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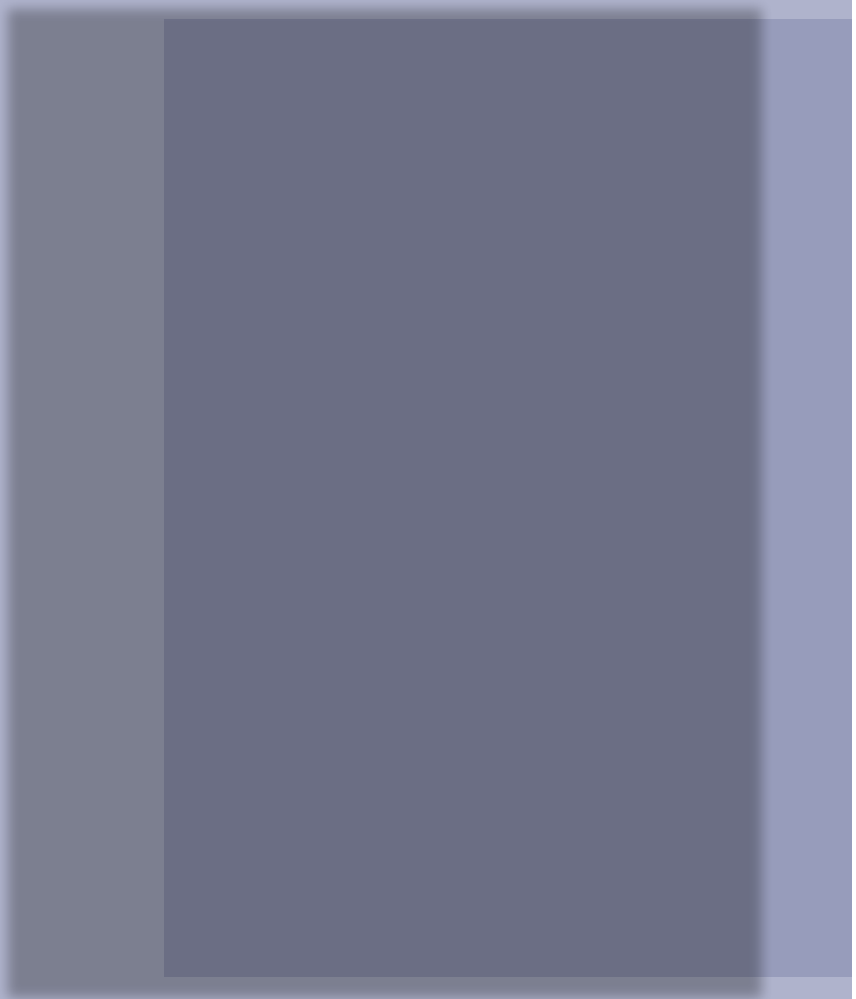
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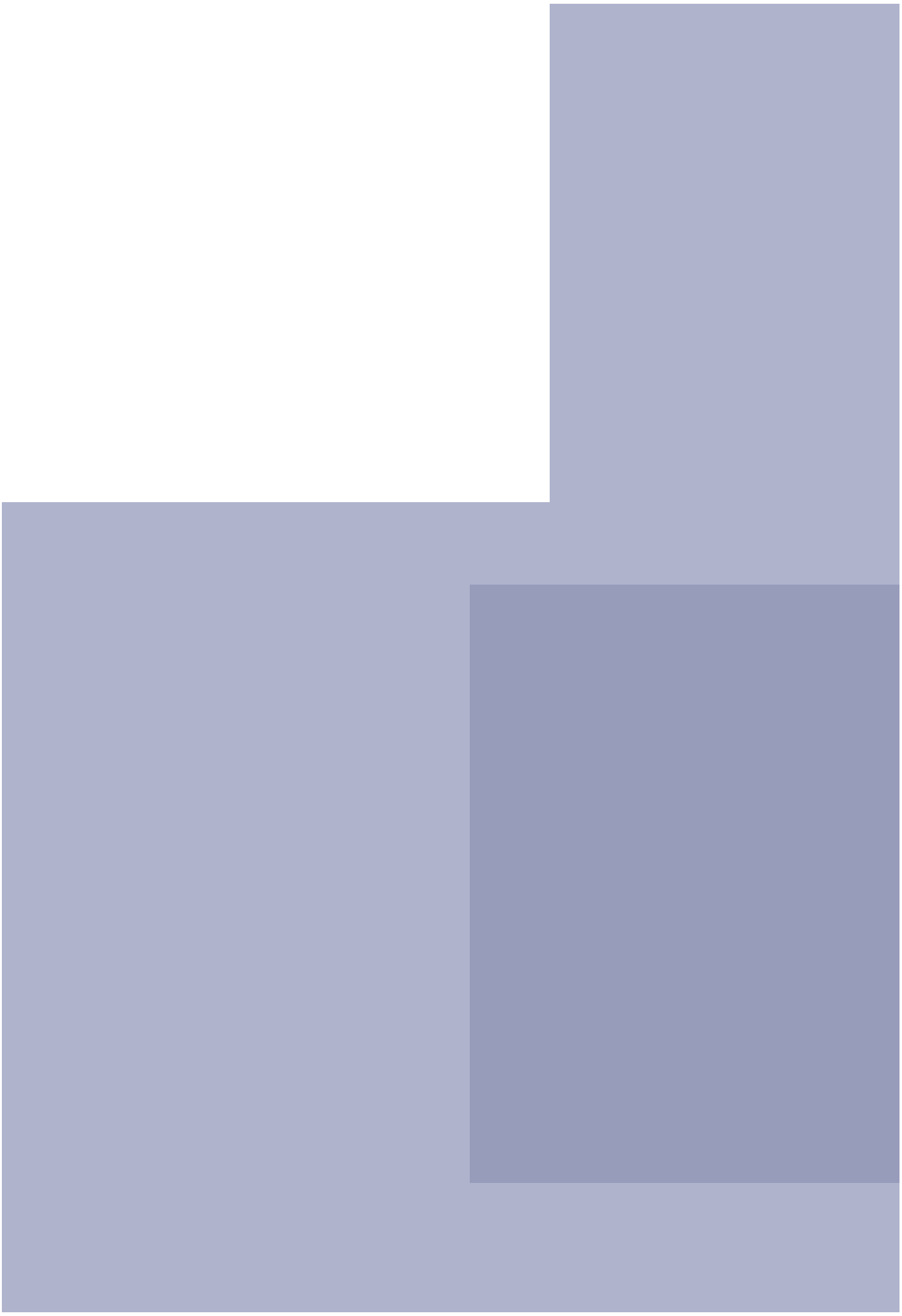
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What makes basketball players continue with the planned play or change it? A case study of the relationships between sense-making and decision-making

Anne-Claire Macquet · Koffi Kragba

Abstract In team sports, players are required to undertake planned coordination (i.e., play) so that their teammates know what will happen and can achieve positive outcomes. They are also required to change the play when situations develop in a different way to that anticipated. But what make the players continue with the planned play or change it? This study aimed to identify relationships between the sense players made of situations and their decisions to continue with the planned play or change it. Seven female elite basketball players from the same team participated in the study. A match was video-recorded. Postperformance interviews were conducted separately; each player was shown the video and asked to describe her activity in relation to the events observed. The interview data were used to identify how players made sense of situations and the relationships between sense-making and decision-making. Results showed two steps in sense-making: assessment of the current situation, and anticipation of possible situation developments to manage risk. Results also showed risk assessment led the players to continue or change the play. Results suggest players used situation recognition and mental simulation to make sense of situations. They changed the play to cope with risks, suggesting team adaptation.

Keywords Rigor/adaptation · Risk management · Expertise · Team functioning · Elite sports

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1 Introduction

In recent years, there has been renewed interest in team functioning and team coordination in the literature on expertise in aviation (e.g., Sorensen and Stanton 2010), human computer systems (e.g., Turner and Turner 2001, Salas et al. 2006), the military (e.g., Entin and Serfaty 1999) and sports (e.g., Bourbousson et al. 2010; Eccles and Groth 2007; Pedersen and Cooke 2006). Nevertheless, little is known about how team members undertake the tasks they face, nor how they coordinate with other team members. To suggest some answers to this, Eccles and his colleagues conceptualized team coordination in sports by taking into account social and cognitive processes, such as the effects of the social process on the individual cognition of a team member, and the team-level cognition in relation to the group and team interactions (Eccles 2010; Eccles and Tran 2012; Eccles and Johnson 2009).

1.1 Coordination among team members

Team coordination is the process of organizing team members' actions in order to achieve the most positive outcome (Eccles and Tran 2012). Team members' actions are arranged according to three dimensions, namely type, timing and location. The type of action depends on the situation and team members' roles and competencies. Each type of action is carried out at a particular time and place to enable the action to be successful.

Different studies have shown that coordination among team members is facilitated by different factors: (a) common goal; (b) shared mental model; (c) "basic compact"; (d) action interpredictability; (e) communication; and (f) division of labor. Expert team members use their individual technical expertise and coordinate their action in order to achieve a

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common goal; their coordination seems fluid and easy because of the synergy created by the team considered as a whole (e.g., Salas et al. 2006). Team members hold common knowledge about the goal and the means to achieve a task and team members' respective goals and roles. This common knowledge is known as a shared mental model (e.g., Pedersen and Cooke 2006). Each team member is required to be sufficiently committed to support coordination. This level of commitment is known as the ''basic compact'' (e.g., Klein et al. 2005). Each team member is required to make his/her own action predicable for his/her team members; this refers to action interpredictability (e.g., Klein et al. 2005). Coordination is facilitated by intentional and unintentional exchange of information among group members in order to share situation awareness and the actions to be undertaken. Exchange of information refers to communication (e.g., Eccles and Tran 2012). Finally, coordination is improved as team members have specific roles and actions to be undertaken in accordance with team-level planning. This role and action specificity is concerned with the division of labor (e.g., Eccles 2010). Eccles (2010) suggested that studying coordination among players might improve knowledge of team functioning. He also stressed the lack of theory and research on team functioning and team coordination and called for studies focusing on when, how and why play develops.

In team sports, team-level planning seems to play an important role in coordination (Eccles and Johnson 2009). This refers to the playbook defining plays (i.e., structured patterns of players' coordination and teammates' actions) for offensive and defensive options, according to: (a) players' roles within the team (i.e., guard, forward and center in basketball); (b) players' competencies; and (c) potential game development in relation to opponents (e.g., Eccles et al. 2009). Plays are planned before being undertaken by players. The playmaker calls for a play at the beginning of a game situation, by showing his/her teammates a number made with his/her fingers. This call allows each teammate to know what actions to undertake, when and where. Plays are flexible and adaptive to allow players to adjust when the situation develops in a different way to that anticipated (e.g., timing of an attack). Players are also flexible and adaptive and can adjust the nature and timing of their actions. Little is known about what makes players continue with the play or change it during the game. In sports training and other domains characterized by uncertainty, high time pressure and high stakes, it is important to understand when and why team members decide to continue or change the plan.

1.2 Decision-making and sense-making

It is widely recognized that decision-making depends on sense-making (e.g., Klein 2009). The poorer sense-making and the less adequate sense-making are in crisis situation, the more likely it is to lead to loss of control of the situation and crisis (e.g., Weick 1988). Weick (1995) stresses that the process of sense-making is a central cognitive function that individuals use in natural settings. Individuals spend a lot of time perceiving and connecting information to make sense of events. Sense-making is ''the deliberate effort to understand events'' (Klein et al. 2007, p. 114). It is triggered by unexpected changes in situations that make us change the sense we make of situations. Due to our bounded rationality (Simon 1996), individuals cannot understand all the information. They rather perceive and make sense of the ''triggers'' from the situation (Norman 1981). To better understand players' decisions within the game and team functioning, it seems important to study what sense players make of situations.

Sense-making has been theorized in the domain of naturalistic decision-making, from a constructivist approach and schema theory (Klein 2009; Klein et al. 2006a, b, 2007; Neisser1976; Piaget 1954). Sense-making is the process of analyzing events retrospectively, explaining apparent anomalies, anticipating the future, and directing exploration of information. It consists of connecting the data comprising events, knowledge, etc., to build a frame. It determines what is considered as data, in relation to our goals, competences, expectations, etc. Data are not perceived directly, and they are abstractions from the environment. Due to Simon's boundary rationality, we cannot connect all the data. We favor some data over other data. Under time pressure, getting more information could be counterproductive and it may be better to prioritize information and jump to conclusions in order to undertake actions in time. Sense-making consists of fi ng data into a frame and fitting the frame around data. The frame allows us to fi and understand the data while at the same time testing and improving the frame. The frame is dynamic; it can be changed and adapted if new data do not fi the initial frame. Sense-making pertains to a double cycle comprising two steps: building the frame (i.e., framing) and maintaining it, with reference to Piaget's (1954) concept of assimilation, and reconsidering the frame and enriching it by new information (i.e., reframing), with reference to Piaget's (1954) concept of accommodation. Sense-making stops when the data fit the frame and the frame fi around the data. Sense-making is concerned with different aspects: (a) the initial frame people make to explain events; (b) the process of framing; (c) examining the frame to identify inconsistent data in relation to unexpected changes in situations; (c) fi the initial frame; (d) discovering inconsistencies in the initial frame; (e) comparison of alternative frames; (f) reframing the initial frame and replacing it with another; and (g) deliberate building of a frame when none is

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automatically recognized (Klein et al. 2007). Sense-making is directed toward ‘‘problem detection, problem identifi , anticipatory thinking, forming explanations, seeing relationships, as well as projecting the future’’ (Klein et al. 2007, p. 120).

This theory of sense-making based on a schema theory (Neisser 1976; Piaget 1954) describes sense-making as a micro-cognitive function. It is different from team sense-making, considered as a macro-cognitive function. Team sense-making is the process used by a team considered as a whole to manage and coordinate its efforts to explain the current situation and to anticipate the development of the situation and future events, under uncertain or ambiguous conditions (Klein et al. 2010). The theory of sense-making, considered at a micro-level, namely the level of the individual, fits to study of players' sense-making and decision-making.

1.3 Study aims

The present study aimed to understand what makes basketball players continue or change the play during the game. More specifically, it aimed to explain how players make sense of situations during a game and the relationships between sense-making and the decision to continue or change the play.

2 Method

2.1 Participants

Seven elite female basketball players from the same team volunteered to participate. The criteria employed to select them included being elite athletes and playing for the same team for at least 1.5 years. Players ranged in age from 16 to 18 years (M = 17.3 years, SD = 0.5 year) and had been playing basketball for 4.5–10.5 years (M = 9 years, SD = 2 years). They had been playing for the same team for 1.5–2.5 years (M = 2.3 years, SD = 0.5 year). Since the present study was conducted, five of the participants have represented France during the European Championships for players aged under 19 and one participant represented France during the Senior European Championships. No other players who fulfilled all these requirements were available to participate in recorded competition and self-confrontation interviews. Such studies have often involved very few participants because, by definition, only a few individuals become experts (e.g., Ericsson et al. 2004; Nieuwenhuys et al. 2008). Players were given pseudonyms to provide some degree of confidentiality: numbers 1–7. The study was approved by a local ethics committee.

2.2 Data collection

Two types of qualitative data were collected: (a) video recording of a competition; and (b) verbalizations during posttraining interviews.

2.2.1 Video recording of players' behaviors and movements during a match

A senior French Championship match was recorded by a camera placed in the stand near the center of the court (lengthwise). A wide-angle lens continuously registered all the players and their opponents. The angle was constantly adapted to follow the players' movements and behaviors. Coaches' and athletes' communication were recorded by a digital camera and HF microphones worn by the coaches. The videotapes were used to provide behavioral and contextual data but also to stimulate the parties to re-experience the competition during the interview.

2.2.2 Verbalizations during postcompetition interviews

Verbalization data were collected during self-confrontation interviews conducted with each athlete and coach separately. Interviews were conducted regarding the fourth quarter of the match (i.e., final ten minutes). This was the only period when the two teams successively led the score. Earlier, the team being studied led the score. Many coaches stress that when the score is tight, players are more involved in the game in order to prevent the opponents from scoring. It could be argued that, due to the tight score, this fourth quarter had greater uncertainty regarding situation development and match outcome, and consequently more changes to planned plays. For each interview, the video recording of the training session or competition was played and the player was invited to describe and comment upon her activity during the course of action without a posteriori analysis, rationalization or justification. The player could stop the video whenever she wanted and go back to comment on a specific event, thought, feeling or perception she had during the action. The interviewer used specific prompts to encourage the participant to describe her sense-making of situations and decision-making as they were experienced (i.e., what did you perceive at this point in time? How did you feel? What were you thinking about? What did you say to yourself? What did you decide?). The full interviews were video-recorded in order to check correspondence between the comments and action that was being described (i.e., contextual features and behaviors during the training sessions and competitions). Interviews were conducted by the same person, who had already conducted self-confrontation interviews of this type in previous studies (e.g., Macquet 2009, 2013; Macquet et al.

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2012). They took place the day after the match. Interviews were recorded (M = 48.2 min, SD = 2 min) and transcribed.

2.3 Data processing

Data processing involved three steps: (a) identification of meaningful units; (b) identification of the information the players connected and categorization of the way players connected it; and (c) identification of the relationships between sense-making and decision-making. Data processing was done using the constant comparative method (Corbin and Strauss 1990). Two researchers processed the data.

2.3.1 Identification of meaningful units

In the first step, each researcher divided the transcripts into meaningful units according to the decision to continue or change the play (see Table 1). Each meaningful unit was concerned with the sense the player made of the situation and the decision she took.

2.3.2 Identification of information the players connected and categorization of the way players connected it

In the second step, meaningful units were synchronized with the video recordings from the fourth quarter of the game, in order to see the context of the game situation, the sense players made of the situation and their decision to continue or change the play. Researchers identified what information the players held (e.g., ball trajectory, team members' movements). They also categorized the way players connected information about the current situation in order to make sense of it. To do that, the researchers analyzed how players assessed the current situation and whether players anticipated a different situation development to that expected according to the play (see Table 1). Categories of sense-making were identified. Each category was labeled, and its properties were described.

2.3.3 Identification of the relationships between sense-making and decision-making

In the third step, researchers identified the decisions made by the players in relation to the sense players made of situations. Decisions were concerned with whether to continue with the play or change it. After each data processing step, data were constantly compared until saturation was reached, which occurred when no further meaningful unit and category were identified from the data. The two researchers compared their results and discussed any initial disagreement until consensus was reached. The reliability of the coding procedure was assessed with Bellack's agreement rate (Von Someren et al. 1994). The

Table 1 Examples of meaningful units, categories of sense-making and decision-making

Meaningful units	Sense-making		Decision-making
	Steps in sense-making	Risk assessment	
''I can see them and I know where they are and what they are going to do in this situation because I know them. I check what they are doing. I'm looking at [Player 7] and seeing she's coming into this zone as she is required. As I see her, I guard my opponent, like I'm supposed to do.'' Player 2	1. Assessment of current situation development in relation to the playbook	No risk perceived	Continue with the play
''Her opponent might catch the ball after the free-shot. I'm supporting my teammate by guarding her opponent to make the play work.'' Player 4	2. Anticipation of potential situation development which is different from this expected from the playbook: an opponent's or teammate's risky action which could jeopardize the success of the play	Manageable risk	Continue with the play
''My teammate wants to set me the ball. I'm supposed to shake off my defender but she makes an ''over-play'', so I make a ''back-door''. She's defending close to me so I can't get the ball. I get away. My teammate has to change wing to pass the ball.'' Player 7	2. Anticipation of potential situation development: an opponent's or teammate's risky action which could jeopardize the success of the play	Risk difficult to manage	Change the play
''I was supposed to pass to [Player 1] who was guarded and I saw [Player 5] close to me. She tends to play for herself and I felt the current situation was good for her: it was an offensive dual. I showed her I was ready to help her. I know she's able to play an offensive dual easily. I know that as she's going to receive the ball, she's going to want to play by herself. She's 1,93 m tall [$6^{0}4^{00}$] and nobody can stop her.'' Player 3	2. Anticipation of potential situation development: a teammate's action which was not required by the play, however, which could achieve a positive outcome and avoid risk-taking in comparison with the action required by the play	Risk avoidance	Change the play

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initial agreement rate was between 83 and 90 % depending on the data processing steps. Interview transcripts were divided into 195 meaningful units.

3 Results

Results are presented in two parts. The first deals with the sense players made of situations. The second refers to the relationships between sense-making and decision-making.

3.1 Sense players made of situations

Players are required to make sense of situations in order to adapt their decisions to the way the current situation is developing. During training sessions, they learn to recognize potential situation developments in order to improve their ability to analyze game situations rapidly and efficiently during competition. They also learn what action the opponents might take in specific situations and what they should do in such situations. Specific situations and associated decisions by players related to the playbook. The playbook defines what the players are required to do in specific situations as well as how they could adapt their actions if the situation develops differently. The playbook outlines possible situation developments as well as providing decisions adapted to situation developments, and to players' roles, competencies and tendencies. Results showed that in order to decide whether to continue or change the play, players first made sense of a situation. They connected information about players' placement and movement on the court, players' competencies, tendencies and roles, and ball trajectory. Two steps were identified: (a) assessment of current situation development, and (b) anticipation of potential situation development. Players used solely the first step, or both steps, depending on the situation.

3.1.1 Assessment of current situation development

Assessment of current situation development consisted of building up a frame of the way the situation had developed. It was based on a comparison between information pertaining to the expected situation development in relation to the playbook and actual situation development. Players checked whether the situation was developing as expected according to the playbook. For example, Player 2 said:

> I can see them and I know where they are and what they're going to do in this situation because I know them. I check what they're doing. I'm looking at [Player 7] and seeing she's coming into this zone as she is required.

Similarities between expected and actual situation development indicated that players did not perceive any risk about situation development.

3.1.2 Anticipation of potential situation development

Anticipation of potential situation development consisted of reconsidering the frame created and enriching it with new information. New information related to predicting a player's possible actions and the consequences on the game. Results showed two kinds of anticipation: (a) an opponent's or teammate's risky action which could jeopardize the success of the play; and (b) a teammate's action which was not required by the play, however, which could achieve a positive outcome and avoid risk-taking in comparison with the action required by the play. In the first kind, anticipation led the player to investigate the consequences of risky action and assess whether the risk was difficult to manage or manageable. Risk was considered difficult to manage when the player thought it would have been very difficult to make the play work. For example, Player 6 said:

> I'm required to set the ball to the centre player but she is guarded. I see [Player 2] is free of defenders. So I set her the ball.

Risk was considered manageable when the player believed she could cope and make the play work. For example, Player 4 said:

> Her opponent might catch the ball after the free-shot. I'm supporting my teammate by guarding her opponent to make the play work.

In the second kind of anticipation, the player anticipated a different situation development to that expected according to the play. Anticipation led the player to change the play in order to achieve a positive outcome without risk-taking. The player anticipated such a development as a teammate was either better placed than her or another teammate with whom she was expected to coordinate and her placement was not risky, or she was more competent in this situation than required. For example, Player 3 said:

> I was supposed to pass to [Player 1] who was guarded and I saw [Player 5] close to me. She tends to play for herself and I felt the current situation was good for her: it was an offensive dual. I showed her I was ready to help her. I know she's able to play an offensive dual easily. I know that as she's going to receive the ball, she's going to want to play by herself. She's 1,93 m tall [$6^{0}4^{00}$] and nobody can stop her.

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3.2 Relationship between sense-making and decision-making

According to the playbook, players were required to undertake planned plays so that their teammates knew what would happen and could achieve positive outcomes. They were also required to change the play when situations developed in a different way to that anticipated. Results showed that players assessed risk which could jeopardize the success of the play, in order to decide whether to continue or change the play. Results showed four levels of risk: (a) no risk perceived; (b) manageable risk; (c) risk that was difficult to manage; and (d) risk avoidance.

3.2.1 No risk perceived

Checking that actual situation development was as expected from the playbook and was not risky led players to continue with the play (41 % of total decisions, see Table 2; Fig. 1). For example, while checking her teammate was well placed, Player 2 said: ''As I see her, I guard my opponent, like I'm supposed to do.''

3.2.2 Manageable risk

Assessing risk as manageable led players to continue with the play. To cope with risk and achieve a positive outcome, players decided to be more involved while facing the opponent's action (22 % of total decisions, see Table 2; Fig. 1). For example, Player 1 said:

> I'm not focusing on my teammates because I'm on the ball. The opponent I'm required to guard might make a screen on my playmaker. I tell her about the screen and stay focused on my defence on the ball. I must watch this opponent's every move.

Table 2 Frequencies and ratios of decisions in relation to risk assessment

	Frequencies	Ratios
No risk perceived—continue with the play	80	0.41
Risk manageable—continue with the play	43	0.22
Risk difficult to manage—change the play	35	0.18
Risk avoidance—change the play	37	0.19
Total	195	1



Fig. 1 Distribution of decisions in relation to risk assessment

3.2.3 Risk difficult to manage

Assessing risk as difficult to manage led players to change the play. Players avoided taking the risk that the play might fail (18 % of total decisions, see Table 2; Fig. 1). For example, Player 7 said:

> My teammate wants to set me the ball. I'm supposed to shake off my defender but she makes an ''overplay'', so I make a ''back-door''. She's defending close to me so I can't get the ball. I get away. My teammate has to change wing to pass the ball.

3.2.4 Risk avoidance led to change the play

Risk avoidance led the player to change the play because a teammate was better placed or more competent than the player required by the play (19 % of total decisions, see Table 2; Fig. 1). For example, Player 7 said:

> My teammates are making screens to allow me to go ahead with the ball. I see [Player 2] is ahead and alone because her defender is in late. So, I set her the ball.

4 Discussion

These results are discussed in two parts: (a) consistency of results to the sense-making theory; and (b) planned decision versus emergent decision.

4.1 Consistency of results to the sense-making theory

As the theory of sense-making predicts (Klein 2009; Klein et al. 2006a, b), players assessed the situation by connecting data pertaining to available information on situation development, in order to build a frame. The frame was built using a recognition process, consisting of comparing the current situation development with counterpart situation development memorized from the playbook. In some situations, they enriched the frame by anticipating situation development from players' current actions, placements and competencies. Information on situation development was compared to that memorized from the playbook and known about teammates' competencies and tendencies. These results suggest that sense-making was governed by recognition of situation and mental simulation, consistent with the recognition primed-decision model (Klein et al. 1986).

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Results showed that players took teammates' and opponents' placements, moves and action into account, as well as their teammates' competencies and tendencies, to assess the situation and anticipate potential situation development. These results are consistent with Macquet's (2009) study on volleyball players' decision-making and (Macquet and Fleurance 2007) study on badminton players' decision-making. The current results also stress the role of the playbook in coordination among players and are consistent with previous studies (e.g., Eccles and Johnson 2009; Macquet 2009).

Results also showed that players anticipated specific scenarios and assessed risk-taking in order to consider whether risk was manageable. If they considered risk was manageable, they continued with the play; if not, they changed it. Results suggest that risk assessment refers to the anticipate–adapt perspective developed by Shapira and described by Klein (2009). This perspective allows players to cope with complex, ambiguous and unpredictable situations and to manage risk. Exploring risk-taking would be a worthwhile avenue for future research in sports and other contexts.

4.2 Planned decision versus adapted decision

Results showed that players continued with the play as long as they considered they could make it successful. As situations became too risky or to avoid risk-taking, players changed the play in light of the opponent's and teammate's actions. Continuing with the play suggests rigor in team functioning; it allows action interpredictability (e.g., Klein et al. 2005). Changing the play to the evolving situation suggests adaptation in team functioning. It allows risk-taking to be reduced and positive outcomes to be achieved. The results are consistent with existing work about adaptation within teams (e.g., Klein 2009; Salas et al. 2005). Klein (2009) stresses that adapting means changing our goals, preparing to change what we are used to doing and changing the way we work together. In complex situations, adaptation attempts may fail if we persist in maintaining the individual goals we started with, if we tend to minimize risk or if we maintain the ground rules we planned at the beginning of the situation. Adaptation is a way of designing systems and organizations to be flexible in order to cope with unpredictable risks. Instead of using safeguards against previous threats, adaptation aims to improve the system capacity to reconfigure in order to cope with unexpected risks. One function of adaptation is reliance on system adjustment capacities by preparing team members to expect to face unpleasant surprises rather than trying to predict and prevent risks. In sports, few researchers have provided evidence of experts' engagement in such a process (Horton et al. 2005; Klein 2009).

Results showed that players changed the play as they anticipated a different situation development to that expected according to the play. Players watched their teammates' and opponents' action closely in order to: (a) detect potential changes; (b) determine whether additional information and help were required; and (c) determine how to adapt the planned play (i.e., the play called by the game leader). Changing the play to suit different situation development to that expected according to the playbook is consistent with the adaptability described by Salas et al. (2005). Salas et al. (2005) stressed the role of adaptability in the effectiveness of teamwork. They present adaptability as one of the five core components of the effectiveness of teamwork. The other components include: (a) team leadership; (b) mutual performance monitoring; (c) backup behavior; and (d) team orientation.

Results also showed that players checked whether their teammates were behaving as expected according to the playbook. This checking is consistent with mutual performance monitoring as developed by Salas et al. (2005) to account for the effectiveness of teamwork. Mutual performance monitoring refers to the ability to observe team members' work in order to ensure that team members follow procedures correctly and to ensure everything runs as expected. Mutual performance monitoring facilitated coordination among players. By monitoring teammates' actions and performance, players made the play work and changed it when teammates' or opponents' actions could jeopardize its success. In this way, mutual performance monitoring allowed teammates to achieve positive outcomes. Salas et al. (2005) stressed that effective mutual performance monitoring requires a team to have a climate of trust. Exploring trust and confidence within the team during a match or specific period would be a worthwhile avenue for future research in sports and other contexts.

Finally, the results showed that players assessed whether their teammates' actions could achieve a positive outcome. If they considered a teammate's action could jeopardize the success of the play, they changed the play. That happened when: (a) a player who was required to receive the ball was guarded by her opponent; (b) a player could not go forward with the ball because she was guarded by her opponent; or (c) the opponent the player was required to guard might make a screen on her playmaker. Her teammates estimated that the player's workload had surpassed the player's capacity. Consequently, a teammate: (a) set the ball to another player who was better placed; (b) asked the player to set the ball to a specific teammate who was better placed; and (c) became more involved while facing the opponent's action and told her teammate what the opponent might do. Those behaviors concerned with continuing the play by being more involved or changing the play are consistent with the backup behavior described by Salas et al. (2005).

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Backup behavior is able to compensate for a teammate's action which could jeopardize the success of the play because the teammate is overloaded. The ways of providing backup behavior are also consistent with those developed by Marks et al. (2000): (a) carry out the task in place of the teammate; (b) give the teammate information to improve performance; or (c) assist the teammate in performing the task. Although the present study did not focus on teamwork directly, it is relevant to note that the "individual work" of the participants within the team comprised three of the five core components described by Salas et al. (2005), namely adaptability, mutual performance monitoring and backup behavior. The two other core components, namely team leadership and team orientation, are concerned with the team considered as a whole. These results suggest that the team studied was highly effective. They are consistent with the level of the team studied, which was composed of elite athletes.

At the applied level, it seems important to develop team adaptation as a strategy for protecting ourselves against risk (Klein 2009). Beyond developing plays for offensive and defensive options, coaches might use drills involving changing conditions (e.g., timing of an attack, number of players involved in a specific play) to force players to adjust coordination to changing conditions. This would contribute to developing the flexibility of using tactical solutions in changing game conditions, and the originality of tactical solutions chosen by teammates. In this way, adaptation development might improve creativity in team sport (Memmert and Roth 2007). Memmert and Roth (2007) stressed that it is possible to train tactical creativity independently of tactical play pertaining to the playbook and technical actions. To develop creativity, coaches might change drills and situations to push players to adapt the nature and timing of their individual and collective actions. Coaches might also ensure that players are realistic in interpreting situations. Optimistic bias seems to play a role in risk-seeking: Individuals misread the risks, leading them to be overconfident, and to give greater weighting to successes than failures (Kahneman 2011). Overconfidence might prevent team adaptation. Exploring the effects of self-confidence on sense-making and decision-making would be a worthwhile avenue for future research in sports and other contexts.

This study presents some limitations. Firstly, it did not feature other teams and matches for comparison. The extent to which coordination depends on sense-making and decision-making within different matches and practice levels is, therefore, not known. There are very few studies of elite team sport performance, and sport psychology research has often involved few participants because only a small number of athletes reach elite level. Secondly, the study focused on sense-making and decision-making without taking account the players' hierarchy within the team. It could be argued that the present results are not representative. Exploring the effects of players' hierarchy within the team on sense-making and decision-making would be a worthwhile avenue for future research in sports and other contexts.

5 Conclusion

Athletes were shown to make different sense of situations in relation to risk assessment. They were also shown to adapt their decisions to risk-taking. The data tend to support the view that sense-making and more specifically risk management play a key role in coordination among players, leading players to use team-level planning, or change it to adapt to evolving game conditions. The continued study of coordination among team members will improve our understanding of team functioning and team performance within expert teams.

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