

The Impact of Changes in the Ability to Convey Information and to Make Decisions among Women Soccer Players

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Abstract In soccer, in addition to skills improvement, raising the tactical understanding of the coach leads to an improved team performance. The purpose of this study was to make a longitudinal inspection of how tactical understanding is impacted by changes in the ability to make decisions and the ability to convey information, which are thought to be related to the tactical understanding of the coach. The scope of the study covered 62 players belonging to women's soccer clubs. At the beginning and end of a 5-month intervention period, a survey was conducted to evaluate the ability to make decisions and the ability to convey information. The results were classified into an increase group that made an improvement, and a decrease group that worsened. Also, the players' tactical understanding was evaluated using video tasks, and the degree of change during the intervention was calculated. As a result of the analysis, for the ability to make decisions and the ability to convey information, the increase group had a significantly higher rate of change than the decrease group with regard to tactical understanding. To raise the level of tactical understanding, it is important to increase the ability to make decisions or to convey information.

Keywords: open skill, tactical understanding, team performance, video task, coaching

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1. Introduction

In open skill sports, in order to constantly adapt to changing situations, the ability to assess the situation and maintain visual attention are important, as well as skill and mental and physical conditioning [1,2]. While soccer is played on pitches that are larger than those of other games, each player touches the ball for about one minute of the 90 minutes of the match [3], which means that passing skills and off-ball positioning are important. Garganta [4] reported that a team's performance can be improved by raising the understanding of the tactics of the coach. Therefore, coach must not only teach skills but also convey their tactics to the players [5].

However, in the case that the players are not given a sufficient tactical understanding, the coach may feel stressed and may also give improper coaching [6], including corporal punishment and verbal abuse. In Japan, there were 695 cases in which teachers (coach) administered corporal punishment to children or students [7]. This kind of coaching not only destroys trust between the coach and the player but also worsens the motivation and performance of

the player, puts the player into a slump, and may even lead to the player quitting the sports. Adam et al. [8] reported that excessive tactical instruction from the coach leads to a decline in player performance, which means that it is necessary for the coach to independently learn methods on tactics. Based on the above, the coach should not only convey the tactics to the players, but the players should also gain an understanding of tactics for themselves.

Until now, experimental and ecological studies of decision-making among soccer players have been conducted [9]. However, these studies surveyed the factors and skills of players in connection to decision-making, and there have been almost no studies of the players' understanding of the coach's tactics. The authors [10] made a cross-sectional inspection of the connection between tactical understanding and thinking about the game (22 items) and clarified that players with a higher tactical understanding surpassed other players in their ability to convey information and to make decisions. However, as it was not a longitudinal inspection, the causal relationship of the two abilities and tactical understanding is unclear.

Thus, this study's objective was to inspect the impact of changes in the ability to make decisions and convey information on tactical understanding.

2. Method

2.1. Subject

The participants in this study were 68 players belonging to women’s soccer club aiming to improve its playing ability (18.4 ± 2.0), and 62 players who responded to both the Pre and Post surveys were targeted. Subjects were classified into 27 people (age 20.4 ± 1.3) belonging to the Top team (Team-T), 20 players (age 19.9 ± 0.9) belonging to the Second team (Team-S), and 15 senior high school players (age 16.7 ± 1.1) at their sub-team (Youth team: Team-Y). The coach (manager) was a male (42 years old, with 15 years of coaching experience) who was in charge of Team-T and the entire club. The following survey was conducted after the participants or their parents / guardians were given a full understanding of the study details and objectives and after obtaining their consent in writing. The study plan was approved by the human research ethical review board (2021-04) of the Fukui University of Technology.

2.2. Level of Tactical Understanding

The players’ understanding of the manager’s tactics was evaluated using a video task. This task covered two matches played by Team-T in the D1 Nadeshiko League (the top women’s soccer league in Japan consisting mainly of amateurs and university students), with surveys being conducted in April (Pre) and October (Post) in 2021 (Pre: 1-0, Win; Post: 0-0, draw). The manager took charge of the club from around the beginning of the year of the survey, and the players increased their understanding of the manager’s tactics through daily practice and matches. Therefore, there was a 5-month period between the two matches. To make the visual angle and ground condition consistent, the scope of the survey covered matches played in the same stadium.

Based on the 7 coaching practice themes provided to coaches by the Japan Football Association and the 3 settings added as required by the manager, making a total of 10 (see Table 1), the manager provided 3 options (Figure 1) for each setting that he thought would be an issue in the future (Pre: 37 tasks, Post: 34 tasks), with 3, 2, or 1 point/s being conferred in order of the option that was

closest to the tactics required by the manager (Table 2, Table 3). In other words, higher scores indicated a player’s greater understanding of the manager’s tactics. Due to the difference in the number of tasks between Pre and Post, in this study, a score percentage was calculated for Pre and Post (total score/perfect score) and the evaluation variable was set as the score change rate ($[\text{Post} - \text{Pre}] / \text{Pre}$).

2.3. Thinking about the Game

Samejima et al. [10] inspected the connection between the understanding of the manager’s tactics and thinking about the game among women soccer players and reported that those who excelled in the former also excelled in their ability to convey information (sharing information through conversation with teammates) and the ability to make decisions (quickly making decisions about the flow of the match). In this study, in both Pre and Post, a five-stage response was sought to items evaluating the former ability, namely, (1), Disagree, (2) Moderately disagree, (3) Neither agree or disagree, (4) Moderately agree, and (5) Agree. The results were classified by an increase group that made an improvement (ability to convey information: 19 people, ability to make decisions: 19 people) and a decrease group that worsened (ability to convey information: 16 people, ability to make decisions: 15 people). Regarding those whose results did not change, 27 people had no change in the ability to convey information and 28 people had no change in the ability to make decisions.

Table 1. Video classification (Scene)

a. Improvement in defending from a high position
b. Improvement in build up (against defense from a high position)
c. Improvement in defense in seizing the ball in midfield
d. Improvement in attack with respect to defense in which the ball is seized in midfield
e. Improvement in retreat to a defensive position
f. Improvement in attack with respect to retreat to a defensive position
g. Improvement in counterattack (after withdrawing into your own team)
h. Set play
i. Short counter
j. Counter measure

Note) h, i, j: Created by the authors.



Figure 1. Example of visual task

Table 2. Video Task 1

Question				Options		
ID	Time	Score	Scene	①	②	③
1	First	0-0	a	FW approaches opponent DF	FW approaches opponent DF	Don't move from the spot
2	First	0-0	c	Approaches Opponent WG	Don't move from the spot	Down while the kick
3	First	0-0	d	FW approaches opponent DF	FW approaches opponent DF	Don't move from the spot
4	First	0-0	d	Pass to MF	Pass to the front of DF	Pass to the foot of the DF
5	First	0-0	d	Through pass to FW	Back pass to DF	Pass to FW
6	First	0-0	a	DF approaches opponent SB	FW approaches opponent SB	Don't approach
7	First	0-0	f	Dribble into the penalty area	Kick the cross ball	Switch back and back pass
8	First	0-0	h	Short corner	Far side	Near side
9	First	0-0	c	Two Defenses go down	DF approaches opponent MF	Don't move from the spot
10	First	0-0	b	Pass to DF	Pass to DF	Long pass to FW
11	First	0-0	e	DF approaches opponent MF	FW approaches opponent MF	Don't approach
12	First	0-0	g	Dribble	Through pass to FW	Switch back and back pass
13	First	0-0	b	Pass to FW	Turn forward	Through pass to RMF
14	First	0-0	d	Through pass to FW	Put a pass in the vertical space	Pass to the foot of the FW
15	First	0-0	i	Through pass to FW	Dribble	Through pass to FW
16	First	0-0	f	Shoot	Pass to MF	Pass to FW
17	First	0-0	d	Switch back and back pass	Pass to MF	Pass to FW
18	First	0-0	f	Shoot	Cross ball to the center	Switch back
19	First	0-0	d	Back pass	Long pass to FW	Side change to the right
20	First	0-0	f	Switch back and back pass to CB	Trough pass to LWG	Pass to FW
21	First	0-0	d	Switch back and pass to CB	Pass to DF	Long pass to RMF
22	First	0-0	f	Pass to FW	Pass to FW	Pass to MF
23	First	0-0	a	MF approaches opponent MF	FW approaches opponent MF	Don't approach
24	First	0-0	c	FW approaches opponent MF	FW approaches opponent MF	MF approaches opponent MF
25	First	0-0	f	Switch back and back pass	Side change to the Left	Dribble
26	First	0-0	i	Switch back and back pass	Dribble	Long shoot
27	Second	0-0	d	Pass to MF	Pass to DF	Long pass to SB
28	Second	0-0	c	Go down diagonally	Approaches opponent FW	Don't approach
29	Second	0-0	c	Through pass to MF	Dribble	Pass to FW
30	Second	0-0	e	Approach while watching the movement of opponent FW	Go to Approach the ball	Don't approach
31	Second	0-0	b	Return pass	Pass to CB	Side change to the Left
32	Second	0-0	j	Go steal the ball	Steal the ball by sliding	Delay the attack
33	Second	0-0	a	FW approaches opponent DF	FW approaches opponent DF	Don't approach
34	Second	0-0	h	Pass to MF quickly	Pass to DF	Long kick
35	Second	0-0	f	Pass to DF	MF Through pass to FW	Pass to MF
36	Second	0-0	f	Pass to FW	Pass to FW	Switch back and back pass
37	Second	0-0	c	MF approaches opponent DF	FW approaches opponent DF	Don't approach

Table 3. Video Task 2

Question				Options		
ID	Time	Score	Scene	①	②	③
1	First	0-0	f	Overtake the FW	Support at an angle	Expand to the side
2	First	0-0	g	Return pass	Expand to the side	Dribble
3	First	0-0	a	Approach to the side	Approach the side while being cautious of the vertical	Don't approach from the spot
4	First	0-0	b	Through pass to FW	Pass to FW	Return pass to GK
5	First	0-0	d	Quick throwing pass	Pass to Left side	Take some time
6	First	0-0	d	Back pass	Pass to Side	Pass to FW
7	First	0-0	a	Side steals the ball	MF steals the ball	Don't approach
8	First	0-0	i	Pass to FW	Side pass	Back pass
9	First	0-0	d	Back pass	Pass to FW	Through pass in vertical space
10	First	0-0	d	Pass to Side	Pass to WB	Pass to MF

Question				Options		
ID	Time	Score	Scene	①	②	③
11	First	0-0	f	Dribble & Pass to Side	Pass to Side	Switch back & Back pass
12	First	0-0	f	Switch back & cross ball on far side	Dribble & Negative Cross ball	Cross ball Between FW and DF
13	First	0-0	e	CB approach & Support from players on both sides	Raise the DF line	Don't approach from the spot
14	First	0-0	e	Approach to FW	Prevent vertical breakthrough	Going to steal the ball
15	First	0-0	h	Far side	Side pass & cross ball	Side pass
16	First	0-0	c	Don't approach	Care for the back while descending	Approach before
17	First	0-0	d	Switch back & Back pass	cross ball on the far side	Side pass
18	First	0-0	c	Don't approach	Raise the DF line	Be wary of the back
19	Second	0-0	b	Through pass to FW	Pass to MF	Side pass
20	Second	0-0	c	WB go down & DF slides to the left	Don't Approach	WB goes up
21	Second	0-0	j	Go down a little	Don't approach	Go down a lot
22	Second	0-0	i	Through pass to FW	Side pass	Switch back & back pass
23	Second	0-0	d	Side pass	Pass to MF (11)	Through pass in vertical space
24	Second	0-0	a	Eliminate side pass courses	Going to steal the ball	Eliminate vertical courses & approach the ball
25	Second	0-0	a	Don't approach	Eliminate vertical courses & guide the path to the center	Eliminate vertical courses & guide the back pass
26	Second	0-0	a	Eliminate vertical courses & guide the left-side pass	Eliminate vertical courses & guide the right-side pass	Don't approach
27	Second	0-0	c	Eliminate vertical courses	Eliminate the inner pass course	Going to steal the ball
28	Second	0-0	b	Expand to the right-side	Pass to left side	Pass to CB & Expand to the right-side
29	Second	0-0	b	Pass to vertical pass	Side change	Through pass to right-side
30	Second	0-0	h	Cross ball in the Far side	Cross ball in the center	Cross ball in the Near side
31	Second	0-0	f	Side pass	Through pass to FW	Switch back & back pass
32	Second	0-0	c	The two in the center go up	Going to steal the ball	Lower the DF line
33	Second	0-0	f	Side pass	Cross ball	Dribble & shoot
34	Second	0-0	d	Switch back & back pass	Cross ball on the other side	Cross ball in the central area

2.4. Statistical Analysis

Regarding the two items, the ability to convey information and the ability to make decisions, the difference in the score change rate between the two groups was inspected in an unpaired t-test. The effect size (Cohen's d) was calculated in order to study the size of the gap between the average scores, with 0.2 set as small, 0.5 as medium, and 0.8 as large. The level of significance of statistical hypothesis testing in this study was set at 5%.

3. Results

Table 4 shows the basic statistics for the score change rates of the increase group and decrease group for the ability to convey information and the results of the analysis. A significant difference between the groups was found for the score change rates, and the effect size was medium ($d = 0.71$).

Table 5 shows the basic statistics for the score change rates of the increase group and decrease group for the ability to make decisions and the results of the analysis. A significant difference between groups was found for the score change rates and the effect size was medium ($d = 0.71$).

4. Discussion

In this study, in order to inspect the hypothesis that players that improved their ability to convey information or their ability to make decisions would also improve their tactical understanding, a longitudinal study was implemented. As a result, both hypotheses were supported. Pre- and Post- surveys were conducted across a 5-month period (refer to Method). It was also not possible to have consistency in environmental factors such as the temperature, humidity, and weather during the matches. The video tasks were produced based on introspection and tasks related to the most recent match, so there were differences in the number of questions and their difficulty due to the In the Post survey, in particular, the match was against a very strong team that won the league in the year of the survey, and there were many reflections and challenges. For that reason, the average score in the video task was lower in Post than in Pre (Pre: 0.82 ± 0.07 , Post: 0.79 ± 0.07). In view of the above, there was a decrease even in the scores of players who had a continuously high understanding of the manager's tactics, and there were cases of negative score change rates. This study was considered with these limits in mind. competitive level of the opponent and the match details.

Table 4. Basic statistics and analysis results of score change rate in convey information ability

	Improvement group (n = 19)				Decline group (n = 16)				t	p	d
	M	SD	MAX	MIN	M	SD	MAX	MIN			
Score change rate	0.00	0.09	0.21	-0.14	-0.07	0.10	0.20	-0.26	2.08*	0.045	0.71

Note) *: $p < 0.05$.

Table 5. Basic statistics and analysis results of score change rate make decision ability

	Improvement group (n = 19)				Decline group (n = 15)				t	p	d
	M	SD	MAX	MIN	M	SD	MAX	MIN			
Score change rate	-0.02	0.09	0.21	-0.16	-0.09	0.09	0.10	-0.26	2.07*	0.047	0.71

Note) *: $p < 0.05$.

Those who underwent a decline in the ability to convey information, that is, the ability to communicate, had a lower score change rate than the players who made an improvement. In other words, those who made an improvement in the ability to convey information were found to be more capable of understanding the manager's tactics than those whose these results that the ability to convey information and the between players are effective factors in terms of strengthening tactics, efficiency, motivation, and concentration [12], which contributes to exhibiting the best possible performance [13]. Also, players who had a high level of tactical understanding communicated more frequently with the manager than the other players. Therefore, these reports support the results. In this study, the quality of the ability to convey information was evaluated on the basis of self-criticism. The ability to convey information comprises both personal and external perspectives, such as speaking, listening, and understanding, and it is difficult to make an accurate evaluation through self-criticism alone. For that reason, an issue for the future is to create an index for an objective evaluation of the degree of the ability to convey information, which is needed in order to make an evaluation.

Those who underwent a decline in the ability to make decisions had a lower score change rate than the players who made an improvement. In other words, those who made an improvement in the ability to make decisions were found to be more capable of understanding the manager's tactics than those whose score decreased. There have been, many studies that used video tasks to evaluate the differences between players who excel at the ability to make decisions and those who do not. The ability to make decisions covered by those studies refers mostly to an evaluation of the understanding of general tactical theory by soccer coaching specialists. Although there are almost no reports regarding an increase or decrease in the understanding of the manager's tactics, as in this study, it is clear from these results that the ability to convey information and the ability to make decisions are valid factors. The average score and standard deviation of those who increased in both factors (7 people) was 0.05 ± 0.08 , and, in comparison to those who only improved in the ability to convey information or the ability to make decisions, those who improved in both had a higher score change rate. Therefore, in order to raise the understanding of the manager's tactics, an effective method is to take an approach toward the player's ability to convey information and the ability to make decisions. As a challenge for the

future, it will be necessary to carry out intervention training in order to raise the ability to convey information and/or the ability to make decisions of players with a low understanding of the manager's tactics, and to verify the results.

In tactical training, small team games and virtual reality are used. However, in larger pitches, it is difficult to convey the manager's instructions to the player accurately, and the player may continue playing without correctly understanding the tactics. Therefore, by devising ways for the player to assuredly grasp the manager's instructions in regular training using Information and Communication Technology (e.g., constantly sharing information with the player using a microphone headset), the tactical understanding can be improved as well as the ability to make decisions. Also, the video task created in this study can be applied in order to deepen the manager's tactical understanding, which is useful when trying to raise the tactical understanding of players who do not play in a match. In other words, using visuals can create a deeper common understanding of the issues on each side (the player and the manager), which may improve the ability to make in-match decisions. In order to improve the ability to convey information, in the process of engaging in this tactical training and these video tasks, it is important to have opportunities for the players to meet and give feedback, and by applying psychological approaches within that process, a further increase in effectiveness can be expected.

5. Conclusion

Those who improved in their ability to convey information or ability to make decisions also improved in their understanding of the manager's tactics. Those who improved in both of the two items had an even greater understanding of the manager's tactics.

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Conflict of Interest Statement

The authors declare no conflicts of interest associated with manuscript.

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