

## Thoughts of Korean Women Badminton Singles Players in Various Situations during Games

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*The purposes of this study were; 1) to investigate the thoughts of Korean women badminton singles players before and during their games, 2) to extract rational thoughts in order to make them optimally perform by specifically identifying intentional thoughts which appeared in various situations, and 3) to help those who lack specific thoughts and/or have improper thoughts to have rational and appropriate thoughts for the competitions by providing appropriate programs that fit various competition situations. Twelve players were the subjects of this study (two top-elite level, five national level, and five company/university level players). A half-structured interview representing specific game situations was administered individually in order to identify their thoughts during competitions in general and during strokes. The personal interview questionnaire were made from my experiences as a badminton coach for 20 years and with the help of sport psychology consultants. The interview questionnaire included potential occasions that could happen in singles matches. It was divided into three situations, before and during competitions, and during strokes. After the interview, a qualitative research method was utilized to analyze the content of the interview. Results revealed that the thoughts during the competition were various. That is, there were mixed positive and negative thoughts, and there were specific and non-specific thoughts as well. Differences were found between top-elite and elite players and according to game situations. Especially, top-elite players didn't yield their will regardless of any situation during the game, rather they even enjoyed those situations or had fun in the situations. In addition, they simply focused on each moment of the game and did their best. They hardly show their emotional swings, nor did they reveal their emotions during the game. Also, top-elite players recognized exactly the situation of each stroke when they or the opponent hit the shuttlecock. They said that they sent the shuttlecock in the direction intended and focused on the place where the opponent could send it back. In addition, they showed relatively low mental changes influenced by external moods or game situations.*

*key words* : badminton players, women's singles matches, thoughts before and during the game, half-structured interview

### Introduction

#### Purpose of the study

Athletic performance in the field is presented as the results of complex interactions among physical, social, technical and psychological variables. Especially, the psychological variable is one of the most important elements for the athletes to manage their game (Han, 1996; Han & Kim, 1995). Badminton was first introduced to Korea in the 1960s. At first the level of Korea was not

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good enough to be one of the best countries in terms of badminton performance. However, it is not too much to say that the current level of the Korea badminton players has been recognized as some of the top players in the world through continuous development. Koreans have proved the truth of their reputation by winning two gold medals in male and female doubles in the 1992 Barcelona Olympics and two gold medals in female singles and mixed doubles in the 1996 Atlanta Olympics. Koreans are known to be strong in badminton doubles and nobody can deny that. However, it is also true that they are weak in singles matches where the player face 1 to 1 situations and have to cope with them. Many variables such as excellent skills and strong physical and psychological components are involved in badminton. Since the rally proceeds very rapidly in a narrow space, excellent results are expected only when those variables mentioned above are appropriately interacted.

Previous studies in badminton mostly have analyzed the skills used in the game (e.g., Kim, D.M., 1999; Kim, J.H., 1999; Kwon, 2001; Ra, 2002). Other studies have examined physiological variables (Park & Park, 1991; Kim et al., 2002) and psychological variables (Park, 2001; Shin, 2000) and fitness/skill measurements (Ahn, 1998; Lee, 2001). Although a few studies (Park & Kim, 2000; Seong & Gu, 1992; Seong & Kim, 2001) have focused on the field research for the performance enhancement of elite players, much more information is still required.

It is presumed that top-elite athletes who show superb performance in badminton matches also have peculiar thoughts and behavior. Particularly, the ability of the player to stay calm, to solve and cope with the difficulties/adversities is more important than any other element when she is confronted with an urgent, dangerous, and uncontrollable situations in the singles match. In addition, the top-elite players should respond appropriately to the opponent's strokes during continuous and repeated rally situations without physical exhaustion. They should also be able to manage fast movements instantaneously. It is well believed that these factors are well developed through training. However, when well-trained movements are not followed by appropriate thoughts, then inappropriate movements or behaviors result. In order to perform efficiently in competitions, appropriate judgment, expectations based upon game situations, and the ability to understand the mind of the opponent play decisive and important roles.

Especially it is necessary for players to analyze opponents' stroke courses and states continuously and to prepare appropriate strategies based upon the analysis. The reason for this is that single players may demonstrate habitually particular movements in similar situations such as stroke habits in the game. Focusing on this necessity, previous studies (Park & Kim, 2000; Seong & Kim, 2001) examined the stroke courses of elite players. The authors reported that there were preferable courses that the players like to do in single matches, which resulted from habitual movements. This indicates that players replicate the same movements as they hit the strokes during a rally or that the same situations for the stroke during a rally are continuously repeated. In other words, the stroke courses of the player can be anticipated by the opponent. Thus, what are the thoughts of the players during games and what sort of thoughts they have during strokes are highlighted as important matters associated with the game results.

In general, psychological skills related to performance results are variously presented. They include anxiety, self-efficacy, psychological preparation, concentration, motivation, and imagery

ability, etc.(Hardy, 1990). However, other complex psychological interactions such as situation recognition, judgment, strategy planning, understanding and anticipating the opponent's mind occur in one-to-one situation during singles match as well. Therefore, the optimal performance in a badminton singles match will be closely related to the ability to recognize these factors and the means of performing intentional plays using these factors. Generally, thoughts are interpreted as the cognition or recognition and understood as the mental processes to trigger memories proper to the situation using certain information, to judge, to abstract appropriate results, and to solve problems caused by these processes. Thus, the thoughts of each player are associated with her own experiences, the capability to think appropriately also can be enhanced through training or game situations. In addition, it is said that skill acquisition and understanding about skills are dependent on the cognitive ability of the player.

Cognitive elements related to badminton include expectation capability, degree of understanding of tactics and strategies, ability of imagery usage, positive thinking, and controllability of competition anxiety. It is believed that these components are especially found among superb top-elite players. Research on cognition ability has been carried out in other fields as well. Although various cognitive restructuring programs have been applied to each player in some sports by some sport scientists in the sport psychology literature, research on cognition in badminton is very limited. In particular, coaches and players have questioned the necessity of investigation on cognition of the players. Indeed, badminton requires many cognitive processes during the game. Thus, research on the cognition of badminton players is important. However, few studies have investigated the cognition of badminton players.

Therefore, the purposes of this study were: (1) to investigate the thoughts of the women badminton singles players before and during the game; (2) especially, to identify their thoughts specifically at the moment of the stroke, which will be differently described, based upon the situation; and (3) to provide basic psychological information which can help women players to enhance their performance by reviewing these psychological processes.

## Method

### Subjects

The subjects were 12 women singles players. All were either ex- or current national players in singles events. Two players were world-ranked (within top five) top-elite athletes who were Korean representatives at the time of the experiment. They had participated in the Olympic Games, World Championships, and Asian Games and won medals in those competitions. Another five athletes were Korean delegates at the time of the experiment. And five more players were former delegates in the badminton singles event. However, these ten players had not won any medals in international championships. In order to examine whether there were differences in their thought patterns based upon game situations, the subjects were divided into three groups according to their skill levels. That is, two top-players were categorized as top-elite players, while the five national team members

and the other five players belonging to company or university teams were categorized as elite players. The reason for this was due to the common fact which appeared among national and company team players except the top-elite players. The careers, ages associated with experiences, and the performance levels of the current national team players, including promising young players for the next generation, were not predominantly higher than those of company or university team players. Especially in terms of careers and the current performance level, some national players were lower than those of the company or university team players. This is why those two groups were treated as one group, the elite group. The ages of two top-elite players were 27 and 23 years old and their careers were 17 and 14 years, respectively. The range of the ages in the other group (elite group) was from 21 to 26 and their careers were from 12 to 16 years.

### Measurements/Tools

Personal interviews consist of half-structured specific questions relevant to competition situations. These personal interviews were administered to the subjects in order to identify the general and specific thoughts of the players during competitions and strokes (See the appendix). The personal interview consisted of specific questions that could happen in the singles matches. The questions were about their thoughts before and during the competition, and at the moment of the strokes according to the game situations. These questions mainly came from the authors' court experiences of 20 years of badminton coaching. And the questions were refined and finalized with the help of sport psychologists. After the interviews, qualitative data analyses were conducted in order to investigate their thoughts. Qualitative research method are the means not only to supplement the weak points of quantitative method, but also to determine much more in-depth information about the subjects (Patton, 1980). The results of this qualitative research were reviewed, discussed and divided into appropriate categories in terms of sub-themes and main theme.

### Contents of the study

Following were the contents of this study:

- 1) To identify general thoughts of women badminton singles players before and during competition
- 2) To identify the thoughts of women singles players according to game situations
- 3) To compare their thoughts during the game based upon skill levels
- 4) To compare the thoughts of women singles players based upon skill levels at the moment of strokes during a rally in the competition.

### Data analysis

Each personal interview was recorded and the contents of the interview were reproduced in statements on paper. The authors of this study read the contents at least three times in order to understand each interview. Deductive analysis was performed for content analysis after the

understanding. All the sentences were categorized according to similar and associated meanings, which were meaningful upper class themes. These upper class themes were again categorized into independent main themes. Whole sentences were again re-categorized based upon specific game situations. In addition, appropriate and meaningful themes were abstracted from the data. The authors wrote the contents and the meanings based upon the data after reviewing the whole data twice to correct wrong categorizations. If there were mismatches on the categorization between authors, discussions were held until they reached agreement.

## Results

The authors asked the players to talk about their general thoughts after they suggested special situations that could happen before and during the game. It was due to the fact that the behaviors or thoughts of the players which appeared in special situations during the game generally influenced the performance of badminton. The following were the results of the analyses of the contents that they mentioned.

### Thoughts before the game

The results revealed that the general thoughts of the badminton single players could be divided into two parts, positive and negative thoughts. The positive thoughts consisted of positive expectations of the game, self-efficacy, concentration, challenge, and comfortable feelings. These thoughts could be again divided into 1) specific and intentional thoughts about the game; and 2) nonspecific moods or thoughts about the game. Specific and intentional thoughts about the game meant that players thought about their tactics or strategies as they were in the state of recognition for the game. Nonspecific moods or thoughts about the game indicated ambiguous moods or states of the mind that could be felt based upon the game situations. Negative thoughts appearing during the game included anxiety, pressure, loss of self-efficacy, excessive arousal level, negative physical feelings, and renunciation caused by negative expectations of the game results. These thoughts could be again divided into 1) specific and intentional thoughts about the game; and 2) nonspecific moods or thoughts about the game.

The thoughts before the game that the players expressed were analyzed based upon two criteria; (1) an important/big game which was a great burden on the player (eg, must-win situation of team event); and (2) a general game in which the players felt less pressure. Those were the contents that the players mentioned.

#### *Thoughts before the Burdensome Game*

Thoughts before the burdensome game referred to the feelings or thoughts of the players right before an important or must-win game and team event. The content of the thoughts were as follows(See Table 1). Negative non-specific thoughts were the most frequently mentioned (11/12:

eleven of twelve players mentioned them) among thoughts before the burdensome game, followed by negative-specific (9/12) and positive-specific(intentional) thoughts(See Table 2). Negative-nonspecific thoughts were the ambiguous moods or ideas that the players felt before game situations. These included a burdened mind and uncomfortable thoughts caused by must-win situations. Interestingly most players had experienced these sorts of feelings. Negative-specific(intentional) thoughts indicated those ideas which appeared associated with game results or plays. These included negative expectations about the results and uncomfortable strategic ideas about the plays. Positive-specific (intentional) thoughts referred to the states recognizing specific details about their own game. They consisted of self-efficacy on the competition, specific strategic ideas and concentration on the game. In addition, positive-nonspecific thoughts indicated the self-efficacy resulting from comfortable feelings as usual and challenging thoughts although it was a burdensome situation. As <Table 1> illustrates, the authors learned that the content the players mentioned consisted of similar expressions.

*Table 1. Thoughts of players before the burdensome game*

dimensions	main theme	higher order themes	raw data themes
positive thoughts	Specific /intentional thoughts on the game	<ul style="list-style-type: none"> <li>· self-efficacy on the game</li> <li>· thoughts on tactics</li> <li>· full attention and concentration</li> </ul>	<ul style="list-style-type: none"> <li>· I think that I have to play confidently rather than lose confidence</li> <li>· I think that I should pay full attention to my play</li> <li>· I think that I have to do my best without feeling burdensome</li> <li>· I think that I should not make any mistake in the first service</li> </ul>
	nonspecific thoughts on the game	<ul style="list-style-type: none"> <li>· self-efficacy</li> <li>· comforts</li> <li>· challenges</li> </ul>	<ul style="list-style-type: none"> <li>· I am confident, although the opponent gets on my nerves</li> <li>· Although I am frustrated a little bit, it doesn't influence my game</li> <li>· My mind is calm and there is little distraction in my thoughts</li> <li>· I am confident as the coach selected me, indicating his belief in me!</li> <li>· I think "Yes, I can do it well. Let's just do it!"</li> </ul>
negative thoughts	specific /intentional thoughts on the game	<ul style="list-style-type: none"> <li>· negative expectation</li> <li>· thoughts on the tactics</li> </ul>	<ul style="list-style-type: none"> <li>· Anxious feelings such as "I am afraid of losing this game" haunt</li> <li>· As I see the plays of my opponent, the idea "My play won't work today." comes to my mind</li> <li>· I think "I wish I could avoid playing against difficult opponents"</li> <li>· The opponent gets on my nerves and she would play better than me</li> <li>· I think I am not ready for the game yet</li> <li>· I think if I lose, then my team would lose as well</li> </ul>
	nonspecific thoughts on the game	<ul style="list-style-type: none"> <li>· burdens in mind</li> <li>· anxiety</li> </ul>	<ul style="list-style-type: none"> <li>· I am burdened with the thought that I have to win</li> <li>· I think that the mood of my team would be high only after my win</li> <li>· I think I want to avoid this game if I can</li> <li>· I think the responsibility for the results would be passed on to me</li> <li>· I just tremble without thinking of anything</li> </ul>

There was a difference according to their skill levels in terms of the rate of mentions (frequency). Particularly, the top-elite players and elite players showed distinct differences in the content and the rate they mentioned. These differences were illustrated in <Table 2>. As we can see, top-elite players all mentioned positive thoughts, especially that they had specific (intentional)

thoughts about the game. Although they had burdened minds before the game, this did not influence their performance. It seems that the usual comfort and self-confidence helped them to have challenging thoughts. And this state of mind led players to wholly concentrate on the game. On the other hand, elite players mentioned negative thoughts in general, showing a higher rate than that of top-elite players. They demonstrated higher rate in the vague burdens about the game and the state of anxiety rather than preparing to have specific thoughts.

*Table 2. Thoughts of players before the burdensome game based upon skill levels*

dimensions	main themes top-elite/elite	higher order themes	top-elite players n=2 (100%)	elite players n=10(100%)
positive thoughts	specific (intentional) thoughts 2/4	· self-efficacy on game	2 (100)	2 (20)
		· strategic ideas	2 (100)	4 (40)
		· full attention/concentration	2 (100)	4 (40)
	non-specific thoughts 2/2	· self-efficacy	1 (50)	0 (0)
· comfort		1 (50)	0 (0)	
· challenge		2 (100)	2 (20)	
negative thoughts	specific (intentional) thoughts 0/9	· negative expectations	0 (0)	6 (60)
		· strategic ideas	0 (0)	6 (60)
	non-specific thoughts 1/10	· burdened mind	1 (50)	8 (80)
		· anxiety	0 (0)	7 (70)

### *Thoughts before the General Games*

Thoughts before the general games were what the players felt and thought before the general games. General games were individual events including any kind of open championships, international games and/or domestic games. The players could participate individually without much pressure in these regular games. The contents the players mentioned were summarized in <Table 3>.

Positive-specific(intentional) thoughts were the most frequently mentioned item (11/12) among the thoughts before the regular games, followed by negative-specific (10/12), negative-nonspecific (8/12), and positive-nonspecific thoughts (7/12)(See Table 4). Positive-specific(intentional) thoughts were those which appeared before the game. These included positive expectation, strategic thoughts about the opponent, and game preparation. Negative-specific thoughts referred to the lack of self-efficacy or anxious states resulting from the negative expectation about the game. All elite players had these thoughts, but the top-elite players did not. Negative-nonspecific thoughts were expressed as physical uncomfortableness and lack of self-efficacy, while positive-nonspecific thoughts were described as comfort, good feelings(senses) and challenges. Especially, the expressions they mentioned in this category were similar as well. These were different from those of the 'burdensome thoughts before the game' as we mentioned above. The main characteristic that we could abstract from this fact was that excessive pressures the player had before the game prevent the player from having specific and intentional thoughts for the game.

Table 3. Thoughts of the players before the general game

dimensions	main themes	higher order themes	raw data themes
positive thoughts	specific /intentional thoughts on the game	<ul style="list-style-type: none"> <li>· positive expectations</li> <li>· thoughts on the tactics</li> <li>· game preparation</li> </ul>	<ul style="list-style-type: none"> <li>· I think of strong/weak points of the opponent and plan how to deal with her</li> <li>· If I play well in the first game, then I can do it well until the last game</li> <li>· I can win if I do my best with my whole efforts</li> <li>· The opponent gets on my nerves, but I try to figure out the opponent even within the moment of a glance</li> <li>· I want to act to the best of my abilities as I have practiced</li> <li>· I think that I have to warm-up fully</li> <li>· I think that I want to hide my strong points</li> <li>· I think in my mind that I should not loosen up and make mistakes</li> </ul>
	nonspecific thoughts on the game	<ul style="list-style-type: none"> <li>· comfort</li> <li>· athletic feelings</li> <li>· challenge</li> </ul>	<ul style="list-style-type: none"> <li>· I think that I am comfortable</li> <li>· I account much of the feeling about the first game</li> <li>· I remind myself of the good feeling experienced in the past and think that I should do it again like at that time</li> </ul>
negative thoughts	specific /intentional thoughts on the game	<ul style="list-style-type: none"> <li>· negative expectation</li> </ul>	<ul style="list-style-type: none"> <li>· I think that the opponent can manage the game well today</li> <li>· I am afraid of making mistakes</li> <li>· I am afraid of losing the game</li> <li>· I think that the opponent can play better than me</li> </ul>
	nonspecific thoughts on the game	<ul style="list-style-type: none"> <li>· loss of self-efficacy</li> <li>· physical feelings</li> </ul>	<ul style="list-style-type: none"> <li>· I am nervous</li> <li>· I think that I have little strength and am not confident without any particular reason</li> <li>· I think that I am not in a good condition</li> </ul>

Table 4. Percentage of thoughts before the general games based upon skill levels

dimensions	main themes top-elite/elite	higher order themes	top-elite players n=2 (100%)	elite players n=10 (100%)
positive thoughts	specific(intentional) thoughts 2/9	<ul style="list-style-type: none"> <li>· positive expectations</li> <li>· strategic thoughts</li> <li>· game preparations</li> </ul>	2 (100)	0 (0)
	nonspecific thoughts 2/5	<ul style="list-style-type: none"> <li>· comfort</li> <li>· athletic physical feelings</li> <li>· challenge</li> </ul>	0 (0)	4 (40)
negative thoughts	specific(intentional) thoughts 0/10	<ul style="list-style-type: none"> <li>· negative expectations</li> </ul>	0 (0)	10 (100)
	nonspecific thoughts 0/8	<ul style="list-style-type: none"> <li>· loss of self confident</li> <li>· physical feelings</li> </ul>	0 (0)	6 (60)

Meanwhile, <Table 4> reveals that most players mentioned that they had specific(intentional) thoughts. An interesting difference was found between top-elite and elite players. That is, only top-elite players showed 100% of positive-specific(intentional) thoughts. Elite players showed 100 % of negative-specific(intentional) thoughts, although they also showed a higher percentage of positive-specific thoughts. It is suggested that the top-elite players did not think negative thoughts,

while elite players thought more negative thoughts than positive ones. The percentage rate here was similar to that in the 'burdensome thoughts before the game.' It implies that top-elite players were consistent in their thought patterns before the game with less emotional disturbances or thought changes, even when they were pressured from uncomfortable situations.

### Thoughts during the Game

The thoughts of the players during the game were analyzed according to the special situational characteristics of badminton. The situations were divided into three different circumstances; 1) on-going rally situation; 2) disadvantageous situation, and setting situation. The following were the results obtained from those three analyses.

#### *Thoughts during Rallies*

Thoughts during rallies referred to the emotions, moods and thoughts that the players felt as the rallies were generally occurring during the game. The contents were summarized in <Table 5>. <Table 5> showed that during rallies most players had positive and specific (intentional) thoughts. Positive-specific(intentional) thoughts consisted of thoughts on the tactics/strategies, expectation about the opponent's play, full attention and concentration.

*Table 5. Thoughts of Players during Rallies based upon skill levels*

dimensions	main themes	higher order themes	raw data themes
positive thoughts	specific (intentional) thoughts on the game	<ul style="list-style-type: none"> <li>• strategic thoughts</li> <li>• concentration/full attention</li> <li>• expectation</li> </ul>	<ul style="list-style-type: none"> <li>• I think that I should not make mistakes and just play how I want to play</li> <li>• I think of the stream or rhythm of the game</li> <li>• I think that I have to stroke accurately</li> <li>• I send the shuttle intentionally to the empty spaces of the opponent</li> <li>• I think that I should be deliberate and concentrate on each shuttle</li> <li>• I concentrate and pay full attention to giving and receiving the service</li> <li>• I try to anticipate the characteristics of the first shuttle</li> <li>• I think of the expected place of the opponent's shuttle and then move to the place</li> </ul>
			<ul style="list-style-type: none"> <li>• self-efficacy</li> <li>• full attention</li> </ul>
negative thoughts	specific (intentional) thoughts on the game	<ul style="list-style-type: none"> <li>• negative expectation</li> <li>• negative association</li> <li>• relinquishment</li> </ul>	<ul style="list-style-type: none"> <li>• I worry whether I would make mistakes</li> <li>• It seems that my opponent plays better than me</li> <li>• That I made mistakes frequently haunted me, resulting in more worries</li> <li>• I wish that my opponent would make an error quickly</li> <li>• I wish this game to be over as soon as possible</li> </ul>

<Table 6> representing the percentage of thoughts during rallies according to skill levels, revealed that top-elite players all responded to positive-specific thoughts. However, no elite players responded to this item. Rather, they said that they only concentrated on the play and tried to anticipate the opponent's shuttle. Specific(intentional) negative thoughts that the players mentioned consisted of negative expectation of their skills, negative association, and relinquishment. Negative expectation was the sense that the players felt about their skills at the moment of impact between the racket and the shuttle. Negative association during rallies was the case when the player was unexpectedly haunted by bad experiences or associated scenes that she had had in the past. Relinquishment was another expression of giving up. As we can see in <Table 6>, top-elite players said they did not have negative thoughts, while most elite players responded that they had negative-specific(intentional) thoughts. From this result, the authors could determine that there was an obvious difference in their thoughts during rallies in terms of skill levels. It seems that the performance of the elite players was influenced much by strong negative specific (intentional) thoughts, although the elite players had positive specific (intentional) thoughts about the game.

*Table 6. Percentage of thoughts during rally situations according to skill levels*

dimensions	main themes top-elite/elite	higher order themes	top-elite players n=2(100%)	elite players n=10(100%)
positive thoughts	specific(intentional) thoughts 2/10	· thoughts on tactics	2(100)	0 (0)
		· concentration/full attention	2(100)	8 (80)
		· expectations	2(100)	10 (100)
	nonspecific thoughts 2/6	· self-efficacy	0 (0)	4 (40)
		· full attention	1 (50)	6 (60)
negative thoughts	specific(intentional) thoughts 0/8	· negative expectations	0 (0)	7 (70)
		· negative associations	0 (0)	4 (40)
		· relinquishment	0 (0)	6 (60)

#### *Thoughts in Disadvantageous Situations*

Thoughts in disadvantageous situations referred to the emotions, moods or thoughts that the players felt when they were in difficult situations or adversities. Such hard situations included the following occasions: when they were behind in points, at the moment of losing a point, or when they had to cope with strong pressures from the opponent. The contents of this theme were described in <Table 7>. The most frequently presented theme among their statements was negative-specific (intentional) thoughts (10/12) followed by negative-nonspecific thoughts (9/12), positive-specific (intentional) thoughts (6/12), and positive-nonspecific thoughts (4/12). One finding was that most players had more negative thoughts than positive ones. Negative expectation about the game was the number one theme in specific (intentional) thoughts. Some players mentioned that they even had anxious thoughts due to lack of confidence. In addition, the players showed high arousal level in which they had vague emotions during disadvantageous situations. They stated that this higher arousal level would lead to physical discomfort, which would end in giving up the game. Specific (intentional)

thoughts in positive thoughts which showed a relatively low rate (see Table 6) consisted of thoughts on tactics/strategies and reconcentration on the game. Thoughts on the tactics/strategies referred to the ideas that the player had in order to change the stream of the game. Reconcentration on the game came when the player had the will to cope with adversities/troubles. As a result, refocusing on performance could occur. Specific details of this theme in terms of their expressions were similar to one another.

Table 7. Thoughts of players in disadvantageous situations

dimensions	main themes	higher order themes	raw data themes
positive thoughts	specific (intentional) thoughts on the game	<ul style="list-style-type: none"> <li>· strategic thoughts</li> <li>· coping</li> <li>· concentration/reconcentration</li> </ul>	<ul style="list-style-type: none"> <li>· I think of the means to quickly recover</li> <li>· I think that I should change the shuttle or my play</li> <li>· No matter how hard the situations are, I will try to cope with them by myself</li> <li>· My ability of concentration is getting stronger as I think that this is the last chance</li> <li>· I become deliberate as I think that I will lose no more points from now.</li> <li>· I think that I and my opponent are neck and neck</li> <li>· I think that I should not use the skills I used when I made mistakes continuously</li> <li>· I am careful about the ways I made mistakes frequently and think of the reasons for them</li> <li>· I think that if I lose the game, there is no way to recover and then refocus on the game</li> </ul>
		<ul style="list-style-type: none"> <li>· challenge/ full attention</li> <li>· self reinforcement</li> </ul>	<ul style="list-style-type: none"> <li>· I think that this is not a big deal and I will directly face it.</li> <li>· I encourage myself that I can do it and catch up with her!</li> </ul>
negative thoughts	specific (intentional) thoughts on the game	<ul style="list-style-type: none"> <li>· negative expectation</li> <li>· loss of self-efficacy</li> </ul>	<ul style="list-style-type: none"> <li>· I think that I will lose the game in this manner and worry how I can win</li> <li>· I feel no strength at all</li> <li>· I think that I am not confident of my stroke</li> <li>· I regret that I did not practice those skills necessary for this sort of game</li> <li>· I begin to worry how I can win this game</li> <li>· I begin to think that it will be helpful for me if the coach gives me advice</li> <li>· My opponent seems to be commanding and confident</li> </ul>
		<ul style="list-style-type: none"> <li>· arousal level</li> <li>· feelings in body</li> <li>· relinquishment</li> </ul>	<ul style="list-style-type: none"> <li>· I am worried, impatient, irritated and feel the sense of crisis</li> <li>· I am annoyed and the bad situations frequently disturb me</li> <li>· I become angry and sometimes shed tears due to fretting and/or irritability</li> <li>· I feel no strength in my legs</li> <li>· I think that I am going to die</li> <li>· I really wish I could give up</li> </ul>

Meanwhile, <Table 8> shows that thoughts in setting situations were different based upon skill levels. That is, all top-elite players responded that they had positive thoughts, while elite players mentioned this theme at a lower percentage, compared to that of top-elite players. This indicates that top-elite players had specific and positive thoughts about the game even they were in disadvantageous situations. Moreover, elite players responded with higher rates of negative thoughts than top-elite players. Especially, the top-elite players mentioned that they expected negative aspects of the game. However, they had strong wills to cope with, which led to refocus on the game situations. The elite players could not control their own emotions or the moods of the circumstances due to the negative expectation of the game. As a result, they rather wanted to give up the game.

*Table 8. Percentage of thoughts during setting situations based upon skill levels*

dimensions	main themes top-elite/elite	higher order themes	top-elite players n=2(100%)	elite players n=10(100%)
positive thoughts	specific(intentional) thoughts 2/4	· strategic thoughts	2(100)	3 (30)
		· coping	2(100)	4 (40)
		· concentration/ reconcentration	2(100)	4 (40)
	nonspecific thoughts 2/2	· challenge/ full attention	2(100)	0 (0)
		· self-reinforcement	0 (0)	2 (20)
negative thoughts	specific(intentional) thoughts 1/9	· negative expectations	1 (50)	8 (80)
		· loss of self-confidence	0 (0)	5 (50)
	nonspecific thoughts 0/9	· arousal level	0 (0)	8 (80)
		· feelings in body	0 (0)	7 (60)
		· relinquishment	0 (0)	6 (60)

### *Thoughts in Setting Situations*

The setting in a game is an important situation to determine winning or losing in badminton. Most players responded that they had nonspecific thoughts about the game. And the contents were divided into two parts, positive thoughts and negative thoughts. <Table 9> is the summary of the contents they mentioned. In positive thoughts, they strongly expressed their confidence about the situations and their refocus on the game. They also mentioned negative expectations, negative associations and physical discomfort resulting from the negative thoughts. As a whole, the players responded that they had more negative thoughts than positive ones. The frequencies they mentioned per theme showed differences among players based upon their skill levels.

<Table 10> shows that the top-elite players mentioned a higher rate of focus and refocus, while the elite players had a higher rate of the negative expectations. Top-elite players accurately recognized that the setting was a very important moment to decide win or loss of the game. They also showed a strong will to win the game. That is, they said that their concentration of mind was getting sharper and stronger during the setting situation although they knew it was an urgent situation. However, the elite players said that they focused on the setting situation but experienced physical uncomfot because of strong negative expectations.

*Table 9. Thoughts of players during setting situations*

dimensions	higher order themes	raw data themes
positive nonspecific thoughts	<ul style="list-style-type: none"> <li>· self-efficacy</li> <li>· concentration and reconcentration</li> </ul>	<ul style="list-style-type: none"> <li>· Although my opponent seems to catch me, I think that I can win by at least one point</li> <li>· I say to myself, "let's play with confidence"</li> <li>· I try to concentrate telling myself that I have to end the game at this point with my whole efforts</li> <li>· I think that my concentration or mind is getting stronger than my opponent, although she seems to be confident</li> </ul>
		<ul style="list-style-type: none"> <li>· I think that I would certainly make a mistake first</li> <li>· I am afraid and irritated due to the thought that my opponent could catch me and I could lose the game</li> <li>· Bad memories of the lost game at setting frequently pop into my mind, which makes me anxious</li> <li>· I think that this is the last point, which makes me hurry</li> <li>· I think that I am short of breath and the strength of my legs ebbs continuously</li> </ul>

*Table 10. Percentage of thoughts during setting situations based upon skill levels*

dimensions	higher order themes	top-elite players n=2(100%)	elite players n=10(100%)
positive-nonspecific thoughts	· self-efficacy	0 (0)	2 (20)
	· concentration/full attention	2(100)	4 (40)
negative-nonspecific thoughts	· negative expectations	0 (0)	8 (80)
	· negative association	0 (0)	2 (20)
	· physical body feelings	0 (0)	6 (60)

## Thoughts at the Moment of the Stroke

Thoughts at the moment of the stroke referred to the thoughts that the players had right before they hit the shuttle. The authors suggested those situations because those situations could happen in any badminton competition and then asked the players to talk about their feelings and thoughts as they hit the shuttle. One of the unique characteristics in badminton was that the rallies occurred very fast. Thus, we asked them to talk about their thoughts at the moment of the stroke. These were described in <Table 11> and <Table 12> respectively.

Most players recognized the moment of the stroke and evident differences were found between the top-elite and elite players. As we can see in <Table 11>, top-elite players thought of specific (intentional) plans at the moment of the stroke. Furthermore, they also anticipated the next course of their opponent even at the moment of their own strokes. They concentrated on the stroke moment by moment. They had assurance of their behavior, skills and/or movement with kinesthetic

feelings. They also mentioned that they responded very rapidly to the place where they wanted to hit, even in their unconscious strokes. In addition, they did not have negative thoughts at the moment of the strokes, and even during neck and neck rallies in the behind game. They expressed their strong will to cope with these adversities or difficulties.

*Table 11. Thoughts of top-elite players at the moment of stroke*

higher order themes/raw data themes
(1) Intentional thoughts/expectations
· I think of the place of the opponent's next stroke
· I can identify characteristics of stroke after rallying 3 points
· It is not difficult to identify, the level of my opponent
· I send the shuttle to the place where I intended so that I can make the next returning shuttle my decisive chance
· I move to the place where I can play easily after sending the shuttle to the space that I intended
· I always try to find weak points of my opponent
· I automatically begin to swing my racket where I see the weak points
· I decided the strokes (intensity/course, etc.) based upon the situations of weak points
· I return the shuttle properly when I think I have physical space to do so
(2) Beliefs in my skills and concentration
· I concentrate on each situation
· I am sure of certain kinesthetic feelings
· I focus my skills on the shuttle because I believe in my skills
· I feel kinesthetic senses as a result of repeated exercises in terms of accuracy
· I concentrate on my skill executions as I believe in my kinesthetic senses

*Table 12. Thoughts of elite players at moment of stroke*

higher order themes/raw data themes
(1) Intentional thoughts/expectation
· I can hardly think of where my opponent will move
· Difficult to expect the course of the opponent's shuttle
· I think that I am busy only hitting the shuttle, which may be due to my slow movements
· It takes long to identify the characteristics of the opponent
· I think that I have to use strokes that I had practiced
· I think that I have to unconditionally save and return the shuttle first
· I try to send the shuttle to the place where the opponent is not ready yet
· My body doesn't follow my thoughts as I intended even though I expected it
· I can expect the opponent's shuttle as I have room to prepare but I even forget to do that as I have less room actually.
(2) Negative thoughts
· I worry about whether I will make mistakes almost 100% as I hit the shuttle without confidence
· I am not sure of my movements or skills
· I think that I need more preparation in my movements and skills
· I doubt whether I can do well even if I give my whole efforts
· I worry and become fainthearted when I think of how other people will think of me
· I worry about whether the coach will blame me
· I worry about whether I will make mistakes as the racket doesn't hit the shuttle correctly

Although the elite players mentioned that they had intentional expectation at the moment of the stroke, the contents were different between the top-elite and elite players. <Table 12> reveals those differences. For example, the elite players said that they had difficulties in predicting the next shuttle of their opponent, although they were aware of the shuttle at the moment of the stroke. And some of them said that they could expect the next shuttle at the moment of the stroke, but their bodies could not follow their thought as they intended. Some players even said that their reaction time at the moment of the stroke was so slow that they did not think of the characteristics of their shuttles in advance such as intensity or direction. Generally, many elite players mentioned that at the moment of the strokes they had negative thoughts and they thought of external factors rather than focusing on the stroke. They did not believe in their movements or skills at the moment of the stroke, either. This information implies that even the elite players who had international experiences did not have certainty about their movements or skills they execute.

## Discussion

The purposes of this study were: (1) to investigate the thoughts haunting the badminton singles players before and during the game; (2) especially, to identify their thoughts specifically at the moment of their stroke, which were differently described, based upon the situations; and (3) to help women players enhance their performance by reviewing these psychological processes.

As we reviewed above, the thoughts of Korean women singles badminton players were diverse. These thoughts consisted of positive thoughts, negative thoughts, specific thoughts about the game, and non-specific thoughts about the game. And different thought patterns were found between the top-elite and elite players. In addition, they showed many differences in thoughts based upon game situations.

Through the personal interviews, it was found that the top-elite players consistently controlled their thoughts during the game so that they did not yield their wills under whatever situations. Rather, they had interests in those situations or even enjoyed those adversities with little emotional intervention. The general thoughts of the top-elite players during the game were very simple compared to other players. In other words, they mentioned that they did not think of external matters but only paid full attention to and concentrated on the game, moment by moment. It was found that they kept their thoughts consistent no matter what situations they might face. In addition, they had specific and intentional thoughts about the game and played by showing their appropriate recognition calmly and coolly urgent and critical situations.

Although the top-elite players were under lots of pressure, these stresses did not much influence their performance. They also well understood their situations at the moment of strokes as they and/or the opponents hit the shuttles. Furthermore, they sent the shuttle to the direction where they had intended to and tried to anticipate the course of the shuttle returned by opponents. Especially, they focused only on the shuttle at the moment of the stroke and they were not disturbed by emotional, and/or external moods according to the situation. These results imply that the top-elite players had a superb capability to control their emotions or behavior. It also suggests that the

ability to control themselves for their best performance was much stronger than for any others.

Meanwhile the elite players, including national delegates with no international prizes, company and university players showed different thought patterns compared to top-elite players although they were also national delegates. Particularly, some promising elite players expressed strong dissatisfaction with their movements, behavior, and so on. Some other players reported that they felt uncomfortable both physically and psychologically, caused by extreme emotional intervention in certain situations. It seems that these emotions or moods might influence the performance even at the moment of the stroke. Furthermore, the specific and/or intentional thoughts about the game were disturbed by these emotions or moods. The authors had pity on the players who had expressed negative responses including their dissatisfactions throughout the interview. In order for them to play well, specific and deliberate management of these players should be planned. In addition, certain psychological training programs fit for each player in order to substitute these irrational thoughts with rational ones should be suggested.

Many differences were found in each theme in terms of response frequency per player, although the thoughts of the Korean women badminton singles players seemed to be similar in each theme in terms of content. That is, most responses from the elite players were similar expressions to the top-elite players. However, they were quite different for each player, especially in frequency. If we can substitute these negative or negative thoughts of elite players with positive or rational ones, they also can demonstrate their peak performance in the game.

For example, Seong and Gu(1992), Park and Kim(2000), Seong and Kim(2001) have introduced some suggestions to develop these psychological training programs. They suggested that in the programs the following items should be emphasized: 1) The players should think of preferable courses/game styles of the opponents rather than thinking of the negative outcomes of the game. Based upon these thoughts, the players should plan specific tactics appropriate for the opponent. And 2) the players should try to get specific information in order to identify the course of the opponent's stroke in the game, and 3) the players should concentrate on the efficient execution of their tactics. It seems that imagery training associated with actual game situations is the ideal component for the program, because these suggestions from previous studies can be reinforced by cognitive training (e.g., imagery training).

Finally, some elite players who showed passive responses in the interviews were not familiar with the habit of expressing themselves. Based upon this, it is presumed that the communications and/or counseling between elite players and the coaches were not enough. Thus, the coaches should at least figure out the states of the players. In addition, the coaches should recognize the fact that players could execute higher performances when the coaches continuously show careful concern about them. Therefore, future studies should continuously investigate the suggestions in this study, and specific psychological training programs for each player should be developed.

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## [Appendix]

## &lt;Background Questionnaire&gt;

Name/Institution		Birth date	
Career of athletes(yrs.)		Career as a national athlete(yrs., national or subnational)	
Records of winning championship			
Strong points (Daily life)		Weak points (Daily life)	
Strong points during competition		Weak points during competition	
Degree of satisfaction in badminton		Degree of preference in badminton	

## &lt;Questionnaire on general thoughts based upon game situation&gt;

## 1. Before the game

- 30 min. before the game:
- When I face a stronger opponent than me
- When I face a weaker opponent than me
- When I face a familiar opponent that I know well
- When I face an unknown player
- When I see the opponent who is warming up
- When I am designated the first competitor of my team (based upon importance of game):
- When I am designated the last competitor of my team (based upon importance of game):
- before the first game of the tournament:
- When I volley with the opponent before the play starts

## 2. During the game

- When the play begins:
- When the rally is generally going on:
- When there is a break between rallies:
- When I am in the process of winning:
- When I am behind the game:
- When I won the rally:
- When I lose the rally:
- When my play is going as well as I willed:
- When my play is not going as well as I willed:
- When I won a difficult rally:

- When I lost a difficult rally:
- When I felt that my opponent's play is easier than I expected:
- When I felt that my opponent's play is more difficult than I expected:
- When I won a point:
- When I lost a point:
- When I call the setting:
- When I first reached the setting point:
- When there is a rest between games(time for drinking water/cleaning sweats):
- When I won the first game:
- When I lost the first game:
- When there is a break during the one to one situation:
- When I felt that my physical fitness is exhausted:
- When I wanted to give up in my mind:
- When the judge/line judge made an unfair decision for me:

### 3. Thoughts during strokes

- I think "Which direction will the next stroke be?" at the moment of the stroke.
- I think "Where will the opponent move?" at the moment of the stroke.
- I think of the position of the opponent at the moment of the stroke.
- I think of the court of the opponent at the moment of the stroke.
- I think "How will I return the stroke?" at the moment of the stroke.
- I think of the place where the stroke should be sent at the moment of the stroke.
- I am afraid whether I could make a mistake at the moment of my stroke.
- I am afraid what other people may think of me at the moment of my stroke.
- I think of appropriate movements and skills fit for the situation at the moment of my stroke.
- I have a training procedure to remind myself of at the moment of the stroke.
- I think that I have to finish this rally with this stroke at the moment of the stroke.
- I think that my movements and skills of my strokes are best at the moment of the stroke.
- I can figure out my opponent's characteristics of the stroke after having a few rallies
- What is your first thought in your mind at the moment of the stroke?
- What is your first thought in your mind after your stroke?
- What is your first thought during your stroke as your movement is not in balance?
- What are your thoughts in your mind at the moment of your stroke?
- What are your thoughts appeared in your mind at moment of your stroke in a tight rally situation?
  - In an advantageous situation:
  - In a disadvantageous situation: ✖