.14 ± 1.81	1.77 ± 1.43	.38	.19
	51.35 ± 11.72	51.11 ± 10.30	.92	.02
Penetration	1.45 ± 1.09	1.60 ± 1.54	1.00	.08
	58.73 ± 42.12	42.81 ± 37.66	.19	.40
	.55 ± .69	.80 ± .92	.31	.25
	51.52 ± 33.2	38.83 ± 22.71	.15	.45
Offensive coverage	9.79 ± 5.88	9.83 ± 5.14	.97	.00
	98.12 ± 5.45	97.43 ± 6.16	.54	.12
	.14 ± .35	.23 ± .50	.50	.22
	50.75 ± 16.10	51.52 ± 11.22	.81	.06
Depth mobility	2.79 ± 3.42	3.23 ± 3.22	.61	.12
	97.12 ± 12.10	97.90 ± 6.12	.53	.09
	.03 ± .19	.10 ± .31	.32	.00
	58.80 ± 20.32	60.61 ± 22.85	.79	.08
Width and length	8.38 ± 4.13	10.50 ± 5.06	.08	.46
	95.35 ± 9.30	93.72 ± 20.11	.50	.11
	.28 ± .53	.27 ± .78	.50	.00
	52.00 ± 14.91	48.79 ± 15.73	.41	.22
Offensive unity	4.07 ± 2.63	3.10 ± 2.20	.13	.42
	71.42 ± 32.7	85.93 ± 26.74	.08	.49
	1.14 ± 1.46	.37 ± .67	**.01***	.64
	48.21 ± 21.31	49.02 ± 18.23	.88	.04
Defensive actions	27.93 ± 9.72	27.00 ± 9.38	.66	.09
	81.23 ± 11.10	84.81 ± 11.52	.22	.32
	5.38 ± 3.88	4.07 ± 3.59	.20	.35
	33.90 ± 5.21	35.25 ± 7.03	.39	.21
Delay	5.21 ± 2.69	5.17 ± 2.57	.95	.00
	67.84 ± 25.09	77.90 ± 19.21	.09	.46
	1.59 ± 1.21	1.20 ± 1.19	.17	.33
	29.94 ± 8.46	35.67 ± 12.58	**.04***	.55
Defensive coverage	1.55 ± 1.90	0.97 ± 0.81	.52	.44
	75.00 ± 42.01	95.02 ± 22.45	.14	.62
	.21 ± .41	.03 ± .18	**.04***	.61
	43.82 ± 24.32	43.01 ± 25.01	.92	.03
Concentration	4.38 ± 3.03	2.57 ± 1.70	**.01***	.77
	95.44 ± 12.23	98.81 ± 6.42	.20	.37
	.21 ± .56	.03 ± .18	.11	.25
	29.42 ± 7.33	33.06 ± 17.75	.33	.29
Defensive balance	8.21 ± 4.10	9.47 ± 4.67	.27	.30
	82.68 ± 16.36	81.65 ± 19.94	.87	.06
	1.52 ± 1.66	1.47 ± 1.66	.80	.00
	36.09 ± 6.33	35.21 ± 10.91	.72	.09
Defensive unity	8.59 ± 4.89	8.83 ± 3.91	.83	.05
	78.40 ± 26.12	86.42 ± 18.51	.34	.36
	1.86 ± 2.55	1.33 ± 2.12	.50	.26
	33.02 ± 10.11	35.59 ± 11.40	.37	.23

Note. *p<.05

± 2.1 points) (t_{116} = 6.4; p < .001; d = 1.20). It was also found that the higher IFTA group performed more on-the-ball skills (61.8 ± 17.0 and 50.4 ± 15.4, respectively; t_{57} = 2.7; p = .009; d = .70) and used their right foot more often when performing these skills (5.9 ± 2.7 points and 4.3 ± 1.8 points, respectively; t_{57} = 2.7; p = .01; d = .71). On the other hand, there was no difference between the groups regarding the use of the left foot during on-the-ball skills execution (2.1 ± 2.4 points and 2.7 ± 1.7 points; t_{57} = -1.1; p = .27; d = .29).

Correlational analysis

Pearson's correlation test did not identify an association between IFTA and TPI (r = -.06; p = .66). Likewise, there was also no correlation between IFTA and TPI for either group (higher IFTA: r = .11; p = .56; lower IFTA: r = -.13; p = .48). Notwithstanding, there was a strong correlation between IFTA and the utilisation rates of preferred and non-preferred feet (r = .92; p <. 01; r = -.77; p <. 01, respectively).

Discussion and conclusions

The aims of this research were: (1) to compare tactical behaviour and performance of football players with different on-the-ball skills execution FTA levels; and (2) to verify whether FTA and TPI of football players are associated. Our hypothesis associated to the effects of FTA on the behaviour and tactical performance was partially confirmed, since the group with lower IFTA showed a better tactical efficiency than their counterparts.

The lower IFTA group showed better tactical performance when executing the *delay* principle, as well as performed less unsuccessful *defensive coverage* than the higher IFTA group. The tactical principle of *delay* means facing the opposing player who is in possession of the ball in order to recover it and/or prevent its advancing on the playing field, whereas *defensive coverage* consists of supporting the teammate who performs the delay (Costa, et al., 2009; Reis & Almeida, 2019). The execution effectiveness and efficiency of these principles may contribute to more ball recoveries, as defending players could stick close and ultimately tackle and intercept opponents' passes.

In general, the best teams are more likely to recover ball possession by tackling and intercepting passes than the teams ranked at the bottom of the table of a championship (Almeida, Ferreira, & Volossovitch, 2014), which increases the odds of conceding goals by approximately three times more (Barreira, Garganta, Guimarães, Machado, & Anguera, 2014). Hence, a good performance in these tactical defensive actions helps top teams increase the odds of winning titles in high level competitions (Liu, Gomez, Lago-Peñas, & Sampaio, 2015; Liu, Hopkins, & Gómez, 2016). In this way, based on our results, the capability of using any feet for actions and skills execution to recover ball possession is a *condition sine qua non*.

On the other hand, the higher IFTA group performed the principle of *concentration* more often than the lower IFTA group. Concentration means protecting areas at a greater risk of attacks from the opponent, that is the area close to the own goal (Costa, et al., 2009; Reis & Almeida, 2019). As higher IFTA players had shown poorer performance when executing the defensive tactical principles of *delay* and *defensive coverage*, they preferred protecting the areas closer to their own goal.

The lower ITFA group also performed less unsuccessful *offensive unity* than the higher ITFA group. Offensive unity consists of tactical actions performed off-the-ball and behind the line of the ball, generating offensive compactness through the creation of backward passing lines and promoting an approximation between the transversal lines of the team (Costa, et al., 2009; Reis & Almeida, 2019). Thus, a greater ability to use both feet when performing on-the-ball skills allows a better position to receive passes regardless of the foot they must use to control the ball. This may give a player confidence in compacting the lines in case they have to receive backward passes and react quickly and efficiently. As a result, these abilities allow them to perform collective tactical principles, organise, and attack with effectiveness, which provides a competitive advantage (Moura, Martins, Anido, Barros, & Cunha, 2012; Reis & Almeida, 2019).

Thus, the lower IFTA group performed better space management to solve each play situation. Thus, lower IFTA football players were tactically more efficient because they were able to position themselves better on the play field without worrying about making tactical adjustments to receive the ball on their preferred foot.

When conceived as a level of hierarchy of movement construction, the space in the play determines the way skills are performed, as a response to environmental challenges (Profeta & Turvey, 2018). Since the dynamics of the football game is characteristically unpredictable due to the constant exchange of information between players and teams (Araújo & Davids, 2016; Corrêa, et al., 2012; Davids, et al., 2013), football players need to respond quickly and adaptively to environmental changes (Orth, et al., 2017; Profeta & Turvey, 2018). Two mechanisms of information exchanging may be observed in a game: a) movements of teammates aiming to offer information that is relevant for collectively achieving an objective; b) movements intended against the opponents aiming to deceive or hide intentions so that the opposing team does not reach their objective (Corrêa, et al., 2012).

This constant exchange of information between players and teams requires players to keep seeking for spaces they can occupy to execute their skills (Corrêa, et al., 2012). FTA reflects an additional constraint as players who are limited by their inability to control the ball with both feet would naturally be limited in the spaces they can occupy to perform actions successfully, efficiently and effectively in the play.

In ecological psychology, the decision-making process for motor skills execution requires the perception of affordances, which are opportunities for action offered by the performance environment so that the individual can solve motor problems and reach the task goal (Araújo & Davids, 2016; Profeta & Turvey, 2018; Silva, Garganta, Araújo, Davids, & Aguiar, 2013). In this way, a high FTA index can impair the perception of affordances in the environment, because the player focuses his/her attention internally to a certain movement pattern with the preferred foot instead of focusing his/her attention externally to the relevant information to reach the task goal. In the case of our study, this occurred, in particular, in the process of ball possession recovery.

No association was found between IFTA and TPI. This may have occurred due to the characteristics of the sample of this study which was composed of young football players affiliated to lower performance teams. In addition, the use of the right foot to execute on-the-ball skills is a trend in the general population given that most people and players have their right foot as their preferred one (Carey, et al., 2001).

Finally, our results have a high practical applicability to players' training and development. The ability to use both feet when performing on-the-ball skills has a clear effect on tactical behaviour and performance, especially in actions that result in compacting the team that is attacking. Further investigations may verify the effect of task constraints and the instruction of the educator/coach on the improvement of skills with both feet as well as on the tactical behaviour and performance of young football players.

Accordingly, the teaching-learning and training processes of football should be guided by activities that stimulate strengthening of both the interpersonal and intrapersonal coordination. A systemic approach to these processes may be used with the objectives to: a) make exercises as close as possible to the real actions and situations of the game; b) associate the tactical (reason to do) and technical (how to do) skills of the players; c) base actions on principles of the play; d) allow learning transfer; e) strengthen perception-action coupling (Davids, et al., 2013; Garganta, 1998; Garganta & Gréhaigne, 1999; Oppici, Panchuk, Serpiello, & Farrow, 2018; Santos, et al., 2018).

It is concluded that the football players with lower IFTA had greater tactical efficiency, greater effectiveness, and efficiency in the execution of defensive tactical principles of delay and defensive coverage. They were also more efficient in executing offensive unity than players with higher IFTA. On the other hand, the higher IFTA group performed the defensive tactical principle of concentration more often than players with a lower IFTA.

No association was found between the IFTA and the tactical performance index. Finally, the young football players performed more on-the-ball skills with their right foot compared to the left foot, which was determinant for the unbalance in the use of preferred and non-preferred foot in the execution of the skills in the play.

References

Almeida, C., Ferreira, A., & Volossovitch, A. (2014). Effects of match location, match status and quality of opposition on regaining possession in UEFA Champions League. *Journal of Human Kinetics, 41*(1), 203-214. doi: 10.2478/hukin-2014-0048

Aquino, R., Marques, R., Petiot, G., Gonçalves, L., Moraes, C., Santiago, P., & Puggina, E. (2016). Relationship between procedural tactical knowledge and specific motor skills in young soccer players. *Sports (Basel), 17*(4)*,* 52. doi: 10.3390/sports4040052

Araújo, D., & Davids, K. (2016). Team synergies in sport: Theory and measures. *Frontiers in Psychology, 7*(1)*,* 1449. doi: 10.3389/fpsyg.2016.01449

Barreira, D., Garganta, J., Guimarães, P., Machado, J., & Anguera, M. (2014). Ball recovery patterns as a performance indicator in elite soccer. *Journal of Sports Engineering and Technology*, *228*(1), 61-72. doi:10.1177/1754337113493083

Bradley, P., & Ade, J. (2018). Are current physical match performance metrics in elite soccer fit for purpose or is the adoption of an integrated approach needed? *International Journal of Sports Physiology and Performance, 13*(5), 656-664. doi: 10.1123/ijspp.2017-0433

Caetano, F., Souza, N., Bueno, M., Cunha, S., & Moura, F. (2020). Interpersonal interaction during official soccer matches considering the coupling of different playing positions. *International Journal of Performance Analysis in Sport*, *20*, 1-13. doi: 10.1080/24748668.2020.1775412

Carey, D., Smith, G., Smith, D., Shepherd, J., Skriver, J., Ord., L., & Rutland, A. (2001). Footedness in world soccer: An analysis of France '98. *Journal of Sports Sciences, 19*(11), 855-864. doi: 10.1080/026404101753113804

Corrêa, U., Alegre, F., Freudenheim, A., Santos, S, & Tani, G. (2012). The game of futsal as an adaptive process. *Nonlinear Dynamics Psychology and Life Sciences, 16*(2)*,* 185-203.

Costa, I., Garganta, J., Greco, P., Mesquita, I., & Maia, J. (2011). System of tactical assessment in soccer (FUT-SAT): Development and preliminary validation. *Motricidade*, *7*(1), 69-84. 84. https://doi.org/10.6063/motricidade.121

Costa, I., Silva, J., Greco, P., & Mesquita, I. (2009). Princípios Táticos do Jogo de Futebol: conceitos e aplicação. [Tactical principles of soccer game: Concepts and application.] *Motriz*, *15*(3), 657-668.

Dancey, C., & Reidy, J. (2013). *Statistics without maths for psychology*. New Jersey: Prentice Hall.

Davids, K., Araújo, D., Correia, V., & Vilar, L. (2013). How small-sided and conditioned games enhance acquisition of movement and decision-making skills. *Exercise and Sport Sciences Reviews, 41*(3), 154-161. doi: 10.1097/JES.0b013e318292f3ec

Filetti, C., Ruscello, B., D'Ottavio, S., & Fanelli, V. (2017). A study of relationships among technical, tactical, physical parameters and final outcomes in elite soccer matches as analyzed by a Semiautomatic Video Tracking System. *Perceptual and Motor Skills*, *124*(3), 601-620. doi: 10.1177/0031512517692904

Garganta, J. (1998). O ensino dos jogos desportivos colectivos. Perspectivas e tendências. [Teaching team sports games. Perspectives and trends.] *Movimento, 4*(8), 19-27. doi: 10.22456/1982-8918.2373

Garganta, J., & Gréhaigne, J. (1999). Abordagem sistêmica do jogo de futebol: moda ou necessidade? [Systemic approach to soccer game: A case of fashion or need?] *Movimento, 5*(10), 40-50. doi: 10.22456/1982-8918.2457

Guilherme, J., Garganta, J., Graça, A., & Seabra. (2015a). Influence of non-preferred foot technical training in reducing lower limbs functional asymmetry among young football players. *Journal of Sports Sciences, 33*(17)*,* 1790-1798. doi: 10.1080/02640414.2015.1012100

Guilherme, J., Garganta, J., Graça, A., & Seabra. (2015b). Effects of technical training in functional asymmetry of lower limbs in young soccer players. *Revista Brasileira de Cineantropometria e Desempenho Humano*, 17(2), 125-135. doi: 10.1590/1980-0037.2015v17n2p125

Liu, H., Gomez, M., Lago-Peñas, C., & Sampaio, J. (2015). Match statistics related to winning in the group stage of 2014 Brazil FIFA World Cup. *Journal of Sports Sciences, 33*(5), 1205-1213. doi: 10.1080/02640414.2015.1022578

Liu, H., Hopkins, W., & Gómez, M. (2016). Modelling relationships between match events and match outcome in elite football. *European Journal of Sport Science, 16*(5), 516-525. doi: 10.1080/17461391.2015.1042527

Marcori, A., Giovanini, B., Monteiro, P., Nascimento, V., Souza, D., & Okazaki, V. (2022). How positional constraints affect footedness in football: A notational analysis of five leagues in europe. *Journal of Motor Behavior, 54*(3), 382-390. doi: 10.1080/00222895.2021.1980367

McGuckian, T., Beavan, A., Mayer, J., Chalkley, D., & Pepping, G. (2020). The association between visual exploration and passing performance in high-level U13 and U23 football players. *Science and Medicine in Football, 4*, 1-17. doi: 10.1080/24733938.2020.1769174

Moura, F., Martins, L., Anido, R., Barros, R., & Cunha, S. (2012). Quantitative analysis of Brazilian football players' organisation on the pitch. *Sports Biomechanics, 11*(1), 85-96. doi: 10.1080/14763141.2011.637123

Newell, K. (1985). Coordination, control and skill. In D. Goodman, R. Wilberg & I. Franks (Eds.), *Differing perspectives in motor learning, memory, and control* (pp. 295-317). North-Holland: Elsevier Science Publishers.

Oliveira, J., Graça, A., Seabra, A., & Garganta, J. (2012). Validação de um sistema de avaliação da assimetria funcional dos membros inferiores em Futebol (SAFALL-FOOT). [Validation of a system for assessing the functional asymmetry of the lower limbs in football (SAFALL-FOOT).] *Revista Portuguesa de Ciências do Desporto, 12*(3), 77-97. doi: 10.5628/rpcd.12.03.77

Oppici, L., Panchuk, D., Serpiello, F., & Farrow, D. (2018). Futsal task constraints promote transfer of passing skill to soccer task constraints. *European Journal of Sport Science, 18*(7), 947-954. doi: 10.1080/17461391.2018.1467490

Orth, D., van der Kamp, J., Memmert, D., & Savelsbergh, G. (2017). Creative motor actions as emerging from movement variability. *Frontiers in Psychology, 8*(1)*,* 1903. doi: 10.3389/fpsyg.2017.01903

Praça, G., Soares, V., Matias, C., Costa, I., & Greco, P. (2015). Relationship between tactical and technical performance in youth soccer players. *Brazilian Journal of Kinanthropometry and Human Performance, 17*(2), 136-144. doi: 10.5007/1980-0037.2015v17n2p136

Profeta, V., & Turvey, M. (2018). Bernstein's levels of movement construction: A contemporary perspective. *Human Movement Science*, *57*(1), 111-133. doi: 10.1016/j.humov.2017.11.013

Reis, M., & Almeida, M. (2019). *Futebol, arte & ciência: construção de um modelo de jogo*. [Football, art and science: Building a game model.] Natal: Primeiro Lugar.

Reis, M., Vasconcellos, F., & Almeida, M. (2017). Performance and tactical behaviour of youth soccer players. *Brazilian Journal of Kinanthropometry and Human Performance, 19*(2), 242-250. doi: 10.5007/1980-0037.2017v19n2p242

Robinson, G., & O'Donoghue, P. (2007). A weighted kappa statistic for reliability testing in performance analysis of sport. *International Journal of Performance Analysis in Sport, 7*(1), 12-19. https://doi.org/10.1080/24748668.2007.11868383

Santos, R., Duarte, R., Davids, K., & Teoldo, I. (2018). Interpersonal coordination in soccer: Interpreting literature to enhance the representativeness of task design, from dyads to teams. *Frontiers in Psychology, 9*(1)*,* 2550. doi: 10.3389/fpsyg.2018.02550

Silva, P., Garganta, J., Araújo, D., Davids, K., & Aguiar, P. (2013). Shared knowledge or shared affordances? Insights from an ecological dynamics approach to team coordination in sports. *Sports Medicine, 43*(1), 765-772. doi: 10.1007/s40279-013-0070-9

Verbeek, J., Elferink-Gemser, M., Jonker, L., Huijgen, B., & Visscher, C. (2017). Laterality related to the successive selection of Dutch national youth soccer players. *Journal of Sports Sciences, 35*(22), 2220-2224. doi: 10.1080/02640414.2016.1262544

Submitted: September 1, 2020
Accepted: July 1, 2023
Published Online First: October 20, 2023

Correspondence to:
Marcos Antônio Mattos dos Reis
Federal University of Sergipe
Postgraduate Program in Physical Education
Av. Marechal Rondon, s/n – Jardim Rosa Elze,
São Cristóvão – SE, Brazil, 49100-000
Phone: +55 (79) 99885-9022
E-mail: marcos.reis@upe.br