

Informatics Study on the Coach's Verbal Communication Strategies in Walking Skill Instruction

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SUMMARY

In the early stages of skill learning, the main coaching point is to provide instructions on a coach's ideal form by verbal communication (VC). It is important that while a coach's VC is mainly about body motions, the coach expects a learner to experience body feelings. Here, the information on such body feelings is difficult to put into words because it has the nature of implicit knowledge. Therefore it is inferred that good coaches pursue effective VC with learners using easy-to-understand words. The purpose of this study is to examine the VC strategies of the coach by focusing on verbal communication when the coach try to give the learner instructions for walking skill. The analytical resource was a recorded video in which its second author, a sprint coach gave instructions on walking skills to a 5th-grade female elementary school student being a rugby player. Next, a transcript regarding the conversation communication was prepared. The discussion suggested that the coach's VC strategies had three strategies: the strategy of "Open question" where the coach understood what Learner was thinking by having Learner shift her attention to internal focus, the strategy of "Analogy" where the coach explained his ideal body motions for easy-to-understand, and the strategy of "Jargon" where body feelings were shared through the simple explanations and words for body motions. The new knowledge obtained through this study indicates phased strategies regarding the coach's VC in his giving instructions on physical skills and is expected to be an effective design policy in coaching.

key words: Coaching, Verbal Communication, Strategies, Walking Skill

1. Introduction

1.1. Background

In skill coaching, Functional and effective communication is important between a learner and a coach encouraging through verbal acts the learner to gain cognitive understanding and change body motions[1][2]. Precedent Studies of skill learning have indicated that physical skills change through multiple stages of development. According to the skill learning model of Fitts[3], there are three classified stages: Verbal-Cognitive Stage (Stage I), Associative Stage (Stage II) and Autonomous Stage (Stage III). This study is going to make discussions by focusing on Verbal-Cognitive Stage I of Fitts' model.

In the general coaching on Stage I, the main coaching point is to provide instructions on a coach's ideal form by verbal communication (VC). Regarding preceding studies, as the outcomes of an interview survey with both coaches and learners, Rhino and Jowett (2010) extracted factors such as "Advice" modeling a relationship-building process regarding communication between both the parties[4]. Meanwhile, Jowett and Cookerill (2003) reported based on an interview survey with Olympic medalists that factors such as "Thoughts of Co-orientation" affected the evaluation of coaches' communication skills[5]. Moreover, Shimazaki and Kikkawa (2015) surveyed the use frequency of non-verbal communication (NVC) by sports instructors and athletes' evaluations of their coaching, reporting that NVC affected the evaluations of coaching and further did them through mutual interactions with VC[6]. Therefore, in order for a coach as an information sender to effectively deliver information to a learner as an information receiver, it is necessary for the coach's VC fully function.

1.2. Physical Skills as Tacit Knowledge

The important point in physical skills research is that while a coach's VC in physical skill instructions is mainly about body motions, the coach expects a learner to physically experience body feelings in association with body motions. For instance, assume that a coach has instructed,

"Place your weight on 50% of your sole forward from the middle". This VC is a sort of a means seeking the understanding of a learner and thus it would be little problem even if the weight placement is actually 51 or 48%. In other words, the coach's main purpose is, by explaining with words in order for the learner to understand more easily, to deliver body feelings to the learner when placing the weight on the front half of the sole[7].

However, the information on such body feelings is difficult to put into words because it has the nature of implicit knowledge[8][9], and the most appropriate body motions vary by learner because of their individual identities. Accordingly, it is expected that there will be differences in understanding of words between the coach and learner, and further it is thought that VC itself may inhibit the acquisition of physical skills by a learner. Davids et al.(2008) states, "A practitioner's verbal communication seem to be the most powerful and direct form of informational constraint used to alter movement patterns. However, verbal instruction can have both positive and negative effects on skill acquisition[10]", pointing out that VC has both positive and negative aspects in the acquisition of physical skills.

1.3. Research Question

The cognitive activities of a coach are important for reading the various situations and providing appropriate instruction to the learners[11][12]. Through the observations of a learner, A coach should understand the meanings of a learner's body motions and encourage him/her to focus on next learning tasks. It is inferred that good coaches pursue effective verbal communication with learners using easy-to-understand words[13]. Many traditional studies gained knowledge from interviews after actual practices and experiments[4][5], however, they failed to discuss how coaches tried to use VC to learners effectively under actual sports settings. And, it has not been discussed specifically what kind of VC makes a learner's physical skills proficient or the degree of proficiency of the learner. If, through the investigation of coaching, a characteristic tendency

is shown in the VC of a coach, and furthermore, the skill acquisition of a learner is recognized, it may be an indicator to transfer body feeling as tacit knowledge.

The purpose of this study is to discuss a coach's VC strategies by seeking to model the phenomena, through their abstraction, regarding physical skill instructions under sports settings. As the significance of this study, it is expected that an effective design policy with the nature of implicit knowledge can be obtained from the perspectives of relevant field (see Fig.1).

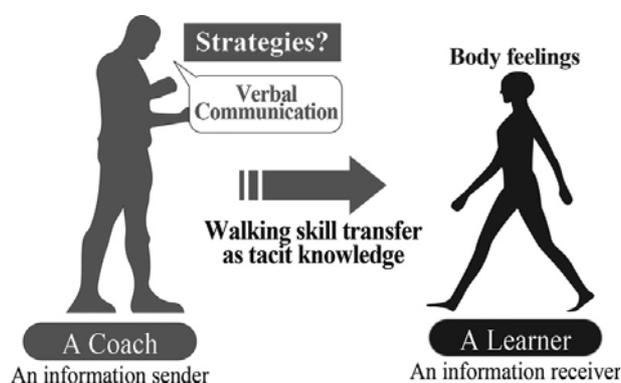


Fig. 1 Conceptual diagram of this study

1.4. Walking Skill to be Focused on

This study focuses on walking which humans naturally acquire after the birth and becomes automatic. Humans are said to learn the way to stand erect and walk on two feet at their infant stage aged around one and they achieve stable walking in stages by, during this period, understanding the best coordination among muscle movements and maintenance of bones[14]. Because people's walking becomes automatic once they have acquired it, unless becoming unable to move normally as a healthy person, they are thought to have few chances to think about their walking.

Prior studies discussed efficient and stable walking forms with a stable chest position and center of gravity with regard to walking skills in periodical exercises[15]. In addition, from the standpoints of sports medicine, it was reported that improvements in upright positioning and walking skills were effective for the enhancement of sports performance[16], and that the gait of sprint skilled athletes and non-athletes differ in

their walkings[17]. Therefore, the outcomes of this study are expected to build the foundation for VC studies for complicated physical skills.

2. Method

2.1. Subject of Analyses

In this study, the analytical resource was a recorded video in which its second author, a sprint coach (hereinafter "Coach"), gave instructions on walking skills to a 5th-grade female elementary school student (as of 2018) being a rugby player (hereinafter "Learner"). A coaching session was provided on January 25, 2018 at the indoor arena of an educational institution which the first author belonged to. The contents of the coaching session on that day were understood solely by Coach himself, not informed to any other researches beforehand.

2.2. Participants in Study

Coach's brief background description is as follows. He became the national champion in the 100-meter race in junior high school and competed on the national level in his high school and university days. He is now engaging in activities as a professional running coach and providing instructions with emphasizing the way to stand for creating the center of a body in order to run fast and to walk efficiently. In addition, he enjoys the history of coaching to athletes inside and outside Japan including the Japanese national rugby team by age group and has received the Japan Rugby Coaching Award 2018 in 2018. Presently, he is active as a performance architect for rugby football teams (as of April 2021).

On the other hand, Learner's brief background description is as follows. Learner had been playing rugby for 5 years and 10 months at the time of the coaching session (as of January 2018) and playing rugby currently as well in her junior high school (as of April 2021). Learner played a backs position requiring high running skills. Learner pointed out her own challenge by saying, "I want to improve my way of running with no motion sharpness and going forward with heavy footsteps".

2.3. How to Analyze Video

It is believed that participants in communication express different attitudes because both the parties have different experiences and accesses regarding objects to be evaluated[18]. In case of this study, what to be evaluated is walking skills and it is expected to be a process where the evaluations of both the parties will be matched in stages through the coaching of the instructor. Then, in examining Coach's VC strategies, communications are analyzed not only from evaluative perspectives included in Coach's utterances but also in terms of reactions by learner as the information receiver[19].

Next, in reference to rules in the transcript of LeBaron(2000)[20], a transcript regarding the conversation communication was prepared. Those parts of utterances enclosed in a square bracket in the transcript re-occurred with the immediate body motions enclosed in a double round bracket. The colon means the extension of a long vowel, and the down arrow means the switching of the video scene. The contents of the utterances of Coach and Learner were classified into categories, and a concept was given to each utterance[21]. As the basic principle of turns, they were set as shifting to another one when Learner's utterance, nod or practice of a new body motion is confirmed in response to Coach's utterance.

2.4. How to Evaluate Accomplishment Level

The accomplishment level of walking skills was evaluated by the fourth author, a physical therapist, with 32 years of clinical experiences and 24 years of educational and research experiences (in addition to those in doing PR activities of sports and in treating athletic injuries). Specifically, he conducted a qualitative analysis by visually examining the recorded video under mute setting. In the meantime, with an aim to get rid of the confirmation bias of the fourth author, an athletic trainer officially certified by Japan Sport Association who did not know the study purpose examined the video visually and evaluated Learner's walking skills from the standpoints of sports science.

3. Result

3.1. Video Transcript

Table 1 and Fig. 2 show the transcript and images of the coaching session on walking skill. It was categorized into 6 sections based on its contents, finding 62 turns in total. In the transcripts, The coach's VC showed factors of questioning, instructing, explaining, and evaluating. The questions were divided into open and closed questions. Jargon and analogies were found in the coach's questions, instructions and explanations. Open questions were identified 18 times, analogies 6 times, and jargon 21 times.

This study performed annotating a video. The audio was confirmed by listening and annotated to the video. Table 2 shows the playback time for each expression in the transcript. All playback times were 426.9 seconds, of which 266.7 seconds were for VC, and 148.7 seconds were for NVC. Among the open question, which 12.8 seconds were by jargon, and 5.3 seconds were by analogy. Among the closed question, 5.4 seconds were by analogy. Time of instructions 81.0 seconds, of which 40.8 seconds were by jargon. Time of explanations were 85.8 seconds, of which 44.0 seconds were by jargon, and 26.6 seconds were by analogy.

3.2. Evaluation by Physical Therapist on Learner's Walking

The fourth author, a physical therapist, visually examined and analyzed the video under mute setting, finding the followings.

Regarding Learner's standing position before the coaching session, based on her lateral malleolus closest to the body area touching the ground, her femoral trochanteric fracture as the landmark of her standing position is positioned around immediately above, acromion positioned backward, and earlobe positioned immediately above. This result indicates a possibility that Learner's center of gravity shifts backward from the position of the center of gravity line which produces the best energy efficiency in the same proportion as her lumber lordosis enhances, neck region demonstrates a slight anteflexion position, and accordingly upper

Table 1 Transcript of the coaching session on walking skill

Line	Turn	Transcript about coaching	Coach	Learner
1. Before Coaching				
1	C1	Coach	Looking at your own face, how do you feel? Yours?	Instruction, Open question
2	L1	Learner	[Well., I feel like my left shoulder always sagging.]	Answer
3			((the learner stops walking and pointed at her left shoulder))	
4	C2	Coach	Oh, you feel there.	Confirm
5	L2	Learner	[Yes.] ((nodding))	Reply
6	C3	Coach	Now, why don't you walk a little bit more? How is it? What can you see?	Open question
7	L3	Learner	[Hum:] ((looking unsure))	Unknown
8	C4	Coach	Ok, just a moment ago, you said your shoulder was sagging, didn't you?	Closed question
9	L4	Learner	[Yes.] ((nodding))	Reply
10	C5	Coach	Anything else?	Open question
11	L5	Learner	[Hum:] ((looking unsure))	Unknown
12	C6	Coach	How about describing them while walking casually a little bit more?	Instruction
13	L6	Learner	[My hands are always., well, how can I say, in front of my thigh or something like that.]	Answer
14			((stopping walking and moves her hands))	
15	C7	Coach	Well, right, then, it is ..., why don't you write down what you have seen today?	Instruction
16	L7	Learner	((writing down in a form what she has noticed))	Writing
↓				
2. Weight on Sole				
17	C8	Coach	[Push me.] ((the coach places his palms against the learner's palms and then draws them back in being pushed by the learner)) [Now, let me push you.]	Instruction
18			((the coach places his palms against the learner's palms and then pushes her))	
19			((pushing the coach and is pushed while placing her palms against the coach's))	
20	L8	Learner		Practice
21	C9	Coach	OK, [now, please take a look at the sole.] ((the coach shows his sole to the learner))	Open question
22			Which side of your sole will bring you a win and which side will do you a lose?	
23			[Do this with thinking about it, would you?]	
24			((the coach places his palms against the learner's))	
25	L9	Learner	[My body moving forward will shift my weight forward and then naturally.]	Answer
26			((waving her arms in front of her))	
27	C10	Coach	[You look like winning] ((nodding))	Confirm
28	L10	Learner	[Yes] ((nodding))	Reply
29	C11	Coach	[You should remember these names. 50% of your sole back from the middle is called Losing Position. 50% of your sole forward from the middle is called Winning Position.]	Explanation by jargon
30			((while nodding, the coach points at the areas of his sole where his weight is placed and explains these names))	
31				
32				
33	L11	Learner	[Yes.] ((checking her sole too and nod))	Reply
34	C12	Coach	Now, stand in Winning Position. Your both feet. Winning Position.	Instruction by jargon
35	L12	Learner	((nodding, and taking a position to place her weight on the front side of her sole))	Practice
36	C13	Coach	Take Losing Position.	Instruction by jargon
37	L13	Learner	((following the coach's instructions, standing while shifting back and forth her weight on both of her soles))	Practice
38				
39	C14	Coach	Winning Position, Losing Position, these, [look at yourself in the mirror now.]	Instruction by jargon
40			((pointing at the learner in the mirror))	
41			This position, take a look at it from the corner of your eye.	
42	L14	Learner	((looking at the mirror from the corner of her eye while shifting back and forth her weight on both of her soles))	Practice
43				
44	C15	Coach	Winning Position, Losing Position, Winning Position, Oh, you are doing good.	Instruction by jargon, Evaluation
45	L15	Learner	((following the coach's instructions, standing while shifting back and forth her weight on both of her soles))	Practice
46				
47	C16	Coach	[Now, look at me doing it. This one, what position?]	Open question by jargon
48			((the coach stands with shifting his weight to the front side of his sole))	
49	L16	Learner	Well: Winning Position.	Answer
50	C17	Coach	Yes, [how about this one?]	Open question by jargon
51			((the coach stands with shifting his weight to the back side of his sole))	
52	L17	Learner	Losing one.	Answer
53	C18	Coach	[I am swinging pretty much, ain't I ?]	Closed question
54			((the coach stands while shifting back and forth his weight on both of his soles))	
55	L18	Learner	[Yes.] ((nodding))	Reply
56	C19	Coach	[You would say, "Oops", when you are pushed from your front side in your Losing Position, wouldn't you?] ((the coach stands with placing his weight on the back side of his sole, engages in an off-balance movement, and nods))	Explanation by jargon and analogy
57				
58				
59	L19	Learner	[Yes.] ((nodding))	Reply
↓				
60	C20	Coach	A good walk requires a long duration of Winning Position. Let me demonstrate it for you	Explanation by jargon
61			This is not a good walk. [It has a long duration of Losing Position.]	
62			((walking with prolonging a duration during which the back side of his sole touches the floor))	
63			A good walk quickly shifts from Losing Position to Winning Position, making the duration of Winning Position longer.	
64				
65			((walking with quickly shifting his weight to the front side of his sole))	
66	L20	Learner	((nodding and observing the coach walking))	Practice

Line	Turn	Transcript about coaching	Coach	Learner
67	C21	Coach	Now, you give it a try. Will you show me how you quickly move to Winning Position?	Instruction by jargon
68	L21	Learner	((with prolonging a duration during which the back side of her sole touches the floor))	Practice
69	C22	Coach	Good, good, good.	Evaluation
70	L22	Learner	((with prolonging a duration during which the back side of her sole touches the floor))	Practice
71	C23	Coach	You can touch the floor more naturally, [but in Winning Position. Push out the floor at the moment when your foot leaves it.]	Instruction by jargon
72			((walking with placing his weight to the front side of his sole))	
73				
74	L23	Learner	((walking with consciously placing her weight on the front side of her sole))	Practice
75	C24	Coach	Good, good, good.	Evaluation
76	L24	Learner	((walking with consciously placing her weight on the front side of her sole))	Practice
77	C25	Coach	Comparing with a previous one, how have your waking speed changed?	Open question
78	L25	Learner	[Getting faster] ((stops walking and nodding))	Answer
79	C26	Coach	Getting faster. It is obvious, [isn't it] ((nodding))	Confirm
80	L26	Learner	((nodding silently))	Reply
↓				
3. Arm Swing				
81	C27	Coach	Then, which part of your body isn't moving now? Look at you in the mirror.	Open question
82	L27	Learner	((checking her foot, and stops walking))	Practice
83	C28	Coach	[Which body part of yours is different from mine?] ((walking with widely swinging his arms))	Open question
84	L28	Learner	I don't swing my arms at all.	Answer
85	C29	Coach	Right. [You were in the water. Heavy water. You were waist deep in the water]	Explanation by analogy
86			((describing the image of movements in the water while moving his hands))	
87	L29	Learner	((nodding silently))	Reply
88	C30	Coach	If you were in such a situation, [how would you walk?] ((nodding))	Open question by analogy
89	L30	Learner	[I would do like this.] ((walking slowly using only her legs with deeply bending her knees, but without moving her arms))	Answer
90				
91	C31	Coach	[You wouldn't use your arms? You wouldn't push out the water like swash, swash?]	Closed question
92			((the coach moves his arms))	
93	L31	Learner	Well: [I wouldn't do that a lot.] ((shaking her head))	Answer
94	C32	Coach	[This one, actually, it will be better for you to do the work of properly pushing out the water in order to walk quicker in the water.] ((walking slowly with moving both of his hands))	Explanation by analogy
95				
96	L32	Learner	((nodding silently))	Understanding
97	C33	Coach	[This one, you can describe this by your own image, push out behind the water by the side of your waist like swash, swash, swash]. Would you push out the water more steadily?	Instruction by jargon
98			((the coach walks with moving both of his hands in front of him))	
99				
100	L33	Learner	((walking silently with being conscious about swinging her arms))	Practice
101	C34	Coach	Yeah, you are looking good.	Evaluation
102	L34	Learner	((walking silently with being conscious about swinging her arms))	Practice
103	C35	Coach	[Right, speed up your walk, would you?] ((while clapping his hands))	Instruction
104	L35	Learner	((walking with being conscious about swinging her arms))	Practice
105	C36	Coach	Good, good, good, boom, boom, boom.	Evaluation
106	L36	Learner	((walking faster with being conscious about swinging her arms))	Practice
107	C37	Coach	Boom, boom, boom. Here is a question for you. This sound of "boom" is produced when your hand passes by a certain part of your body. Which part is it?	Open question
108				
109	L37	Learner	[Here, this waist part, somewhere like that.]	Answer
110			((while nodding, the learner waives her hands by the side of her waist))	
111	C38	Coach	[The side of your waist, isn't it?] ((nodding))	Closed question
112	L38	Learner	[Yes.] ((nodding))	Reply
113	C39	Coach	It is the correct answer. Produce this sound with your arms when they pass by your waist.	Explanation
114			[Boom, boom. You naturally use your strength exactly here, don't you?]	
115			((nodding while swinging both of his arms by the side of his waist))	
116	L39	Learner	((nodding while swinging her arms))	Practice
↓				
4. Coordination between Weight Placement on Sole and Arm Swing				
117	C40	Coach	After walking boom, boom, boom, again, be aware of your Winning Position acutely.	Instruction by jargon
118			[Will you walk in Winning Position while being aware of "boom"?)	
119			((walking with swinging her arms widely while strongly paying attention to the weight placement on her soles))	
120				
121	L40	Learner	((walking while paying attention to the weight placement on her sole and arm swing))	Practice
122	C41	Coach	You are walking very nice, aren't you?	Evaluation
123	L41	Learner	((walking while paying attention to the weight placement on her sole and arm swing))	Practice
124	C42	Coach	Haven't you already forgotten how you walked here at the beginning?	Instruction
125	L42	Learner	((walking with being conscious about how she walked before getting coached))	Practice
126	C43	Coach	What most differentiates your current walking from previous one here?	Open question
127	L43	Learner	I am now waving arms wider, and legs, I am raising, raising, raising my legs higher.	Answer
128	C44	Coach	Higher and wider. The most important change is you are now probably conscious about your movements, aren't you? Such as boom, boom, boom and Winning Position. You have been conscious about something in your body, haven't you?, in your second attempt. That is the biggest difference, and looking at it, you move your arms differently and legs differently.	Explanation by jargon
129				
130				
131				
132	L44	Learner	((nodding while hearing the coach's explanation))	Understanding
↓				

Line	Turn	Transcript about coaching	Coach	Learner
5. Posture of Upper Limb				
133	C45	Coach	Next, you always stand in Winning Position for both of your feet.	Instruction by jargon
134	L45	Learner	((standing with placing her weight on the front side of both soles))	Practice
135	C46	Coach	Stand in Losing Position, would you?	Instruction by jargon
136	L46	Learner	((standing with placing her weight on the back side of both soles))	Practice
137	C47	Coach	This posture gives you a pretty bad feeling, doesn't it? [Pretty much] ((nodding))	Closed question
138	L47	Learner	[Yes, yes.] ((nodding with a smile))	Agreement
139	C48	Coach	When pushing a ruck maul, will you push it with being hunched over?	Open question by analogy
140			Or, with sticking out your chest? ((the coach stands and sticks out his chest after taking	
141			a hunched-over posture with leaning forward))	
142	L48	Learner	[Sticking out the chest.] ((nodding))	Answer
143	C49	Coach	You stick out your chest, don't you? How do you stick it out?	Open question by analogy
144	L49	Learner	((after nodding, pushing the coach with her shoulder while taking a lower position))	Practice
145	C50	Coach	Well, right. Then, how about when you are in a standing position? [Would you stand at	Open question
146			attention?] ((the coach stands with adjusting the posture of his upper limb, and nodding))	
147	L50	Learner	[Stick out the chest.] ((while standing with adjusting the posture of her upper limb))	Answer
148	C51	Coach	[Nice.] ((nodding)) A good posture seems to be important, doesn't it?	Confirm
149	L51	Learner	((nodding silently))	Agreement
150	C52	Coach	Now, this one, instead of standing at attention, let's do it more specifically	Explanation
151			[Extend the distance between your pit of stomach and belly button, would you?	
152			OK, touch them, check them.]	
153			((the coach points his pit of stomach and belly button with his fingers respectively	
154			and takes an action to vertically extend the distance between them))	
155	L52	Learner	((pressing her pit of stomach and belly button while nodding))	Practice
156	C53	Coach	[Shorten the distance, would you?] ((the coach shortens the distance between his pit of	Instruction
157			stomach and belly button by curling his upper body))	
158	L53	Learner	((shortening the distance between her pit of stomach and belly button))	Practice
159	C54	Coach	[Try extending it. Take Winning Position for both of your feet. Keep this posture.]	Instruction by jargon
160			((again, the coach extends the distance between his pit of stomach and belly button	
161			and standing with placing his weight on the front side of her sole))	
162	L54	Learner	((placing her weight on the front side of her sole, extends the distance between	Practice
163			her pit of stomach and belly button, and nods silently))	
164	C55	Coach	Take a Losing Position for your soles. And, your upper limb, [this posture is called as	Explanation by jargon
165			Losing Line.] ((again, shortening the distance between his pit of stomach and belly button	
166			by curling his upper body))	
167	L55	Learner	((placing her weight on the back side of her sole, shortens the distance between her pit	Practice
168			of stomach and belly button, and nods silently))	
169	C56	Coach	[Take Winning Position for your sole. Take Winning Line for your upper limb.]	Instruction by jargon
170			((again, extending the distance between his pit of stomach and belly button and stands	
171			with placing his weight on the front side of her sole))	
172	L56	Learner	((placing her weight on the front side of her sole and extends the distance between her	Practice
173			pit of stomach and belly button))	
174	C57	Coach	Pit of stomach and belly button, [look sideways, you are standing with a very beautiful	Instruction, Evaluation
175			posture.] ((pointing at the mirror))	
176	L57	Learner	((checking her standing posture in the mirror))	Check
↓				
6. After Coaching				
177	C58	Coach	Now, why don't you walk just one more time? Would you do it with thinking about various	Explanation by jargon
178			things you have done so far? We have had several key words. You can take Losing Position	
179			first. But, you should shift to Winning Position quickly.	
180	L58	Learner	((nodding silently))	Reply
181	C59	Coach	Then, your upper body? What is it?	Open question
182	L59	Learner	[Uhm: Winning Line.] ((nodding))	Answer
183	C60	Coach	Winning Line. If somebody asks you, "What would you do specifically to take this	Open question by jargon
184			Winning Line?", how would you answer?	
185	L60	Learner	[Extend the distance between your pit of stomach and your belly button as far as possible.]	Answer
186			((nodding while distancing her belly button from the pit of stomach))	
187	C61	Coach	[Right.] ((nodding)) It is perfect. Then, what would you do with your arm swing?	Evaluation, Open question
188	L61	Learner	Arm swing is:, walking like flowing backward what is in front of you.	Answer
189			((swinging her arms and nodding))	
190	C62	Coach	[Yes.] ((nodding)) OK, then, I want you to walk like that. Let's go.	Instruction
191	L62	Learner	((the learner practices a walk with being conscious about	Practice
192			how to place her weight on the soles, swing her arms and maintain her upper body.))	



Fig. 2 Images for coaching walking skill

Table 2 The playback time for each expression

Item	Playback time
All playback times	426.9
Verbal Communication	266.7
subtotal	70.6
Open Question	57.4
by Jargon	12.8
by Analogy	5.3
Closed Question	13.2
by Analogy	5.4
subtotal	81.0
by Jargon	40.8
subtotal	85.8
by Jargon	44.0
by Analogy	26.6
Evaluation	10.1
Non Verbal Communication	148.7

* Playback time is in seconds.

part of the trunk is positioned backward. For this reason, it is inferred that Learner maintains her anteroposterior balance by moving the upper extremities more forward than their naturally hanging position through the flexion of her neck region and the slight flexion of her shoulder joints.

Meanwhile, regarding Learner's walking, the relative positional relationships among her femoral trochanteric fracture, acromion and earlobe are not different from those for her standing position in the entire walking cycle. Learner swings both of her upper extremities slightly while walking and her hands are never positioned more backward than the femoral trochanteric fracture, inferring that there is very little rotation movement of her body trunk occurring between the pelvis and thorax. The extension of her hip joints can be found only slightly which is supposed to be observed from the mid stance to the pre-swing for both legs. Because of this, learner's walking shifts from the stance to the swing in the state where the timing of her toe off in the pre-swing is not clear (see Fig. 3).



Fig. 3 Walking of Learner before coaching

After the coaching session, in the extend position of Learner's knee joints, the line connecting her earlobe, acromion, femoral trochanteric fracture and lateral malleolus was similar to the vertical line. From this standing position, learner has become able to shift her center of gravity line back and forth as an autokinetic exercise without losing the alignment of her earlobe, acromion and femoral trochanteric fracture. In addition, although there was a shortage in the extension of knee joints in the heel contact on one side and the heel off on the other side while walking and therefore the rise of learner's body trunk in the mid stance is lower than Coach's, her arm swings have been extended in an anterosuperior direction and her hand swings have reached the height of her umbilici. Further, Learner's heel contact has become clearly observable, making it possible to confirm the extension of her contralateral hip joint then. As just described, from the perspective of physical therapy, it was confirmed that Learner has acquired proficiency in her walking motions (see Fig. 4).



Fig. 4 Walking of Learner after coaching

3.3. Evaluation by Athletic Trainer on Learner's Walking

With an aim to get rid of the confirmation bias of the fourth author, an athletic trainer officially certified by Japan Sport Association who did not know the study purpose examined the video visually and evaluated Learner's walking skills from the standpoints of sports science. The evaluation results on walking are as follows. Learner's walking motion before the coaching session has a longer time duration from heel strike to midstance and a shorter time duration from her midstance to toe off in the stance phase.

Additionally, there is little motion in Learner's upper extremity and her four extremities do not work with each other. Learner's walking motion like this makes her center of gravity shift backward, walking cycle speed slower, and further strike per walk shorter. In the meantime, Learner's walking after the coaching session has a higher ratio of the section from midstance to toe off. Also, her arm swing in upper extremity has become work together with the motion of upper extremity. Consequently, Learner's posture with the center of gravity being placed backward has been improved, walking cycle speed has become faster, stride has been extended, and walking speed has been enhanced.

Additionally, Learner answered, "Slightly" when asked for an evaluation regarding the question of "How do you evaluate the efficiency level of Learner's walking after receiving the coach's instructions from the perspective of sports science?" with 4 answer choices ("Not at All", "Not Much", "Slightly" and "Very Much"). As just discussed, from the perspective of sports science, it was confirmed that Learner has acquired proficiency in her walking skills.

4. Discussion

4.1. Open Question for Learner's Shifting Attention to Internal Focus

The results of the analysis by the fourth author and an athletic trainer confirmed that the learners' walking skills were proficient. With respect to transfer of walking skills from Coach to Learner, we discuss the VC strategy of the coach based on the results.

Initially, as shown in Table 1, VC took 266.7 seconds while NVC took 148.7 seconds, indicating that VC is the main means of communication in Verbal-Cognitive Stage (Stage I)[3]. This VC was divided into four main categories: Question (70.6 seconds), Instruction (81.0 seconds), Explanation (85.8 seconds), and Evaluation (10.1 seconds). In the skill coaching, as well as Instruction and Explanation, a large amount of time was spent asking questions to Learner, which is considered to be a characteristic result.

Under sports settings, the importance of Learners' attitude of careful listening to the words of their coach referred to as "Active Listening" has been pointed out[22][23]. Accordingly the outcomes of this study also identified many situations where Coach asked an open question (57.4 seconds) to Learner in particular. For example, before the coaching session, in response to Coach asking, "Looking at your own face, how do you feel? Yours (Line 1)", Learner told what she had noticed regarding her own physical motions such as her left shoulder sagging (Line 2-3) and hands being in front of her thighs (Line 13-14). In addition, Coach instructed Learner to write down in a form in her own words what she had noticed about her body motions (Line 15). Suwa(2008) reported that learners' effort to proactively verbalized what they had thought and perceived after practicing physical skills would contribute to the enhancement of their physical skills[24]. Meanwhile, It is not possible to know from the externally measured numerical values what kind of consciousness the learner is practicing and what she feels while correcting the movement. While observing the learner's movements, the coach needs to understand the meaning of the athlete's thoughts and movements and to use words to encourage the focus of the next learning task. In line with this, the outcomes of this study are thought to suggest that Coach's open questions were his strategic approach to having learner shift her attention to internal focus.

However, Learner does not necessarily understand all of what Coach is trying to say through an open question. For this reason, there is a need to understand how Learner thinks when practicing a body movement being instructed. For instance, in response to Coach asking, "Then, which part of your body isn't moving now? Look at you in the mirror (Line 81)", Learner stopped walking after seeing her feet (Line82), which scene was observed in the video. Then, Coach, judging from Learner's stationary condition that she would not swing her arms more, asked another open question to her such as, "Which body part of yours is different from mine? (Line83)", which question confirmed that the learner answered that her arm swing had been different from Coach's (Line84).

Furthermore, Coach asked additional open questions to Learner after the coaching session so that he could check how far she understood the contents of his instructions (Line 177-190). As just described, it was suggested that one of Coach's VC strategies was to check Learner's way of thinking other than the one to shift her attention to internal focus.

4.2. Analogical Reasoning for Easy-to-Understand Explanation on Motions

This study confirmed that Coach explained body motions while using analogical reasoning. Precedent studies reported that the use of analogical reasoning was effective for acquiring physical skills[25]. For example, Liao and Masters (2001) reported that a comparative discussion regarding the task of forehand topspin in table tennis among three groups - Implicitly Group, Explicitly Group and Analogy Group - concluded from the higher scores of Analogy Group and other facts that analogical reasoning was effective for acquiring physical skills[26]. Additionally, Lam et al. (2009) reported that the performance evaluation of a basketball shooting task under pressure had revealed that analogy Group's performance had not been affected[27].

As a result of this study, in having Learner observe his standing positions swung by changing the placement of his weight on the sole back and forth (Line 47-58), Coach made an off-balance gesture by placing his weight on the backside of the sole while saying, "You would say, 'Oops', when you are pushed from your front side in your Losing Position, wouldn't you? (Line 56-58)" Moreover, judging from Learner showing her approval by nodding (Line 59), it is indicated that Coach's explanation was understood by Learner. Further, Coach explained the posture of upper extremity by using a ruck and a maul as examples considering the fact that Learner had played rugby (Line 139-141). It is inferred that one of Coach's strategies was to give easy-to-understand explanations by using analogical reasoning.

Meanwhile, some scenes were witnessed as well where Learner's response was not as expected even if Coach gave analogical expressions. For instance,

when Coach asked a question on how Learner moved her body for walking in heavy water (Line 88) in order to explain the way of arm swing, Learner used only her legs with deeply bending knees without swinging her arms at all (Line 89-90). While this can be explained by Learner's inexperience in walking in the water consciously, Coach explained the importance of arm swing analogically by adding explanation of walking in the water while swinging his arms widely (Line 94-95). As discussed above, it was suggested that one of Coach's VC strategies was to explain using analogical reasoning for the purpose of giving Learner easy-to-understand explanations on body motions.

4.3. Jargon for Simple explanation and sharing of physical sensations

This study revealed that Coach shared early in the coaching process with Learner jargons. In order to have a learner acquire physical skills, a coach needs to use VC as concisely and effectively as possible. In addition, there may be a case where a language itself can be the bottleneck for the acquisition of physical skills due to its attributions such as ambiguity, similarity and polysemy. Precedent Studies have indicated that common words called "craft language" were used between masters and students as an effort to avoid contradictions and traps in communicating skills in words[28][29]. A craft language is a word that metaphorically expresses skills acquired over a long period of time. In contrast, a jargon is an artificial language used by the members of a group, and is relatively easy to create[30].

This result of this study showed that Coach shared with Learner jargons as common words like "Winning Position, Losing Position (Line 29-32)", "Winning Line, Losing Line (Line 164-171)" and "Boom Boom Boom Walking (Line 117-120)". The sharing of words was also proved from the response by Learner. Specifically, when Coach asked Learner after the coaching session, "You should shift to Winning Position quickly. Then, your upper body? What is it?" (Line 179-181), she replied, "Winning Position", shoring up this theory. As the example of an advantage using

common words, more efficient VC would become possible if first sharing a jargon of “Winning Line” and then making a concise explanation rather than repeatedly explaining, “Extend the distance between your pit of stomach and belly button (Line 159)”. Further, it is inferred that Coach employed a strategy to briefly explain his ideal body motions by creating the phrase of “Boom Boom Boom Walking” using an onomatopoeic word of “Boom, Boom, Boom” brought out for keeping the rhythm of arm swing.

Moreover, an analysis found that the use of jargons was the sharing of physical feelings through words as well as a simple explanation strategy. Unlike visible body motions, judging whether Learner is actually feeling body sensations has no choice but to depend on her observable learning words. Specifically, also based on the facts that Learner immediately answered that her walking speed became faster in response to the question of “Comparing with a previous one, how have your walking speed changed?” (Line 77) asked by Coach who instructed her to walk in Winning Position and that she gave an affirmative response while nodding with a smile as the answer to the question such as “This posture gives you a pretty bad feeling, doesn’t it?” (Line 137) raised by Coach who instructed her to stand in Losing Position before that, it is thought that body sensations were being shared between both parties (Line 138). Thus, it was suggested that the use of jargons was a strategy to share body sensations with Learner in addition to acting as a one to simply explain Coach’s body motions.

After understanding what the learner is feeling inside through open questions, Coach tries to convey Coach’s body feelings using jargon. On the other hand, it was suggested that analogies could be used to compensate for areas that could not be shared between Coach and Learner through jargon alone.

5. Conclusion

The purpose of this study was to, by focusing on the VC of Coach trying to give Learner instructions on physical skills, discuss Coach’s VC

strategies. The discussion suggested that Coach’s VC strategies had three levels: the level of “Open question” where Coach understood what Learner was thinking by having Learner shift her attention to internal focus, the level of “Analogy” where Coach explained his ideal body motions for easy-to-understand, and the level of “Jargon” where body feelings were shared through the simple explanations and words for body motions. The new knowledge obtained through this study indicates phased strategies regarding Coach’s VC in his giving instructions on physical skills and is expected to be an effective design policy in coaching.

The future study task is as follows. This study pursued Coach’s VC strategies with focusing on the verbal-cognitive stage. Meanwhile, giving instructions on physical skills is a progressive process and shifts from the verbal-cognitive stage to the next associative stage and the autonomous stage. Therefore, the discussion of Coach’s VC strategies on each stage of physical skill instructions is expected to be made.

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