

## **Coaches' thinking process:**

### **Analysis of decisions related to tactics during team sport games**

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### **Abstract**

A three-step model of coaches' tactical thinking process is proposed: pre-interactive, interactive and post-interactive decisions. This study focuses on the interactive decisions. Its first objective was to verify if a coach is able to report these decisions at the end of a game. The second objective was to analyse the goals and factors inducing the decisions. Data were collected during and after four games directed by two coaches, one in basketball, and the other in volleyball. Their teams participated in the second division of the Belgian national championship (1998-1999). The research method was similar to that developed by Gilbert, Trudel, and Haughian (1999). Coaches reported a limited number (1 to 9) of tactical decisions immediately after each game. Decisions reported by the coaches and additional decisions selected by researchers from videotapes of the games were used for stimulated recall interviews. A total of 82 decisions were analysed with the basketball coach and 88 with the volleyball coach. Data analysis was considered separately for each coach. Calling time out, player substitutions, and tactical cues were the most frequently analysed decisions. Adapting the team strategy and providing information or directives were the priority goals of the decisions. Most of the decisions were determined by subjective field information.

## **Introduction**

In sport contexts, coaches are considered as a factor strongly related to the athletes' effectiveness. During practice sessions, they select learning objectives, choose appropriate training contents, organise the activities and manage human relationships within the team and the club. In team sports, coaches and players behaviours during practice sessions were pretty well investigated, in terms of elite athletes (Mc Kenzie, 1986; Tharp & Gallimore, 1976), comparison of most and least successful coaches (Markland, & Martinek, 1988), or at various level of competition (Rodrigues, Sarmiento, & Piéron, 1996), comparison of high and low achievers (Piéron & Bozzi, 1988).

Coaches' action is also very important during competition. In that environment, their role is traditionally related to organisation, stress management and, particularly in team sports, to implement game strategies. The need to have a better knowledge of what coaches do during games induced several researchers to analyse systematically their behaviours. Sherman & Hassan (1986) observed two or three times 24 baseball youth coaches with the "Coaching Behavior Assessment System" developed by Smith, Smoll & Hunt (1977). They pointed out that more than 80% of the behaviours were sport relevant. Cloes, Delhaes & Piéron (1993) concluded that successful volleyball coaches provided more feedback to their players and were more positive and specific than unsuccessful coaches were. They underlined also that the place given to game strategies cues among the coaches' interventions was low (7.5%) even if they could be considered as one of their major responsibilities. Observing three Portuguese volleyball coaches during games of the first national division, Rodrigues & Pina (1999) showed that information given between two sets differed when the team won or lost. After a lost set, coaches gave more information about the opponent and required often players' attention. They tended also to give more tactical cues.

Only a few studies focused on coaches' tactical decisions. Administrating a questionnaire to 35 university women's basket-ball coaches to determine the types of events that influenced calling timeout, Duke & Corbett (1992) showed that perception of the players' physical state and strategic responses to offensive or defensive events were the most frequent aspects cited by these coaches. The study evidenced that coaches' behaviour was related to many different factors.

Recently, Trudel, Haughian & Gilbert (1996) pointed out that the analysis of coach's cognitive decisions could improve the understanding of the coaching process. To identify factors accounted for in game decisions, they used verbal cueing stimulated recall interviews (VCRSI) with an ice hockey coach. In the VCRSI, the subject received verbal information designed to help the recall process before viewing videotaped segments of the game. Trudel et al. (1996) found that the coach's decisions were related to direct and indirect field information and to his prior knowledge of players and sport speciality. Gilbert, Trudel & Haughian (1999) who analysed interactive decisions of five youth ice-hockey coaches confirmed these results.

In other socio-cultural contexts, it is worthy to verify if coaches identify the same factors and if they take similar decisions related to tactics. The latter could be integrated in a three-step model of the coaching process (Figure 1). According to this model, coaches take tactical decisions during: (1) a pre-interactive stage concerning all decisions taken before the game; (2) an interactive stage dealing with what the coach decides during the game; (3) a post-interactive stage corresponding to the reflective process arising from the game result when the game is won or lost. Figure 1 shows the complexity of relationships between stages, decisions and influencing factors.

The purpose of the present research was two fold: (1) to verify if a team sport coach was able to report his tactical decisions at the end of a game, and (2) to analyse the goals and factors inducing the decisions.

## **Methods**

A multiple case study design was used. Following Huberman & Miles (1991), this research design is appropriate to analyse a complex phenomenon like sport team management during competition. It allows collecting detailed data but limits the size of the sample due to the required time for individual treatment.

Two male coaches, one in basketball and one in volleyball volunteered in the study. They were 35 and 40 year old. They presented similar characteristics of experience (10 years at a high level of competition) and preparation (highest Belgian coach certification). Both male teams competed in the second division of the Belgian national championship (1998-1999). They were ranked between 3<sup>rd</sup> and 6<sup>th</sup> places. Four games were

analysed for each team. All games except the fourth in basketball were won. Data was collected using background

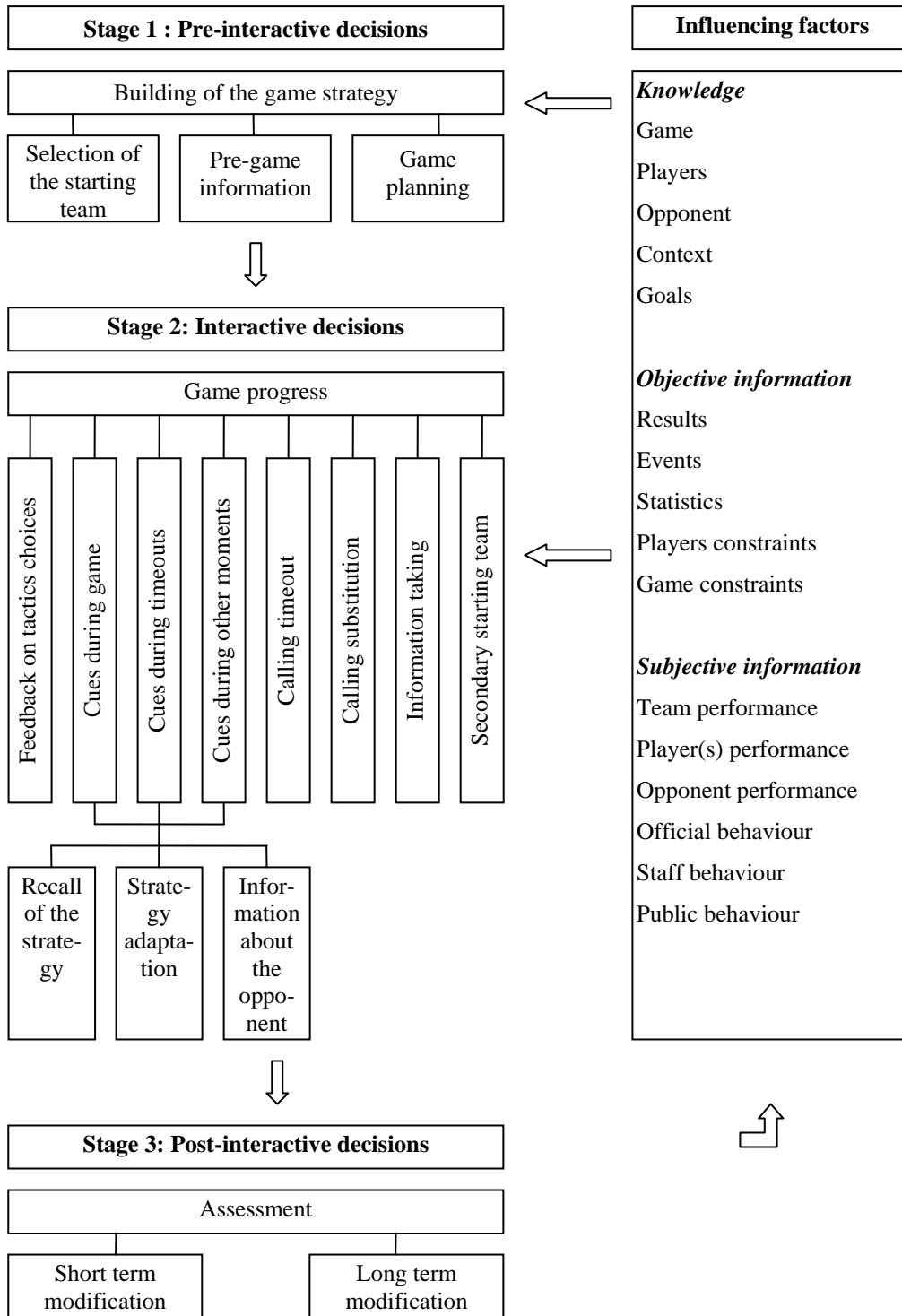


Figure 1 – Three steps model of coaches' decision making related to tactics

questionnaire, pre- and post-game semi-structured interviews, videotaping the game, event recording by an observer, verbal cueing stimulated recall interviews and final interview.

The *background questionnaire* was designed to gather information about (1) coaches' demographic characteristics and playing context, (2) usual coach-players interactive pattern. During the *pre-game interview*, the researcher asked the subject to describe the cues given to players before the beginning of the game. When the game started, a researcher began to videotape. A wireless microphone was used to record coach interventions. A wide-angle video camera was set up to record the coach and the game field. An observer noted down *major tactical events* on a sheet, indicating systematically the score. The *post-game interview* focused on (1) the coach perception of the game; (2) the direct recall by the coach of intervention and/or decision dealing with tactical aspects that occurred during the game. The tactical interventions or decisions reported after the game by the coach and other events selected by the observer were located on the videotape and edited in respect of their chronology on new a videotape. Within two days after the game, this new videotape was used during a *VCSRI session* (Trudel et al., 1996). Events analysed during this session were classified into three categories:

- (1) Type 1 events. They were decisions/interventions reported by coaches after the game and that they recalled immediately when experimenter proposed cues to focus their memory on a specific moment of the game.
- (2) Type 2 events. They were not reported during the post-game interview but were remembered by the subject after receiving cues.
- (3) Type 3 events. Coaches remembered the decision/intervention only after viewing the videotape.

When subjects recalled the event, experimenter asked several questions dealing with its characteristics, particularly the decisions purposes and factors which generated it. Viewing the videotape allowed confirmation of the coach's initial answers. Events not identified by the coach were not processed. Each VCSRI session comprised between 15 to 28 events' analysis. They were audiotaped for further analysis. A session lasted at least one hour. The *final interview* gathered the coach perception about the study.

Data from the questionnaire were analysed and compiled in tables allowing easy consulting of answers. Answers given during VCSRI were coded in a multidimensional system adapted from the results published by Trudel et al. (1996). Two coders analysed independently events proposed for one basketball and one volleyball games (respectively 23 and 19 events). Inter-analyst reliability was estimated by Bellack formula and the agreement percentage ranged from 83.3 to 100%.

This paper only focused on the analysis of the VCSRI (goals and factors of decisions related to tactics).

## **Results and discussion**

Analysis of Type 1 decisions (spontaneously recalled) was the first aspect being processed. Goals and incentive factors of all decisions were also studied.

### ***1. Decisions spontaneously reported by the coach***

In four games, the basketball coach reported 18 Type I events while his volleyball colleague proposed 21 decisions (4.5 and 5.2 per game). After each game, the number of Type I events ranged from 1 to 9 (Table 1). Considering the decision specificity, both coaches seemed to have available a sound basis for reflection upon their managing process.

In a case study, Trudel et al. (1996) were impressed by the subject's ability to recall spontaneously an average of 2.5 unspecified decisions after each game. The coach was certified but had a brief coaching experience as head coach. Interviewing five other ice hockey coaches with different levels of certification, coaching experience and playing experience, Trudel et al. (1999) found an average of 1.9 unspecified Type I decisions. In both studies subjects coached youth teams.

It would be worthy to verify if coaches' preparation and competition level do influence their ability to remember what happened during the game. We would argue that, at a high level, the competition stakes are so important that coaches need to develop a thorough expertise in analysing their decisions. Improvement of self-perception looked always possible as pointed out by both coaches during the final interview.

Basketball coach: *“It was good for me to hear me after the game ... I became aware that I gave too frequent interventions...”*

Volleyball coach: *“For the coach, it’s (the VCSRI) a big job on oneself because when hearing what had said, one doesn’t always agree with what has been said or not...”*

The number of decisions reported by both coaches did not vary across the games (Table 1). After the fourth game in basketball and the last two games in volleyball, coaches reported the highest rates of Type I events. In the first case, difficulties encountered by the team which lost could explain the increased number of events: the losing coach could be involved in a mental rehearsing from the events of game to assess what went wrong, where and when were the mistakes and how to avoid a similar situation in the future. During that game, the basketball coach took several decisions trying to modify strategies to find a solution against the opponent in clear lead.

Basketball coach: *“... it was nothing to loose, thus I put them in 1-3-1 in zone press defence on half court, to try picking up balls. At that time, the other team was leading by 18 points”.*

Basketball coach: *“Ah yes, against the zone, they played handball, they didn’t come in, they stayed outside. I told them to change...”*

**Table 1 – Number of Type I event according to the game**

Games	# 1	# 2	# 3	# 4	Total
Basketball coach	4	4	1	9	18
Volleyball coach	4	2	8	7	21

Four out of the eight interactive decision’s categories showed in the model described earlier were identified among those reported by coaches after the games (Table 2). Cues related to game strategy provided during the game or timeouts gathered together all subcategories proposed in figure 1. They did not the differentiate information concerning opponent team (“Opponent”) and the one aiming to organise the team or

individual player actions in attack and/or defence (“Recall of the strategy” and “Strategy adaptation”). Calling a timeout or substitutions was usual coaching decisions. For a lay person, they are the most identifiable interactive decisions related to tactics. Due to game rules, volleyball coaches have fewer opportunities to use them than their basketball colleagues do.

The traditional picture of basketball coaches describes gesticulating and shouting guys intending to direct players’ activity while they focused on the ball, opponents and teammates movements. In this situation, players seemed not to be very receptive. It is common sense that the basketball coach recalled often “administrative” actions among his interactive decisions related to tactics. During game, players do not easily process the information given. The basketball coach confirmed this interpretation in the final interview.

**Table 2 – Type I decisions related to tactics**

	Basketball	Volleyball
Cues related to tactics (game)	3	12
Cues related to tactics (timeout)	1	1
Calling timeout	7	4
Calling substitution	7	4

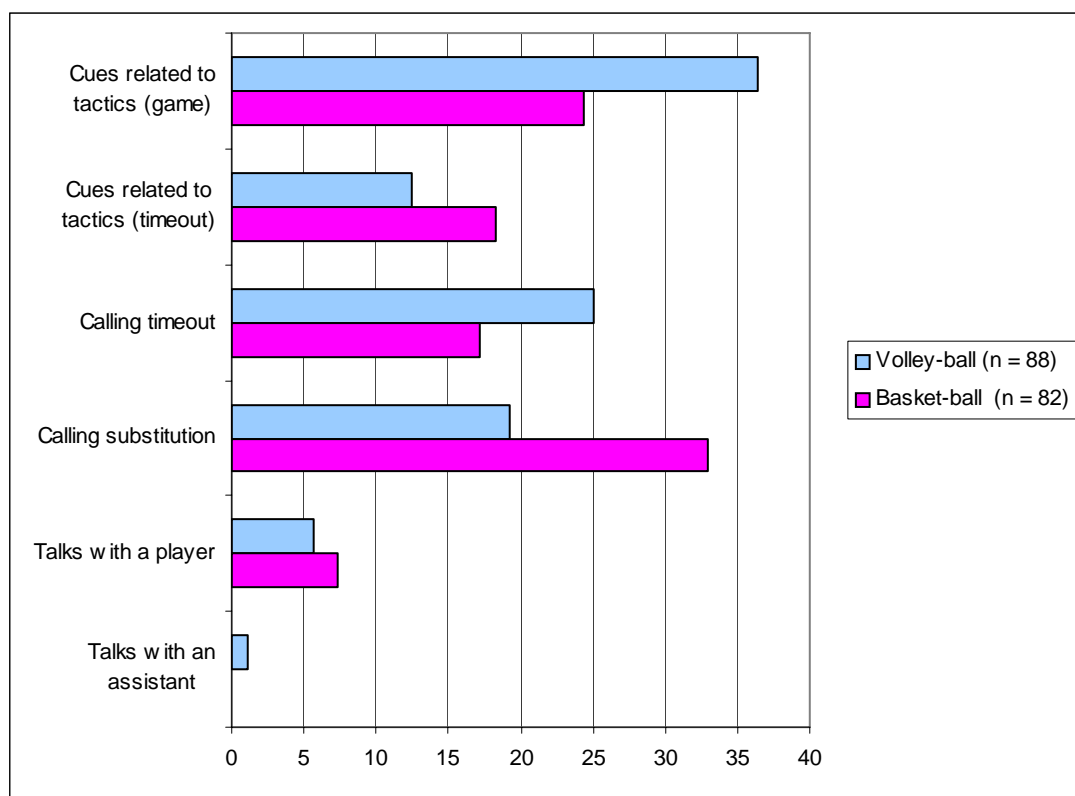
In volleyball, coaches can communicate with players between two rallies. That characteristic of the sport allows them to provide more information to players, explaining the high occurrence of game cues among the Type I decisions related to tactics. If the volleyball coach reported so many of these decisions, we need to account for the limited number of possible decisions like timeout or substitutions. Our interpretation was that the volleyball coach tried to influence directly the game progress.

## **2. Goals given to the tactical interactive decisions**

The analysis was based on Types 1, 2 and 3 events: 82 decisions for the basketball coach and 88 for his volleyball colleague. Interactive decisions were split up in six categories (Figure 2). The distribution respected relatively well what was extracted out the coaches’ post game interviews. However, researchers selected



additional events like talks with a player and/or with an assistant, which were unnoticed by coaches after the game. These decisions corresponded to two categories of tactical interactive decisions showed in the model (“Cues during other moments” and “Information taking”) (Figure 1). From this model, subjects and researchers did not identify only decisions like specific feedback about tactics and choice of the starting team(s) for the next set or half time. Cloes et al. (1993) pointed out tactical feedback was rather infrequent in volleyball. Informal analysis of the coaches’ interventions confirmed that findings explained why the category was not used. Choice of the secondary starting team(s) would have been proposed among the interactive decisions because selection of the players starting after each part of the game represents a tactical decision with strong implications. They should be specifically studied.



*Figure 2 – Distribution of each category of interactive decisions*

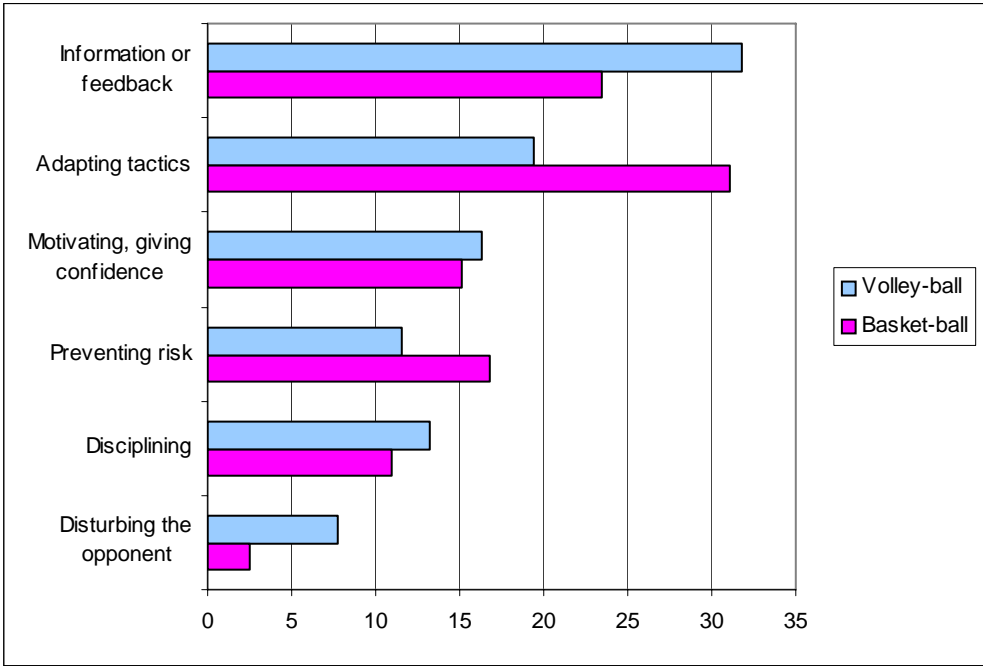
Both coaches identified six categories of goals (Figure 3). An average of 1.5 goal was given for each interactive decision. Trudel et al. (1999) found 1.1 goal per decision by youth ice hockey coaches.

The basketball coach intervened mainly to adapt strategies (31.1%) and to provide information or feedback (23.5%) (Figure 3). In basketball, where teams interpenetrate, strategies are flexible and change

frequently. Coaches need to behave like Joint Chiefs of Staff on the battlefield. Their mission consists of using in real time their team strongest points and to exploit opponents' weaknesses. Players take up the strategy imposed by the coach.

In volleyball, the coach provided information or feedback (31.8%) and tactics adaptations (19.4%) (Figure 3). Due to the net separating teams, collective strategies do not change as much as in basketball. Only a few individual adaptations are expected to increase the game effectiveness. Volleyball coaches are usual information providers to players whose should use it to cope with game situations.

It is surprising that disturbing the opponent was the least frequent purpose in both subjects (2.5 and 7.7%) (Figure 3). In team sport, increasing the opponent uncertainty level is viewed as a strategic priority. In the coach decision making process it could be interesting to check if he/she is prone to focus more on defensive strategies in reaction to opponent moves rather than taking the initiative by emphasising offensive decisions disturbing the opponent.



*Figure 3 – Distribution of each category of decision goals*

In basketball, adapting tactics relied most on player substitution (9.2%) and cues given during game (5.9%). Information or feedback was mainly given during timeout (10.9%) while substitutions intended

motivating players (7.6%) and anticipating problems (14.3%). Discipline control was mainly considered through cues given during the timeout (5.0%).

In volleyball, giving cues during the game was related to all purposes. It is probably why the coach reported so frequently these interactive decisions after each game. Calling timeout was designed to provide information (7.0%) and to discipline the team (4.6%). As in basketball, when calling substitution, the volleyball coach tried to anticipate difficulties (9.3%) or to enhance players' motivation and involvement (4.6%).

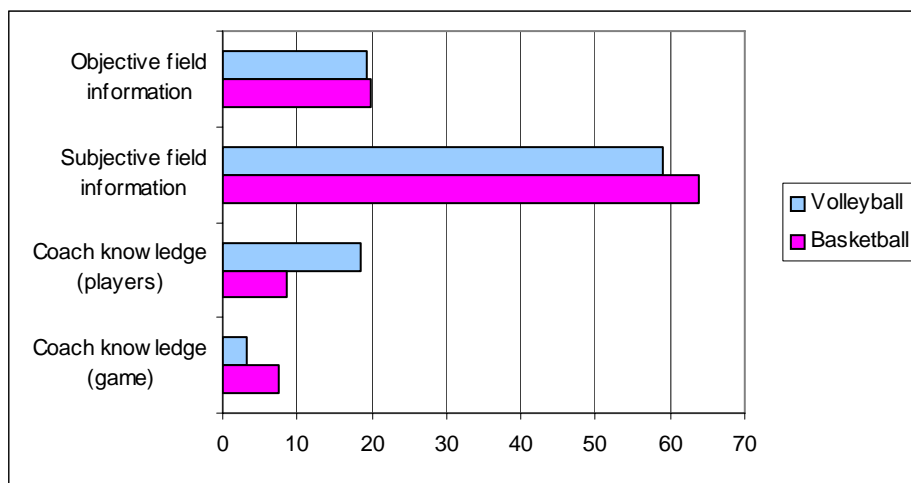
Volleyball coach: *"Fred was removed because during the two previous rotations, he missed his serve. I thought that the next time he had to serve, I should substitute him. I would like that the serve will be good on that rotation"*.

### **3. Factors inciting the decisions related to game strategies**

Subjective field information represented the most important categories of factors (Figure 4). This finding confirmed data collected in ice hockey coaches (Trudel et al., 1999). However, even if the category system was slightly different, it seems that Belgian coaches give more attention to their perception of what's going on the field than their Canadian colleagues. The latter confer more importance to all other categories. The specificity of decision related to tactics would incite basketball and volleyball coaches to be more reactive towards each event occurring during the game. To look for the highest level of team effectiveness, coaches need to be able to quickly select and process elements that could influence the game progress without overloading their decision-making.

Basketball coach: *"I saw that the man to man defence didn't work. Thus I asked to David to press his man. He played high with the ball in hands and it was easy for him to pass to the Bobby's man"*.

Basketball and volleyball coaches proposed a mean of 1.7 and 1.8 factor per interactive decision while subjects interviewed by Trudel et al. (1999) reported 2.8 to 3.2 factors. Again, the specificity of decisions related to game strategies could be suggested to explain the difference. This underlines that coaches could lack the time



*Figure 4 – Distribution of each category of decision factors*

necessary to pick up many aspects. It could be worthy to determine if decisions related to tactics are integrated in routines.

Factors listed in Table 3 were the most frequently reported by both coaches. Results confirmed that they based most of their interactive decisions on the observation of performances occurring on the field (field players, team and opponent). It is a major difference with findings of Trudel et al. (1999). They showed that youth ice hockey coaches less frequently reported this kind of factors. Field players' performance accounted for 0.0 and 7.5% of the factors. Ice hockey coaches reported more factors like "Coach experience", "Past performance/actions", "Point(s) scored".

Another similarity between basketball and volleyball coaches dwell in their common interest towards the teams' setting up (Table 3). This objective field information referred to the analysis of individual players' characteristics. Coaches showed an effort to identify and communicate data that could be used by players to improve their effectiveness.

Volleyball coach: *"Playing at number 4, he had the small setter face to pole and the tall centre blocker inside..."*

The basketball coach reported other factors specific to his sport: player(s) field time, time of game/time restraints and rules (Table 3). This underlined that he mastered several routines enabling to avoid difficulties:

Experimenter: *“At 59-53 for your team, David leaves the field and Patrick comes in”.*

Basketball coach: *“Yes, it was the fourth foul of David. I couldn’t keep him on the field now because it’s the end and with four fouls, he will be less aggressive”.*

In volleyball, three other factors were regularly reported: Past performance/actions, skill level game, and score/outcome (Table 3). The first two relied on information collected before the game. For a coach, it is important to decrease the uncertainty encountered by his players. Referring to previous experiences help the team to better cope when facing a tough situation.

Volleyball coach: *“Here, I tell him that if the ball goes to the number 6, he has to work for a tip because that spiker doesn’t like to be blocked. We saw on a videotape that when he was blocked, for the next ball, he tended to chose a tip”.*

**Table 3 – Most reported factors in basketball and volleyball coaches (%)**

<b>Basketball</b>		<b>Volleyball</b>	
	n = 141		n = 161
Field player(s) performance	27.0	Field player(s) performance	26.1
Team performance	14.9	Opponent performance	20.5
Opponent performance	9.9	Team performance	9.9
Player(s) field time	6.4	Player(s) on field/bench	9.9
Time of game/time restraints	6.4	Past performance/actions	8.1
Player(s) on field/bench	5.0	Game score/outcome	6.8
Rules	5.0	Skill level	6.2

To summarise, findings confirmed the relationships between several components of the model of coaches’ tactical thinking process (Figure 1). Performance of own team, opposite team and own players were the most influential role. Other factors would be limited to occasional events.

Let us consider the factors related to the main interactive decisions (Table 4). When calling for substitution, the basketball coach reported frequently poor performance of a player (14.2%). Any decrease of effectiveness must be processed immediately. Substitutions could also come from a game planning organising regular turn over of players (6.4%) to keep them aroused. Rules also determined some substitutions (3.5%).

Concerning timeouts, the coach proposed team performance (5.0%), and times of game/time restraint (3.5%) and game score/outcome (2.8%). It seems logical to use means more powerful than substitution when the lack of effectiveness appears. Timeouts were usually asked when any other solution worked. They help to communicate information to the whole team.

Cues related to tactics during timeouts depended on team (6.4%), player (5.0%) and opponent (5.0%) performances. For the coach, timeouts were good opportunities to review the situation and to explain what should be done to increase the effectiveness of the whole group. Logically, the same factors were among those determining tactical cues given during game (Table 4).

In volleyball, informal observation showed that the coach used two approaches to provide cues related to tactics during the game: (1) he prescribed specific action; (2) he provided information about the opponent performance to focus player's attention on the best action to choose. Usually, the latter was already learned during a training session or described during pre-game information.

Calling for substitution was mainly related of a specific player's performance (Table 5). A volleyball coach can not accept that a player accumulates mistakes giving advantage to the opponent and breaking his own team confidence. Finding game score among factors determining substitutions obeyed to a well known coaching principle: after three consecutive lost points, a coach must break the momentum.

Calling timeouts and giving cues were often dependent to the opponent performance (Table 5). In volleyball, timeouts were a useful means designed to break the momentum of an opposite team performing too well. Moreover, calling timeout should act as a kind of electric shock treatment designed to boost the team performance.

**Table 4 – Main factors reported according to the interactive decisions (%)**

<b>Basketball (n = 141)</b>			
<b>Cues related to tactics (games)</b>	<b>Cues related to tactics (timeout)</b>	<b>Calling timeout</b>	<b>Calling substitution</b>
Field player(s) performance (4.3%) Team performance (2.8%) Opponent performance (2.8%) Player(s) on field/bench (2.8%)	Team performance (6.4%) Field player(s) performance (5.0%) Opponent performance (5.0%)	Team performance (5.0) Time of game/time restraints (3.5%) Game score/outcome (2.8%)	Field player(s) performance (14.2%) Player(s) field time (6.4%) Rules (3.5%) Physical attributes (2.8%)
<b>Volleyball (n = 161)</b>			
Field player(s) performance (10.6%) Opponent performance (9.9%) Post performance/action (5.6%) Player(s) on field/bench (5.0%) Team performance (2.5%) Skill level (2.5%)	Field player(s) performance (3.7%) Opponent performance (2.5%) Player(s) on field/bench (2.5%)	Opponent performance (5.6%) Team performance (5.0%) Field player(s) performance (3.7%)	Field player(s) performance (6.8%) Game score/outcome (3.7%) Skill level (2.5%)

Comparison between coaches showed that they tended to focus on similar factors depending on the interactive decision. A few adaptations occurred according to the sport specificity (rules and game context).

### **Conclusion**

After a game, subjects were able to recall few interactive decisions related to tactics among all of those that were taken. This finding showed that coaches should be trained to analyse more systematically their interactive decisions. This process would provide a better understanding of what happened on the court.

Interactive tactical decisions reported by the coach after the games and selected by the researchers have been classified into categories proposed by a model of coaches' decision making related to tactics.

Finding show that coaches involved in high level competition mainly focused on subjective field information like performances of players, team and opponent. This study supports the existence of the links described in the three-step model. Additional research is needed to refine the understanding of mechanisms used by coaches in managing their teams. Moreover, the existence of specific routines should be analysed.

Some discrete but important decision like the selection of the secondary starting team(s) was not evidenced in that research but need be analysed in future studies. It could also be worthy to differentiate the analysis of cue subcategories to describe more accurately coaches' tactical thinking and choices. Disturbing the opponent was an infrequent goal of the coaches' interactive decisions. Verifying this finding with other coaches and analysing the reasons of that coaching conception could bring some practical implications in coaching programs.

It should be noted that comparison of tactical interventions during won and lost games would be envisaged. Behaviour and thinking process of losing coaches should differ from those of winning teams. For individual coaches, analysis of their "mistakes" should enhance the understanding of the game and improve their tactical decision making.

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