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Identification and Conceptualization
of Expert High Performance Gymnastic Coaches' Knowledge

by
Jean Côté

Thesis submitted to the School of Graduate Studies
of the
University of Ottawa
in partial fulfillment of the requirements
for the degree of
Doctor of Philosophy in Education

Ottawa, Canada, 1993
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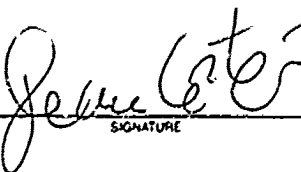
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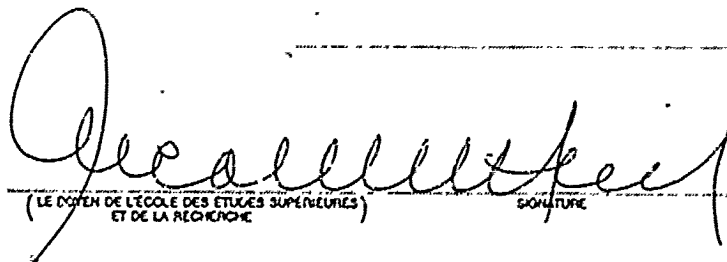
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For my wife, Kristin,
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continuously inspire me to be my best,
and to my first child, Jean Philippe,
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Abstract

An expert system approach (Buchanan et al., 1983) was used to identify and conceptualize the knowledge of 17 Canadian expert high performance gymnastic coaches. The selection of expert high performance coaches was based on multiple criteria. First, a minimum of 10 years of coaching experience was required. Second, each of the expert coaches required a performance outcome measure, and thus needed to have developed at least one international and two national level gymnasts. Finally, each expert coach had to be recognized by Canada's national coach as one of the best in Canada for developing elite gymnasts. By using a qualitative research method based on the traditions of cognitive anthropology (Spradley, 1979) and symbolic interactionism (Blumer, 1969; Glaser & Strauss, 1967), this study focused on the first two stages of the knowledge acquisition process for building an expert system: identification and conceptualization. The knowledge elicitation process consisted of open-ended questions and various questioning methods to unveil, explore and probe important information (Patton, 1987; Spradley, 1979) about coaching situations in training and competition. All coaches' interviews were transcribed verbatim and the unstructured qualitative data were inductively analyzed following the procedures and techniques of grounded theory (Côté, Salmela, Baria, & Russell, 1993; Glaser & Strauss, 1967; Strauss & Corbin, 1990). The analysis was done separately for coaches working with females (N=8) and coaches working with males (N=9). The structure of the knowledge elicited was represented in the form of mental models (Holland, Holyoak, Nisbett, & Thagard, 1986; Johnson-Laird, 1983), which provided a flexible and suitable representation of knowledge for the examination of an instructional issue (Glaser, 1987) such as coaching.

The results of the identification stage indicated that the interview transcripts of coaches of males and females were divided into 595 and 560 meaningful episodes of information or "meaning units" (Tesch, 1990), respectively. The inductive analysis process allowed these meaning units to be regrouped into 134 properties, 28 categories, and 6 components. The components emerging from the analysis were the same for coaches of males and females and consisted of: 1) competition, 2) training, 3) organization, 4) coach's personal characteristics, 5) gymnast's personal characteristics and level of development, and 6) contextual factors. The categories and properties of coaches' knowledge varied slightly in number and by their nature for coaches of males and coaches of females. Attempts to explain differences in the categories of knowledge elicited by coaches of males and coaches of

females were made in light of the evident age-related and gender specific task differences in men's and women's gymnastics.

The results of the conceptualization stage indicated that the coaches' mental model of various situations was built through the assessment of three "peripheral components," consisting of their own personal characteristics, the gymnasts' personal characteristics and level of development, and some contextual factors. The mental model resulting from this assessment guided the coaches for their intervention in the "competition," "training," and "organization" components, defined as the "coaching process." The large arsenal of coaches' knowledge organized hierarchically through the different properties, categories, and components allows expert coaches to rapidly assess situations that do not fit their mental model and, consequently make the appropriate changes. In sum, the qualitative research method used to examine coaches' expertise showed findings which were consistent with studies investigating expertise in cognitive tasks within an expert-novice research paradigm (Glaser & Strauss, 1988), led to a detailed description of expert gymnastic coaches' knowledge and opened new avenues of research in coaching expertise.

CHAPTER 1

INTRODUCTION

While it is the teacher who is responsible for a child's education in school, outside the classroom door children often participate in other learning activities, such as sport, dance, drama and music, in which specialized instructors also have an impact upon their development. The focus of the present study is on those individuals responsible for a child's development in sport: coaches. Like teachers, the coach's job is to transmit and transform a collective body of knowledge and skills on a given subject in order to help athletes acquire and use that knowledge in various situations. A coach's challenge is to teach physical skills as well as to build character, instill integrity, and point the way for youngsters to become confident self-reliant adults (Horn, 1987; Martens, 1988). In a retrospective portrait of six outstanding coaches, Walton (1992) revealed that great coaches do not simply master their sport but are also champions of wisdom and understanding.

Bloom (1985) stated that teachers, coaches or instructors need different kinds of knowledge and skills for different phases of a learner's development. He identified three phases of talent development for performers in domains such as science, art, and sport: the early years or initiation, the middle developmental years, and the later years of perfection of skills. In the early years the main qualities of the teachers / coaches were to be kind, cheerful, caring and process-centered. In the middle years the teachers / coaches were to be more demanding, and needed more specific skills related to the performer's activity. Finally, in the later years the teachers / coaches were to be highly competent in the activity and their emphasis was on meeting the highest and most stringent standards in the performer's domain. Bloom also noted that as the level of the performers increase, the knowledge base of the coach or teacher is more profound and elaborate. In sport, few studies have systematically examined what the high performance coach needs to know and do to help athletes fully develop their talent in the later years of development.

Retrospective profiles with successful coaches have provided valuable information on how some of the best high performance coaches think and apply their knowledge in different situations (Kimiecik, & Gould, 1987; Mechikoff, & Kozar, 1983; Walton, 1992; Wooden, 1988; Wrisberg, 1990). These profiles have shown that expert coaches don't always agree with theoretical principles of coaching and that their experiential knowledge can be as rich and as useful as any textbook on coaching. In fact, most of the information delivered to coaches comes from sport scientists who often are not aware of the nature of the problems that

coaches face in their daily work (Salmela, Russell, Côté, & Baria, 1993). In an attempt to identify the educational needs of elite American coaches, Gould, Giannini, Krane, and Hodge (1990) found it "disconcerting" that only 46% of the sample believed that "...there exists a well defined set of concepts and principles for coaches to use" (p.337). In another investigation, Gould, Hodge, Peterson, and Petlichkoff (1987) surveyed college wrestling coaches in order to determine the usefulness of different psychological strategies conveyed in the sport psychology literature. Gould et al. (1987) recommended that this research approach "should be supplemented in future investigations by actual observations of coaches in practices and competitions and by in-depth interviews that allow for the acquisition and interpretation of rich qualitative data" (p. 307). These findings suggested that a reality grounded approach might be useful in investigating such a complex domain of expertise as high level coaching. Indeed, Régnier, Salmela, and Russell (1993) recently suggested using a "bottom up" approach for studying high level performance "...by trying to find out what reported features talented performers cite in any specific domain to explain their exceptional performances" (p. 294).

More generally, certain authors (Côté, Salmela, Baria, & Russell, 1993; Dewar, & Horn, 1992; Martens, 1987b; Streat & Roberts, 1992) have argued that more knowledge emanating from personal experience, rather than from experiments, is needed to have a better understanding of the complex world of coaches and athletes. According to Dewar and Horn, controlled experiments have been used predominantly in developing knowledge in sport psychology. However, some psychological and educational phenomena cannot be studied by isolating behaviors and looking at them separately, as the logical positivist model of orthodox science suggests. Martens proposed that research in sport psychology should focus more on experiential knowledge and that qualitative methods of investigation, such as the idiographic approach, introspective methods and field studies should be used. Thus, it is the aim of the present study to qualitatively investigate the experiential knowledge of the best high performance gymnastic coaches in Canada using an expert system approach.

The Expertise Approach

The objective of researchers interested in human expertise is to identify the content, structures and processes that are responsible for skilled performance. To reach such an objective, most of the studies on expertise have examined structures and processes of individuals in different domains using the expert-novice paradigm (Campbell, Brown, &

DiBello, 1992). This research approach has provided robust findings on the nature of expertise (Cook, 1992; Glaser & Chi, 1988). However, a critical issue in the expert-novice approach is to identify standardized tasks that capture the relevant aspects of superior performance and allow an assessment of the cognitive mechanisms underlying the superior performance (Ericsson & Smith, 1991). This issue has lead researchers on expertise to focus on domains in which superior performance can be demonstrated under relatively standardized conditions such as chess.

In more complex tasks domain, such as physics, medical diagnosis, music, or sport, investigators have tended to select a small number of tasks assumed as being representative of the domain (Ericsson & Smith, 1991). The tasks usually chosen in these complex domains represent well-defined activities in which the operations, objects, constraints, and goals are clear. The result of this approach for studying expertise is that the state of knowledge of complex domains of expertise is incomplete (Campbell et al, 1992; Ericsson & Smith, 1991). Coaching is an example of a domain in which the tasks and prerequisite knowledge of expertise has never been identified. In fact, despite the existence of coaching certification programs in Australia, Canada, Eastern Europe, Germany, Great Britain, and the United States (Campbell, 1993; Salmela, 1991), the proven effectiveness of these coach-centered programs is not clear (Salmela et al., 1993).

With this in mind, the intent of the present study is to directly ask high performance expert gymnastic coaches about the important concepts and strategies that they use in coaching. This idiographic approach to elicit the prerequisite knowledge of expert coaches is similar to the first few stages that a knowledge engineer would go through with experts for building an expert system. In acquiring knowledge from experts, the knowledge engineer proceeds through several stages before building an expert system. These stages are characterized as problem identification, conceptualization, formalization, implementation, and testing (Buchanan, et al., 1983). The present study focuses on the first two stages of knowledge acquisition, identification and conceptualization, by using a qualitative research approach based on the traditions of cognitive anthropology (Spradley, 1979) and symbolic interactionism (Blumer, 1969).

In the expert system approach, the identification stage consists of having the experts describe prototypical and ambiguous situations they face in their daily activities, and having them provide specific strategies to deal with these situations. In short, the aim of this stage is to have the experts elicit the key elements and verbalize the knowledge they perceive as important for dealing with real life situations in their domain. Subsequently, the

conceptualization stage consists of establishing relationships between concepts elicited in the identification stage. Ultimately, the concepts elicited would be integrated into a model characteristic of the cognitive process that the experts would go through for dealing with various situations within their domain (Buchanan et al., 1983). It is within such a framework that the knowledge of expert gymnastic coaches was identified and conceptualized.

To obtain such a conceptualization of expert gymnastic coaches' knowledge, it is crucial to choose a framework to represent the content and structure of the knowledge elicited by the coaches. Accordingly, the notion of mental models (Brewer, 1987; Gentner & Stevens, 1983; Glaser, 1987; Holyoak, 1984; Johnson-Laird, 1983) appears to provide a flexible and suitable mode of knowledge representation for the examination of instructional issues (Glaser, 1987) such as coaching. Unlike propositional representations of knowledge, such as schemas or scripts, which consist of precompiled generic knowledge, the mental models are composed of specific knowledge structures that are constructed to represent new situations through the use of generic knowledge (Brewer, 1987). For instance, in the course of learning, coaches might develop mental representations of their tasks based on their knowledge of certain variables; these representations can be referred to as mental models which direct their behaviors and performance.

In an ill-defined domain such as coaching, where many uncertainties exist concerning the given information, the operations that can be used, and the possible constraints which might be present, a great deal of time could be spent forming a mental model of a specific situation. Therefore, an assessment of the knowledge that expert coaches use to construct their mental models could provide useful guidelines for improving the coach's development and, consequently, the child's or athlete's education.

The Research Problem

Because coaching expertise has not yet been adequately defined, it is important to focus primarily on identifying the knowledge which characterizes high performance expert coaches. A taxonomy of expert coaches' knowledge would provide the basis from which high performance coaches could be studied as well as give valuable insights into what it takes to become a high performance coach. Therefore, based on the expert system approach, the present study was designed, first, to identify the knowledge which characterizes expert gymnastic coaches and, second, to generate a conceptualization of how that knowledge is processed and used by the coaches.

The conceptual framework to reach these objectives is elaborated on in Chapter Two which contains a review of the literature on the psychology of coaching and a critical overview of the major findings and methods used to study experts in different domains. The methodology is described in Chapter Three, together with the logic underlying the choice of the qualitative research approach used. The results of the identification and conceptualization of coaches' knowledge are presented in Chapter Four. Finally, Chapter Five consists of a detailed discussion of the results along with recommendations for future studies.

CHAPTER 2

LITERATURE REVIEW

There is an immense array of literature on coaching. A computer-base search in the SPORT data base revealed that since 1980, there have been 10,215 publications on coaching, 15% of which deal with the psychology of coaching. Before suggesting a theoretical framework within which expert coaches' knowledge can be examined it is important to present a critical overview of the literature on coaching. Five main areas of coaching research as it relates to sport psychology will be examined: 1) coach's educational role, 2) coach leadership behavior, 3) gender differences in coaching, 4) coaching demands, and 5) strategies used in coaching. For each of these five areas of coaching research, the main method of investigation, major findings, and limitations of the approaches used will be highlighted. This literature review on coaching will lead to an examination of methods used to study expertise in different domains, including coaching.

Coach's Educational Role

Martens (1986) estimated that 20 million children between the ages of six and 18 participate regularly in some form of organized sport in non-school settings in the United States alone. Australian children have been estimated to have an even higher participation rate, involving 67% and 75% of preadolescent girls and boys, respectively (Robertson, 1986). Organized sport programs in industrial societies exist mainly because of the support and involvement of volunteers, many of whom act as coaches who are willing to devote their time to help children practice, enjoy, and learn a sport (Gould & Martens, 1979; Spallanzani, 1988). Coaching youth sport involves teaching physical skills, instilling integrity, and pointing the way for youngsters to become confident self-reliant adults (Horn, 1987; Martens, 1988). Studies which have examined the influence of coaches on children's sport can be divided into three major categories. The first category consists of those studies that were conducted to examine the relationship between the coach's behavior and the youngster's psychological growth. The research design used in these types of studies consisted of relating coach behavior to the child's satisfaction and self esteem. Studies comprising the second category examined the coach's instructional role and the coach's influence on the child's skill development. The third category consisted of studies conducted for examining the coach's influence on the child's development of social values. This classification of

studies into three categories is somewhat arbitrary since the links between the coach's psychological, instructional, and social roles in a child's development are quite close. Nevertheless, the studies are separated into three groups in order to add coherence and clarity to the discussion of the studies on the coach's role in youth sport.

Coach's Influence Upon the Child's Psychological Growth

The major studies examining the coach's influence on a child's psychological growth were carried out by Smith, Smoll and colleagues (Smith, Smoll, & Curtis, 1978, 1979; Smith, Smoll, & Hunt, 1977; Smith, Zane, Smoll, & Coppel, 1983). Their research project took place in two phases and was centered around the development and assessment of a program aimed at improving the ability of coaches to interact more effectively with their young athletes. Phase I of their research project was aimed at relating coaching behaviors to players' attitudes toward their coach, teammates, themselves, and other aspects of their sport involvement. Phase II was devoted to the application of the results of phase I in order to derive behavioral guidelines and to develop a psychologically oriented training program for coaches.

In the first phase of their research, Smith et al. (1977) developed the Coaching Behavior Assessment System (CBAS) to permit the direct observation of coach behaviors. The CBAS included 12 behavioral categories divided into eight reactive and four spontaneous coaching behaviors. The reactive category consisted of the coaches' responses to either desirable performance or effort, mistakes and errors, or players' misbehaviors. The spontaneous categories were divided into either relevant or irrelevant behaviors initiated by the coach during the game.

Using the CBAS, Smith et al. (1978) observed 51 little league baseball coaches for at least three games each. At the end of the season 542 players were interviewed about aspects of their experience. More specifically, the players were asked to indicate how frequently their coach was engaged in each of the 12 CBAS behaviors. Players also answered 10 questions to indicate their reactions to their participation. Finally, a measure of each player's self-esteem was obtained. The distribution of coach behavior observed with the CBAS showed that nearly two thirds of the behaviors fell within the instructional and supportive categories. The players' ratings of how frequently their coaches engaged in the CBAS behaviors revealed that players most accurately perceived punitive behaviors, reactions to mistakes, and game irrelevant communicative behaviors of the coach. The players reactions to their participation

indicated that, overall, their attitudes were favorable toward their experiences and their coaches. Finally, the analysis of the relationship between coach behavior and player's self-esteem showed that players who played for coaches who gave high levels of "reinforcement" and "mistake-contingent encouragement" had higher self-esteem scores than did the children who played for less supportive coaches.

The second phase of their research involved the development of an intervention program with coaches of little league baseball (Smith et al., 1979). The intervention program involved 31 coaches divided into two groups. One group of 18 coaches received training on how to communicate effectively with children. The remaining 13 coaches did not receive any training and represented the control group. Coaches of both groups were observed with the CBAS during four games, while 325 players were interviewed at the end of the season to collect players' perceptions. The results showed that the trained coaches gave more reinforcement and encouragement and were less punitive than the non-trained coaches. Additionally, players who played for the trained coaches exhibited a significant increase in self-esteem over the previous year. Finally, players who played for the trained coaches evaluated their coaches more favorably and got along better with team members despite the fact that the average won-lost records of the two groups of coaches were similar.

Smith et al. (1983) further examined coach behavior and child self-perception in a study of coaches and athletes in a youth basketball league. Similar to their previous results, the relationship between player attitude and coach behavior indicated that coaches who provided more "mistake-contingent technical instruction," less general feedback, less punishment and less controlling behaviors had players who evaluated them more highly and expressed a higher level of sport enjoyment. Similarly, Fisher, Mancini, Hirsch, Proulx, and Stawrowsky (1982) showed that coaches of satisfied high school basketball players had more control, provided more organization, were more supportive, and used more praise and acceptance and less criticism than did coaches of less satisfied athletes.

In a recent study, Black and Weiss (1992) used perceived coaching behavior by athletes instead of systematic observation to assess 312 competitive swimmers between the ages of 10 and 15. Their results supported the findings of Smith et al. (1978, 1979, 1983). In essence, coaches who were perceived by the swimmers as displaying encouragement, positive reinforcement, and giving instruction and less criticism had athletes with higher levels of self esteem and who enjoyed swimming more.

In another study, Horn (1985) utilized the CBAS to compare coaching behaviors in practice and competition settings with changes in female softball players' perceptions of

competence. Her results indicated that the primary contributor to positive changes in self-perception did not come from the coach directly but from the player's own skill improvement. Nevertheless, behaviors of coaches in practice also contributed significantly to the enhancement of the players' perceptions of competences. Players who frequently received verbal feedback from the coach following successful performances manifested lower perceptions of competence than players receiving high frequencies of criticism in response to unsuccessful performances. Although these results appeared to be surprising, they are consistent with results of studies examining adult expectational levels of performance as well as with studies concerning patterns of feedback provided to children (Cooper & Good, 1983; Meyer, Bachmann, Biermann, Hempelmann, Ploger, & Spiller, 1979). These studies have shown that classroom teachers use reinforcement for motivational or disciplinary purposes and not as a performance enhancement technique or as an appropriate evaluation of the child's performance. Horn indicated that a coach's use of inappropriate praise might establish lower expectations for a player's performance by inducing negative self-perceptions. In discussing these results, Brustad (1993) pointed out that children who received more frequent but less specific feedback were likely to infer low ability since the coach did not praise others who performed at a similar level on the task.

In sum, studies examined in this section have shown that coach behavior has a significant influence on a child's psychological profile, affecting such characteristics as self-esteem and satisfaction. Horn's study (1985), although designed to examine the coach's influence on the child's psychological profile, has provided valuable insights on the coach's teaching roles. The next section will examine studies which have focused specifically on the coach's instructional role.

Coach's Instructional Role and Influence on the Child's Development

Besides developing the child's psychological characteristics, another goal of the youth sport coach is to provide a context where all children have the opportunity to learn physical skills optimally (Horn, 1987; McKenzie & King, 1982). The learning context of players in practices has been investigated using the Academic Learning Time - Physical Education (ALT-PE) instrument. Siedentop (1983) defined the ALT-PE as "a unit of time in which a student is engaged in relevant physical education content in such a way that he or she has an appropriate chance to be successful" (p. 27). In a review article dealing with the issue of time in sport pedagogy, Meltzer (1989) reported moderate to strong correlations between

"functional time" such as the ALT-PE and learning. Accordingly, the ALT-PE rates of players in practices has been investigated in various sports such as volleyball (Brunelle, Spallanzani, Tousignant, Martel, & Gagnon, 1989; McKenzie, 1986; Wuest, Mancini, van der Mars, & Terrilion, 1986), ice hockey (Trudel & Brunelle, 1985), soccer (Boudreau & Tousignant, 1991), and Taekwon-do (Brunelle et al., 1989). In general, these authors reported that players' ALT-PE rates varied between 25% and 54% of the total practice time. A conclusion of these studies was that ALT-PE data is influenced by factors such as the type of sport, the level of competition, and the coaches' behaviors.

In line with studies examining players' learning time, systematic observation of successful and less successful coaches has been widely used to obtain information about coaches' teaching roles. In a pioneer study, Tharp and Gallimore (1976) devised a 10 category system to observe John Wooden, a successful basketball coach at the University of California at Los Angeles, during 15 practices. Their results revealed that 50% of Wooden's behavior was in the instructional category. The authors further reported that at least 75% of Wooden's behavior observed in training carried information. For example, the behavior "scolds" (6.9% of all behaviors) was almost always followed by specific instructions.

Lacy and Darst (1985) used a modified version of Tharp and Gallimore's (1976) instrument to observe 10 experienced high school football coaches during three practices each. The instructional category of behavior was observed most frequently, representing 42.5% of all coach behaviors. Lacy and Darst's observation instrument was later used by Lacy and Goldston (1990) to observe 10 high school basketball coaches during six practices each. As with Lacy and Darst's study, the instructional category of behavior dominated the observed behavior during practices with a percentage of 49.6%. Segrave and Ciancio (1990) extended the line of research instigated by Tharp and Gallimore by observing a successful youth sport football coach in 20 practices. The most observed behavior was once again instructional (33.7% of all behaviors), although it occurred less often than in Tharp and Gallimore's, Lacy and Darst's and Lacy and Goldston's studies.

In another study, Wandzilak, Ansorge, and Potter (1988) compared 17 youth soccer coaches in 60 games and 69 practices with the Coaching Behavior Assessment Inventory (CBAI), which consisted of 14 different behaviors. The purpose of their study was to verify if similar behaviors were exhibited by the coaches in practices and games. Their results revealed that the majority of the coach behavior was instructional / organizational or encouraging, regardless of settings. The coaches tended to be more encouraging during games but utilized more organization and instruction in practice. Their results also showed

that coaches utilized positive remarks in practices and games although they were more negative in practices. This study is particularly interesting since it is the only one that has examined the coach's instructional role in games.

The results of the studies just reviewed are consistent and show that the predominant behavior of a coach in training is to provide verbal instruction. However, the data analyzed in these studies used an event recording procedure (Darst, Zakrajsek, & Mancini, 1989) and therefore did not show the time intervals spent for each behavior. To analyze coaches' work in training more precisely, Claxton (1988) used a time sampled event recording procedure (Rushall, 1977) which allowed him to analyze coaches' work in light of both specific events and the time spent in each behavior category. Claxton observed nine high school tennis coaches using the observation instrument developed by Lacy and Darst (1985). Consistent with the studies previously mentioned, "instruction" was the most often exhibited behavior in terms of event recording. However, when viewed from an interval recording viewpoint, "instruction" was much less a factor, accounting for only 9.9% of the recorded intervals. The category, "other" (42.1%), was the most frequently used behavior, followed by "silence" (22.0%), then "instruction" (9.9%), and "management" (9.8%). The results of Claxton's study exemplify the limitations of the systematic observation method, which did not provide information concerning the categories, "silence" and "other". Further investigations are needed before concluding that these coaches were off-task when in "silence" or exhibiting "other" behaviors.

Other studies examining coaches' teaching roles have focused on the type of feedback provided by coaches. According to research in motor learning, the kind, quantity, and timing of feedback may have differentiating effects on the acquisition and learning of motor skills (Chamberlin & Lee, 1993; Magill, 1993; Vallerand, 1983). Studies focusing on coaches' feedback in natural settings have shown that the feedback most frequently used by successful coaches was auditory, immediate, and corrective and that players of more successful coaches received significantly more feedback than players of less successful coaches (Markland & Martinek, 1988). Youth sport coaches, on the other hand, have been observed to give poor quality feedback, and to provide little specific information useful for improving performance (McKenzie & King, 1982). To improve teaching behaviors, Mancini, Clark, and Wuest (1987) implemented an intervention strategy to improve the quality of feedback given by a field hockey coach to her players. The coach was first observed during practices to gather data on her behavior in training. Based on this data the coach was provided with systematic supervisory feedback from a qualified instructor to change inadequate teaching behaviors.

Following the supervisory feedback, the coach changed her manner of giving feedback. Her feedback to the players became more varied and the type of directions she gave were less ordering and directive. Observation of the same coach in practices a year later indicated that the changes in her teaching behavior were maintained.

The studies reviewed in this section highlight the important role of the coach in teaching technical and physical skills. Generally, authors who have examined coaches' instructional roles have merely described coach behavior in training without explaining these behaviors. For instance, no studies have focused on eliciting coaches' perceptions or knowledge regarding specific methods of teaching or on why certain methods are preferred over others. Besides providing opportunities to learn sport related skills, youth sport coaches can also be a medium by which children learn social values. The next section will focus on studies which have examined coach behaviors and their possible impact on the child's social development.

Coach's Role on the Child's Development of Social Values

The learning context provided by youth sport coaches needs to be favorable to increasing the child's pro-social behaviors, such as cooperating, and decreasing antisocial behaviors, such as competition and aggression (Brustad, 1993; Coakley, 1993; Greendorfer, 1992). The assumption that sport builds character automatically through competition, whether winning or losing, may not always be true (Bredemeier & Shields, 1993; Weiss, 1991). For instance, some studies have shown that participation in sport decreases behaviors such as sharing and helping and increases behaviors such as aggression (Dubois, 1986; Kleiber & Roberts, 1981). The environment of youth sport participants needs to be specifically structured to teach moral and sportmanship-like values to children (Bredemeier, Weiss, Shields, & Shewchuk, 1986; Romance, Weiss, & Bockovan, 1986). Accordingly, coaches have a central position for creating this positive environment (Bredemeier, 1988; Martens, 1987a, 1990; Weiss, 1991). In a retrospective portrait of six outstanding coaches, Walton (1992) revealed that great coaches do not simply master their sport but are also champions of wisdom and understanding. The coaches examined by Walton did not only produce excellent athletes, but also educated and contributed to the human development of these athletes. For instance, all of the coaches were committed to the athletes' integrity, values, and personal growth and were profound thinkers who saw themselves as educators of social values, not just trainers of physical skills.

Some studies (Bredemeier et al., 1986; Romance et al., 1986) have shown that specific instructional strategies such as modelling, giving appropriate reinforcement and discussing inappropriate sport behavior with the child can increase a child's sportsmanlike behavior. However, other studies observing coaches in real situations have indicated that youth sport coach behavior can be in conflict with a child's development of "appropriate" social behaviors. Several authors have reported that youth sport coach behavior during games was mostly directed towards winning instead of focusing on players' actions or on the development of social skills (Chaumeton & Duda, 1988; Hastie & Saunders, 1992; Strong, 1992).

In a series of studies, Trudel and colleagues examined ice hockey coaches' behavior during games to see if their actions could be related to players' aggressive acts. In a first study, Trudel, Guertin, Bernard, Boileau, & Marcotte (1991) used an observation form designed to code seven different coach behaviors during games. The seven behaviors were regrouped into three categories: coach behaviors toward the referee, coach behaviors that encouraged players' physical contact, and coach behaviors that encouraged players' respect or violations of rules. They observed 11 different coaches over 27 games with hockey players between the ages of 14 and 15. Their findings showed that the coaches observed did not directly ask players to be aggressive. However, coaches did shout their disagreement at the referee and asked for more intensity from their players. Considering the fine line between the definition of aggression and assertion (Husman & Silva, 1984), the authors argued that asking for more intensity could be interpreted by players in certain situations as asking for more aggression.

Consequently, a second study (Côté, Trudel, Bernard, Boileau, & Marcotte, 1993), using the same observation instrument, was done to analyze the relationship between coach behavior and game score differential. The purpose was to verify if coach behavior changed depending upon winning or losing. Twenty-three coaches from 20 teams were observed in 65 different games. The results indicated that, when losing, coaches "disagreed with the referee" significantly more than when winning and simultaneously asked their players to be more assertive. In discussing these results, the authors suggested that because disagreeing with the referee was exhibited in a context where the coaches were hostile and shouting their grievances at the referee and because of the fine line existing between assertion and aggression, the coach behavior exhibited when losing could have easily been interpreted by the players as "be more aggressive". Similarly, Dubois (1981) found that 14 youth soccer and football coaches showed twice as many negative behaviors toward their players when

losing.

Another finding resulting from the studies of Trudel et al. (1991) and Côté, Trudel, Bernard, Boileau, and Marcotte (1993) indicated that coaches rarely dealt with bodychecking techniques during games. In a sport such as ice hockey where physical contact is frequent, game situations have been proposed as ideal settings for providing instruction and feedback on bodychecking skills (Trudel, Bernard, Boileau, & Desharnais, 1992; Trudel, Bernard, Boileau, & Marcotte, 1992). Indeed, bodychecking is the major cause of injuries and aggressive acts during ice hockey games (Roy, Bernard, Roy, & Marcotte, 1989) consequently, coaches need to provide feedback to their players during games for using the skill appropriately. To further explore the phenomenon of aggression in ice hockey, Trudel, Dionne, and Bernard (1992) interviewed players and coaches. The interviews were guided with video-clips showing segments of games interrelated with players' minor and major aggressive acts. The coaches and players were invited to comment on what they saw on the video and to elicit reasons as to why the players acted aggressively during games. The main reasons mentioned by coaches and players was "frustration and lack of discipline". The results also indicated that bodychecks were, most of the time, the cause of underlying players' frustration or lack of discipline.

The preceding results allowed Trudel and colleagues to implement an intervention program for improving coaches' strategies for teaching bodychecking techniques (Trudel, Bernard, Boileau, & Desharnais, 1992; Trudel, Bernard, Boileau, & Marcotte, 1992). The purpose of the program, which lasted an entire season, was to provide pedagogical materials and individual supervision to 23 youth ice hockey coaches in order to improve their intervention strategies for teaching bodychecking techniques. Results of a questionnaire assessing coaches' levels of satisfaction with the intervention program indicated that the materials provided, interested the players (96%), helped the players to improve their bodychecking skills (82%) and enhanced the coaches' knowledge (74%). However, no follow-up study was conducted to see if the intervention program affected coaches' and players' behaviors during games.

From the literature review on the coach's role in youth sport, it becomes evident that the coach-athlete interaction affects a youngster's social, physical, and psychological development. The coach-athlete relationship can also ultimately influence the athletes' sport enjoyment and their decision to continue participating in the sport. The only study examining the relationship between coach behavior and youth sport attrition was done by Barnett, Smoll, and Smith (1992). Their results indicated that when coaches were trained to increase

coach-player interaction and intra-team cohesion, and to promote participation in sport as an opportunity for achievement rather than for failure, their players dropped out significantly less than when coaches did not receive training.

The results of the Barnett et al. (1992) study are consistent with descriptive studies which assess children's motives for participation and withdrawal from sport. The main motives for children's participation in sport can be grouped into four categories: fun, competence, fitness, and affiliation (Brustad, 1993; Gill, Gross, & Huddleston, 1983; Gould & Petlichkoff, 1988; Petlichkoff, 1993). Motives mentioned by children for dropping out of sport included more diverse reasons such as interest in other activities, lack of fun, lack of playing time, too little success, loss of motivation, dislike of the coach, overemphasis on competition and performance, and hard physical training (Burton & Martens, 1986; Gould, 1983, 1987; Gould, Feltz, Horn, & Weiss, 1982; Klint & Weiss, 1986; Orlick, 1973; Orlick & Botterill, 1975; Pooley, 1980).

Motives to participate or drop out of sport were recently conceptualized through the Sport Commitment Model (Scanlan, Carpenter, Schmidt, Simons, & Keeler, 1993). The model consisted of five constructs which had the potential to increase or decrease sport commitment. The first construct, which positively affected sport commitment, was "sport enjoyment" or the pleasure resulting from sport participation. The second construct, which negatively affected sport involvement, was "involvement alternatives," which was defined as the opportunity to engage in other activities instead of participating in the sport. The third construct, which positively affected sport involvement, was "personal investments," defined as personal resources invested in the sport such as time, effort and money. The fourth construct, "social constraints," addressed the social pressure put on an athlete to participate. This construct was described as positively affecting sport commitment. Finally, "involvement opportunities" such as the chance to improve skills, be with friends, or stay fit was described as positively influencing sport commitment. The Sport Commitment Model and the research dealing with the coach's role in youth sport imply that coaches can have an influence on many factors affecting their athletes' personal development and participation in a sport. Indeed, several authors agreed that the relationship between coaches and athletes is an important determinant of the ways in which children are ultimately affected by their participation in organized sport (Martens, 1978; Petlichkoff, 1993; Seefeldt & Gould, 1980; Vanden Auweele & Wylleman, 1993).

Despite these statements, the knowledge gathered on the coach's educational role has been limited to the identification of coach behaviors. Although systematic observation of

coaches has provided useful knowledge about youth coach behavior, it has not provided much insight on the cognitive processes underlying these behaviors. In outlining the methodological limitations of the CBAS, Smith and Smoll (1990) noted that "the CBAS is a broad-band coding system that does not presently make distinctions between other potentially important aspects of coaching behaviors, such as verbal and nonverbal responses, magnitude of reinforcement, quality and duration of instruction, and so forth" (p. 991). To different degrees, this comment is applicable to other observation systems which have been designed to examine youth sport coaches in specific settings. Thus, the portrait drawn of youth sport coaches from systematic observation is not complete and does not provide a thorough understanding of their work. In discussing this issue Smith and Smoll added:

Thus, our behavioral data are most properly interpreted as assessing differences in the type of general social environment produced by the coaches' behavior. Studies with finer-grained analyses of the specific interaction patterns created by coaching behaviors are clearly needed. (p. 991-992)

This comment summarizes what has been accomplished and what remains to be done in research examining the coach's educational role. The next section focuses on a psychometric approach to examining coach leadership behavior at different levels of competition.

Coach Leadership Behavior

The development of the multidimensional model of leadership (Chelladurai, 1980) has generated a considerable number of studies examining coach leadership behavior. The central component of this model features three states of coaches' behavior: actual behavior, coach behavior preferred by athletes, and required behavior. These are influenced by three "antecedent" variables which are the characteristics of the coach, the athletes and the situation. The model's main supposition is that the outcome, or the performance, and satisfaction are positively related to the degree of congruence among the three states of coach behavior.

The Leadership Scale for Sport (LSS) was developed by Chelladurai and Saleh (1980) to test the relationship specified in the multidimensional model and the applicability of the model to the prediction of leadership effectiveness in sport. The LSS consisted of five dimensions of coaches' leadership behavior: 1) training and instructional behavior, 2) democratic behavior, 3) autocratic behavior, 4) social support behavior, and 5) rewarding behavior. The LSS can be administered in three different versions: to assess athletes' preferences for specific coach behavior; to measure the athletes' perceptions of their coaches'

behavior; and to evaluate coaches' perceptions of their own behaviors.

While the LSS and the Multidimensional Model of Leadership provide a general framework to study coach leadership behavior, the Normative Model of Decision Style in Coaching was proposed by Chelladurai and Haggerty (1978) for studying coach's decision making style, a component of the coach's leadership style. This model considered seven variables which have an effect on a coach's style of decision making: 1) the level of quality inherent in the problem situation, 2) the amount of relevant information available to the coach, 3) the complexity of the problem, 4) the degree to which group acceptance of the decision was critical, 5) the degree of integration among group members, 6) the presence or absence of time restrictions, and 7) the amount of status or power the coach held over the team members. Chelladurai and Haggerty suggested that these variables affected a coach's decision to utilize an autocratic, participative, or delegative style of decision making.

The studies that have examined coach's decision making style and coach's leadership behavior will be reviewed in three different parts. First, studies using the LSS and which describe the leadership behaviors that athletes prefer their coaches to exhibit will be reviewed. Second, studies dealing with the consequences of certain leadership behaviors on athletes' performance and satisfaction studies will be examined. Finally, studies which focus on the coach's decision making style will be discussed.

Preferred Coach Leadership Behavior

Studies examining the leadership style preferred by athletes have focused on differences in athletes' age / maturity, ability, gender, culture, and type of sport. Chelladurai and Carron (1983) used the LSS to assess four age groups of male basketball players: early high school, high school juniors, high school seniors, and university level. Their results indicated that the training and instructional dimensions of preferred coach behavior decreased for athletes from early to senior high school level but increased again at the university level. They also showed that socially supportive and autocratic behaviors progressively increased from early high school to the university level. In other words, older male basketball players preferred their coaches to be autocratic and to exhibit socially supportive behavior.

In contrast, Terry and Howe (1984) found no age differences in regard to preferred coaching behavior in a group of 160 athletes ranging in age from 17 to 40 from a variety of sports. Similarly, Terry (1984) found no age differences on the dimensions of the LSS in a group of 160 athletes ranging in age from 17 to 28. In a discussion of these results, Horn

(1992) suggested that the age factor in these studies was confounded with the level of competition and years of sport experience. As a result, measures of the effect of age differences in regard to athletes' preferred coaching behavior has not yet been obtained (Horn, 1992).

Gender differences and athletes' preferred coaching leadership behavior has also been studied with the LSS. Terry and Howe (1984), found no gender differences in their sample of 17 to 40 year-old athletes. However, other studies have showed different preferences in coaching behavior from male and female athletes. Chelladurai and Saleh (1978) found that male university students representing a variety of sports preferred their coaches to be more autocratic and more supportive than their female peers. Similarly, Erle (1981) reported that male university athletes preferred more training and instruction, more autocratic behavior, more social support and less democratic behavior than their female counterparts. Terry (1984) partially replicated these findings by showing that male athletes preferred an autocratic coaching style more than did female athletes. The results of these studies show that female athletes tend to prefer a more democratic leadership style than do male athletes. Further research is needed to identify the reasons for such results.

The ability of the athletes is another variable susceptible to affecting the athletes' preferred leadership styles. Garland and Barry (1988) compared regular and non-regular collegiate football players. Their results indicated that regular players perceived their coaches to emphasize more training and instruction, to be more socially supportive and to provide more feedback than did non-regular players. Consistent with these findings, Robinson and Carron (1982) found that highly skilled high school football players perceived their coaches to be more autocratic than did less skilled players. Although limited in scope, these results suggest that as athletes gain ability, they prefer their coaches to be more autocratic and socially supportive.

The effects of culture on preferred leadership behavior have also been studied. Terry (1984) compared university athletes from Canada, the United States, and Great Britain and found no differences between the three groups on their preferred coaching behaviors. Terry explained these results by stating that athletes from these three countries shared similar "cultural backgrounds" and "sporting ideologies." However, Chelladurai, Malloy, Imamura, and Yamaguchi (1987) found differences in several dimensions of the LSS between Japanese and Canadian physical education students, two populations which have different cultural backgrounds. The Japanese sample included two groups: students who participated in modern sports (e.g., basketball, volleyball) and students who participated in more traditional

sports (e.g., judo, kendo). The results indicated that both groups of Japanese athletes showed a greater preference for social support than did the Canadian group. Japanese students from modern sports showed a greater preference for a democratic coaching style than did Canadian students. Moreover, Japanese students engaged in traditional sports preferred an autocratic coaching style more than did both the Japanese and the Canadians involved in modern sports. Finally, Canadian athletes preferred more positive feedback than did the Japanese participating in traditional sports.

In a follow-up study, Chelladurai, Imamura, Yamaguchi, Oinuma, and Miyauchi (1988) administered the LSS to 115 Japanese and 100 Canadian university athletes. The results showed that Canadian athletes preferred more training and instructional behavior from their coaches while Japanese athletes preferred more autocratic behavior and social support. The results of these studies support the idea that there are cultural differences in athletes' preferred coaching behaviors. However, as Chelladurai et al. (1988) suggested, the type of sport in which athletes are engaged, may interact with their culture to affect the preferred coaching behavior.

The relationship between type of sport and preferred coaching behavior is another issue which has been examined with the LSS. Chelladurai (1980) found that athletes engaged in team sports preferred more training and instructive behaviors and more positive feedback than did athletes in individual sports. Moreover, individual sport athletes preferred more democratic behavior than did athletes from team sports. Terry and Howe (1984) and Terry (1984) also replicated these findings in their study. Chelladurai (1993) subsequently suggested that as task dependance and task variability increase in team sports, there are also increases in the need for training and instruction, autocratic behavior, social support, and positive feedback.

The results of the research assessing athletes' preferred leadership behavior provide support for the situational approach to leadership effectiveness. Indeed, Chelladurai's (1980) Multidimensional Model of Leadership received empirical support that the preferred leadership behavior of athletes varies according to group member characteristics (e.g., age, ability, gender) and situational characteristics (e.g., cultural factors, type of sport). In the next section, research which has focused on the consequences of certain leadership behaviors on athletes' performances, satisfaction and team cohesion will be examined.

Consequences of Coach Leadership Behavior

Satisfaction, performance and group cohesion are the three consequences of a coach's leadership behavior that have been studied with the LSS. Chelladurai (1984) suggested that the discrepancy which existed between the athletes' responses on the preferences and perceptions dimensions of the LSS was associated with athletes' satisfaction. The satisfaction construct has typically been measured by administering a Lickert-style questionnaire in which athletes indicate their degree of satisfaction with regard to different elements of their coach's leadership behavior.

In administering the perceived and preferred versions of the LSS to 196 university athletes, Chelladurai (1984) found that the discrepancies between the scores on training, instruction and positive feedback dimensions of the two versions of the LSS mainly affected the athletes' levels of satisfaction. The higher the perception of those behaviors relative to the preferences, the higher the athletes' satisfaction. These findings were corroborated and extended by Schliesman (1987) and Horne and Carron (1985) with university level athletes. Their results showed that larger differences between perceived and preferred coaching behaviors for training, instruction, positive feedback, and social support were associated with the athlete's higher level of satisfaction. On the other hand, Chelladurai et al. (1988), compared Japanese and Canadian athletes and reported that the perceived version of the LSS was more predictive of athletes' satisfaction for both Canadian and Japanese athletes. Nevertheless, the results of these studies bring support to the notion that the discrepancy between perceived and preferred coaches' behavior is predictable of athletes' levels of satisfaction. It appeared that the training, instruction, positive feedback and social support behaviors of the coach were most highly correlated with athletes' satisfaction.

Performance as a consequence of a coach's leadership behavior and group cohesion as a consequence of a coach's leadership behavior have been examined in only one study each. Weiss and Friedrichs (1986) analyzed the relationship between the perception of coach behavior on the LSS of 251 collegiate basketball players with the team win / loss records. When all variables of the LSS were averaged over a team, as opposed to considering the scores of individual athletes, the perception of coach leadership behavior was predictable of win / loss percentages. Specifically, high frequencies of perceived social support behaviors were associated with poorer performance records, or more losses. Further research is needed before concluding that coaches' leadership behaviors lead to a performance differential; indeed, it is also possible that coaches could tend to alter their behaviors according to their

team performance. In another study, Westre and Weiss (1991) examined the relationship between coaching behaviors perceived by 163 high school football players and their team cohesion as measured by the Group Environment Questionnaire (Widmeyer, Brawley, & Carron, 1985). Results indicated that when coaches were perceived by their athletes as exhibiting higher frequencies of instruction, positive feedback, social support, and a democratic style of leadership, their athletes also had a higher perception of team cohesion.

Studies examining the consequences of preferred and perceived leadership behavior have been limited in number and have focused on isolated consequences. For instance, in real situations coaches have to deal with players' satisfaction, team performance, and team cohesion simultaneously and not as separate variables. Therefore, when these three variables are considered together, the athletes' actual preferences or perceptions of coach behavior may be somewhat different than the results of the studies just reviewed. More comprehensive studies are needed to understand the relative importance and the links between the consequences which ultimately influence coach behavior.

Decision Style in Coaching

A last area of research in the sport leadership domain is the identification of a coach's decision making style. Three studies were conducted based upon Chelladurai and Haggerty's (1978) Normative Model of Decision Styles in Coaching. Each of these studies used a questionnaire which described different problem situations and asked the subjects to choose between an autocratic, delegative, or participative decision-making style to solve each problem situation. Athletes who completed such a questionnaire were asked to identify the style they believed their coaches would use and the style they would prefer their coaches to use. Coaches who responded to the questionnaire were asked to identify the style they would use in making a decision.

Chelladurai and Arnott (1985) administered a decision style questionnaire to 144 male and female university level basketball players to identify the type of decision-making style players preferred their coaches to use. Their results indicated that players almost totally rejected the delegative style for the situations outlined in the questionnaire. The decision style most preferred by the athletes was autocratic. More specifically, athletes preferred an autocratic style of decision-making when problem situations presented in the questionnaire emphasized both dimensions related to quality requirement and problem complexity, or in other words, when an optimal solution was needed for a complex problem. "Participation,"

in which the coach allowed the athletes to participate in the decision-making process, was preferred by the athletes only when one of the quality requirement or problem complexity dimensions was highlighted in the problem situation. A comparison of male and female athletes showed that females preferred a participatory style more than did males.

The gender differences found in Chelladurai and Arnott's (1985) study were not replicated in a subsequent study by Chelladurai, Haggerty and Baxter (1989), who assessed the preferred decision-making style of 99 male and female university basketball players. These authors also evaluated the decision-making style of the 22 coaches of these athletes. Overall, both coaches and male and female players were similar in preferring a more autocratic style when the problem situation required that the coach possess a high level of relevant information or when both the quality requirement and problem complexity were high. Coaches and players preferred a more participative style when problem situations emphasized the degree to which group acceptance of the decision was crucial.

In another study, Gordon (1988) administered a decision style questionnaire to 161 male intercollegiate soccer athletes and 14 of their coaches. In the questionnaire, coaches were asked to indicate which decision style they would use and also which decision style they felt other coaches would use for each of the 15 situations presented in the questionnaire. In addition, the athletes were asked to indicate which decision style they would prefer their coaches to use and which decision style they thought their coach would use in each of the same 15 situations. The athletes also completed a coaching effectiveness questionnaire, which consisted of assessing their satisfaction with various aspects of their coach's behavior. Results indicated that autocratic was the coaching style which was most often perceived and preferred by both players and coaches. Another finding was that a high congruence between the coach's self-reported decision style and the athletes' preferred and perceived decision style was highly correlated with the coach's effectiveness as rated by the athletes.

The results of these studies dealing with decision-making style in coaching support the notion that the problem situation and its attributes influenced the type of decision-making style used more than did the individual differences among subjects. Coaches and players tended to prefer more autocratic styles for dealing with complex problems requiring quality decisions and for dealing with trivial problems. Therefore, instead of labeling coaches as autocratic, or democratic it appears to be more appropriate to designate specific situations requiring either autocratic or democratic decision-making styles.

Chelladurai (1993) recently raised a methodological issue concerning studies done on coaching decision style. He stated that "the real life decision situations in coaching could be

markedly different than the cases used in the above studies" (p. 667). In fact, situations presented in decision-making questionnaires were based on the literature and might not adequately reflect the kinds of problems that coaches face on a daily base. Scenarios containing real coaching problems are needed to increase the relevance of the research on coaching decision style.

Gender Differences in Coaching

While athletes' gender differences in preferred leadership style have been investigated within the multidimensional model of leadership (Chelladurai, 1980), no investigation has yet contrasted the leadership style of male and female coaches. This section is devoted to the issue of gender differences in coaching.

In the last several years, the under-representation of females in coaching positions has been a concern to researchers. In the United States, although no national survey has been ever conducted, men held 86% of the girls intercollegiate basketball head coaching positions and 77% of the track coaching jobs in the state of Montana (Sisley, Weiss, Barber & Ebbeck, 1990). In Oregon, in 1985-1986 only 17.3% of all high school coaches were women (Sisley & Capel, 1986). In Kansas, a survey of 1,070 high school coaches showed that 83% of the coaches were male (Cox & Noble, 1989). Similar trends were reported in other states, including Ohio, Wisconsin, and Pennsylvania (Sisley, Weiss, Barber, & Ebbeck, 1990; Stangl & Kane, 1991). In Canada, a survey concerning the employment situations of high performance coaches showed that only 19% of the respondents were women (Laberge, 1992).

Three research strategies have been adopted by investigators to try to explain this under-representation of female coaches. The first strategy, reflected in the work of Hart, Hasbrook, and Mathes (1986) consisted of asking both former and current female coaches to indicate reasons for leaving the coaching profession. These authors surveyed 256 active and 105 former female interscholastic coaches. Their results revealed that active coaches would leave coaching if "their performance as coaches were inadequate." On the other hand, former coaches indicated that they left coaching because of "perceived time and role conflicts with their personal lives."

The second research strategy which attempted to explain why women were under-represented in coaching involved asking athletes about their beliefs and attitudes regarding coaches. Parkhouse and Williams (1986) reported that both male and female high school

basketball players viewed male and female coaches differently. Even if male and female coaches had similar coaching records and coaching philosophies, players of both sexes perceived female coaches to be less knowledgeable, less able to motivate, less likely to achieve future success, and less desirable to play for than their male counterparts. Weinberg, Reveles, and Jackson (1984) obtained slightly different results when examining the sex biases of male and female college, high school, and junior high school basketball players. Their results revealed that female athletes' attitudes toward having a male or a female coach did not differ and were positive. However, male athletes exhibited a negative bias toward female coaches. In a more recent study, Williams and Parkhouse (1988) reported that female high school athletes exhibited sex-biased attitudes toward coaches, however, these attitudes were mediated by the sex of the coach and the level of success of the team. In essence, they found that male athletes on winning teams coached by men, and female athletes on losing teams coached by women had the strongest "male is better" bias. Interestingly, they also found that female athletes of winning teams coached by women preferred female coaches instead of male coaches.

The third strategy for trying to explain women's under-representation in coaching was to survey athletic directors who were responsible for hiring coaches. Stangl and Kane (1991) indicated that women, as is the case with coaches, were under-represented in higher leadership positions such as that of athletic director. These authors also reported that there was a significantly greater percentage of female coaches under female athletic directors than under male athletic directors. In discussing this trend, Stangl and Kane suggested that "homologous reproduction," or hiring someone of your sex, could be an explanatory variable underlying the employment practices toward females. This assumption was reinforced by the results of Acosta and Carpenter (1985), who asked intercollegiate male athletic directors to rank a number of possible reasons for the under-representation of females in coaching. The top four ranked reasons were: 1) lack of qualified female coaches, 2) an unwillingness of female coaches to recruit and travel, 3) failure of women to apply for job openings, and 4) time constraints due to family obligations.

Hasbrook, Hart, Mathes, and True (1990) suggested that these beliefs held by athletic administrators reflected stereotypical gender-role notions such as: 1) women are less competent than men, 2) women are less seriously committed to a career than are men, and 3) the employment of women jeopardizes the family institution. In their study, Hasbrook et al. tested the validity of these beliefs by investigating 256 women and 296 men coaches. In contrast to male directors' beliefs, they discovered that female coaches were actually more

qualified than male coaches in terms of coaching experience with female teams, professional training, and professional experience. They also found that males were more constrained with family responsibilities than were females. In examining the occupational socialization patterns of female and male interscholastic basketball coaches, Anderson and Gill (1983) discovered similar patterns to those of Hasbrook et al. Generally, Anderson and Gill found that female coaches of women's teams had more professional qualifications than did male coaches.

The results of these studies indicated that women are under-represented in the coaching profession because of sex stereotypes and sex biases, suggesting that discrimination based on perceptions of competence may occur from both athletes and administrators. Because competence was mentioned by coaches, athletes, and administrators as the major factor for evaluating coaches, education programs have been established in the United States to recruit and train female coaches and to provide support for women who are already coaching. Programs have been implemented in Colorado (Schafer, 1987), Pennsylvania (Oglesby, Shelton, Demchenko, & Thumler, 1987), and Wisconsin (Fowlkes, Coons, Bonner, & Koppein, 1987). In general, these programs have improved the percentage of active female coaches in these states.

One such program was organized for 43 female coaches in the state of Oregon, not only to recruit and train potential female coaches but also to evaluate the efficacy of the workshop. The evaluation component consisted of pre-workshop, post-workshop, and follow-up measures of participants' motivation, self-perception of ability, and perceived coaching strengths and weaknesses (Weiss, Barber, Sisley, & Ebbeck, 1991). The first phase of the evaluation component was aimed at assessing coaches prior to and following the workshop on attitudes, motives, and perceptions of ability (Sisley et al., 1990). Responses to a questionnaire revealed that the female coaches were highly motivated to coach, mainly because of their love for the sport and the enjoyment associated with coaching athletes. Coaches indicated that their strengths were in communicating, explaining sport skills, and motivating athletes, whereas, the most cited weaknesses dealt with legal liability, dealing with parents, and organizing a season plan. Pre- and post- workshop measures revealed that coaches' perceptions of ability increased following the workshop.

Of the 43 female coaches who attended the workshop and participated in the first phase of the study, 28 agreed to complete a season-long internship with a more experienced coach. Coaches' positive and negative comments about the internship as well as perceptions of their own strengths and weaknesses in coaching following the season-long internship with

their cooperating coach was investigated by Weiss et al. (1991). These authors used qualitative methods of investigation in the form of in-depth interviews and inductive analyses of the responses. As positive aspects of their internship, coaches mentioned their interaction with the athletes, the development of coaching skills, and the fact that it was fun. The negative aspects of the coaches' internships were related to a difficult relationships with their cooperating coach and the excessive time demands associated with coaching. The female coaches defined their strengths in terms of communication, motivation and teaching skills. Finally, their weaknesses were more generally defined in terms of coaching skills such as sport-specific knowledge or practice planning and management. The qualitative methodology used in this study provided an opportunity to gain a more detailed knowledge base of the experience of novice female coaches and furnished new directions for investigations concerning the retention of women in the coaching profession.

Coaching Demands

Coaches are expected to produce successful athletes, but often have little control over the talent of athletes with whom they are working. Additionally, coaches can prepare athletes in a superb fashion but the ultimate performance is not within their control. Coaches' high levels of responsibilities combined with their lack of control on performance variables make them susceptible to stress related problems (Taylor, 1992). Few researchers have systematically investigated the sources of stress in coaching.

Certain authors have reported that factors such as long working hours, full time status, and losing seasons were related to higher levels of stress in coaching (Caccese & Mayerberg, 1984; Lackey, 1986; Zitzelsberger, 1991). Other investigators have systematically examined perceived stress as it relates to gender differences. For instance, Caccese and Mayerberg indicated that female coaches were more susceptible to burnout than male coaches. In contrast, Dale and Weinberg (1989) found that male coaches scored significantly higher on burnout inventories than did female coaches. Inconsistent results between these two studies may have been due to uncontrolled variables, such as the time of the season that the questionnaires were completed as well as the age and years of experience of the coaches investigated. Dale and Weinberg also reported that coaches who showed "friendship," "mutual trust," "respect," and "consideration for feelings of others" were more susceptible to burnout than coaches who did not exhibit these behaviors. In fact, social factors such as coaches' relationships with other professionals, assistant coaches, parents,

and athletes have been reported as significant concerns of coaches (Capel, Sisley, & Desertrain, 1987; Hellstedt, 1987; Partington & Orlick, 1987; Sage, 1989; Tutko, 1986).

Despite the limited number of studies examining coaches' sources of stress, Taylor (1992) recently proposed a model of stress management for coaches. He identified coaches' main stresses as being: 1) personal, 2) social, and 3) organizational. Coaches' personal stresses were defined as self-doubt, physical health, and inadequate skills. Social stressors included lack of support, team conflicts, and pressure from fans, media, and parents. Finally, organizational stressors were defined as long hours, travelling, overload of responsibilities, administrative difficulties and time pressures. Although this conceptualization of stresses which affect coaches appears to represent coaches' realities, it is grounded with limited support from the coaching literature.

To obtain a better understanding of the coaching demands some investigators have asked coaches about their attitudes towards coaching and the adequacy of their educational background. Cox and Noble (1989) surveyed 1,070 high school coaches in the state of Kansas. They found that 60% of their sample had a college physical education degree. Additionally, most of the coaches received formal training in the areas of first aid (83%), athletic training (76.9%), techniques of coaching (64.3%), CPR (63.4%), and kinesiology (53.6%). Courses least attended by coaches were coaching liability (20.5%), coaching practicum (27%), and psychosocial components of coaching (30.7%). Coaches' attitudes towards coaching courses indicated that the coaches tended to feel stronger about the importance of a particular content area if they had taken a course on the subject.

In another study, Gould et al., (1990) attempted to identify the educational needs of 130 elite American coaches who participated in the 1987 Pan American Games. The coaches' average years of experience was 15 years and 76% of the sample had college degrees. Interestingly, the authors found that the two most important knowledge sources which helped the coaches to develop their coaching style were their own experience and other successful coaches. These sources were considered far more important than the two lowest ranked sources: coaching books and coaching classes. This appears to be a severe indictment against existing courses designed for this very purpose, such as the American Coaching Effectiveness Program in the United States, or the National Coaching Certification Program (NCCP) in Canada.

In fact, the first three of the five certification levels of the NCCP were assessed in a study by 75 experts in coach education (Haslam, 1990). The experts were selected on the basis of their relative expertise and interest in the NCCP and included master course

conductors from across Canada ($N = 35$) and provincial coaching coordinators ($N = 40$). Although experts generally agreed with the educational objectives of levels 1, 2 and 3 of the program, they favored a more socio-psychological orientation. Levels 4 and 5 of the program, which are directed toward elite coaches, were not assessed in Haslam's study, since the educational needs of coaches at this level of expertise had not yet been conceptualized. This lack of knowledge concerning elite coaches in Canada appears to be consistent with what Gould et al. (1990) found in United States. In discussing the educational needs of 130 elite American coaches, they stated that "one disconcerting finding was that less than half of the coaches sampled felt that there exists a well defined set of concepts and principles for coaches" (p. 342). These results emphasized the need to identify a common knowledge base which would represent elite coaches' realities.

The studies reviewed in the above section showed that coaches face various demands and that their educational needs are not well defined. Thus, the development of a coaching knowledge base, which educators and coaches could refer to when facing various demands, would be helpful for the advancement of the coaching profession. Some dimensions of such a knowledge base have already been explored by researchers who have examined the effectiveness of different strategies used by coaches.

Strategies Used in Coaching

Because of the various coaching demands, coaches need to have an extensive and high level of knowledge and strategies to deal with different kinds of situations. Studies examining coaches' knowledge and strategies can be divided into one of two categories. First, investigators have assessed coaches' opinions concerning the importance, effectiveness and / or use of different psychological strategies. Second, in-depth interviews and retrospective profiles of successful coaches have provided an interesting source of experiential knowledge about the psychology of coaching.

Coaches' Assessment of Psychological Strategies

Among the studies which have investigated the psychological strategies used by coaches, three studies have examined the abilities of coaches in assessing their athletes' anxiety levels. Martens and Simons (1976) investigated the abilities of 16 intercollegiate volleyball coaches and nine high school basketball coaches to predict both the state anxiety

and trait anxiety levels of their athletes. It was shown that the coaches were poor predictors of their athletes' anxiety levels. In a follow-up study, Martens, Rivkin and Burton (1980) assessed the abilities of both coaches and athletes of 15 high school volleyball teams to predict each other's state anxiety levels before a competition. Similar to the previous study, the correlation between coaches' prediction and athletes' anxiety levels was very low. Interestingly, the athletes were better at predicting their coaches' state anxiety levels. In a similar study, Hanson and Gould (1988) also reported that 28 coaches of varsity cross country teams were not accurate in estimating their athletes' levels of anxiety. However, the coaches' accuracy in estimating their athletes' trait level of anxiety increased with the coaches' years of experience.

Although this line of research tends to indicate that coaches are poor estimators of their athletes' anxiety levels, it is important to recognize some methodological shortcomings inherent in these studies. First, Martens and Simons (1976) and Martens et al. (1980) used two different instruments to measure athletes' anxiety levels, and the two instruments had not been tested for their between assessment reliability. Although Hanson and Gould (1988) considered this methodological bias in their study, other more general questions concerning these studies can be raised. For instance, the reliability of an anxiety measure of coaches and athletes taken just prior to a competition is questionable. Coaches and athletes might be preoccupied with more important concerns than filling out a questionnaire just before a competition. It might also be useful to recognize how critical it is for performance that coaches have an accurate estimation of their athletes' anxiety levels.

The need to know more about psychological strategies used by coaches was addressed by Gould, Hodge, Peterson, and Petlichkoff (1987). These authors surveyed 101 wrestling coaches concerning the importance, use and frequency of problems arising from and the degree of success they felt they had in changing or developing 21 psychological skills. The results indicated that mental toughness, positive attitudes, individual motivation, and attention-concentration were judged to be the most important skills to develop in their athletes for success in wrestling. The areas in which wrestlers most frequently experienced problems were reported as anxiety-stress control, attention-concentration, lack of confidence, and mental toughness. Coaches also indicated that the strategies most easily developed were goal setting, team cohesion and mental practice-imagery. Finally, the areas coaches felt they were most successful in enhancing were team cohesion, communication, sportsmanship, and goal-setting. The same survey was conducted with 46 national coaches in New Zealand and the authors reported similar results (Sullivan & Hodge, 1991).

The survey approach used in the previous two studies had some limitations that need to be underlined. For instance, the terms chosen to describe the 21 psychological strategies used in the questionnaire might have been easily interpreted differently by the coaches. Terms such as "mental toughness" and "emotional control" are general expressions which might be confounded with other psychological strategies. Indeed, Grove and Hanrahan (1988) demonstrated that athletes were in disagreement with coaches concerning their mental training needs when these were defined in general terms such as "emotional control". However, athletes agreed with coaches when their mental training needs were more specifically defined in terms such as "accepts criticism," "ignores negative comments," and "handles the unexpected," all of which are terms included in the general category, "emotional control". Thus, it appears to be important to adopt coaches' and athletes' specific vocabularies when working with them and this has not been seriously considered in the Gould et al. (1987) and Sullivan and Hodge's (1991) studies.

In another line of research, investigators assessed coaching strategies to increase athletes' self-efficacy (Gould, Hodge, Peterson, & Giannini, 1989; Weinberg & Jackson, 1990; Weinberg, Grove, & Jackson, 1992). These authors utilized a standardized questionnaire composed of 13 strategies used to enhance self-efficacy. Examples of coaching strategies listed on the questionnaires were, "enhance performance through instruction-drilling," "act confident yourself," "encourage positive self-talk," etc. Gould et al. (1989) administered the questionnaire to 101 wrestling coaches and 124 elite American coaches; Weinberg and Jackson used the same questionnaire with 222 high school tennis coaches; and finally, Weinberg et al. compared the results of this last study with 60 Australian tennis coaches. In each of these three studies, coaches were asked to rate how often they used each strategy and how effective the strategy was for enhancing athletes' confidence. In general, the results of the three studies showed that all 13 strategies were used at least sometimes by the coaches, and they felt that these techniques were at least moderately effective.

It is not surprising that in discussing their results the authors of these studies all suggested that more in-depth interviews and observation of coaches in training and competition were needed. Indeed, other than demonstrating the importance that coaches placed on building athletes' confidence, the implications of their studies were quite limited. For example, since all strategies were rated as somewhat important, it is quite possible that coaches used other strategies than the ones listed in the questionnaire. Furthermore, there may have been other strategies not listed in the questionnaire which might have been even more important for some coaches.

In a more educationally orientated study, Hall and Rodgers (1989) organized a workshop to help 44 figure skating coaches with the application of various psychological techniques with their athletes. Included in the workshop were mental training techniques such as focusing, use of cue words, imagery, and negative thought stopping. In general, coaches evaluated the workshop as being informative and felt that it helped them to use these psychological techniques more effectively. Furthermore, the skaters reported improvement in their practices following the coaches' attendance to the workshop.

With the exception of Hall and Rodgers' study, whose goal was to educate coaches on the use of psychological strategies, the other studies reviewed in this section were aimed at having coaches evaluate predetermined coaching strategies. The major limitation of these studies seems to lie in the appropriateness of the strategies provided to the coaches. In fact, there is a limited knowledge base concerning which strategies are important to use in training and competition for developing athletes, thus, standardized questionnaires based on the literature may not adequately represent "real" strategies used by coaches.

Knowledge and Strategies of Successful Coaches

One technique that has not been utilized extensively in the past to investigate the nature of coaches' knowledge and strategies is in-depth interviewing. Mechikoff and Kozar (1983) interviewed 22 expert coaches in regard to how they incorporated psychological strategies and methods in their coaching. Topics discussed included motivation, match or practice preparation, goal-setting, and confidence building strategies. These interviews provided an interesting source of experiential knowledge about the psychology of coaching. Similarly, interviews with successful coaches, such as James "Doc" Counsilman (Kimiecik & Gould, 1987) and Pat Head Summit (Wrisberg, 1990), and retrospective profiles of great coaches (Walton, 1992; Wooden, 1988) have also provided considerable information on how successful coaches think and apply their knowledge in different situations.

Results from these studies have shown that although expert coaches often agree with sport psychologists' suggestions, such as using positive reinforcement and developing athletes' self-confidence, they also disagree with certain theoretical principles of coaching. For example, James "Doc" Counsilman strongly favors group motivational pep talks as opposed to individualized consultations, John Wooden gives few rewards when teaching a skill, Francis Allen waits one or two days after a disastrous performance to provide feedback, and Darryl Royal spends little time goal-setting, but concentrates more on practice

organization. All of these strategies diverge somewhat radically from the conventional research findings in main stream sport psychology.

Although these series of interviews and profiles have provided an interesting source of coaches' experiential knowledge, little effort has been made by the authors to identify a common knowledge base that would represent the coaches' expertise. A methodology similar to the one used by Weiss et al. (1991) with novice coaches could prove desirable for identifying the knowledge domains and strategies employed by expert coaches who use applied sport psychology on a daily basis. This kind of research would enhance the development and standards of training programs for coaches and athletes. Furthermore, since sport psychology consultants' strategies to enhance athletes' performances have often been reported by athletes as not being relevant for exceptional performance (Mahoney, Gabriel, & Perkins, 1987), qualitative research with expert coaches would also provide useful insights to sport psychologists concerning the art of intervening with athletes.

Overview of the Research on Expertise

This section is devoted to the elaboration of a conceptual framework from which coaches' knowledge can be studied. The goal of cognitive psychology is to provide a general understanding of human cognitive structures and processes (Cook, 1992; Schoben & Ross, 1987). Over the last 20 years, a popular approach used by cognitive psychologists to understand better human cognition has been to examine human expertise in different domains. The determination of a theoretical framework to accommodate both the conceptual and methodological aspects of an extensive study of expert gymnastic coaches' knowledge demands a critical examination of the literature on expertise. Consequently, the literature review presented in this section is focused and critical rather than exhaustive in nature. Specifically, the studies reviewed are centered around the work on expertise in cognitive tasks rather than motor tasks and, as much as possible, on sport-related investigations.

The critical review of literature on expertise focuses on five different methods used to examine experts' performances in cognitive tasks: 1) protocol analyses, 2) psychometric tests, 3) sorting methods and task performances, 4) extensive studies of single subjects, and 5) interviews. Each of these methods will be briefly described along with their strengths and limitations. Additionally, the major findings on the nature of expertise obtained by these methods of investigation will be discussed.

Protocol Analysis

The protocol analysis method of investigation involves asking subjects to think out loud while they work through problems in their domain (Ericsson & Simon, 1984). Before protocol analysis can be used to study expert performance, it is necessary to find a problem which is challenging enough to differentiate experts from novices. The objective of the protocol analysis method, when applied to expert research, is to identify differences between subjects with regard to their knowledge and the processes used when solving problems (Gammack & Young, 1985; Reitman-Olson & Biolsi, 1991).

A protocol analysis technique was used by Chi, Feltovich, and Glaser (1981), who asked experts and novices to sort physics problems and analyze the nature of their solutions. They found that the experts used abstract physics principles when categorizing the problems, whereas the novices used more superficial concepts to categorize the same problems. Rutt-Leas and Chi (1993) recently used protocol analysis methods to examine the knowledge base of expert swimming coaches. Rutt-Leas and Chi's study is the only study that has used the expertise framework to examine coaches' knowledge. The purpose of their study was to investigate the differences in the diagnostics of a freestyle stroke by expert and novice swimming coaches as represented by their perception, problem solving, and memory processes. Their results showed that expert coaches demonstrated a greater amount of knowledge, had a more coherent knowledge base and represented their knowledge at a deeper level than did the novices.

Protocol analysis techniques have also been used in other domains of expertise such as psychology (Murphy & Wright, 1984), computer programming (Adelson, 1981), "star wars" (Means & Voss, 1985), medicine (Joseph & Patel, 1990; Patel & Groen, 1986; Patel, Groen, & Arocha, 1990), and studying (Chi, Bassok, Lewis, Reimann, & Glaser, 1989). In essence, results of these studies indicated that expert performers in any domain have a more extensive and more accessible body of knowledge than do novices. Furthermore, the knowledge representation of experts appears to be more detailed than that of novices and, accordingly, leads to successful and efficient problem solving. Finally, protocol analysis methods have also allowed researchers to suggest that experts have strong self-monitoring skills when solving problems (Chi et al., 1989; Cook, 1992).

Observation of Task Performance

Several investigators have observed experts and novices perform various tasks to assess the organization and representation of their knowledge. Contrary to the protocol analysis technique, observation of task performance does not ask for direct reports or strategies used in solving problems (Reitman-Olson & Biolsi, 1991). Instead, subjects are asked to reproduce different kinds of tasks or rate the similarity between two problems or situations. From a subject's behavior and a comparison of their behavior with that of other subjects, the investigator can infer the cognitive processes that were used by each subject (Gamack & Young, 1985).

In their study of chess skill, Chase and Simon (1973) had experts and novices reconstruct the positions of pieces on a chess board after a five second presentation. They found that experts recalled more pieces than did novices when the pieces represented "real game" situations, yet no differences were found when the pieces were randomly arranged on the board. They concluded that experts did not have greater memory capacity, however, they were superior at reconstructing the board since they perceived the pieces in larger groups or "chunks." The results of Chase and Simon's study were replicated in a number of other domains such as in the games of go (Reitman, 1976) and bridge (Charness, 1979), in music (Sloboda, 1976) and in electronics (Egan & Schwartz, 1979).

The recall task method utilized by Chase and Simon (1973) was also used to compare experts and novices in sport. For example, Allard, Graham, and Paarsalu (1980) presented varsity and intramural basketball players with slides which described structured offensive basketball situations and unstructured situations of games, such as scramble. The "structured" slides represented actual game situations and were screened for four seconds by the players. Then the players had to reconstruct the situations on a metal board with a basketball court drawn out by placing magnets representing players' positions. Expert players recalled more players' positions correctly than did novice players for structured game situations. No differences in recall were found between experts and novices for non-structured game situations. Similar results were obtained for a recall task presented to expert and novice field hockey players (Starkes & Deakin, 1985), and ballet dancers (Starkes, Deakin, Lindley, & Crisp, 1987).

The sorting procedure used by Chi, et al. (1981) in the first phase of their study has also been used within the sport context. For instance, Allard and Burnett (1985) had fans and players sort photographs of basketball skills and concepts that they perceived to belong

together, into categories. A cluster analysis showed that fans classified categories according to how many players were shown on the photographs, while players sorted the photographs into categories such as offensive or defensive situations. Similarly, using an expert system approach, Russell and Salmela (1992) had an expert male cyclist sort problems, task situations, and strategies into categories to define his sporting experience. A multidimensional scaling technique was then used to examine the relationships between the categories perceived by the athlete. The results indicated that the cyclist conceptualized the tasks in cycling quite differently from what existing motor tasks models and sport classification schemes would suggest.

A consistent finding of the preceding studies, all of which used the observation of task performance method, was that experts have the ability to process large quantities of information in a brief period of time. This characteristic of experts appears to be related to an ability to regroup information into meaningful units (Allard & Starkes, 1991).

In sum, task performance is a useful technique to assess the mediating cognitive structures and processes used by experts and novices when solving a problem. However, one has to realize the potential danger of studying aspects of performance which are not encountered in the normal environment of the subjects under study. If unfamiliar tasks are presented to the subjects, the inferences made by the investigators concerning the cognitive processes used by the subjects to perform the tasks might be inappropriate.

Extensive Studies of Single Subjects

Some investigators have used detailed case studies to describe the cognitive processes underlying the superior performances of individuals. Some examples illustrating this kind of research are the studies on expert memory (Chase & Ericsson, 1982; Ericsson & Polson, 1988). These studies used methods such as protocol analysis and retrospective verbal reports to identify the knowledge used by one individual over a period of time of up to two years during which the individual is trained and tested. For example, Chase and Ericsson trained a college student to recall as many as 89 digits. The subject, a competitive runner, learned to group the digits into chunks of three or four numbers that could be remembered as running times for specific races, such as the one mile world record or one mile high school times. Then, these categories were regrouped into higher level categories, such as running times for the 3/4 mile, 1 mile and 2 mile races. Other case studies have examined the exceptional memories of a restaurant headwaiter (Ericsson & Polson, 1988) as well as expert calendar

calculators, who can name the day of the week on which any given date falls (Ericsson & Smith, 1991).

Extensive studies of single subjects permitted Chase and Ericsson (1982) to establish five principles which characterize experts' memory: 1) experts encode information using existing semantic memory patterns, 2) the use of retrieval structures for encoding guarantees the accessibility of information at the time of recall, 3) encoded information is stored in long-term memory and can be retrieved over surprisingly long intervals, 4) the speed of encoding increases with practice, and 5) memory skill is domain-specific and does not transfer to different situations.

In sum, investigations using case study methods have revealed important information about expert performance. The strength of this method lies in the possibility of studying cognitive changes of a single subject over an extended period of time, however, because these studies focus on only one individual, generalizations are limited in nature.

Psychometric Tests

Few studies have attempted to measure experts' knowledge using psychometric tests such as questionnaires. In sport, McPherson and Thomas (1989) developed an instrument to evaluate tennis players' skills and knowledge. The multiple choice knowledge test measured different aspects of tennis such as rules, players' positions, stroke production, and scoring, while the skill test measured the players' abilities to direct the ball to specific targets on the court. The authors showed that the experts possessed more sport skill and sport knowledge than did the novices. Using the same psychometric test, McPherson and French (1991) also showed that one's declarative knowledge base is important in learning and performing tennis skills.

Baria and colleagues (Baria, 1993; Baria, Salmela, Côté, & Russell, 1993) also designed a psychometric test to compare the similarities and differences concerning the coaching knowledge of expert Brazilian, Canadian, Chinese, German, and Russian gymnastic coaches. Preliminary results indicated that the five groups of coaches were fairly homogeneous in terms of declarative and procedural knowledge, however, they presented some differences regarding their metacognitive knowledge.

In sum, psychometric tests to assess expert and novice knowledge can be useful in comparing large samples of subjects. However, psychometric instruments need to be built for domains where specific knowledge items are known to differentiate between expert and

novice performance (McPherson & Thomas, 1989). The validity of a psychometric instrument can be enhanced with the construction of a questionnaire using items elicited from interviews with experts (Reitman-Olson & Biolsi, 1991).

Interviews

Interviewing is another method for eliciting knowledge from experts. This method has been used mostly with experts to examine the development of expertise (Bloom, 1985; Campbell, Brown, & DiBello, 1992; McCaffrey & Orlick, 1989; Orlick & Partington, 1988) or to build expert systems (Hayes-Roth, Waterman, & Lenat, 1983; Mishkoff, 1985; Wielinga & Breuker, 1985). In particular, Bloom and colleagues used in-depth interviews to investigate the career development of 120 American world class performers who had been acknowledged by their peers to have been among the top 25 performers in their domain. Bloom and his colleagues identified experts in the field of sport, science, and the arts. Their results revealed that there were three distinct career phases for the initiation, development, and mastery of the talent of all performers. Similarly, Orlick and Partington (1988) used in-depth interviews to investigate mental readiness and mental control of 75 elite athletes who participated in the 1984 Olympic Games in Sarajevo and Los Angeles. They identified seven "mental links to excellence" associated with success.

Interview techniques have also been used for the first phase of studies to elicit information that can be used later with other techniques, such as protocol analyses or sorting methods. For example, Joseph and Patel (1990) asked medical experts for causal explanations of medical cases. In a first interview, the subjects revealed various concepts and categories included in their domain. Then the authors used protocol analysis to identify how the subjects used the concepts elicited in the interview when making a diagnosis. Similarly, Russell (1990) and Russell and Salmela (1992) used a structured interview technique with elite athletes to identify sport situations which were perceived to present certain demands. These sport task situations were then used in a card sorting procedure to examine the athletes' cognitive processes when classifying the different tasks.

In summary, the use of interviews is an appropriate technique for describing the formal characteristics of complex task environments. In complex domains of expertise where problems and tasks are ill defined, interviews with experts are a reliable method to capture the task and prerequisite knowledge necessary to deal with that domain (Gammack & Young, 1985; Russell & Salmela, 1992).

Summary of Results on Expertise

Based upon empirical findings and extensive reviews of the literature on expertise, Glaser and Chi (1988) identified seven dimensions which distinguish expert and novice performance: 1) experts excel mainly in their own domain, 2) experts are fast: they are faster than novices at performing the skills of their domain, and they quickly solve problems with little error, 3) experts spend a great deal of time analyzing a problem qualitatively, 4) experts have superior memory ability in their domain, 5) experts represent problems in their domain at a deeper level, 6) experts perceive large meaningful patterns in their domain, and 7) experts have strong self-monitoring skills. These characteristics, based on numerous experiments in which expert and novice differences were contrasted, appear to be robust and generalizable across a variety of domains. However, as with any single approach to research, the expert-novice paradigm has some limitations.

A Critique of the Expert-Novice Research Paradigm

Ericsson and Smith (1991) defined three research steps essential for understanding expertise. The first step was to find or design specific tasks that captured the superior performance of individuals in a domain of study. The second step was to use the tasks identified in the first step to examine the phenomena associated with a particular type of expertise. The final step for understanding expertise was to describe how superior performance was acquired, in other words, what was found from the second step. Most studies conducted within the expert-novice paradigm have focused on the last two steps and have generally paid little attention to the first step by choosing typical problems in a specific domain of expertise (Ericsson & Smith, 1991; Perkins, Schartz, & Simons, 1991). Ericsson and Smith asserted that there are

"...some potential dangers of studying aspects of 'real' expert performance with tasks not encountered in the normal environments of the experts. If we provide an expert with unfamiliar tasks, we need to consider the possibility that the expert may resort to nonoptimal and unstable strategies that can be rapidly improved even during just a couple of sessions." (p. 24)

In fact, many complicated and unstructured domains of expertise have not yet been adequately captured and the first step of the expertise approach has sometimes been neglected. Ericsson and Smith further suggested that: "to understand the many factors

underlying why some individuals attain the highest levels of performance whereas others do not, we need to broaden our approach" (p. 33).

The present study, using a qualitative method of investigation, focuses on the first step of the expertise approach, that is, to identify knowledge and tasks that capture the superior performance of expert coaches. To reach this objective it is important to chose a framework within which coaches' knowlege will be represented.

Knowledge Representation

Questions on how knowledge is organized, structured, and used is a central aspect of cognition and the study of expertise. Various representational systems of knowledge based on propositional representation have been suggested over the last 20 years, the most important being the frame (Minsky, 1986), the semantic network (Anderson, 1983), the script (Schank, 1980), and the schema (Rumelhart, 1980). These representational systems share the common characteristics of knowledge being represented as a set of discrete symbols or propositions; in other words, the concepts of the real world are represented by formal statements.

Although these propositional systems of representation are valuable for regrouping information, there is a lack of flexibility in certain situations. For example, when events are highly atypical, a single schema or script might not contain the knowledge structure to suggest an appropriate behavior. To demonstrate the inflexibility of a script for certain situations, Holland, Holyoak, Nisbett and Thagard (1986) used the example of a "restaurant script". Such a script would contain the organizational knowledge used when a person goes to a restaurant: he or she gets a table, waits for the menu, orders, eats, pays the bill, and leaves. However this script would be inappropriate if a goat entered the restaurant, since the script would not contain any information on "goat entry in the restaurant" and appropriate actions. The script or schema might be of some use but only in combination with other knowledge structures, such as rules which permit the activation and integration of multiple knowledge structures (Holland et al., 1986).

The mental model was proposed in order to overcome the inflexibility of propositional systems of representation (Holland et al., 1986; Johnson-Laird, 1983). Unlike a propositional representation, mental models allow the combination of two or more existing knowledge structures. The flexibility of mental models comes from allowing rules to operate in parallel so that new combinations of existing rules can be used to model novel situations

and create new structures. Therefore, the mental model becomes an analogy between the domain it represents and a person's cognitive representation of the domain.

Johnson-Laird (1983) suggested that the psychological core of understanding consisted of having a "working model" of a phenomenon in mind. If individuals understand inflation, a mathematical proof, or how to develop talented athletes, then they have a model to make decisions and solve problems in their specific domains. The "working models" constructed by individuals are not necessarily complete, accurate understandings of a phenomenon, but rather useful representations of how the variables and concepts of the phenomenon interact (Glaser, 1987). Johnson-Laird explained the nature of mental models as follows:

Your model of a television set may contain only the idea of a box that displays moving pictures with accompanying sound. Alternatively, it may embody the notion of a cathode-ray tube firing electrons at a screen, with the beam scanning across the screen in a raster controlled by a varying electro-magnetic field, and so on. You may conceive an electron as nothing more than a negatively charged particle whose trajectory is influenced by a magnetic field. There may be no need for you to have any deeper understanding, because you can grasp the way the set works without having to reduce everything to its fundamental principles. A person who repairs television sets is likely to have a more comprehensive model of them than someone who can only operate one. A circuit designer is likely to have a still richer model. Yet even the designer may not need to understand the full ramifications of quantum electro-dynamics - which is just as well, because nobody completely understands them. (p. 3-4)

The point here is that there are not complete mental models for any empirical phenomena. However, being familiar with the kinds of models experts use can give valuable insights into the important features of their domains as well as provide analogies which could facilitate the acquisition of relevant knowledge for novices (Schumacher & Czerwinski, 1992). In fact, according to Schumacher and Czerwinski (1992) and Gick and Holyoak (1985), learning by analogy enables new knowledge representations to be created from existing ones. In situations where new types of solutions are to be learned, a learner can use analogical reasoning to map new concepts with an existing mental model (Holyoak, 1984). This kind of approach provides a framework from which learning can result from a deductive as well as an inductive process.

Mental models are also important to knowledge representations because they facilitate searches through a knowledge base by helping to group facts and rules that are likely to be used together. The research on expertise has shown that experts categorize problems based

on structural aspects while novices rely on more superficial features. According to this view, the acquisition of expertise can be seen as an evolution from the learner, who principally relies on the superficial and less relevant features of a domain, to the experienced individual, who relies more on the structural and most relevant features of the domain. Therefore, with expertise, the correspondence between mental models or internal representations and real situations are as direct as possible. For instance, a novice coach will most likely spend the bulk of his or her time attempting to recognize and map the relevant features of a specific situation, building the best internal representation from the available knowledge, while an expert will rapidly recognize systemic patterns of behavior and activate the most appropriate conceptual model from memory.

Research Objectives

It is within the expertise approach that the nature of the mental models of expert gymnastic coaches will be investigated. The purpose of the present study is to capture the content and organization from which mental models of coaches are constructed. A taxonomy of the experiential knowledge and mental models used by expert coaches will provide specific cases that have been tested in real situations. More specifically, two objectives are at the foundation of the present study:

- 1) To identify the knowledge and tasks that characterize expert gymnastic coaches**
- 2) To provide a conceptualization of how expert gymnastic coaches' knowledge is represented and used through mental models.**

These two research objectives correspond to the first two stages of knowledge acquisition through which knowledge engineers proceed for constructing expert systems (Buchanan et al., 1983). In the present study, the first objective, or the identification stage, consisted of elucidating a collection of specialized facts, procedures, and strategies about the domain of gymnastic coaching. The second objective, or the conceptualization stage, was aimed at uncovering a conceptualization of the process used by the coaches to generate solutions and make optimal use of their knowledge.

CHAPTER 3

METHODS

After reviewing research dealing with coaching and expertise, it is evident that little is known about the knowledge required to be an expert gymnastic coach. Few investigators have thoroughly entered the coach's world to understand the nature of their work. The present state of knowledge about gymnastic coaches along with the objectives of the present study show the need for a qualitative methodological paradigm that will provide flexibility and freedom to explore gymnastic coaches' knowledge.

Qualitative Research Traditions

In a review paper on qualitative research, Jacob (1987) illustrated how various qualitative traditions of research differ in their assumptions, focus and methodology. The assumptions underlying the present study are that the knowledge domains pertaining to elite gymnastic coaches have not yet been identified. Thus, the focus is on identifying the knowledge and concepts perceived as being important by expert gymnastic coaches. Therefore, the assumptions and focus of this study are similar to qualitative research traditions referred to by Jacob as cognitive anthropology and symbolic interactionism.

Cognitive Anthropology

Cognitive anthropologists are interested in providing a complete and accurate description of the organization of particular cognitive systems. In contrast to researchers in many other qualitative traditions, they are not concerned with observable behavior (Tyler, 1969). The aim of this qualitative research framework is to discover how knowledge is organized by using participant's categories and by focusing on the semantic relationships used to organize different categories of knowledge.

Interviews, or controlled eliciting, is the main method of data collection for cognitive anthropologists (Jacob, 1987). Spradley (1979) elaborated on the use of three different types of questions for eliciting knowledge. In the beginning phases of a study, researchers frequently ask open-ended descriptive questions to learn about the informant's regular activities. Then, some structural questions are asked to find out how informants have organized their knowledge. Finally, contrast questions are asked to discover what an

informant means by some of the terms used. These three types of questions provide a systematic framework for eliciting knowledge from an informant. More detail on utilization of this type of questioning is extensively discussed by Spradley.

Language analysis is the main type of data analysis for cognitive anthropologists. The analysis does not focus on the interpretation of written data but rather on the semantic relationships of the language. Cognitive anthropologists work with distinguishable units, called "symbols", which are linguistic units representing a culture (Spradley, 1979). Therefore the task consists of uncovering structures that are believed to exist in the data by finding similarities, differences, and relationships between symbols. In language-oriented studies, such as most of the studies within the tradition of cognitive anthropology, the commonly explored relationships are those of inclusion (a kind of), attribution (an attribute of), means-end (a way to), rational (a reason for), function (is used for), and also spatial, temporal, and cause-effect relationships (Spradley, 1979). Tesch (1990) referred to this type of language-oriented analysis as "structural qualitative analysis" because "the analysts assume that the structure is actually inherent or contained in the data and the researcher's job is to uncover it " (p. 103).

Although most of the studies using the framework of cognitive anthropology have used a language-oriented analysis (Tesch, 1990), some cognitive anthropologists have put more emphasis on cognition instead of linguistics to describe the body of knowledge of a culture (Agar, 1983; Agar & Hobbs, 1985; Dougherty & Keller, 1985). Since these authors were interested in the subjects' interpretations of different events, they investigated the organization of knowledge of individuals by examining the meaning of text segments. When cognitive anthropologists are interested in the interpretation of communication to examine a cognitive system instead of the structure of the language, it becomes a qualitative research tradition closely allied with symbolic interactionism (Jacob, 1987, 1988).

Symbolic Interactionism

Symbolic interactionists are interested in individuals' interpretations of their experience and on the processes by which meanings and knowledge are developed and used to guide actions (Jacob, 1987; Tesch, 1990). In this qualitative tradition of research, data are collected mainly through interviews, life histories, case studies and participant observation (Jacob, 1987). According to Blumer (1969), "The end result of a symbolic interactionism study is the formulation of propositions about relationships among categories of data, which

the researcher weaves into a 'theoretical scheme'" (p. 48).

Tesch stated that few methodological techniques are available to researchers who wish to conduct a symbolic interactionism study. However, Jacob (1987) argued that the methodological approach of "grounded theory" developed by Glaser and Strauss (1967), although not designed in the symbolic interactionism tradition, can be used as a methodological framework by symbolic interactionists since they share the same focus and assumptions. In fact, symbolic interactionism, as well as grounded theory, does not test or try to prove existing theories but rather tries to develop concepts and theories which account for the behaviors of the individuals under study (Glaser & Strauss, 1967; Jacob, 1987; Tesch, 1990). The units of analysis for both approaches are segments of text which are classified by being coded in order to allow the analyst to quickly find them. Then all segments which relate to a particular question, concept or category are clustered together (Tesch, 1990). Tesch referred to this type of analysis as "interpretational qualitative analysis" because "the interpretational researcher 'overlays' a structure of her/his own making on the data, as a device for rendering the phenomenon under study easier to grasp" (p. 103).

Bridging the Gap Between Cognitive Anthropology and Symbolic Interactionism

The focus of the present study was to examine expert gymnastic coaches' knowledge to gain a better understanding of their work. The approach is "cognitive," though in a different way than indicated by the traditional use of the term in cognitive anthropology. The categories of knowledge and the mental model generated from the interviews with coaches were interpretive in the sense that the understanding of the researcher was based on an interpretation of some text segments. This type of approach fits into a recent trend in cognitive anthropology that blends in with the interdisciplinary field of cognitive science. This trend focuses more on explicit representation of knowledge rather than the structure of language and semantics (Agar & Hobbs, 1985).

This recent trend in cognitive anthropology was used by Dougherty and Kelier (1985) to understand better the knowledge of blacksmithing. They interviewed blacksmiths to discover the way they organized relevant knowledge about such things as tools, products, and materials they worked with. Their results provided a set of names which reflected a variety of basic elements relevant to blacksmithing. In another study using a similar approach, Agar and Hobbs (1985) interviewed one subject, Jack, to find out "how he became

a burglar." The results of their study allowed them to construct a network of schemata representing Jack's knowledge of the facts perceived as important for becoming a burglar. For example, Jack talks about his "social isolation", "the life he was leading", and "when he met Johnny, the man who eventually teaches him burglary." The knowledge contained in these schemata demonstrate how Jack made sense of a variety of situations and how these situations were linked to his burglar life.

Agar and Hobbs' (1985), as well as Dougherty and Keller's (1985), studies are examples of studies done within the framework of cognitive anthropology with a focus on cognitive processes instead of linguistics. Agar and Hobbs described their approach in the following terms:

The approach is cognitive, in the sense that we are concerned with the representation of knowledge needed to understand the expression of one tradition through the eyes of another. However, we do not claim that it is 'psychologically real' or that we have arrived inside Jack's head. Whatever the internal cognitive and affective processes were that constituted Jack's 'lived experience' of the interview, the coherence analysis only sets out to understand the results of those processes from a particular point of view. (p. 429-430)

The study of the processes by which knowledge is developed and used to guide behavior have also been the concern of symbolic interactionists and grounded theorists. They believe that reality cannot actually be known and is always interpreted, thus, the best way to bring reality to light is to develop theoretically informed interpretations (Blumer, 1969; Glaser, 1978). The formulation of concepts and theory implies interpreting and conceptualizing the data as well as relating the concepts to form a "theoretical explanation of reality" (Strauss & Corbin, 1990) similar to the approach used by Agar and Hobbs (1985) in their study.

Therefore, the investigation of gymnastic coaches' knowledge through the analysis of meaningful episodes of information is similar to the trend of cognitive anthropology, which focuses on knowledge representation. Also, because the present study is concerned with the construction of mental models that would represent coaches' knowledge, it also fits the grounded theory approach of explaining reality by providing a framework for action.

Considering the focus of the present study, the "controlled eliciting" method of cognitive anthropologists (Spradley, 1979) is most suitable for eliciting knowledge from expert coaches because the grounded theory methodological framework provided few explicit techniques to collect experts' knowledge (Charmaz, 1983). However, cognitive

anthropologists have mostly analyzed data using a linguistic approach and few procedures are available for interpretational qualitative analysis (Tesch, 1990). The interpretational qualitative analysis or the inductive construction of categories generated from the data have been extensively discussed by grounded theorists (Charmaz, 1983; Glaser & Strauss, 1967; Strauss, 1987; Strauss & Corbin, 1990) and other authors, whose techniques underlie the same basic principles of grounded theory (Huberman & Miles, 1990; Tesch, 1990).

Therefore, the analysis of the interview transcripts of expert coaches follows the general principles underlying grounded theory construction. On the other hand, the methodological framework for data collection used in the present study was inspired from techniques used in cognitive anthropology (Spradley, 1979) as well as qualitative methods of interviewing (Brenner, 1985; Jones, 1985; Patton, 1987) and specific guidelines for eliciting knowledge from experts (Gammack & Young, 1985; Marshall & Rossman, 1989; Reitman-Olson & Biolsi, 1990).

Some Preliminary Statements on the Chosen Method

Based upon the qualitative research traditions just discussed and some qualitative research principles provided by Tesch (1990) and other authors, some general statements on the method used to examine expert coaches' knowledge can be articulated:

- 1. Analysis is not the last phase in the research process; it is concurrent with data collection (Tesch, p. 95).** This strategy helps to strengthen the quality of the data and the concepts that develop from the analysis (Charmaz, 1983). Both data collection and data analysis inform each other (Huberman & Miles, 1990) and the two become "integrated" in the research process (Glaser & Strauss, 1967).
- 2. Processes and products of the research are shaped from the data rather than from an existing theoretical framework (Charmaz, p. 110).** The analysis procedure relies on inductive reasoning rather than on logical deductive reasoning. Tesch described this flexible process in the following terms "some topical categories, relating to a conceptual framework or to a particular research question may exist before analysis begins, but for the most part the data are 'interrogated' with regard to the content items or themes they contain, and categories are formed as a result" (p. 96).
- 3. Data are segmented into relevant and meaningful units' (Tesch, p. 95).** The data are first analyzed line by line and then segmented into units or incidents which describe a behavioral action or particular event (Strauss, 1987). Tesch's definition of such a

unit is "a segment of text that is comprehensible by itself and contains one idea, episode, or piece of information" (p. 116).

4 The analysis tool is comparison (Glaser & Strauss, 1967; Tesch, 1990).

The constant comparative method developed by Glaser and Strauss is used for practically all intellectual tasks during the analysis. The goal is to look for key issues, recurrent events, or activities in the data that become categories of focus (Bodgan & Biklen, 1982). The categories of knowledge at any level of abstraction are defined and redefined based on their conceptual similarities and dissimilarities.

5. Categories generated from the data are tentative in the beginning and remain flexible throughout the analysis (Charmaz, 1983; Tesch, 1990). The theoretical interpretation of the data is flexible and categories are refined and modified until a satisfactory system is established. The aim is not to provide "a final and complete interpretation of the data" but rather to "develop a fresh theoretical interpretation of it" (Charmaz, p.111).

6. The analysis process is systematic and comprehensive, but not rigid (Tesch, p. 95). Spradley (1980) stated that "it is possible to analyze any phenomenon in more than one way" (p. 92), and Patton (1980) suggested that "each qualitative analyst must find his or her own process" (p. 299). On the other hand, Tesch pointed out that, "the researcher is not allowed to be limitlessly inventive" and some guidelines need to be respected (p. 96). Although certain authors have described qualitative analysis as an art (Guba & Lincoln, 1981; Goetz & Lecompte, 1981), "it also requires a great amount of methodological knowledge and intellectual competence" (Tesch, p. 97). Therefore each step of the analysis is documented and qualitative analysis guidelines are followed.

These six methodological statements do not provide an exhaustive description of how the knowledge of expert gymnastic coaches was investigated, however they provide a more explicit background on the methodological framework used.

The Pilot Study

The pilot study consisted of both formal and informal interviews with the national coach, as well as in-depth interviews with two successful coaches of men and two successful coaches of women who were not part of the study. Furthermore, the systematic observation of several expert coaches during training and competition helped the investigator to gain a better understanding of the coaches' roles before embarking on the study. The objectives of

the pilot study were: (1) to develop the interview guide, (2) to become familiar with interview techniques and qualitative data analysis, and (3) to identify the best coaches in Canada for developing elite male and female gymnasts.

The results of the pilot study strongly supported doing a separate analysis of coaches of males and coaches of females. More specifically, the interviews and observation showed differences between coaches of male and coaches of female gymnasts in their interactions with the gymnasts in training and competition, in their concerns, and in their training methods. Also, because of the vast amount and diversity of knowledge resulting from the pilot study it was decided to keep the interview guide as open and as flexible as possible in order to truly identify the knowledge which was perceived as important by the interviewed coaches and not by the investigators. It was decided, however, to focus the interview on two of the coaches' main intervention areas for developing elite gymnasts: training and competition. In each of these two areas of intervention a number of issues were identified as important to explore during the course of the interview. Table 1 outlines the interview guide elaborated as a result of the pilot study.

Table 1.

Interview Guide for Expert Gymnastic Coaches.

Training Considerations

What kinds of things do you do in training?

Can you give some examples of some difficult situations in training? Describe what happened and what you did.

What are the major concerns that gymnasts have in training? Give examples of situations which have occurred. What did you do when this happened?

Describe the tasks involved for developing elite gymnasts.

Describe your relationships with others in training (gymnasts, parents, coaches).

Competition Considerations

What kinds of things do you do in competition?

Can you give some examples of difficult situations in competition? Describe what happened and what you did.

What are the major concerns that gymnasts have in competition? Give examples of situations which have occurred. What did you do when this happened?

Describe the tasks involved for assisting a gymnast in competition.

Describe your relationships with others in competition (gymnasts, parents, coaches).

Is there anything else we have not covered which you feel is an important aspect of your job?

Population and Sample

The identification of experts within a domain can be problematic. Typically, researchers have used experience or the numbers of years on the job as a measure of expertise (Cook, 1992; Hayes, 1981; Posner, 1988). Hayes argued that it takes at least 20,000 hours of experience to achieve expertise in a domain. Because gymnastic coaching is a year long commitment for training and competition, a minimum of 10 years (40 hours per week) would fulfill the 20,000 hours of experience set as a necessary criterion to reach expertise. Unfortunately, experience is not always perfectly correlated with expertise (Chi, Bassok, Lewis, Keimann, & Glaser, 1989; Rutt-Leas & Chi, 1993; Posner, 1988;). Posner (1988) pointed out that there are other factors more difficult to assess than experience, such as motivation, which are also relevant to becoming an expert.

Thus, based on the recommendations of these authors, the selection of expert high performance coaches was based on multiple criteria. First, a minimum of 10 years of coaching experience was required. Additionally, all, coaches had competed as a gymnast in provincial, national and / or international competitions except for two coaches who had 15 and 17 years of experience to compensate. Second, each of the expert coaches required a performance outcome measure, and thus needed to have developed at least one international and two national level gymnasts. These gymnasts were senior athletes who had merited a place on the team at an international competition or at the national championships by the Canadian Gymnastic Federation. Third, each expert coach had to be recognized by Canada's national coach as one of the best in Canada for developing elite gymnasts. All of the chosen coaches were involved in coaching at the time of the interview and worked with high performance athletes who, according to Bloom's (1985) model, were in their later years of talent development. Russell (1987) referred to this phase of the gymnast's career as one of "talent perfection".

Because of the in-depth character of each interview, the interpretational nature of the analysis and the limited number of high performance gymnastics coaches in Canada, 17 coaches were considered to be representative and to meet the objectives of the study as well as the criteria of expert selection. This number of subjects is consistent with other studies which used similar methodologies (Rail, 1990; Russell, 1990) and which reached "theoretical saturation". Theoretical saturation is reached when the data from subsequent interviews of new subjects does not contribute any new information, but fits adequately into the existing organizing system (Glaser & Strauss, 1967). Also, because of differences in age,

physiological make-up and task characteristics of male and female gymnasts as well as the different behaviors that coaches of male and female athletes exhibit (Salmela, Petiot, Hallé, & Régnier, 1980; Baria & Salmela, 1988), nine of the chosen coaches worked with male and eight worked with female athletes. The two groups were analyzed separately. The number of gymnasts developed at the international and national level as well as the number of years of coaching experience are displayed in Table 2 for all the coaches of females and in Table 3 for all the coaches of males. Finally, because no women coached men's gymnastics, all coaches in Table 3 were men, whereas coaches F1, F3, F6, and F7 in Table 2 were female coaches coaching women's gymnastics.

Table 2

Number of Gymnasts Developed and Years of Experience for Coaches of Females

Coach	Years of Experience	Numbers of Gymnasts Developed	
		International	National
F1	21	9	30
F2	20	15	20
F3	20	10	20
F4	16	15	20
F5	15	9	30
F6	15	8	17
F7	10	6	20
F8	10	1	7
M	15.8	9.1	20.5

Table 3

Number of Gymnasts Developed and Years of Experience for Coaches of Males

Coach	Years of Experience	Numbers of Gymnasts Developed	
		International	National
M1	40	30	50
M2	30	20	40
M3	20	4	20
M4	20	1	5
M5	17	6	15
M6	15	15	25
M7	15	4	11
M8	10	12	20
M9	10	1	2
<u>M</u>	19.7	10.3	20.9

Interview Technique

Although interviewing techniques have been categorized in many ways in the literature, the major distinctions are between "structured", "standardized" or "focused" interviews and "unstructured", "elite", "exploratory", "intensive", "ethnographic" or "guided" interviews (Brenner, 1985; Guba & Lincoln, 1981; Jones, 1985; Patton, 1980; Spradley, 1979). The terms "standardized" and "interview guide," employed by Patton, will be used in this study to differentiate between the two types of interview.

In the standardized interview, the questions are formulated ahead of time and all informants are asked the same questions in the same order. In contrast, the interview guide approach covers broad topics and issues that are specified in advance; the interviewer decides the sequence and the wording of questions during the course of the interview. Thus, unlike a standardized interview, the interview guide approach is concerned with unique and individual viewpoints (Guba & Lincoln, 1981). Because elite performers or experts respond well to broad areas of content and open-ended questions that allow them to use their knowledge and imagination, the in-depth interview or interview guide approach has been suggested as the ideal type of interview for eliciting expertise from elites (Marshall & Rossman, 1989).

In the present study, the interview guide approach consisted of asking questions to elicit relevant knowledge from expert coaches. The elucidated expertise was a collection of concepts, specialized facts, procedures and judgmental rules about the specific domains of

high-performance coaches rather than general knowledge or common sense knowledge about coaching.

The interview guide, developed from the pilot study (Table 1), served as a basic checklist during the interview. Although the interview guide provided topics to be explored, any new subjects which emerged from each interview that were relevant to the objectives of the study were explored and probed. This flexibility of the interviewer is essential when interviewing experts since any restrictions placed on the informants can narrow the scope of the interview and interfere with the eliciting process (Reitman-Olson & Biolsi, 1991). In working with experts great demands are placed on the interviewer, who generally has less knowledge on the topic than the informant. The interviewer's role, therefore, is to establish competence by "projecting an accurate conceptualization of the true problem" through acute and judicious questioning" (Marshall & Rossman, 1989).

Methodological Considerations

Recognizing and desiring to release the knowledge and understanding locked in an expert's mind requires a commitment of time and resources in collecting, analyzing and interpreting the data (Brown & Canter, 1985). The assumptions underlying this commitment to the use of interview for the identification of expert coaches' knowledge are twofold. First, expert coaches are in the best position to provide an accurate account of the relevant knowledge needed to develop elite gymnasts. Second, the coaches' own accounts provide the best explanations of that knowledge.

The in-depth interview is one of the most valuable techniques for truly understanding the richness of another person's perspective (Brown & Canter, 1985; Guba & Lincoln, 1981; Jones, 1985; Patton, 1987). The in-depth interview offers a means to extend and amplify meanings that might be lost through other techniques of data collection. Guba and Lincoln (1981) argued that "even open-ended questionnaires, once they are filled out, leave little room for clarification unless there is continuing contact with the respondent" (p. 136). A person being interviewed can immediately and precisely tell the meaning of his or her understanding of different situations. Further, the in-depth interview is an ideal method to continually check the credibility of the information collected by constantly questioning the interpretation (Kvale, 1989).

If one considers the large body of experience, self-generated knowledge and acquired procedures of expert gymnastic coaches, it is clear that there is a rich and vast amount of

knowledge which has not yet been identified and understood. Guba and Lincoln (1981) view the in-depth interview with "elites" as an opportunity to explore and increase our understanding of their expertise:

The human being as inquirer also has an opportunity to explore responses from individuals who have special expertise, who have unique perceptions or roles, or who may provide atypical or idiosyncratic responses. These respondents' reactions, feelings, or inside information would most likely be lost on a standardized questionnaire or in the context of a highly structured interview, even if it were possible to persuade such 'elite' subjects to participate in the first place. But because of circumstances, position, authority, or some other social structuring, their perspectives on the matter under investigation are sufficiently singular to enable them to provide information that could not be duplicated under any other conditions than those of the 'elite' interview. (p. 137-138)

The in-depth interview constitutes a unique method to increase our understanding of expert gymnastic coaches which would be difficult to obtain within the boundaries of orthodox science or other qualitative data collection techniques. In-depth interviews have been assessed as one of the best methods to inductively identify and conceptualize the terminology and main components of a knowledge domain (Gamack & Young, 1985; Marshall & Rossman, 1989; Reitman-Olson & Biolsi, 1991; Wielinga & Breuker, 1985). Accordingly, the in-depth interview technique has been widely used in building expert systems (Hayes-Roth, Waterman, & Lenat, 1987; Hoffman, 1987) and in studies which have adapted a developmental approach to expertise (Bloom, 1985; Campbell, Brown, & DiBello, 1992; Orlick & Partington, 1987).

Despite the strengths of the in-depth interview technique, certain authors have raised some methodological questions concerning the authenticity and validity of the informants' explanations (Brenner, 1985; Brenner, Brown & Canter, 1985; Denzin, 1970; Wielinga & Breuker, 1985). Wielinga and Breuker identified possible biases which could affect the validity of the data obtained from interviews with experts. The biases mentioned were: 1) the expert may forget to mention essential features or special conditions of certain cases; 2) the knowledge may be difficult to express in language because of its complexity; 3) some knowledge may not be consciously accessed by experts; 4) experts may not further elaborate on some issues if they assume that they are known; 5) experts may not be motivated to reveal their inner thoughts; and, 6) most experts have little or no experience in giving reports of their thinking. To minimize the bias effect, all the interviews were carried out in an environment with few distractions and a designated interview format was used. The context and design of

the interview format will be outlined first, then other measures taken to increase the validity of the interview process will be described.

Context of the interviews. Three investigators proceeded with the interviews. One of the interviewers, who worked as a mental training consultant with the Canadian Gymnastic Team, knew all the interviewed coaches for several years. This interviewer had a more intimate relationship with some of these coaches by having worked with their athletes. The other two interviewers, including the author, were introduced to the coaches at a preparation camp for a National Championship in Montréal and at a preparation camp for the World Championship in Toronto. Thus, all the coaches were acquainted with the three interviewers before actually being interviewed.

It was thought that if the interviewer knew the coach too well certain questions might not be asked and some information might be assumed, tainting the content of the interview. To minimize this possible bias, 13 of the 17 interviews were done by the two interviewers who had never worked with these coaches. Five of these 13 interviews were done in the french language by one interviewer and eight in the english language by the other interviewer. The remaining four interviews were done by the third interviewer who had never consulted with any athletes of the coach interviewed and therefore had a less intimate relationship with them.

Each coach planned at least four consecutives hours for the interview. The interviews lasted between one and a half and three and a half hours. Ten of the 17 interviews took place in the coaches' office before or after a training session. Of the remaining seven interviews, two took place in hotel rooms, two in separate rooms at a training camp, one at a coach's house, one at an interviewer's house, and one at a restaurant.

Design of the interview format. The same format was used for each interview. The interview format followed the guidelines for ethnographic interviews proposed by Spradley (1979). Each interview began with general information about the purpose of the project (Section I) and then focused on background and demographic questions (Section II). Finally, the knowledge elicitation took place in Section III with three kinds of open-ended questions and some simulation questions; the basis for these questions was drawn from the interview guide designed in the pilot study. Table 4 outlines the flow structure of the interview format; each section will be discussed to provide the logic underlying the structure.

Table 4

Flow Structure of the Interview Format

Section I: INFORMATION ABOUT THE PURPOSE OF THE PROJECT

Phase 1: Introductory comments

Phase 2: Project explanations

Phase 3: Recording explanations

Section II: DEMOGRAPHIC QUESTIONS

Phase 4: How they became involved in gymnastics

Phase 5: Previous athletic and coaching experience

Phase 6: Characteristics of gymnasts currently being coached

Section III: INTERVIEW GUIDE QUESTIONS

Phase 7: Descriptive, structural and contrast questions

Phase 8: Simulation questions

Section 1 was aimed at establishing a rapport with the coach and at explaining the general purpose and specific directions of the project. First, some introductory comments helped to start an informal and friendly conversation with the coach. Second, the researcher informed the coach about what the project was all about. The interview approach was explained and the design of the interview format was presented so the coach would know what to expect from the interview. Third, the investigator asked if it was possible to record and take notes of the information provided during the interview. After these preliminary explanations, each coach read and signed the consent form.

Section 2 of the interview format was designed to direct the coaches in those channels that lead to discovering their knowledge. The questions asked dealt mainly with how the coach became involved in gymnastics, his or her previous athletic and coaching experience and the characteristics of gymnasts currently being coached. These questions helped to create a favorable context for the next section.

Section 3 of the interview format involved the use of the interview guide for asking questions to elicit knowledge from the coaches. The technique used for asking questions in this section was based upon Spradley's (1979) controlled eliciting and Patton's (1980) guidelines for interviewing. It involved the use of Spradley's three kinds of open-ended questions for eliciting knowledge: 1) "descriptive questions" to learn about the informant's activities, 2) "structural questions" to discover how the informant organized his or her knowledge, and 3) "'contrast questions' to find out what an informant meant by the various terms used" (p. 60).

The following are some examples of descriptive questions used: "Could you tell me what you do in a training session?" or "Could you describe the tasks you performed in the last competition you attended?" The descriptive questions were asked in order to identify topics and situations that the coach perceived as important. Once those specific situations had been elicited, the researcher then asked structural questions to gain as much information as possible about each issue. The following is an example of a structural question: "You mentioned before that dealing with an athlete's financial problems is an important part of your job. What do you do when a gymnast has financial difficulties?" Finally, the contrast questions were employed to clarify and distinguish between issues and situations. A typical contrast question would be: "What are the differences between training an eight year old gymnast and a 15 year old gymnast?"

To assure further the authenticity of the coaches' responses, coaches were regularly asked for specific situations that happened in training and competition. One technique used for eliciting "real" situations was to ask simulation questions as described by Patton (1980). These questions asked the coaches to simulate situations that had been experienced in training or competition and required the coaches to visualize the situation to be described. Examples of these questions are: "Suppose I am a new seven year old gymnast in your club. Can you tell me what would be going on in my first training week?" or "Suppose I am one of your best gymnasts who has just fallen from the bars at an international competition, what would you do when it happens, after the event, after the competition?"

By using the three types of open-ended questions and the simulation questions, several of the biases mentioned by Wielinga and Breuker (1985) were minimized. All of these questioning methods helped to elicit knowledge which might have been difficult to access by experts. Furthermore, complex knowledge, which is often difficult to express in response to open-ended questions, might have been easier to elucidate when specific situations were simulated. Besides the designated interview format and the use of special questions for eliciting knowledge, the interviewers further attempted to minimize any possible biases during the interview by taking some additional measures, thus protecting the authenticity of the interview data.

Other measures taken to minimize interview biases. The three investigators who interviewed the expert coaches received intensive methodological guidance from an experienced qualitative researcher (Dr. Storm Russell, research manager of the Canadian Fitness and Lifestyle Research Institute) and through six different seminars on "expertise in

sports" with Dr. Ted Wall from McGill University and Dr. Claude Alain from the University of Montréal. The three investigators acquired additional knowledge on interview techniques by reading relevant materials written by authors such as Patton (1980, 1987), Brenner, Brown and Canter (1985), Spradley, (1979), Jones, (1985), Lofland (1971), and Werner and Schoepfle (1987). Finally, the main investigator increased his knowledge about qualitative methods of investigation by attending a qualitative research class with Dr. Jean-Paul Dionne from the University of Ottawa. This overall training helped to design the interview schedule described in the last section as well as to provide important devices for minimizing biases when interviewing experts. Some of the specific measures taken during the interview are listed below:

1) Clear and applied questions: The questions asked were as precise as possible about the coaches' working methods and about what they knew and did in different coaching situations. The investigator used the terms, language, and frame of reference of the coach being interviewed. This helped each coach to assess and express his or her actual state of knowledge concerning the development of elite gymnasts. Furthermore, when asked to recall specific situations, the coaches were reminded to mention essential features or special conditions within which their knowledge or action were triggered. This helped to prevent the expert from omitting certain information.

2) Probe questions: Each issue perceived as relevant for developing elite gymnasts was deeply investigated and explored during each coach's interview. The detail-oriented probe questions were the basic "who", "where", "what", "how" and "when" that are used to get a complete and detailed picture of some activity or experience (Patton, 1987). As suggested by Patton, (1980) the "why" questions were used as little as possible since they presume a cause-effect relationships which makes the analysis difficult. The issues revealed by the coaches were probed until they had no new information to provide. This procedure helped to reduce the bias that results when experts don't elaborate on issues on which they assumed the interviewer is knowledgeable. It also helped to alleviate the omission of certain features or conditions of different situations.

3) Neutrality and rapport: Patton (1980) defined rapport as "a stance vis-à-vis the person being interviewed" (p. 127) and neutrality as "a stance vis-à-vis the content of what that person says" (p. 127). In the interviews with expert coaches, neutrality meant that the investigator did not react with either favor or disfavor to the content of the interviews. For instance, no leading questions giving hints about what would be a desirable or appropriate answer were asked. However, while the investigator was neutral regarding the content of the

interview, he was caring about the willingness of the coach to share his or her knowledge and experiences. This was emphasized from time to time during the interview with body signs of verbal tracking, such as nodding, and with words of thanks, support, and praise which helped make the coach feel that the information of the interview was valuable. This type of relationship with the coaches during the interviews helped to create a context within which they felt comfortable and motivated to express their knowledge (Patton, 1987), thus alleviating further potential bias.

These measures, along with the general interview format and interview guidelines helped experts who may have had little or no experience in reporting their thinking to express their thoughts as thoroughly as possible. Thus all of the potential biases identified by Wielinga and Breuker (1985) were addressed so that their effects on the interview validity was reduced or eliminated.

Data Preparation

The amount of data generated from the in-depth interview with each coach varied, each interview lasting between an hour and a half and three and a half hours. Since the raw data of interviews were quotations, a full verbatim transcription of each interview was done as soon as an interview was completed. Only minor editing procedures were performed on the data, mainly, names and references which threatened the anonymity of the coaches were deleted and relevant information was added in brackets to clarify any ambiguous segments of text.

As soon as the transcription of one coach interview was completed it was read numerous times by the investigator in order to search for any new information for future data collection (Huberman & Miles, 1990). This process helped the investigator to: 1) become highly familiar with each coach's interview, 2) continually check the credibility, plausibility, and trustworthiness of the interview process (Kvale, 1989), and 3) facilitate the later phase of the content analysis.

Data Analyses

Glaser, Lesgold, and Lajoie (1987) defined a mental model as "A qualitative internal representation of a physical device along with a set of mental procedures for 'running' that device" (p. 50). The aim of the analysis of the expert coaches' interviews was to interpret the

mental model which coaches construct in the course of developing elite gymnasts. The dynamic aspect or "runnable device" of the mental model was central for representing the knowledge that expert coaches had about the training and competition aspects of their work.

Smith (1990) and Holland et al. (1986) suggested that to be efficient, a processing system must have similar knowledge regrouped into categories. Accordingly, the interpretational analyses of the coaches' interviews were aimed at uncovering categories of knowledge and discovering their relationships in order to provide a simulated model of the knowledge involved for developing elite gymnasts. Therefore, the analyses involved two main phases: first, the development of categories of knowledge and second, the conceptualization of the categories into mental models. The analysis procedures described below were performed twice, once for coaches of female gymnasts and once for coaches of male gymnasts.

Identification of Categories of Knowledge

The objective of the analysis of unstructured data, such as that obtained from interviews with expert coaches, was to build an organizing system of categories which emerged from the data (Boose, 1985; Côté, Salmela, Baria, & Russell, 1993; Gawron, Drury, Czaja, & Wilkins, 1989; Tesch, 1990). Tesch suggested that two main operations play important roles in analyzing unstructured qualitative data. First, there is the detailed examination of the data to identify topics which best describe particular segments of text. Secondly, there is the determination of common features which characterize the text segments in order to create and understand the relationship between topics. These two operations are typical of interpretational qualitative analysis and serve to build an organizing or categorizing system from unstructured data. Côté, Salmela, Baria, and Russell suggested specific guidelines for the organization and interpretation of unstructured data, that is, first creating tags and then creating properties or categories.

Creating tags. The aim of the first part of interpretational analysis, creating tags, was to produce a set of concepts which adequately represent the information included in the interview transcripts. An open coding strategy was used to identify meaningful pieces of information (Glaser & Strauss, 1990; Strauss, 1987). This procedure involved dividing the text of each interview into text segments called "meaning units". Tesch (1990) defined a meaning unit as a "segment of text that is comprehensible by itself and contains one idea,

episode or piece of information" (p. 116). In open coding, the investigator looked for *in vivo* tags, that is, terms used by the coaches. At this point, the coder was not concerned with the aptness of the tag, for the tag could be changed in the analysis process, or could be later combined with other tags with similar meaning. Therefore, each meaning unit was tagged with a provisional name describing the topic of the text segments. In summary, the aim of creating tags was to separate relevant portions of data from their context or to "de-contextualize" the information (Tesch, 1990).

Creating properties. The second step of interpretational analysis, "creating properties", involved listing and comparing the tags derived in the first phase. Tags with similar meanings were then gathered together and a label that captured the substance of the topic was created to identify the cluster of tags (Huberman & Miles, 1990). The purpose of the second step of interpretational analysis was, therefore, to "re-contextualize" the information into distinct properties, resulting in a set of categories which served as a preliminary organizing system (Tesch, 1990).

This initial classification system was built according to three critical characteristics of categorization: (1) coding experience, (2) inductive inference, and (3) similarity (Smith, 1990). First, the coding or tagging experience, which was essential to categorizing a large amount of qualitative data, was used to rearrange the text into manageable and organized units. Second, inductive inference was used to create properties. In this process, there were no predetermined patterns before data collection; the important dimensions of the interviews emerged from the analysis. In other words, tags and properties were generated from the data (Huberman & Miles, 1991; Patton, 1980). Finally, the properties were judged by their similarity, so that the data in each property were similar to each other, yet distinct from the data of other properties (Smith, 1990). This characteristic of a property could be referred to as its internal homogeneity and external heterogeneity (Patton, 1980). Properties for sorting the segments remained flexible during the analysis process. Since properties were developed from the data, they were modified and refined until a satisfactory system was established (Tesch, 1990).

Creating categories and developing dimensions. The next step of the analysis involved two procedures aimed at defining major categories in terms of their properties and dimensions. The goal was to regroup similar properties under a more abstract category. This procedure involved the same analysis process as "creating properties" except that in the

present analysis the properties were compared instead of the tags, resulting in higher-level categories. Therefore, the properties were defined as sub-categories of a broader category and they helped to provide characteristics to that category (Glaser & Strauss, 1990).

Second, the content of the meaning units of each property was examined individually. The aim was to identify and summarize the content of each property or, more specifically, to look for "commonalities in content" and "uniqueness in content" (Tesch, 1990). This procedure allowed the investigator to provide dimensions for each property, that is, to locate the property along a continuum (Strauss & Corbin, 1990). For example, a coach may have knowledge about "giving feedback", which is a property of the higher-level category, "training technical skills". However, not every coach gives the same amount of feedback when teaching a technical skill, thus the dimension of the property, "giving feedback," could vary between "never" and "always". Providing dimensions for the properties helped to uncover as much variation as possible between coaches.

Conceptualization of Categories of Knowledge

Following the procedures of grounded theory (Strauss & Corbin, 1990), the next step was to identify relationships between categories along with their properties and dimensions in order to develop a conceptual model or mental model which would not only describe but also explain the utilization of knowledge for developing elite gymnasts. The integration of one's material into a conceptual framework has been defined by Strauss and Corbin as one of the most difficult tasks of qualitative analysis. They cited a personal communication from Paul Atkinson (Hammersley & Atkinson, 1983), who discussed the difficulty of the integration process:

This aspect--making it all come together--is one of the most difficult things of all, isn't it? Quite apart from actually achieving it, it is hard to inject the right mix of: a) faith that it can and will be achieved, b) recognition that it has to be worked at, and isn't based on romantic inspiration, c) that it isn't like a solution to a puzzle or a math problem, but has to be created, d) that you can't always pack everything into one version, and that any one project could yield several different ways of bringing it together. (p. 117)

Although the integration process can be complex, Strauss and Corbin described different procedures which facilitated the process. The first task involved for achieving integration was to identify the core categories and relate them to the research question. Strauss and Corbin described this process as "the conceptualization of a descriptive story

about the central phenomenon of the study" (p. 119). The central phenomenon of the present study was to identify the knowledge used by expert coaches for developing elite gymnasts. Therefore, this phenomenon was chosen as the ultimate goal around which all categories of knowledge would be articulated.

The second task involved in achieving integration was to write a general descriptive story to integrate the categories and determine which ones were central for achieving the goal. Because each category seemed to describe part but not the whole phenomenon, they were regrouped into sufficiently broad components to encompass the main ideas of developing elite gymnasts. This integration process consisted of comparing and relating the different categories of knowledge. Integration was not much different than the "creation of properties" except that it was done at a higher and more abstract level of analysis.

To include every category into the model it took many versions of the story. The investigator had to arrange and rearrange the components and categories in terms of their effects on the goal. The resulting mental models and stories about "developing elite gymnasts" were "grounded" with interview quotes and fit the original data found in the interview transcripts. The category description, mental models and stories resulting from the analysis of coaches of males and females were used to validate the analysis process and will be discussed in the next section.

Methods of Establishing Trustworthiness

Authors have argued that it is not appropriate to judge the validity of a qualitative study with the same criteria used to judge the validity of a quantitative study (Guba & Lincoln, 1989; Kvale, 1989; Lincoln & Guba, 1985; Marshall, 1990; Salner, 1989). Consequently, many techniques have been suggested by these and other authors (Corbin & Strauss, 1990; Huberman & Miles, 1990; Kirk & Miller, 1986; LeCompte & Goetz, 1986; Strauss & Corbin, 1990) to ensure the trustworthiness of qualitative research. Some of the techniques proposed are usable only within the qualitative research tradition for which they were designed. For instance, LeCompte and Goetz proposed several techniques to enhance the validity of ethnographic research which were not all applicable in a tradition such as grounded theory, since the methods of data collection and data analyses used in each tradition are different. Still, many techniques suggested in the literature can be adapted and applied to respond to the context of a specific qualitative research tradition (Marshall, 1990).

The most elaborate techniques used to ensure the trustworthiness of qualitative research are those proposed by Guba and Lincoln (Guba & Lincoln, 1989; Lincoln & Guba, 1985). These two authors also introduced the four terms "credibility", "transferability", "dependability" and "confirmability" to replace the conventional terms originally developed in the positivist paradigms (Table 5).

Table 5

Comparative Terms for the Trustworthiness of Quantitative and Qualitative Research (after Guba and Lincoln, 1989)

<u>Quantitative research</u>	<u>Qualitative research</u>
Internal validity	Credibility
External validity	Transferability
Reliability	Dependability
Objectivity	Confirmability

The techniques used to assure the credibility, transferability, dependability, and confirmability of the present study will be discussed.

Credibility

According to Guba and Lincoln (1989), the credibility criterion is parallel to the conventional positivist term, internal validity. In qualitative research, the idea of isomorphism between the findings of a study and an objective reality is replaced by isomorphism between the realities constructed by the informants and how these are interpreted and reported by the investigator. In other words, the focus of the qualitative researcher is to represent as accurately as possible the realities of the informants instead of focusing on a presumed "real" reality (Guba & Lincoln, 1989; Kirk & Miller, 1986; Lincoln & Guba, 1985; Polkinghorne, 1989). Six techniques were employed to minimize differences between the coaches' realities and the investigator's interpretation of these realities. These techniques will be discussed in the following section, and are as follows: persistent interviewing, electronic data handling, peer debriefing, informant checking during the analysis, informant checking after the analysis, and negative case analysis.

Persistent interviewing. The interview involved a committed involvement of the investigator and the coach. The interview schedule was designed to identify the issues most

relevant to the coach and to focus on these issues in detail. Throughout the interview process the investigator ensured that the concepts elicited by the coaches were understood in a non-superficial way. The validation and credibility checks were an on-going process which consisted of continually questioning the interpretation of the coach; each coach's interpretation was verified and communicated during the interview (Kvale, 1989; Salner, 1989). None of the interviews were rushed and the coaches always had time to clarify and reformulate their thinking. Before the end of each interview a general probe was asked to ensure that coaches had discussed every issue they perceived as important for developing elite gymnasts (e.g., "Is there anything else we have not covered which you feel is an important aspect of your job?"). These measures, along with the questioning techniques discussed in the data collection section, provided credibility to the data obtained from the interview.

Electronic data handling. A software program, HyperQual for Macintosh users (Padilla, 1989), specifically designed for qualitative analysis helped in the analyses of the coaches' interviews. The electronic organization of the data facilitated the interpretation of the results by keeping a systematic classification of each meaning unit and its source. The process of handling the data electronically, as opposed to manually, reduced the chances of errors in the tagging and categorizing tasks of the analysis and decreased the chances of losing the source of relevant pieces of information (Côté, Salmela, Baria, & Russell, 1993).

Peer debriefing. The purpose of peer debriefing is described by Guba and Lincoln (1989) as verifying the findings with individuals who have experience in the same substance area of research. The role of the individuals, involved in such a debriefing, is to question the findings and to make implicit information that the investigator might possess. In fact, testing results, concepts, and their relationships with colleagues guarded against bias (Corbin & Strauss, 1990). Accordingly, many discussions with colleagues have provided valuable insights to the investigator throughout the duration of the project. The main contributions were conceptual when the components and categories of the model were integrated and methodological to help ensure the trustworthiness of the study.

Another kind of peer debriefing which enhanced the credibility of the data was the presentation of preliminary results and methodological considerations at scientific congresses (Côté, 1991; Côté, 1990; Côté, Salmela, Baria & Russell, 1992; Salmela, Russell, Côté, & Baria, 1991). Finally, the presentation of the final results in graduate and undergraduate sport psychology classes permitted the refining and clarifying of some of the coaching model

components.

Informant checking during the analysis. In grounded theory, the analysis begins as soon as the initial data is collected (Corbin & Strauss, 1990). This procedure implies that validation is part of the research process with continual credibility checks of the collected data (Kvale, 1989). Thus, the interview guide described in the data collection section evolved after the initial interviews were completed and analyzed. As a result of the first two interviews (one with a coach of males and one with a coach of females) the themes, "gymnast's parents" and "relationship with assistants," were systematically added to the interview guide. After a third interview was completed and analyzed, the theme "weight and nutrition," became an important issue to cover with other coaches. Similarly, after analyzing six coaches' interviews (three coaches of males and three coaches of females) the themes, "non-coaching activities" and "planning training and competition," became emerging and important issues to cover with each coach. Finally, after 10 interviews were completed and analyzed, (six coaches of males and four coaches of females) it was found that it was easy for coaches to talk about the qualities of an ideal coach, hence, the theme, "describe the qualities of a good coach," was added to the interview guide. The remaining seven interviews were completed and analyzed without adding any new themes to the interview guide. Because no new salient themes emerged from the last seven interviews and most of the information elicited had already been identified in the previous interviews, one can argue that "theoretical saturation" was reached (Glaser & Strauss, 1967).

The interrelated process of data collection and data analysis permitted the thorough examination of the issues perceived as important by the expert coaches. This method added credibility to the concepts elicited because they were grounded in the coach's reality as opposed to the investigator's reality or to other rigid methodological procedures (Glaser & Strauss, 1967; Kirk & Miller, 1986). Hence, the categories of knowledge contained in the coaching model were not imposed upon by the structure of empirical reality, rather they represented categories by which expert coaches organize and construct their knowledge.

Informant checking after the analysis. After the analysis, another technique used to enhance the credibility of the data was to obtain feedback from the coaches interviewed (Blumer, 1969; Guba & Lincoln, 1989; Huberman & Miles, 1990). The first task consisted of sending a copy of the coaching model with an analytical story describing the relationship between the components of the model to all coaches who took part of the study. A cover

letter explained the objectives of these two documents by generally describing the procedures used to analyze the interviews and by inviting each coach to assess the model and the story. A stamped return envelope was included in each packet. This packet, sent to each interviewed coach, was aimed at evaluating the accuracy of the higher-inference findings (Appendix D).

Two coaches of males and two coaches of females received an additional document describing the components, categories, properties and dimensions of the coaching model in more detail (Appendix E). The objective was to obtain feedback from them on the more detailed aspects of the findings. Because the coaches lived all across Canada, it was not economically feasible to travel to each of their home towns for a second face-to-face interview. Thus, a tape recorded telephone interview format was utilized with three coaches while one interview was done in person.

Of the 17 packets sent to all coaches, nine coaches returned their assessment and generally agreed with the coaching model and the story describing their work. Three coaches mentioned that they would have liked to see more detail in the results, which was legitimate since they received only the higher-inference findings. The four coaches interviewed to obtain feedback on the more detailed aspects of the results also indicated a general agreement with the findings. In fact, these four coaches agreed with the resulting components and categories of the coaching model. Furthermore, although the two coaches of females who were interviewed added two more properties to the results, all four coaches acknowledged the adequacy of the properties and dimensions which emerged from the analysis. The two new properties elicited by the two coaches of females are identified by an asterisk in the results section.

Negative case analysis. The object of negative case analysis for enhancing the credibility of a qualitative study is to account for all known cases elicited (Guba & Lincoln, 1989; Lincoln & Guba, 1985). This method was used in the analysis by refining the categories, properties, and dimensions until they accounted for all meaning units induced from the interview transcripts. When a meaning unit was found to not "fit" into a property or a category already defined, the investigator included the meaning unit in the model by employing one of the following procedures. First, each property was examined closely to see if it could be redefined to accommodate the new meaning unit. If this was the case, then the meaning unit was inserted into the redefined property. Second, if no properties or categories were flexible or malleable enough to welcome the new meaning unit, then a new

dimension, property, or category was created for the new meaning unit and inserted into the coaching model. This measure provided confidence that all the meaning units of each coach's interview were taken into account. Only a few words or phrases from the interviews, not relevant to the goal of the study, were omitted from specific meaning units.

The consequence of accounting for all the meaning units elicited from the interviews was that some meaning units had unclear borderlines and could thus be placed in more than one property. Parallel to this type of analysis is the research on knowledge organization in cognitive psychology, which helps to understand better the process of categorization. In fact, one current view on categories used by individuals to organize their world is that these categories have "prototypes" or "best examples" but also include what have been termed "borderline cases" (Glass & Holyoak, 1986; Holland et al., 1987; Smith, 1990). Glass and Holyoak used the term, "natural categories" to refer to categories such as fruit, cars and chairs, used by individuals in their everyday life. This mental organization of the world in categories of objects that are believed to belong together is essential in order for the human mind to process large amounts of information (Smith, 1990).

As in qualitative analysis, natural categories possess typical and borderline cases. For example, Malt and Smith (1984) asked subjects to classify different types of fruit according to how well they represented the fruit category. The subjects considered that "apple" and "peach" were typical fruits while "pumpkin" and "olive" were considered more atypical. Similarly, to avoid forcing categorization in qualitative analysis, the investigator must allow for borderline cases, or acknowledge that certain categories might overlap. The categories, properties, and dimensions created to account for gymnastic coaches' knowledge followed the same general "prototype" rules of natural categories. All the meaning units which were first perceived as negative cases and which were placed in an existing category or property often became a borderline case or a meaning unit less representative of that category. On the other hand, if a new dimension, property, or category was created to account for a specific meaning unit then it became the best example of that property or category. It is important to note that most properties and categories have borderline cases and sometimes the same meaning unit can be placed in two different properties (Tesch, 1990).

Following are some examples of typical and borderline meaning units. For coaches of males, three of the six properties contained in the category, "technical skill," are "teaching progression," "safety," and "physical preparation". Each of these properties has clear prototype meaning units. For example, a typical meaning unit found in "physical preparation" is:

[For teaching a technical skill], it usually boils down to that simplest most basic element of the skill, or the actual physical preparation that is involved in that skill and I think that again, getting back to physical preparation is very important. (M9)

An example of a typical or prototype meaning unit found in the property "safety" is:

C'est quand même sécuritaire la gymnastique, il y a une technique où on fait glisser un matelas sur la barre pendant qu'il fait son mouvement, alors à ce moment là, ça sécurise l'athlète. Aussi, j'essaie de convaincre les athlètes de façon verbale. (M5)

Subsequently, a typical meaning unit found in the category "teaching progression" is:

On horse for example, when they could do a circle, I allowed them to practice another move and the circle was going to improve with time, but the move that they learned would have a little error in it. When the basic circle is automated from a coach's stand point you rarely have to come back. (M3)

While meaning units such as those contained in each of the above properties were typical cases, some other meaning units lacked clarity, and could have been placed in two properties. For example, the following meaning unit fit best in the property, "physical preparation," but could have also been placed in the property, "teaching progression."

I understand gymnastics as a puzzle. I find that in gymnastics there are so many moves and elements. Depending upon how you put together the basic skills, the resulting skill you will get, as a final product skill, will vary. What I do as a coach is I try to prepare a gymnast physically for that small part. (M1)

Similarly, the following meaning unit was coded in the property, "teaching progression," but could have also been placed in the property, "safety:"

At the start of a tumbling pass he goes blank and says, "There's nothing I can do." So, I go back a couple of steps and say, "Okay now, you were doing a double-back into the pit; now go into the air, twist around and come back down. Do that until you feel comfortable with that, then come back and try the double-back into the pit." (M9)

It is obvious that categorization is an essential conceptual tool for qualitative analysis, however, the image of categories with clear perimeters must be replaced with that of fuzzily bound categories (Tesch, 1990). Just as objects can sometimes be difficult to classify into existing natural categories (i.e., "is a penguin a bird?"), meaning units of coaches did not always fit perfectly into their designated categories. Still, the specific purpose of grounded theory is to arrive at abstract categories that constitute concepts which facilitate our understanding of a phenomenon, and that have specific relationships to each other (Corbin & Strauss, 1990; Strauss & Corbin, 1990). The fact that each meaning unit induced from the interview transcripts, whether it was a prototype or a borderline meaning unit, were taken into account in the construction of the model added credibility to the analysis. In order to make sure that the meaning units were classified into the appropriate categories, measures were taken to ensure the dependability and confirmability of the study.

Dependability and Confirmability

Dependability is comparable to reliability in the positivist approach (Guba & Lincoln, 1989). In a quantitative study, any changes in the methodology would affect its reliability and render the study suspect. In grounded theory, far from being threats to dependability, changes and shifts in interpretation, to represent better the informants' realities, are characteristics of a mature and successful inquiry (Corbin & Strauss, 1990; Tesch, 1990). However, any changes made in the methodology need to be stated clearly so that these changes are trackable by outside reviewers. Furthermore, any changes in the methodology need to be "grounded" in the data so that the interpretation remains as close as possible to the informants' realities.

Closely related to dependability is the confirmability criterion which is comparable to the conventional criterion of objectivity. Using Guba and Lincoln's (1989) words, "like objectivity, confirmability is concerned with assuring that data, interpretations, and outcomes of inquiries are rooted in contexts and persons apart from the [investigator] and are not simply figments of the [investigator's] imagination" (p. 242-243). However, unlike quantitative research which roots its objectivity in the method, qualitative research assures its integrity in the data itself. In the case of grounded theory, this means that the construction of categories can be tracked to their sources, and that the logic used to assemble the interpretations and conceptualizations into a coherent model is both implicit and explicit in the study. The dependability and confirmability of the present study were assessed using an

auditing process (Lincoln & Guba, 1985) which consisted of checking both the credibility of the data interpretation and the credibility of the coding process.

Credibility of the data interpretation. Crucial to dependability and confirmability is the extent to which the sets of meaning provided to the data by the investigator can also be inferred by external observers (LeCompte & Goetz, 1982). Hence, a reliability check was performed on the results of the analyses of coaches of females by following four distinct steps.

First, because of the complexity of the research process, two judges were familiarized with the data analysis techniques by reading the article, "Organizing and interpreting unstructured qualitative data" (Côté, Salmela, Baria, & Russell, 1993), which described the methodology in the data analyses. In a second meeting, the two judges were informed of the final results of the analysis, which consisted of an explanation of the coaching model. To increase the judges' understanding of the study, they also read the story, which analytically described the coaching model, as well as a document explaining in detail each component, category, property and dimension of the model. In a third meeting, the judges were trained to sample meaning units into appropriate components, categories, and properties of the model. The samples consisted of 60 meaning units randomly chosen from the 560 meaning units inducted from the interview with coaches of females. The aim of this third meeting was to make sure that the judges were familiar with the subtleties of the definitions, hence, any uncertainties were discussed with the investigator. This meeting took place separately with each judge and lasted approximately two hours.

In a fourth meeting, each judge performed a coding exercise which permitted a reliability check on the components, categories, and properties of the model. The judges coded 131 randomly selected meaning units into the appropriate components, categories and properties of the coaching model. The 131 meaning units used for the reliability check represented approximately 26% of the remaining meaning units not used in the third meeting for training the judges. It took approximately 3 hours for each judge to recategorize the meaning units into their respective components, categories, and properties.

Reliability was calculated for components, categories, and properties. First, a sample of meaning units was placed in completely different components to the one assessed by the investigator. Both judges made this error three times each, one being the same, for an inter component reliability of 98% for each judge. Second, some meaning units were coded within the same component but in a different category. Both judges misplaced the same

meaning unit, one judge making a total of two errors while the other judge made a total of three errors. These errors inflated to others with the recategorization of meaning units into the components and resulted in an inter-category reliability of 96% and 95% for each judge.

Finally, some meaning units were coded within the same category but in a different property than the one coded by the investigator. Both judges misplaced, in relation to the investigator, the same three meaning units while one judge misplaced a fourth. These errors added to those made when recategorizing meaning units into the components and categories resulted in an inter-properties reliability of 94% and 92% for each judge. More specifically, 123 of 131 meaning units for one judge, and 121 of 131 meaning units for the other judge, were coded into the appropriate property. It is important to note that the 93 properties of the model were all represented by at least one meaning unit.

According to the results of this reliability check, some of the categories and properties were defined more explicitly to emphasize the differences between them. Furthermore, to further enhance the credibility of the data, a reliability check was performed on the coding process.

Credibility of the coding process. The aim of this procedure was to have the same two judges replicate the process by which the investigator created properties, categories, and components from the interview transcripts. To reach this objective, a short document (Appendix F) was developed to help train the judges in tagging and categorizing unstructured qualitative data. After approximately a half an hour of training, the judges were asked to divide 16 pages of interview transcripts (two pages per coach) into meaning units and to place the divided meaning units into a property of the coaching model. The sample pages were randomly chosen from all the interviews of coaches of females. The task of tagging and categorizing the 16 pages of interview transcripts took approximately two hours for each judge.

The investigator had originally divided these 16 pages of interview into 42 meaning units. Accordingly, one judge divided the text into 42 meaning units as well, however seven of these meaning units were not placed in the appropriate property; producing an inter-property reliability coefficient of 83%. On the other hand, the other judge divided the interview sample into 43 meaning units, six of them were not placed into the appropriate property; producing an inter-property reliability coefficient of 86%.

Although the two judges and the investigator divided the text into almost the same number of meaning units, there was a larger variation between each judge and the investigator

in the number of words or lines included in each meaning units. Still, the additional lines that the judges included or left out of a meaning unit did not affect the sense provided to the piece of information and therefore were not believed that important. Indeed, of the 346 lines contained in the 16 pages of interview text, one judge coded 16 lines (0.05%) differently than the investigator and the other judge coded 15 lines (0.04%) differently than the investigator.

Finally, the interpretation errors in coding the meaning units were similar to those observed in the last section when verifying the credibility of the interpretation. Accordingly, these errors were considered by defining more explicitly the differences and similarities between the various properties and categories, and by making more explicit the conceptual links between the components of the coaching model.

Dependability and confirmability of the results for coaches of males. The results of the analysis for coaches of males were similar to the results obtained for coaches of females. The same components were elicited with little variation in the categories and properties found. No test was carried out to verify the data interpretation and coding process credibility for the coaches of males because of the stability of the coaching model between coaches of males and of females and identical data analyses procedures used for both groups. The high reliability coefficients found when checking the interpretation and coding process of coaches of females added weight to that decision.

Transferability

The establishment of transferability by qualitative researchers is very distinct from the establishment of external validity by quantitative researchers. LeCompte and Goetz (1982) argued that even the most exact replication of research methods may fail to produce identical results in qualitative research because of the changing context within which a qualitative study takes place. However, a complete description of the steps followed in qualitative research is necessary to facilitate transferability judgments on the part of other researchers who may wish to apply the same method to their own research contexts (Guba & Lincoln, 1989; Lincoln & Guba, 1985; LeCompte & Goetz, 1982). The major technique suggested by Lincoln and Guba to establish transferability was to provide a "thick description" or highly detailed description of the context and the methods of the study.

Consequently, transferability was assured by spelling out as clearly as possible the data collection, data analyses, and methods to establish trustworthiness, this was done in this

methods chapter. Additionally, because the data upon which the coaching model was derived were comprehensive and the interpretation conceptual and broad, more value was added to the potential transferability of the study (Strauss & Corbin, 1990) and accordingly to the applicability of the coaching model to other coaching situations.

CHAPTER 4

PRESENTATION OF RESULTS

The research objectives, which guided the data collection and analysis were, firstly, to elicit categories of knowledge representative of high performance expert gymnastic coaches and, secondly, to provide a conceptualization of how expert coaches' knowledge is represented and used through mental models. The present chapter is organized according to these two objectives beginning with a brief overview of the nature of the collected data. Then, a description of the knowledge elicited from the coaches which is supported by meaning units from the different coaches, is presented. Finally, a model of coaching, which conceptualizes how expert coaches' knowledge is represented and used through mental models, is introduced. This attempt to conceptualize coach's knowledge permits the examination of the interactive nature of the different components and categories of knowledge and their relative importance for the development of elite gymnasts.

The Nature of the Data

The total number of meaning units extracted from the interview transcripts was 1,155. The interview transcripts of coaches of males and females were divided into 595 and 560 meaning units, respectively. The inductive analysis process allowed these meaning units to be regrouped into 134 properties, 28 categories, and 6 components (Table 6). While the components that emerged from the analysis were the same for coaches of males and females, the number of properties and categories varied slightly in number and by their nature for coaches of males and coaches of females.

Table 6

Frequency of Occurrence and Terms Used in the Inductive Content Analyses Procedures

Level of analysis	Frequency of occurrence		
	Coaches of males and coaches of females	Coaches of females	Coaches of males
1. Properties	134	95	103
2. Categories	28	27	25
3. Components	6	6	6

Identification of Coaches' Knowledge

The results of the inductive content analysis of the interview transcripts are presented in this section. The description of the inductive process will flow from the highest order level of analysis, labeled as components, to categories, to properties and dimensions and back to the original meaning units. This process should allow the progression of higher level components to be retraced back through the initial inductive process to the initial meaning units. However, while examining the tables associated with each component, it is important to remember that the analysis actually began with the meaning units and progressed from properties to categories and components.

Table 7 reports the number of coaches and meaning units which fell into each component (capital letters) and category (lowercase letters). All coaches were represented in each component, except contextual factors, which were mentioned by all but one coach of females. The representation of coaches varied within each category, the second higher order level of analysis. Nevertheless, although certain categories were not as highly represented as others, their inclusion was critical in providing the most complete knowledge structure of gymnastic coaches. Furthermore, the number of meaning units reported in Table 7 provides an estimate of the complexity of each component. For instance, the training component had 252 meaning units while competition had only 71 meaning units, suggesting that coaches' knowledge of training is more abundant and perhaps more complex than coaches' knowledge of competition. It is important, however, to note that the number of meaning units does not provide an estimate of the importance of each component.

Table 7

Number of Coaches and Meaning Units Within Each Component and Category

COMPONENT AND CATEGORY	Coaches of males (N=9)		Coaches of females (n=8)	
	Coaches (N)	MU (N)	Coaches (N)	MU (N)
COMPETITION	9	36	8	35
Competition site	3	3	0	0
Competition floor	9	33	8	27
Trial competitions	0	0	4	8

Table 7 (cont.)

COMPONENT AND CATEGORY	Coaches of males (N=9)		Coaches of females (N=8)	
	Coaches (N)	MU (N)	Coaches (N)	MU (N)
ORGANIZATION	9	123	8	148
Planning training	9	74	8	59
Working with assistants	6	18	6	27
Working with parents	6	8	7	21
Helping gymnasts with personal concerns	7	23	7	26
Monitoring weight/esthetic	0	0	6	15
TRAINING	9	127	8	125
Coach involvement	4	5	5	6
Intervention style	9	35	8	31
Technical skills	9	42	8	40
Mental skills	9	32	8	29
Simulation	6	13	7	19
COACH'S PERSONAL CHARACTERISTICS	9	131	8	115
Personal approach to coaching	5	16	7	21
Sources of satisfaction	4	12	5	9
Perception of qualities of successful coaches	9	26	8	22
Opinions about men's vs women's gymnastics	6	16	7	12
Evolution of knowledge	9	42	8	29
Personal concerns	9	19	7	22
ATHLETE'S PERSONAL CHARACTERISTICS	9	98	8	91
Gymnast's personal qualities	7	33	8	30
Variables affecting performance	7	29	7	15
Gymnast's first stage of learning	9	16	6	20
Gymnast's second stage of learning	5	9	6	18
Gymnast's third stage of learning	6	11	6	8

Table 7 (cont.)

COMPONENT AND CATEGORY	Coaches of males (N=9)		Coaches of females (N=8)	
	Coaches (N)	MU (N)	Coaches (N)	MU (N)
CONTEXTUAL FACTORS	9	80	7	46
Parents	6	12	7	16
Job conditions	9	68	6	25
Assistant coaches	0	0	3	5

Tables 8 - 12 present results of the initial step of the analysis, creating properties. Also listed are the dimensions assigned for each property; the dimensions were obtained by analyzing the content of each meaning unit. In the following sections, the categories, properties and dimensions of each component will be described separately. A close examination of the properties and dimensions will be provided along with examples of representative meaning units. However, due to the large number of meaning units, not all will be included. The focus will be on giving examples of meaning units that represent different coaches' views of the same property and the differences between coaches of males and females. Just as the representation of coaches within each category varied, certain properties were not as highly represented as others, nevertheless, their inclusion was crucial in providing the most complete profile of coaches' knowledge. These properties, considered to be important to specific individuals, provided a broader base from which to study the knowledge of expert coaches. Two additional properties were later elicited by coaches of females in subsequent interviews to assure the credibility of the results; these properties are marked by an asterisk. Finally, no special attention will be given to the coaches' gender since no differences were found in the categories of knowledge elicited by male and female coaches, suggesting that they have similar approaches for developing elite gymnasts.

Competition

The meaning units classified into the competition component were defined as the knowledge used by coaches to help gymnasts perform according to their potential in competition. The three categories included in the competition component were competition floor, competition site, and trial competitions (Table 8).

Table 8

Occurrence of Coach Identification of Properties and Dimensions Within Each Category of the Competition Component

CATEGORY AND PROPERTY	Dimension	Coaches of	
		Males (N=9)	Females (N=8)
COMPETITION FLOOR			
1. Keep gymnast ready to perform	if needed	9	5
2. Technical information	no	4	3
3. When gymnast performs	spectator	4	6
COMPETITION SITE			
1. Controlling distractions	helps gymnasts	2	0
2. Execution of routines	supervises	1	0
TRIAL COMPETITIONS			
1. Participation for learning	important	0	4

Competition floor. The competition floor included all the time spent by the gymnasts immediately before, during, and after an event. This category was defined as the coach's knowledge of what should be done during this time so that gymnasts performed at their best. The first property and dimension of this category included keeping the gymnast ready to perform before an event; this occurred only when a coach deemed it necessary. The second property involved not giving technical information immediately before or during the event. The third property included the coach's acting as a spectator during the gymnasts' performance. Meaning units comprising this category were:

When I go to a competition I try not to over-coach. I don't do a lot of intervention in the meet. The only intervention I do is if I think they're too loose or distracted. (M3)

In competition, I don't try to over-coach them technically because how much more technical information can you give them in 30 seconds that you haven't already given them in three months that is going to help them to be technically better? To me it's only a waste of time. It's not going to help them anyway. It doesn't matter what you do at the competition technically, that is not going to improve it that much. (M9)

I always say a good coach is a guy sitting down and having a coffee during a competition and relaxing because everything's under control. If I'm up there spotting and lifting and flipping and calling orders, it's like I'm having problems with these girls. (F2)

Competition site. The competition site category includes all the time spent during a competition day, week-end or week that is not spent immediately before, during, or after an event. For example, if a gymnast performs between 1:00 p.m. and 5:00 p.m., the time spent between 1:00 and 5:00 would be included in the competition floor category, whereas competition site would include all the time spent during that morning and after 5:00. This category was defined as coaches' knowledge of what should be done at the competition site. The properties and dimensions of this category, discussed only by coaches of males, included helping gymnasts to control distractions and training gymnasts to do their routines. Meaning units illustrating these properties included:

I know the night before any competition I always talk with my kids no matter how old they are. I try to explain some lead-up parts, how they've been training, what I feel are my expectations and how they feel. (M9)

[At the competition site], in the morning we stretch half an hour, do the routines and specific problems each has and then come back in the afternoon and do the routines on the floor. Then, I will do that the day of the meet as well. (M8)

Trial competitions. This category was defined as all real competitions which the gymnasts participated in in order to help them to become more confident and to improve their skills. This category was elicited only by coaches of females and included the property and dimension of participating in competition for learning. For example, coach F8 said:

We competed in L.A. against Fullerton, who was third in the nation. We went down there and the kids were blown away. A screaming crowd of 2,000 people, flowers being thrown by the audience, and every time an athlete scored 9.3, they would go over to a big bowl in the middle of the floor and pick up an orange and throw it at the crowd. It was live television. We competed there and, in fact, the kids did really well. After that they came back to the National Championships here and it was a piece of cake. They walked in with pride and confidence. They've been through this stuff before. That's when I really learned then, that was the kind of things the kids should be exposed to. Not just keep them in a little shell, like always practicing on the Spieth - Anderson apparatus. Performing had to be generalized so that you could do it under any circumstances.

Organization

The meaning units classified in the organization component were defined as the knowledge used by coaches for establishing optimal conditions for training and competition by structuring and coordinating the various tasks involved in coaching. Organization could take place before, during or after training and competition. The categories included in organization were planning training, working with assistants, working with parents, helping gymnasts with personal concerns, and monitoring weight and esthetics (Table 9).

Table 9

Occurrence of Coach Identification of Properties and Dimensions Within each Category of the Organization Component

CATEGORY AND PROPERTY	Dimension	Coaches of	
		Males (N=9)	Females (N=8)
PLANNING TRAINING			
1. Season plan	3-5 competitions/year	2	3
	training all year	2	3
2. Evaluating talent	physical abilities	3	3
	mental abilities	2	3
3. Setting individual goals	long term	3	2
	short term	3	4
	flexible	0	4
	specific	5	4
	challenging	3	1
4. Group dynamics	encourage interaction	5	3
5. Training rules	presence	4	3
6. Gymnast fatigue or minor injuries	modify training	2	3
7. Prevent injuries	reduce stresses	0	3
8. Music choice	important	0	1
9. Club goals	long term	0	3
10. Social rules	presence	0	2
11. Daily training plan	structured	1	0
	flexible	8	0
	written	1	0
	not written	1	0
	gymnast weaknesses	2	0
	conditioning&technique	4	0
12. Few weeks before competition plan	perform full routines	2	0
	reduce conditioning	2	0

Table 9 (cont.)

CATEGORY AND PROPERTY	Dimension	Coaches of	
		Males (N=9)	Females (N=8)
WORKING WITH ASSISTANTS			
1. Assistant coaches	share responsibilities	5	6
2. Sport psychologists	share responsibilities	0	2
3. Nutritionists	share responsibilities	0	3
4. Athletic therapists*	share responsibilities	0	2
WORKING WITH PARENTS			
1. Knowledge of gymnast's goals	inform parents	6	6
2. Expected parents' roles in gymnast's performance	inform parents	0	6
HELPING GYMNASTS WITH PERSONAL CONCERNS			
1. Gymnast's relationship with family	counselor	1	6
2. Gymnast's retirement/leaving	counselor	1	4
3. Gymnast's education	counselor	5	4
	adjusting training and school schedule	5	0
4. Gymnast's personal and social life	counselor	4	5
5. Gymnast's finances	counselor	1	0
MONITORING WEIGHT AND ESTHETICS			
1. Gymnast's physical appearance	importance emphasized	0	5
2. Gymnast's weight and nutrition	monitor	0	3

* Elicited later in a subsequent interview to assure the credibility of the results

Planning training. This category was the most pervasive category and was defined as the coach's knowledge for planning, evaluating or controlling training programs for a gymnast or a team. Properties and dimensions included in this category which were discussed by both coaches of males and coaches of females were: 1) the training and competition season plan, 2) the evaluation of talent through the assessment of gymnasts' physical and mental abilities, 3) the establishment of short- and long-term, flexible, specific and challenging goals, 4) the reduction but maintenance of training when a gymnast is fatigued or slightly injured, 5) the importance given to gymnasts' interactions in trainings, and 6) the presence of training rules such as being on time for training. These properties were characterized by the following meaning units:

Quelques fois on se demande pourquoi les jeunes font de la gymnastique, c'est bien plus payant le hockey. La gymnastique c'est platte on a à peu près cinq compétitions par année c'est pas beaucoup. Au hockey, on a 70 games par saison pour s'évaluer; nous autres on a cinq compétitions. (M5)

There're two kinds of tests for evaluating young gymnasts. Just by looking at the kid, if he's 6'4", or 300 lbs, then he won't make it. So you look at them physically and see if he's fast or slow, that's the first assessment, looking at physical abilities. The other one is if you see that they react fast, are bright, listen. (M4)

I set individual goals monthly or yearly. Actually, a microcycle is six or eight weeks. But I won't have an analysis of power improvement or strength. Individually, some of them are strong, some are flexible, of course they have to improve their weaknesses. (M2)

Lors de blessures mineures, on essaie de maintenir l'entraînement le plus possible dans le gymnase. Sinon on débalance toute leur vie, elles sont toutes débalancées, elles ont du temps libre, elles ne savent pas quoi faire et changent leur mode de vie, et après elles ne sont plus capable de revenir. Elles viennent dans le gymnase, elles font de la préparation physique. Elles font tout ce qu'elles peuvent faire puis elles évitent ce qu'elles ne peuvent pas faire. (F3)

I'm trying to maximize the learning. What I do is alternate. I play around a little bit with the different levels of working. So the fast learners are sometimes paired together and sometimes they are paired with someone who's a little bit slower than them. It is similar with the slow learners. Sometimes they are with someone who learns a little faster or a little slower than them. What I try to do is not put the fast learners always together. I alternate so that they experience both: "Yeah, maybe someone is learning slower or faster than me." (M4)

We don't have unusual rules. We expect them to be on time, to dress properly, to tie their hair, to phone if they cannot come for a training or a competition. (F5)

The planning training category also included properties elicited only by coaches of females. These properties and dimensions were: 1) the establishment of long-term goals for the club, 2) the reduction of stresses on gymnasts in training to prevent injuries, 3) the importance of choosing the appropriate music for a gymnast's routine and 4) the presence of social rules to regulate a gymnast's behavior outside the gymnasium. These properties were characterized by the following meaning units:

So I came back and did some thinking and I said "Dammit, I'm going to start now to prepare for 1996. I'm going to find the kids, and nothing will prevent the fruition of that 1996 team to be ready on that day. We have dedicated coaches and programs. So we're spending between now and this summer in

finding those kids." We're working and thinking ahead. There's interactive planning. We interact with the athletes. I don't sit back and just accept things. My little man says, "Come on, come on." (F2)

I notice now that injuries take place in January-February. The injuries were taking place in the fall, because they were under so much stress to get their routines together and there would be all sorts of excuses not to do a routine. It was like a nightmare for those kids to do the first routine of the year. But once they got it, then it was okay. So I deliberately had a team trial in October and they all had to have routines. If they didn't have routines they couldn't come on the team. The routine was defined as a series of moves together, even if it wasn't the final routine that you really wanted to do. And unless you had a doctor's certificate you couldn't get out of it. But I learned that you've got to get that out of the way earlier on, so that by January everybody would worry about how well they were going to do their routine and not if they're going to do it. And that helped the injury point of view. There was no stress (F8)

Toutes sortes [de musique] ça dépend du genre de la fille, des fois je vais aller dans du classique même si c'est moins à la mode, si c'est pas une fille qui est explosive naturellement tu n'iras pas dans une musique moderne parce que la fille elle ne sortira pas de la musique elle va avoir l'air étouffé. Il faut vraiment que tu observes quel genre d'individu tu as entre les mains. Des fois tu tombes sur un bon choix, d'autres fois pas tout à fait. (F7)

J'ai des balises [en ce qui à trait à leur comportement à l'extérieur du gymnase] qui dépendent de l'âge des athlètes évidemment parce que j'ai des responsabilités civiles, je ne peux pas me comporter en bon père de famille, il y a des risques à ne pas prendre. Donc avec les filles un peu plus vieilles, c'est un peu plus lâche, avec les plus jeunes, c'est plus serré. (F4)

Finally, two properties of the category planning training, were elicited only by coaches of males: having a daily training plan and having a plan for the few weeks before competition. Interestingly, opposite dimensions were elicited for the daily training plan as reflected in the following two meaning units. In fact, one coach liked to have his daily training plan structured and written while another coach preferred to be flexible and not have anything written.

This year was my best year. One of my other coaches put up his whole calendar year, every day with a general plan of what that day will be, up on the wall. So I did the same thing too - this is compulsory routine day, etc. When we are in competition time of the season it's pretty simple. Because what's written up there will be 2-4-6: 2 routines on this; 4 routines on this; 6 routines on this. We have five days and each day has a different theme. So today is Monday, it's basic swing day, we go through our basic swing (M3)

If I write things down [for a training session], they trap me -- my mind shuts off. I'm reading instead of reacting and I'm so used to reacting. The times I have done an annual training plan the guys got hurt, so I've never been able to follow it, the plan is shut. (M8)

A few weeks before competition the training plan will change, as reflected in this meaning unit:

Like most other coaches, especially at the national level prior to a certain time frame in competitions where we have routines, we work on specific skills. As we get closer we start working on full routines, doing a certain number of full routines and doing a certain number of half routines and [work on] major errors within the routine. (M9)

Working with assistants. This category was defined as the coach's knowledge of the roles, functions or tasks of their assistants such as assistant coaches, sport psychologists, nutritionists, and athletic therapists, in the process of developing elite gymnasts. The importance of sharing responsibilities with assistant coaches was discussed by both coaches of males and females. A meaning unit representative of this property was:

There's no reason for me to plan all the practice, let's do it as a coaching team. Everybody agreed with that - if you see that some other coaches do things better than you, let them do it - give them your gymnast. On the other hand, very often as a coach, you're watching some other gymnasts and thinking "Oh, he doesn't understand how to do this, but I know." So in this case, offer yourself. (M1)

Coaches of females elicited the importance of working closely with other professionals such as sport psychologists and nutritionists. Additionally, in the interview to assure the credibility of the results two coaches of females elicited that they also work closely with athletic therapists. A meaning unit representative of these properties was:

Depuis à peu près un an, il y a une nutritionniste qui travaille avec nous; elle est au doctorat à l'Université de Montréal. Elle aide les filles à ce niveau là, elle leur donne plus d'informations, elle va entrer les tailles, poids, elle fait ses chartes et c'est elle qui prend les pourcentages de gras. (F7)

Working with parents. This category was defined as the coach's knowledge of the roles, functions or tasks of the parents in preparing gymnasts for training and competition. The importance of informing parents concerning gymnasts' goals was discussed by both coaches of males and females. For example, one coach said:

We have quarterly meetings with parents. For the first hour, we do it with the group. If we have six boys we invite the six parents for a BBQ. I lay out the yearly training plans and the proposed meets. The general goals for each of the fellows. Every three months we're suppose to have a quarterly meeting; it's either myself and the parents or myself, the parents and the gymnast. (M3)

The importance of informing parents concerning their roles in a gymnast's performance was discussed by coaches of females. For instance, coach F7 mentioned that:

On essaie d'avertir un petit peu les parents. Autant qu'on prépare leurs gymnastes, c'est important de leur faire comprendre un petit peu la situation de comprendre qu'à la fin d'un entraînement des fois la fille est fatiguée peut être qu'elle n'a pas le goût de parler de son entraînement; que ça ait bien été, ou que ça ait mal été. C'est important que les parents comprennent un petit peu plus, qu'ils soient plus derrière eux.

Helping gymnasts with personal concerns. This category was defined as a coach's knowledge of gymnasts' personal concerns and the coach's role in dealing with these concerns. Gymnasts' concerns discussed by both coaches of males and coaches of females were gymnasts' education, gymnasts' relationship with family, gymnasts' personal and social life and gymnasts' retirement/leaving. Generally, coaches helped gymnasts with their personal concerns by acting as a counsellor as is reflected in the following meaning units.

Quand on part à l'extérieur on s'arrange pour qu'elle [gymnaste] fasse son travail scolaire. Par exemple quand je suis partie une semaine avec elle en France j'ai fait du suivi auprès d'elle au niveau scolaire. Elle avait un plan de travail que j'ai suivi avec elle. (F3)

I didn't deal with outside life issues a lot until 1988, and then I was shocked. I never thought of saying, "Don't go out and get drunk." It never entered my mind. And then they get into a group, there's peer pressure and [this gymnast] hates her coach and the others will say: "I hate my coach, too!" Then they all went out and got bombed and then they all got caught. That was a learning experience for me. I'm getting this kid ready gymnastically and she looks great. So that's when I had the revelation that, "Oh there's an outside world and the kids have to live in it and there is peer pressure". Now I deal with it more. I try to deal with it with the kid, not the parent. (F6)

I will lose an athlete if I don't support him [in his personal life]. I try to give the best support I can when they deal with puberty. (M1)

[If kids want to drop out] I try to present to them why they are having that problem, and I give them two or three days to compare their fears and reasons with my evaluation of their conditions. I'm always very realistic about the situation. I will ask them some questions and I will present my judgement of

the situation. I go in a point form with them in what we came through, the positive and negative. In other words, I deal with them exactly the way I would deal with my own sons. (M4)

Coaches of males also mentioned that they try to adjust their training schedule to the gymnasts' school schedule. For example, one coach said:

I coach everyday. When I prepare my coaching schedule, I never go for my convenience. I know that it's not so good for my boy's academic study to practice so many hours. So I decided to do more practices Saturday and Sunday - there is no school these days. In this case, I will give them Monday free and one day I slow down - so I can start later. It is how you sacrifice your own life [Saturday, Sunday], for results in your work (M1).

The gymnasts' finances were also discussed as a personal concern by coaches of males. This concern was characterized by the following meaning units:

For example, if a gymnast wants to get very high marks at school, and be the first gymnast in the country. He is 17 years old. If he wants to be the best gymnast, he has to train 50 hours a week, if he wants to be an A student that's 60 hours of work. Now the financial situation: "Well, my parents will help, but I have to work; that's impossible. The fact of life is that he needs \$800.00 dollars a month to live. If he has the money he will probably have to extend his degree to six years instead of three years. That's what I did with my son, he took six years to do his degree and he had more time to put in gymnastics. That's the kinds of things I have to deal with all the time because parents and athletes themselves don't feel comfortable asking for \$1000 dollars a month from mom and dad, but they still want to do everything. (M2)

Monitoring weight and esthetics. This category was defined as the knowledge used by coaches to establish a program to prevent weight problems and to value the importance of being attractive. This category was discussed by coaches of females only. The properties and dimensions of this category were defined as the importance that coaches gives to a gymnast's physical appearance and the importance of monitoring the gymnasts' weight and nutrition. These two properties and dimensions were characterized by the following meaning units:

How they look is very important: their attire, physical appearance, their hair. So it meant changing some habits: their nails, keeping clean, their gym suit needed to fit nicely, things like that. Things that you can deal with right away are the easiest to deal with. (F1)

If we want an athlete to lose five pounds, we expect them to lose it over three or four months. We may suggest 20 minutes every third day riding a bike. We're one of the few gyms that runs- our athletes run 10-12 minutes every day. It doesn't do a lot cardiovascularly, it does a little, it's more for weight control than anything else. The weight is controlled by appropriate conditioning. We tend to do more conditioning than other clubs so we know they're going to be a little heavier because of the muscle mass. (F5)

Training

The meaning units classified in the training component were defined as the coach's knowledge used to help gymnasts acquire and perform different skills in training. The categories included in training were coach's involvement in training, intervention style, technical skills, mental skills, and simulation (Table 10).

Table 10

Occurrence of Coach Identification of Properties and Dimensions Within Each Category of the Training Component

CATEGORY AND PROPERTY	Dimension	Coaches of	
		Males (N=9)	Females (N=8)
COACH'S INVOLVMENT IN TRAINING			
1. Time involved	20-60 hours/week	4	5
INTERVENTION STYLE			
1. Supportive	if needed	5	5
2. Give responsibilities to gymnasts	important	2	1
3. Feedback frequency	often	1	0
	seldom	1	1
4. Type of feedback	positive	3	3
	negative	1	1
5. Respect from gymnasts	instructional	3	3
	demands	2	0
6. Dictatorial	often	1	0
7. Peer pressure	used	1	0
8. Keeping some distance	important	0	3
9. Asking for quality training	important	0	3
TECHNICAL SKILLS			
1. Teaching progressions	important	9	8
2. Gymnast's physical readiness	important	7	4
3. Safety/manual assistance	important	3	6
4. First execution of a skill	as soon as it is learned	1	0

Table 10 (cont.)

CATEGORY AND PROPERTY	Dimension	Coaches of	
		Males (N=9)	Females (N=8)
5. Measuring progress through gymnast's performance in training	consistency	2	0
6. Gymnast's mental readiness	important	0	5
MENTAL SKILLS			
1. Developing ability to deal with stress	important	4	3
2. Developing motivation	important	7	3
3. Developing awareness	important	4	2
4. Developing self-sufficiency	important	0	5
5. Developing self-confidence	important	0	1
6. Developing aggressiveness/intensity	important	0	4
7. Developing ability to deal with pain	important	2	0
SIMULATION			
1. Simulation of competition demands	used	6	7

Coach's involvement in training. This category was defined as the amount of time a coach spends in the training process. This category contained only one property and dimension describing the time involved in training which varied between 20 and 60 hours per week according to the coach and the time of the year. For example, one coach said:

Je coach en moyenne de 28 à 30 heures, il y a des semaines où ça va être carrément juste mon 23 heures parce qu'il n'y a pas d'évènement ou ma planification je la fais au jour le jour. D'autres fois ça va passer le 30 heures.
(F7)

Intervention style. This category was defined as a coach's knowledge concerning the preferred interaction style in training. The properties discussed by coaches of males and coaches of females dealt with the feedback frequency and the type of feedback given to the gymnasts as well as the importance of being supportive and giving responsibilities to the gymnasts. How often feedback was provided to gymnasts varied between coaches, as reflected in the following meaning units:

The kids get constant feedback, they know where they are regularly. (F2)

On the other hand, another coach said:

I basically only let athletes know that I'm there when they've made an error; they don't need me when they do well. (F5)

Coaches of both males and females agreed that instructional feedback is the appropriate type of feedback to give:

The feedback I give is about how to improve yourself. I try to get the guy to care about what they do and not what they score. It's very performance oriented rather than score oriented. You are capable of doing this with this technique. (M8)

[When I give feedback] usually I start with the part that was good or I'll ask them what part was good. Then I'll ask them what they think was wrong or tell them what was wrong. Then we'll talk about what they have to do to make it better. (F5)

Some coaches favored a positive approach as indicated in the following meaning unit:

I give them constant encouragement and corrections in training (M4).

On the other hand, one coach was more negative as reflected in the following meaning unit:

Usually I give 90% of negative feedback and 10% of positive so they know that when I'm positive this is for real. (M3).

The importance of being supportive if needed and giving responsibility to gymnasts was characterized by the following meaning units:

We are really giving to our athletes. No matter how I feel, I force myself to get into a positive mood: "time to get going", "life is wonderful". We really try to make sure that there's sort of a "team positiveness" and no one person will run or manipulate this gym. So I'm not good when a kid tries purposely to feel sorry for herself. So I tell her to go get a drink, change her mind set, come back and if she don't have the ability to change her mind set, she's not training in this event today. Usually I start gentle, I check to see if everything's okay. I'll try to change their mood by alleviating whatever hurts. If it's a pain thing, I can leave out a trick that's painful. But if it's, "I feel sorry for myself today," that's not acceptable and that's dealt with without mercy. (F6)

C'est sûr que tu dois envelopper, contrôler, supporter, appuyer, donner, tout ça pour modeler un peu. Mais un moment donné tu dois te retirer. C'est le processus inverse, c'est l'inverse qui doit se faire; le gymnaste doit prendre ses responsabilités. (M6)

Coaches of males discussed three kinds of intervention styles they used which were not identified by coaches of females. First, one coach of males said he likes to be dictatorial:

I'm looking for the best athletes who are willing to work with a very structured demanding coach, I still believe being dictatorial is the style to go. (M3).

Secondly, one coach mentioned that he uses peer pressure in training:

I get sarcastic when I get mad. If you're going to bug me, I'm going to bug you. So most of the guys in the group don't want to pay for his mistakes, especially when it's something that they will never do to me. So they shut the guy down. (M8)

Thirdly, two coaches of males said it was important to demand respect from their gymnasts. For example, one coach said:

I don't believe in the really aggressive mind manipulation, where a lot of coaches push buttons, where they know exactly how to force the kid to do a move; it works but only for a short period. What I'm looking for is an open relationship. I know he is working hard and I know I am working hard. What I don't want is the kid thinking that he is fooling me. (M8)

Finally, two properties, in the intervention style category were discussed only by coaches of females. These were the importance of keeping a distant relationship with the gymnasts and of asking for quality training. These two properties were characterized by the following meaning units:

I really felt I got a little too close to some of the kids. As soon as they started to not do well it was like the coach's fault. I've changed over the years. I'm still comfortable and friendly with them but I've put up that wall because I don't want to be hurt. (F1)

What I would consider important, I guess, would be to improve the quality of work and not the quantity. I would be more satisfied with fewer but good repetitions. (F8)

Technical skills. This category was defined as the coach's knowledge perceived as important for teaching technical skills. The most pervasive properties discussed by both coaches of males and females were the importance of teaching progressions, keeping the skill safe, and having the gymnast physically ready before teaching certain skills. The following meaning units were representative of these three properties:

We are big believers in progression. If they're strong enough and flexible enough and if we've taught them the right progression then they should be able to do it and that's how we convince them. We go through the steps, if you do this one stage then you can do it, you move on to the next and you can do it. We just keep building on it. (F1)

Maintenant les gymnastes sont mieux protégés, les équipements sont mieux adaptés, la préparation est meilleure. Tu as des instruments pour faire une meilleure préparation, plus sécuritaire. (M7)

[Le conditionnement fait parti de l'entraînement régulier] je divise ça en trois facettes. Premièrement, tu as la préparation physique, le développement de la force; on fait des éducatifs pour développer [les gymnastes] musculairement. Deuxièmement tu as la technique pour chaque épreuve qui peut être décomposée en éducatifs et en mouvements. Enfin tu as un facteur très important qui est la souplesse et qui peut aussi entrer dans la préparation physique parce que si le gars n'a pas la souplesse pour faire tel mouvement, il est bloqué. Alors la préparation physique, c'est le conditionnement physique, la musculation et la souplesse. Après la préparation physique tu peux commencer certains mouvements techniques. (M5)

Five coaches of females emphasized the gymnast's mental readiness as characterized by the following meaning unit:

If they're not mentally ready, they're not ready and that's a fact. If they're standing on a beam ready to do a skill and they're afraid, then it's not the fear, they're actually not [mentally] ready. So we take them back. (F2)

Finally, two properties of technical skills were discussed only by coaches of males. First, asking a gymnast to execute a skill as soon as it is learned was elicited by one coach as reflected in the following meaning unit:

I usually want a skill to be learnt but not mastered before going to another skill (M3).

Second, the measurement of progress through a gymnast's consistency in training was elicited by two coaches as characterized by this meaning unit:

Most of the kids have their own training program. The only way to monitor them, is to have them do the move that the strength was designed to help. I see that as a measure of performance in training. (M8)

Mental skills. This category was defined as a coach's knowledge used to train mental skills. The importance of developing a gymnast's ability to deal with stress and to develop a gymnast's motivation and awareness was discussed by both coaches of males and females. These three properties were characterized by the following meaning units:

Let's focus on what you're doing, let's ignore everything else and don't worry about it if you don't do well, just try to do your best, if you don't do well we'll worry about it later on, but if you worry about it now you'll screw up. We teach them to know what they can control and not to worry about things they can't control. (F1)

Tu as six mois sans compétitions, sans rien, c'est sûr qu'on cherche comme entraîneur à organiser un voyage, un camp d'entraînement à telle place pour changer de milieu et garder les gymnastes motivés. (M5)

Il faut donner une partie de la responsabilité personnelle à chaque athlète, je ne dis pas la totalité mais une petite partie, ou une moyenne partie, ça dépend de chaque individu. L'athlète s'attend trop à ce que telle personne fasse telle chose, il s'attend à ce que telle autre fasse telle autre chose. Le gymnaste doit être le maître d'oeuvre, l'artisan et l'artiste, il doit avoir entière responsabilité. Il faut développer ce savoir-être, cette conscience personnelle. (M6)

Three properties of the category, mental skills, were discussed only by coaches of females. These properties were developing self-sufficiency, developing self-confidence and aggressiveness / intensity. Meaning units illustrating these three properties included:

To be a good athlete you have to be independent. For example, I have a twelve year old and her mother won't let go and the kid won't let go. So we try to develop independence: "You should pack your own gym bag." (F6)

I am just a big believer in making them believe that they can do it. I think that's a big secret in gymnastics: the kid has got to know that she is in complete and total control of what she is doing. And if they believe they can't do it then forget it. But if you believe you can do it but it's going to be a rough road, OK, I'm here to help. (F1)

Anger is a good thing. It's okay in my mind and it's almost encouraged to the point that pouting is not going to make me faster or stronger but can get me aggressive. If you're angry, that's good. Let me see that in the skill. (F6)

Finally, the ability to deal with pain was elicited only by two coaches of males. This property was illustrated by the following meaning unit:

"Pain in general is something that comes daily, they learn that they can take a little bit more everyday" (M8).

Simulation. This category was defined as the coach's knowledge of scenarios used in training to simulate the mental and technical demands of competition. An example of two meaning units illustrating this category included:

In the gym, we get everyone watching when they have to perform. I would have used that type of thing more, let's say for the Canadian Airlines Cup, which was her first major international meet. In the gym we would have had her warm up on one set of bars and then move to the next set to compete on every day with everybody watching. We would have done the same with each event just to simulate what's going to happen. (F5)

I try to make sure in training that they could deal with all that happens during competition. For example, if everybody is working in training and I know someone will perform a routine, sometimes without him knowing it, I stop everybody else to make sure they put a little pressure by watching him. (M4)

Coaches' Personal Characteristics

The meaning units classified in the coaches' personal characteristics component were defined as the coach's knowledge, philosophy, perceptions, beliefs or personal life, which could influence the organization, training or competition components. The six categories included in this component were personal approaches to coaching, sources of satisfaction, perceptions of qualities of successful coaches, opinions about male versus female gymnastics, evolution of knowledge and personal concerns (Table 11).

Table 11

Occurrence of Coach Identification of Properties and Dimensions Within Each Category of the Coaches' Personal Characteristics Component

CATEGORY AND PROPERTY	Dimension	Coaches of	
		Males (N=9)	Females (N=8)
PERSONAL APPROACHES TO COACHING			
1. Develop the whole person	important	3	6
2. Develop individuals who work hard	important	3	0
3. Working for money	not so important	1	0
	more important	1	0
4. Committed to athlete's learning	important	0	1
5. Emphasis on team	important	0	2
6. Based on experience and theory	important	0	2
SOURCES OF SATISFACTION			
1. Develop successful individuals	important	2	5
2. Develop good gymnasts	important	1	2
3. Develop other coaches	important	1	1
4. Relationship with gymnasts	important	1	0
PERCEPTIONS OF QUALITIES OF SUCCESSFUL COACHES			
1. Consistent	important	2	2
2. Technical knowledge	important	2	2
3. Interpersonal skills	important	4	5
4. Good teacher	important	3	0
5. Committed	important	2	0
6. Common sense	important	1	0
7. Personal life	balance	1	0
8. Patient	important	1	0
9. Creative	important	2	0
10. Hard worker	important	1	0
11. Performance oriented	important	0	3
12. Enthusiastic	important	0	1
13. Positive	important	0	1
14. Integrator of theory and practice	important	0	3
OPINIONS ABOUT MEN'S VS WOMEN'S GYMNASTICS			
1. Teaching technical skills	similar	0	3
	different	3	0
2. Interaction style	similar	0	3
	different	2	3
3. Maturation	females faster	2	2
4. Number of talented gymnasts	more females	1	0

Table 11 (cont.)

CATEGORY AND PROPERTY	Dimension	Coaches of	
		Males (N=9)	Females (N=8)
5. Creativity	limited in female gymnastics	1	0
6. Politics	more in female gymnastics	1	0
7. Competition	more difficult for females	1	0
8. Financial support	more difficult for males	1	0
EVOLUTION OF KNOWLEDGE			
1. Coaching clinics	important	1	1
2. Formal education	important	3	5
3. Experience as a coach	important	9	8
4. Experience as a gymnast	important	4	5
5. Other experienced coaches	important	4	6
6. Caring individuals	important	3	4
PERSONAL CONCERNS			
1. Lack of confidence	occasional	9	2
2. Keep a balance life	difficult	2	5

Personal approaches to coaching. This category was defined as the personal principles underlying the coach's intervention. Coaches of both males and females discussed the importance of developing the whole person as illustrated in this meaning unit:

My philosophy is to make them good people and good gymnasts. Like if I had a kid who just swears and pushes everybody around, I won't accept that at all. So I'm trying to develop good people and good gymnasts. (F6)

Three coaches of males mentioned the importance of working with gymnasts who work hard. For example, coach M8 said:

I'm an easy guy to read. If I feel that you're not going to make it because you're not working hard enough or you're just not thinking well enough, I am not the most fun guy to be around. I can coach someone who is not that good [but who work hard]. I'm an easy guy to be around if you are working hard, but I have a real problem with a person wasting their talent.

One coach of males said that money was not an important factor in his career as reflected in the following meaning unit:

I'm working with a net, I make 27 thousands dollars per year; if the club makes more money I hire more coaches, I try to get better gymnasts, I'm not money oriented. (M8)

On the other hand, another coach had a greater need for money:

J'aime la gymnastique, je veux coacher et continuer là-dedans mais je ne veux pas que mon salaire soit en bas de 42 000\$. Je suis prêt à faire plus d'heures à cause de la gymnastique; je diminue ma tâche à l'école pour me permettre de gagner à peu près 42 000\$ par année pour faire la job. La journée qu'on va me dire, "on te paye 42 000\$", je vais prendre un congé sans solde. Si tu calcules bien, si je prends un 50% de la tâche à l'école c'est parce que j'en fais 20 000\$ ici et je complète avec 20 000\$ à l'école. Tu comprends, ça me prends un minimum vital qui est à peu près le salaire d'un professeur. (M5)

One coach of females discussed the importance of being committed to an athlete's learning:

I guess the most frustrating days relate to the early days of establishing a womens team here. Because the women team had had 4 women coaches who moved on, leaving no continuity. And so, when I began coaching, the most important thing was to be in the gym everyday at the same time no matter if anybody came in or not. Sometimes, nobody would come and I'd sit there for 1/2 an hour and nobody would come. And then that message got down to the athletes that, "he's sitting out they're waiting for us, surely we should show up too." I think I built the spirit with that, you know, expectancy and eventually I didn't have to sit there and wait for people. (F8)

Two coaches of females stressed the importance of emphasizing the team as opposed to the individual. For example coach F2 said:

I don't deal with [only] one kid. Two months ago I lost a kid; six years of training, probably a 9.9 on bar routine. How do I feel? I don't feel anything. It's not that I'm not emotional but from a pure gymnastic point of view, there's not a ripple. Now I have four seniors, but also 3-4 juniors, and 4-5 novices. So, in a big picture, my system is not based on one athlete.

Finally, two coaches of females mentioned that their approach to coaching was based on experience and theory as illustrated in the following meaning unit:

Si tu me demandes "est-ce que tu entraînes en accord avec la théorie?" Je vais te dire "Non". Tu vas me dire: "Pourquoi, est-ce que c'est parce que tu refuses la théorie?" Je vais dire "non, comment est-ce que je refuserais la

théorie parce qu'elle est essentielle". C'est-à-dire que, j'utilise des éléments [de la théorie] que j'intègre à mon expérience en tant qu'entraîneur. Par exemple, ma conception de la structure du contenu de la gymnastique n'a rien à voir avec les bouquins. J'ai déjà utilisé ça mais je l'ai modifié. (F4)

Sources of satisfaction. This category was defined as personal satisfaction resulting from coaching. The sources of satisfaction mentioned by both coaches of males and females were related to developing good gymnasts, successful individuals and other coaches. The following meaning units are examples of these three properties:

Les performances de nos jeunes c'est un gros cadeau pour l'entraîneur. C'est un peu notre réussite par le biais de l'athlète. (M5)

It's important to me that they reach their potential. [For example, this gymnast] she was on the National team and she's been in our gym for the last three years. Now she's in Florida on full scholarship and she plans to study medicine. To me that's one of my biggest success stories, although she never made a World team, or an Olympic team. She stayed in our gym from age eight to 18 training five days a week and she's now enjoying the sport at the university. (F6)

J'aime ça, développer d'autres entraîneurs, à long terme quand je vais avoir fait le tour de la boucle c'est ce que j'aimerais faire. (M7)

Relationships with the gymnasts were mentioned by one coach of males as an important source of satisfaction:

The things I enjoy the most about coaching- I feel, especially with my older guys, that I can be on the same wavelength and that I can joke with them. Even with my kids in their early teens I can joke with them and we can be friends and also coach the athlete. I guess I've been able to separate the two and work with both of them fairly well. (M9)

Perceptions of qualities of successful coaches. This category was defined as personal beliefs concerning the qualities required to be a successful gymnastic coach. Fourteen different qualities were elicited and the number of individuals citing each quality varied between one and five. The qualities discussed also varied from personal qualities such as being positive and patient to more general qualities such as having technical knowledge. Following are some examples of meaning units illustrating the different properties and dimensions included in this category.

Un bon entraîneur est quelqu'un qui est disponible, autant au niveau du temps qu'au niveau du coeur ou de la tête. Parce que ce n'est pas des petits robots

qu'on a entre les mains, c'est quand même des petites filles, des êtres humains. (F7)

Another characteristic of a good coach is balance in his life. It's pure balance in every aspect of your life I don't think you can be really a good coach if you're only driven for gymnastics. (M8)

Une autre qualité d'un bon entraîneur, c'est de varier le plus possible les entraînements. Un entraîneur avec des jeunes, je pense qu'il faut qu'il varie l'entraînement, qu'il soit créatif, sinon ça devient monotone toujours faire de la musculation, de la souplesse, il faut que tu trouves différentes techniques pour leur faire faire la même chose, surtout avec les jeunes. (M7)

Opinions about men's versus women's gymnastics. This category was defined as personal beliefs concerning the differences and similarities between male and female gymnastics. Three coaches of females perceived the property, teaching technical skills, to males and females gymnasts similarly, whereas three coaches of males thought it was different: For example, coach F2 mentioned:

Once more, a skill is a skill. Break it down, analyze it. It's the process of teaching the skill. [As a coach of females], you look at male videos for 2-3 months and then you go teach it. It's that simple, because males do nothing that females do not.

On the other hand coach M3 said

I always coached girls and boys differently because women's gymnastics is so brutal, short, and you're so pressured by the time frame: You must have this trick by the end of the week. A female gymnast has to be established by the time she's 11 years old.

Moreover, three coaches of females agreed with two coaches of males that the interaction style with male and female gymnasts was different, whereas three coaches of females said the interaction was the same as illustrated in these meaning units:

I know with some of the girls I've coached, I coached [interacted] with them, the same as I coach some of the boys I have. (M9)

On the other hand, another coach mentioned:

I think that females tend to want a much more structured practice than males. (F8)

However, both coaches of males and females agreed that females matured faster than male gymnasts. Finally, coaches of males specified that: 1) there were more talented female gymnasts, 2) creativity was limited in women's gymnastics, 3) there were more politics in women's gymnastics, 4) it was more difficult for females to compete, and 5) it was more difficult for males to get financial support.

Evolution of knowledge. This category was defined as the ways the coach learned and how knowledge was acquired to become an elite coach. Also included were sources from which knowledge was retrieved to solve demands and constraints. The properties and dimensions within this category, all of which were mentioned by both coaches of males and females, showed that coaching clinics, formal education, experience as a coach, experience as a gymnast, interaction with other experienced coaches and caring individuals were all important ways of learning. An example of a meaning unit in the property, experience as a coach, which was mentioned by all 17 coaches as being important, was:

It is important to educate coaches, not only in the educational system, but really in experience. When you have more experience, you've already seen all these problems and you've learned how to deal with them. When they haven't had that experience, some of these coaches just don't know what to do. International experience gives you a big insight into what you have to do. (F1)

Following is an example of a meaning unit characteristic of the property, caring individual.

"I had people who cared for me, who were real honest, good people. They gave me their values" (F2).

Personal concerns. This category was defined as a coach's personal worries or anxieties. An occasional lack of confidence and the difficulty of keeping a balanced life were discussed as personal concerns by coaches of males and females. Meaning units illustrating these two properties were:

I lost my own personal confidence several times. I had doubt about the ability to convey those messages; the ability to be able to carry it out if they did decide to go through it. I had been very concerned with my ability to spot and conduct the practice. It was kind of brought back to me when I spotted and saved a lot of kids. So it's one of the things I've realized; I'm not infallible and I can lose my confidence as well. (F8)

La carrière d'entraîneur ça t'oblige à faire des concessions avec ton conjoint, ça c'est pas drôle non plus. Les fins de semaines, les compétitions et on travaille tous les soirs. Souvent on part une semaine là, une fin de semaine là; on est assez souvent parti. Mon ami n'est pas ici il travaille sur les "shifts". Ca dépend toujours des conjoints qu'on a, mais le mien est particulier, alors, ça pose beaucoup de problèmes. Ce sont des inconvénients mais c'est ma job et ça va l'être pour pas mal longtemps. (F7)

Gymnasts' Personal Characteristics and Levels of Development

The meaning units classified in the gymnasts' personal characteristics and levels of development component were defined as a coach's knowledge of a gymnast's level of development, personal qualities, and other personal variables. The categories included in this component were the gymnast's personal qualities, variables affecting performance, and the gymnast's first, second, and third stages of learning (Table 12).

Table 12

Occurrence of Coach Identification of Properties and Dimensions Within Each Category of the Athlete's Personal Characteristics Component

CATEGORY AND PROPERTY	Dimension	Coaches of	
		Males (N=9)	Females (N=8)
GYMNAST'S PERSONAL QUALITIES			
1. Committed	high level	6	7
2. Aware	high level	5	4
3. Physical and technical abilities	high level	4	3
4. Ability to learn	fast	1	1
5. Success oriented	born with it	1	3
6. Self-sufficient	high level	0	3
7. Enthusiastic*	high level	0	2
VARIABLES AFFECTING PERFORMANCE			
1. Fear of movements or of performing	high level	5	4
2. Injury	major	4	3
3. School	difficulties	1	2
	highly involved	1	0
4. Weight	overweight	0	3
5. Integration of french speaking gymnasts with other national gymnasts	difficult	1	0

Table 12 (cont.)

CATEGORY AND PROPERTY	Dimension	Coaches of	
		Males (N=9)	Females (N=5)
GYMNAST'S FIRST STAGE OF LEARNING (males = 6-12 yr olds; females = 5-8 yr olds)			
1. Coach involvement	minimal	3	2
2. Competition stress	minimal	3	2
3. Intervention style	telling approach	1	3
4. Content to be taught	physical skills	5	3
GYMNAST'S SECOND STAGE OF LEARNING (males =12-16 yr olds; females = 8-13 yr olds)			
1. Intervention style	strict and flexible	2	3
2. Content to be taught	technical + mental	5	4
3. Critical period	talent development	1	2
4. Gymnast's first gymnastic experience	some gymnasts	1	0
GYMNAST'S THIRD STAGE OF LEARNING (males =16-25 yr olds; females = 13-19 yr olds)			
1. Content to be taught	mental + technical	3	1
2. Gymnasts' involvement in decisions	high	5	2
3. Career duration	10-15 years	1	0

* Elicited later in a subsequent interview to assure the credibility of the results

Gymnast's personal qualities. This category was defined as the gymnast qualities perceived by coaches as being important in order to perform at an elite level. A high level of commitment, awareness, physical and technical ability and the ability to learn fast as well as being success oriented were considered important characteristics of an elite gymnast by coaches of both males and females. In the interview to assure the credibility of the results, two coaches of females added that being enthusiastic was an important quality of female gymnasts. Examples of meaning units comprising these properties were:

Je pense que pour en faire une grande gymnaste, il faut que dans sa tête elle ait le goût, qu'elle veule absolument atteindre ce but là. Ça peut pas être une petite fille qui est molle dans sa tête. Elle a un but, elle veut faire de la gymnastique, elle aime ça puis c'est stimulant pour elle faire de la gymnastique. (F7)

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If you're talking about a top athlete, most of them know. It's part of their talent that makes them able to compete at a high level consistently by self-evaluation- knowing where they make mistakes. There is a lot of intelligence and awareness there. (M8)

Qualities of a good gymnast never change. They have to have a perfect handstand, they have to have perfect posture, good flexibility and orientation. (M2)

Good gymnasts are fast to learn physical and psychological skills. (M4)

The very successful athletes have the desire in all aspects of their life. They want to be good at school too, not just at gymnastics. Maybe it also comes from the family being goal- or success-oriented. It's part of the reason they become top athletes, it's part of their focus from almost the day they were born. It's not something they learn at age 9 or 10, It's just an attitude that's there. They want to do the best they can. Most at the top are pretty special. (F5)

Furthermore, self-sufficiency was discussed by three coaches of females as being an important quality. This property was characterized by the following meaning unit:

"Les gymnastes élités ce sont des gens qui planifient et qui ont déjà un mode de fonctionnement" (F3).

Variables affecting performance. This category was defined as any variables related to the gymnasts that could affect their training and competition. School, major injuries, and fear of movements or of performing were discussed by coaches of males and females as variables affecting performance. These three properties were characterized by the following meaning units:

He's been quite injury-prone since the 1989 Nationals. A couple of major injuries that weren't caused through some worn instincts, they were both stress injuries. One was quite serious. Both were quite serious and got to the point where he wasn't able to do anything. (M9)

Some kids are really scared. There's a difference here: if they really are too scared, then they shouldn't be in the high performance group and we've had some kids like that. We found they were high performance but they have lots of problems with fear so we'd say, "I think you'd better come back over here where you feel more successful." So, we really direct them. (F1)

So if something is happening in school, they're not doing well in school - my other gymnast, the national athlete, is not an intelligent student, he does very poorly in school - I think that certainly has some effect upon his normal daily training. (M9)

One coach of males also identified the great involvement of his gymnasts with school as a factor affecting their performance:

Entre 12 et 16 ans, il faut qu'ils progressent il faut que tu leur donne du bagage s'ils manquent souvent à cause des études ça ralentit leur progression. (M7)

Three coaches of females identified their gymnast's weight as a variable affecting performance:

La gymnastique malheureusement c'est un sport tellement ingrat il faut avoir une ligne parfaite, les juges ils regardent ça. Les filles quand elles deviennent vraiment compétitive, ils ont 12-13-14 ans et les hormones changent alors il faut faire bien attention. C'est un problème pour certaines filles pour d'autres ce ne sera jamais un problème, génétiquement elles n'ont pas de problème de poids mais pour la grande majorité c'est un problème et c'est pas juste chez nous à Montréal, c'est au Québec, au Canada, aux États-Unis. (F7)

Finally, one coach of males discussed the integration of French speaking gymnasts with other national gymnasts as a variable affecting performance:

Tout se fait en anglais pour les athlètes. Il y en a qui sont peut-être moins gênés que d'autres ou qui parlent mieux anglais que d'autres; ceux là s'adaptent mieux, c'est évident. Des fois ils font des camps d'entraînement une semaine, deux semaines, trois semaines avant le championnat du monde pour intégrer tout le monde, mais effectivement un gars comme lui qui parle peu anglais c'est moins clair et c'est difficile. Il s'intègre moins bien que les autres. (M5)

Gymnasts' first stage of learning. This category was defined as the gymnast's first experience with gymnastics. Generally, male gymnasts were reported to go through this stage between ages of six and 12 and females between the ages of five and eight. Coaches of males and females mentioned that in this stage: 1) high performance coach involvement was minimal, 2) the number of competitions was limited, 3) the intervention was straightforward by telling the gymnasts what to do, and 4) the training content to be taught was comprized mostly of physical skills. Meaning units illustrating these properties included:

What I do is hire ladies or mothers that don't have a good gymnastics background to teach the beginner gymnasts. Myself and two other coaches give the ladies information so that they know just enough. (M8)

With our little ones, we purposely go slower, we have these things called, "pre-comp" meets. They're not real gymnasts yet. We will never compete a kid before age eight. We protect them from failure. We haven't prepared them to compete mentally, physically, technically, so why put them under that sort of pressure. (F6)

It just runs the game of children growing up. Some of the things they perceive are quite comical from our perspective of adults, but for them they're very very real. The younger kids are usually very young, behaviorally. You tell them rights and wrongs, to stand in line, make sure you bring your grips (F2).

For young gymnasts between six and 12 years old, you don't have a choice, you work on the basics, the physical skills, as broad as you can and as much as you can, building on the basics. (M2)

Gymnasts' second stage of learning. This category was defined as the intermediate phase in a gymnast's career. Male gymnasts were reported to go through this stage generally between the ages of 12 and 16 and females between the ages of eight and 13. Both coaches of males and females mentioned that: 1) their intervention in this stage varied and could be strict or flexible, 2) the content to be taught was comprized of technical and mental skills, and 3) this second stage was critical for talent development. Meaning units representative of gymnasts' second stage of learning included:

We're pretty demanding in this second stage, I try to make sure to reward them verbally and physically. Usually when I talk to them I touch them. I reward them for success. I'm also trying to be intense with them when they're not doing what I want. So there's a balance. We're pretty hard on them but we're as hard on them positively as we are negatively. (F6)

I'm really trying to develop that aggressiveness and to develop their skills technically in this second stage. (F6)

Je pense que l'étape la plus importante dans la carrière d'un gymnaste c'est avant 17 ans, avant d'être junior entre 14 et 17 ans ce sont des années très rentables. Durant cette période il faut qu'il commence à avoir un peu plus de force, acquérir un bagage technique. Il faut qu'il explose. (M5)

Finally, one coach of males mentioned that this stage could be the first stage for some male gymnasts:

I didn't get these boys until they were 11 or 12. They both had done about one year or maybe two years of gymnastics. The one that is currently on the national team didn't start any gymnastics until he was 11 and really didn't start what I call true gymnastics until he was 12 because he was in a YMCA program. (M9)

Gymnasts' third stage of learning. This category was defined as the final stage where gymnasts compete at the National or International level. The age of the gymnasts in this stage was generally between 16 and 25 years for male gymnasts and between 13 and 19 years for female gymnasts. Some coaches of males and females specifically discussed the content to be taught in this third stage and the increasing involvement of the gymnasts in the decision making process:

The kids that are up here may have a few technical problems but they're not very huge. We can always work them out, camouflage them or something. So we try not to get into that where the kids are not suited for that program and we work on improving mental skills. (F1)

Le rôle de l'entraîneur change lorsque les gymnastes arrivent à un certain âge. Lorsque le gymnaste atteint 16 ans, l'entraîneur devient plus un conseiller qu'un maître. (M6)

Finally, one coach of males mentioned that the career duration of a gymnast is between 10 and 15 years:

Les carrières sont longues, c'est entre 10 et 15 de carrière du côté masculin; je dirais que présentement c'est plus près de 15 ans. (M5)

Although the initial interviews allowed the identification of three stages of learning for coaches of males and females, in the subsequent interviews to assure the credibility of the results, the four coaches interviewed suggested that the third stage should be divided into two. The division of the third stage of learning into two was characterized by a desire to qualify the gradual change occurring in gymnasts' independence toward the coach. For instance, by the end of the third stage the gymnasts should be self-sufficient, not relying on the coaches' intervention; this transition would mark the fourth stage. Despite this suggestion, expert coaches agreed with the general patterns described in each of the three stages of learning.

Contextual Factors

The meaning units classified in the contextual factors component were defined as a coach's knowledge of unstable factors, aside from the athletes and the coach, that need to be considered when intervening with gymnasts. The categories of parents, assistant coaches, and job conditions were included in this component (Table 13).

Table 13
Occurrence of Coach Identification of Properties and Dimensions Within Each Category of the Contextual Factors Component

CATEGORY AND PROPERTY	Dimension	Coaches of	
		Males (N=9)	Females (N=8)
PARENTS			
1. Expectations for gymnast's performance	differ from coach	3	6
2. Support for the gymnast	lack	2	1
	too much	0	1
3. Involvement in gymnast's career	important	0	3
4. Help to organize club activities	involved	2	0
	not involved	1	0
ASSISTANT COACHES			
1. Cohesion	lack	0	3
JOB CONDITIONS			
1. Non coaching activities	many	6	4
2. Funding	lack	5	2
3. Canadian elite gymnastic system	ineffective	2	2
4. Politics	presence	0	2
5. Coaching salary	low	1	0
6. Coaching recognition	low	1	0
7. Working with many gymnasts	difficult	4	0
8. Communication between elite coaches	bad	4	0
9. Talented young gymnasts	lack	1	0
10. Coach's job in Québec as compared to Ontario	more difficult in Québec	2	0

Parents. This category was defined as the coach's knowledge of situations where parents influenced the coach's intervention with the gymnasts. The different expectations about a gymnast's performance and the parents' lack of support for the gymnast were identified by coaches of males and females as affecting their intervention process. Meaning units illustrating these properties included:

Il y a eu des problèmes avec les parents. Cette année on a eu des cas de filles qui sont parties parce que les parents étaient convaincus qu'on amenait pas leur fille où ils voulaient. (F3)

I look at the way he might have come into the gym, whether he's been in a good mood or a bad mood. That will depend on how his practices are. He

does have a lot of family trouble. And certainly that boils over into his gymnastics. He doesn't have family support for his athletic achievements. (M9)

One coach of females also mentioned that some parents can provide too much support, which has the potential of creating extra stress on the gymnast. In discussing the issue this coach said:

Sa mère est stressée sur plein de choses, elle a des problèmes personnels. C'est une vieille bonne madame, elle est bien gentille mais disons que sa personnalité n'aide pas tout à fait à la petite fille. C'est une maman chouchoutante en même temps. (F7)

Nevertheless, three coaches of females described the importance of parent involvement in a gymnast's careers. For example coach F5 said:

For the mothers who don't work it's very important to be involved. They feel involved in that child's life, they feel important; they're contributing something other than just being home so that they really identify with the activity, it's part of them [and it's also good for the gymnast's career].

Finally, two coaches of males mentioned that parents' involvement in the organization of club activities could influence their intervention with the gymnasts. In discussing this issue, coach M2 mentioned that:

Parents' involvement in club activities change from year to year; that's another thing that adds to stress because you work with the kid and the parents

However, coach M5 did not have the parents involved in the organization of club activities:

On fonctionne un peu différemment des autres clubs là dessus, on est indépendant, on n'a pas de comité de parents pour la gérance, on a plutôt un directeur. La plupart du monde me disent c'est bien mieux comme ça parce que quand les parents s'en mêlent ça peut devenir compliqué. Peut-être, mais par contre je me dis que les parents dans certains clubs apportent une grosse aide à l'organisation. L'implication des parents peut apporter beaucoup mais c'est toujours délicat.

Assistant coaches. This category was defined as the coach's knowledge of situations where assistant coaches were a factor in the coaches' intervention with the gymnasts. Only coaches of females mentioned that a lack of cohesion with their assistants could affect their

work with the gymnasts. For example one coach said:

Quelque fois on est peut-être un petit peu trop isolé dans nos petits coins, ça devient un peu difficile, la clé c'est la communication autant avec les enfants qu'entre nous. C'est un petit peu une de nos lacunes, on n'échange pas beaucoup, par exemple je ne lui donne pas beaucoup de commentaires sur ces engins et elle ne me donne pas de commentaires sur les miens. C'est comme si on est rendu tellement spécialisé dans nos engins qu'on les a appropriés. (F7).

Job conditions. This category was defined as the coach's knowledge of job conditions that could affect their intervention with the gymnasts. The most pervasive properties discussed by both coaches of males and females were: 1) the various non-coaching activities that a coach has to do, 2) the lack of funding, and 3) the lack of effectiveness of the Canadian elite gymnastic system. Meaning units illustrating these properties included:

One difficulty is that our coaches in Canada get involved in all those problems of working much more than they should. Most of my former gymnasts coach now across Canada. I, with full sadness, see them at national championships or other meets where they are only five or 10 years in the business and they are already burnt out. They have to do everything if they want to keep their job safe. That's why many projects which we idealistically plan for coaches are impossible to apply because of the physical conditions in which coaches are working. (M2)

En tant qu'entraîneur, c'est certain qu'on parlera pas des finances parce que cela a toujours été un problème. (M6)

We are very reluctant [in Canada] to commit ourselves. It's the worst coaching system I have ever seen. I find coaching right now to be a very frustrating profession. (F5)

The presence of politics in gymnastics was a property elicited only by coaches of females as illustrated in the following meaning unit:

There's politics in gymnastics- you don't always get the score you deserve and somebody else gets more than they deserve. You don't always win or lose when you should. (F5)

Finally, coaches of males discussed various issues related to their job conditions. The properties induced from the analysis included: 1) low coaching salaries, 2) the lack of social

and professional recognition, 3) the difficulty of working with many gymnasts, 4) bad communication between elite coaches in Canada, 5) a lack of talented young gymnasts, and 6) the difficulty of coaching in Québec as compared to Ontario. Following are examples of meaning units illustrating these properties:

It's a very demanding job and it is a low paying job. When you compare Russia or a socialist country with Canada and you ask why there's a high level of sport. As a coach in Russia, I earned twice the salary of a lawyer or doctor. In Canada I get 10 times less than a lawyer or a doctor. (M1)

All social aspects [are limited for coaches] in Canada. People who work in sport organize meetings and dinners and they invite the best athletes - not coaches. That's why the media never talks about who is behind the athlete with success. (M1)

It's hard in our country, in our situation, because we work with large numbers. We have more athletes than the coaches from the east block. (M8)

I guess quite often [it's difficult] when you're coaching a team of athletes that are from another club. There is a guy who always calls me at the last minute and tells me, "I can't come. Can you take care of my athlete because he is in the same group of your guys". So the kid warms up and you see that he is not ready and you cannot do anything. (M9)

Présentement on vit une drôle de situation, on a un senior mais après ça on a cinq novices âgés de 15 ans à peu près. Le senior qui est sur l'équipe nationale, c'est le plus vieux après ça il y a un gros trou. (M5)

Tout le système est différent [entre le Québec et l'Ontario], la mentalité est différente, par exemple, nos jeunes paient à peu près \$300 par année, à Toronto, ils paient \$2,000 de cotisation par année. A Toronto, je connais du côté masculin au moins une vingtaine d'entraîneurs payés à temps plein et payé beaucoup plus que moi. (M5)

The knowledge just identified through the inductive content analysis provided a hierarchy of coaches' knowledge. Although the results presented flowed from the components, to categories, to properties and meaning units, it is important to remember that the analysis actually began with the meaning units and progressed to the properties, then the categories, and finally the components. The identification stage of expert coaches' knowledge has provided a structure from which a conceptualization of how coaches' knowledge is represented and used through mental models can be defined.



Conceptualization of the Coaches' Knowledge

The purpose of grounded theory is to develop conceptual links between categories and not merely to describe categories (Strauss & Corbin, 1990). Therefore, the components and categories derived from the inductive analysis were examined to determine what their relationship was to the goal of developing elite gymnasts and what their impact on each other was. This was accomplished by identifying which components and categories had a more direct effect on the accomplishment of the goal of developing elite gymnasts. The categories of knowledge found to be central for the development of elite gymnasts were all included in the competition organization and training components. Given the complexity of any coaching situation, these three categories included the knowledge elicited for developing elite gymnasts. Because competition organization and training were directly involved with the accomplishment of the goal and were the primary components for improving gymnasts' performance, they were designated as the "performance components". The performance components and their multiple interactions were defined as the "coaching process". Therefore, the competition organization and training components were at the heart of the integrated model representing coaches' knowledge.

The three remaining components were found to have an indirect impact on the goal by affecting the competition organization and training components. Therefore, the coaches' personal characteristics, the gymnasts' personal characteristics and levels of development, and the contextual factor components were labeled as "peripheral components." The performance and peripheral components as well as their dynamic relationships were then integrated to provide an analytic and conceptual model of the gymnastic coaches' knowledge, as shown in Figure 1. A story was written to capture how the knowledge identified in Figure 1 would be represented in mental models and processed by a gymnastic coach in order to reach the goal of developing elite gymnasts.

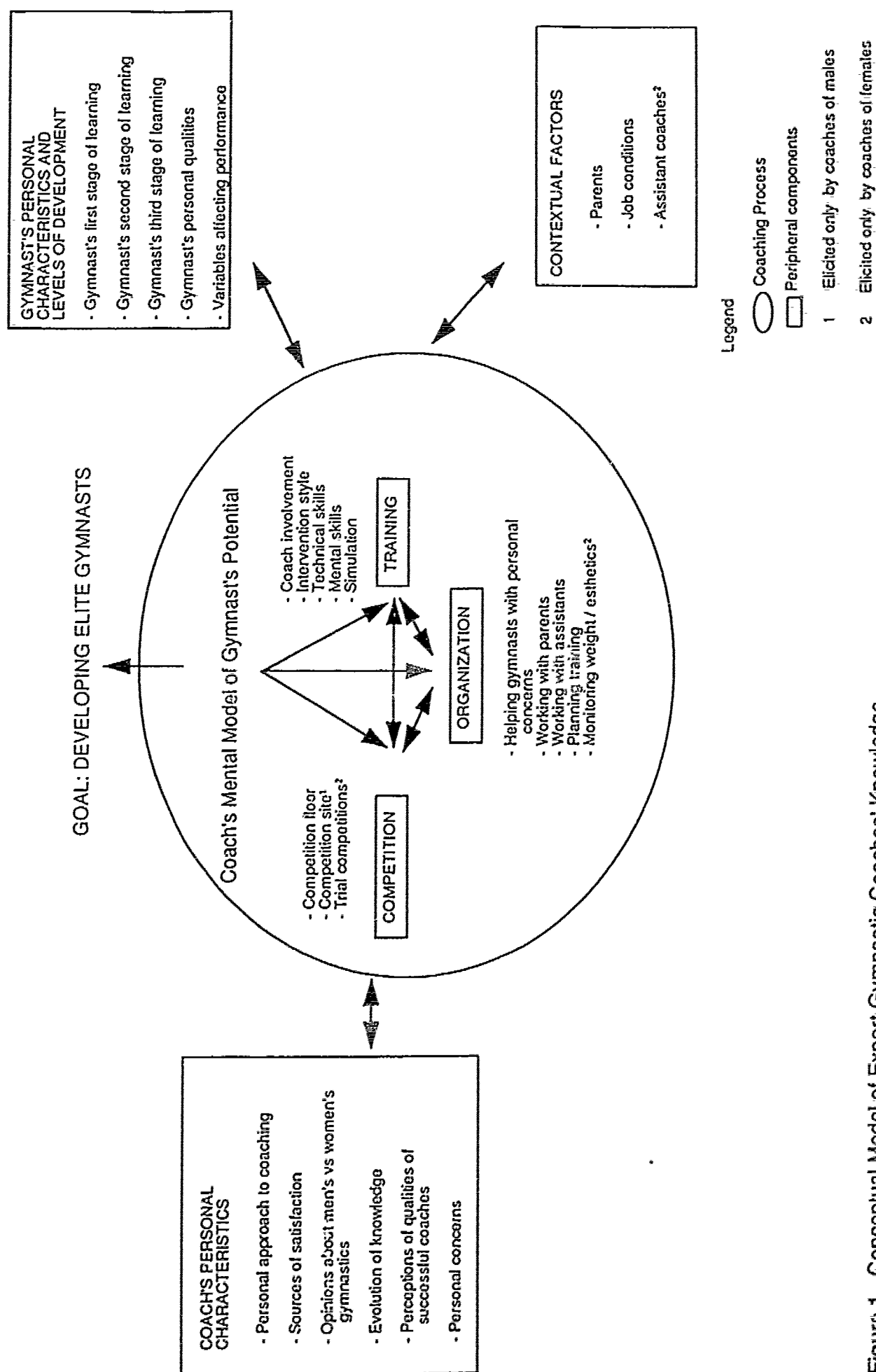


Figure 1. Conceptual Model of Expert Gymnastic Coaches' Knowledge

Story Describing How Coaches' Access their Knowledge by Using Mental Models

Strauss and Corbin (1990) suggested that to move from descriptive qualitative data to the conceptualization of a grounded theory, it is necessary to make a commitment to a story line. In their words: "One way to begin integrating is to sit down at the word processor or typewriter, or with pencil and paper, and write in a few sentences the essence of your story" (p. 119). For the present study, an analytical story was written to achieve the integration and development of a representation which would account for expert coaches' structure of their knowledge. The aim of the story was to fully integrate all the categories of coaches' knowledge in a representation which could handle the specificity of mental models. The modelling system in Figure 1 defined the important links occurring between the components and categories of expert gymnastic coaches' knowledge. An illustration of the performance of this modelling system is described in the following story which integrates coaches' categories of knowledge.

For a coach, the development of elite gymnasts involves numerous tasks which can be classified into three components: organization, training, and competition. These three performance components which are in constant interaction, are defined as the Coaching Process. Included in the performance components are tasks and variables that a coach perceives as important in the development of elite gymnasts. When a gymnast has the physical skills for high level gymnastics, a coach, taking into consideration some external factors or peripheral components, can construct a mental model of a gymnast's potential. The peripheral components consist of the coach's personal characteristics, such as his or her philosophy about coaching, the athlete's personal characteristics and level of development, such as the gymnast's commitment for training, and some contextual factors, such as the coaching conditions. Throughout the Coaching Process, the coach's mental model of the gymnast's potential can be changed depending upon the effects of these peripheral components. Therefore, not long after a gymnast has entered the Coaching Process, a coach will have knowledge of the peripheral components affecting the gymnast, and the performance level she or he can reach. The coach will then keep the estimation of the gymnast's predicted performance in mind, as a mental model to develop that particular gymnast, when intervening in the Coaching Process.

The organization component of the Coaching Process is aimed at setting up optimal conditions for training and competition. Organization tasks include long- and short-term planning to give general direction to the club and gymnasts. Tasks also include some planning with the gymnasts, parents and assistants in order to set objectives and determine the work needed to be accomplished by each individual to reach the objectives. Although each gymnast has his or her own training program, the training is organized for groups so that gymnasts can help each other and work together toward their personal objectives. Finally, one additional variable to consider, by coaches of females, when organizing training is a system to monitor gymnasts' weight and nutritional habits. The organization component is constantly monitored and adjusted by the coach during the Coaching Process according to how it interacts with the training and competition components.

The training component of the Coaching Process involves the coach's knowledge of three different stages of learning for gymnasts, since different skills will be taught at each stage. In general, the elite coach will be minimally involved in the gymnast's first learning stage, where the acquisition of physical skills such as flexibility and strength are the focus. The work of the coach in the second and third stage of a gymnast's development is to teach technical and mental skills. The training of complex routines are based on a teaching progression of basic movements which are slowly and safely integrated. While coaches may use many different techniques to help gymnasts to deal with fear inducing movements and develop their skills, one important aspect of training is to simulate competition so that the gymnast can practise performing under various distractions and stress. The training component is constantly monitored and adjusted by the coach during the Coaching Process according to how it interacts with the organization and competition components.

The competition component of the Coaching Process usually involves minimal intervention of the coach. In the gymnast's first learning stage, the gymnasts generally don't compete. Their physical abilities are evaluated through simulated exercises and games. In the gymnast's second and third learning stages, competitions serve two purposes: learning and performing. Some competitions will be approached as learning experiences to help gymnasts prepare for more important competitions where performance is the focus. In competition, the coach generally has very little interaction with the gymnast; his or her main role is to make sure that the gymnast is mentally prepared for each event. The results and attitudes of gymnasts during competition will indicate the effectiveness of the training and organization components and modifications can then be made to improve the Coaching Process. In effect, the competition component also acts as an evaluation component.

The tasks performed in the organization, training, and competition components involve challenges or demands that can be handled separately without affecting the flow of the coaching process or the coach's mental model of gymnast's potential. For example, if a gymnast has difficulties at school, a coach may find a solution by talking with parents about improving study habits at home. If this strategy works, then the school demands will not have had any effect on the coach's mental model of gymnast's potential. Similarly, if a gymnast has fear for the execution of a movement, a coach will have strategies to deal with that fear in training, which, if successful, will not affect the coach's mental model of gymnast's potential.

Demands on the Coaching Process are solved through the coach's personal characteristics component where knowledge and strategies are rapidly retrieved and applied. The knowledge of a gymnastic coach has been acquired and is always updated through his or her experience as a coach, through interactions with other experienced coaches or caring individuals, and, more formally, through his or her education and coaching clinics.

Sometimes, the demands on the coaching process are so pervasive that they become constraints which are difficult to satisfy without changing the coach's mental model of gymnast's potential as well as the coaching process. These constraints, which are not part of the coach's tasks, are a part of the peripheral components, and need to be solved in parallel with the organization, training and competition components. Modifications to the coaching process and the coach's mental model of gymnast's potential can be temporary or permanent depending upon the types of solutions provided. For example, if a gymnast has a major problem with school and the coach's previous arrangements with parents and teachers have not worked, then the coach will need to reduce the gymnast's training time. This kind of modification requires a reevaluation of the coach's mental model of the gymnast's potential and hinders the coaching process. The major constraints found to have a negative impact on the coach's mental model of the gymnast's potential are: the athlete's personal characteristics, such as a major injury or a lack of talent or commitment; some contextual factors, such as the parents' lack of support or some poor job conditions. Furthermore, the coach's personal characteristics, such as his or her belief system, the coach's personal approach to coaching or his or her personal life can also create constraints that hinder the Coaching Process and require major changes in the coach's mental model of the gymnast's potential.

On the other hand, the peripheral components can also positively affect the Coaching Process and the coach's mental model of the gymnast's potential. Mainly, if a coach has initially overestimated the negative effects of the peripheral components acting on a gymnast's performance, then the standards of the coach's mental model of the gymnast's potential need to be raised. Accordingly, the Coaching Process needs adjustments to meet the requirements of a higher predicted performance. For example, if the high level of commitment of a gymnast for training was initially underestimated by the coach, then the coach's mental model of the gymnast's potential would need to be modified.

Adjustments to the coach's mental model of the gymnast's potential and the coaching process, as a result of the impact of the peripheral components, are also achieved through the coach's personal characteristics component. Unlike meeting the demands of the Coaching Process, satisfying a constraint emanating from a peripheral component is not an all-or-nothing matter, different solutions can affect the Coaching Process in various ways. A coach needs to find an optimal solution to satisfy any constraints and at the same time maintain the mental model of gymnast's potential at a high level. Similarly, the positive effects of the peripheral components need to be rapidly detected by the coach to modify the Coaching Process by setting a higher standard of performance than the one originally planned.

This story illustrates how expert coaches represent and use their knowledge through the construction of mental models. The next chapter is devoted to a discussion regarding the nature of the knowledge identified and the modeling system conceptualized to represent that knowledge.

CHAPTER 5

DISCUSSION

Throughout this investigation the objectives were to explore the nature of the knowledge of expert gymnastic coaches and to articulate a model representative of the organization and utilization of this knowledge. The present chapter has been organized to examine these two objectives. The first part begins with an examination and comparison of the results with the existing literature on gymnastics and coaching. In light of the evident age-related and gender specific task differences in men's and women's gymnastics, attempts were made to explain or explore the differences in the knowledge elicited by coaches of males and coaches of females. However, since no differences were found in the categories of knowledge elicited by male and female coaches, the coaches' gender will not be used as a variable which could explain differences in the knowledge elicited. Nevertheless, the similarity in the knowledge elicited by the four male and four female coaches who coached women's gymnastics brings support to the Hasbrook et al. (1990) and Anderson and Gill's (1983) studies which indicated that women were as qualified and committed to coaching as were men. Therefore, stereotypical gender-role notions, such as women are less competent and less committed to a career than men (Acosta & Carpenter, 1985) appear to be invalid reasons for explaining the underrepresentation of women in the coaching profession (Cox & Noble 1989; Laberge, 1992; Sisley & Capel, 1986; Sisley et al., 1990; Stangl & Kane, 1991).

The second part of this chapter focuses on the links made between coaches' categories of knowledge and the organization of these categories into a model. The components of the coaching model and their specific relationships were used to explain how expert coaches worked towards their objectives of developing elite gymnasts by building mental models for different situations. The chapter concludes with recommendations for future research.

The Nature of Expert Gymnastic Coaches' Knowledge

The knowledge elicited from the coaches interviewed will be outlined in the same order as it was presented in the results section. The categories of knowledge within each component and then the properties and dimensions of each category will be discussed.

Competition

Competition was the component least discussed by coaches as can be seen by the small number of meaning units within this component (6% of all meaning units). The categories elicited in this component were competition site, trial competitions, and competition floor. The category with the most meaning units related to situations on the competition floor (Table 8).

Competition floor. One important role of the coach on the competition floor was to let the gymnasts perform without any interference. Coaches in competition intervened only if they noticed that the gymnasts were not ready to perform. Similar results were recently reported by Hauswirth and Pridham (1993) in an interview with Janice Fowler, a Canadian rhythmic gymnastics coach. The authors were interested in finding out about mental training techniques used by Fowler in training and competition. She said that "If athletes are nervous [in competition] I pull them aside and ask them to go through relaxation exercises and mental rehearsal to help them calm down" (p.6). Furthermore, systematic observation of gymnasts in competition showed that the most frequent social state among gymnasts prior to their performances was that of being alone as opposed to interacting with coaches or other gymnasts (Baria & Salmela, 1988; Esmail & El Arabi, 1987; Salmela et al., 1980). In agreement with these studies, expert gymnastic coaches in the present study mentioned that their role was limited to specific interventions on the competition floor. The notion of the coach as an observer during competition was reinforced by the fact that expert coaches mentioned that no attempts at providing technical information to the gymnasts were made on the competition floor. Thus, expert coaches seem to be aware that, considering the inherent stress of a gymnastic competition (Hallé & Sarrazin, 1987), any extra information might mentally overload the gymnasts and interfere with their ability to attend to task relevant cues (Nideffer, 1986; Salmela, 1979).

The minimal intervention of gymnastic coaches in competition varies considerably with results of studies which examined specific behaviors of coaches involved in youth sport teams, such as baseball, ice hockey, basketball, and soccer (Chaumeton & Duda, 1988; McKenzie & King, 1982; Smith et al., 1978; 1983; Trudel et al., 1991; Wandzilak et al., 1988). Generally, these studies indicated that in competition the intervention of team sport coaches consisted mainly of motivating the players and providing instructions, behaviors which were not elicited by the gymnastic coaches. The expertise of gymnastic coaches on the

competition floor was reflected by their knowing when to intervene, and, most importantly, when to leave the gymnast alone. It is clear that the different nature of team sports and individual sports, such as gymnastics, demands a different type of coaches' intervention in competition.

Competition site. The role of the coach at the competition site consisted of all the time spent with the gymnasts at the competition site, excluding the time during or immediately before or after an event. This category was elicited only by three coaches of male gymnasts. One coach of males emphasized the importance of supervising gymnasts in the execution of their preparatory routines at the competition site. The fact that this property was not elicited by coaches of females might be explained by the differences in task demand between men's and women's gymnastics. For instance, Salmela et al. (1980) observed that three of the four women's gymnastic events -- the vault, the floor exercises, and the uneven bars -- are similar to some extent to men's vault, floor exercises and the horizontal bars, respectively; only the balance beam in women's gymnastics is different from any event on which the men perform. Yet, the men's pommel horse, rings, and parallel bars, three additional events which do not have a counterpart in women's gymnastics are events which possess a high level of variability and complexity in their movements (Fink, 1980; Salmela, 1983). Therefore, considering the variability, difficulty, and larger number of different events in men's gymnastics, it could be more important for coaches of males to supervise their gymnasts' rehearsals of different routines on the competition site than it is for coaches of females on their four different events.

A second property elicited by two coaches of males highlighted the importance of helping their gymnasts to control distractions at the competition site. The main strategies used by these coaches were to talk to the gymnasts the night before regarding their feelings about the competition, as well as to plan the meals of the gymnasts and check the equipment the day of the competition so that the gymnasts did not have to be concerned with these distractions. Coaches' knowledge of potential distractions at the competition site allowed them to make a plan for helping their gymnasts to stay focused on their performance. The fact that this property was not elicited by coaches of females is difficult to explain in light of the different nature of men's and women's gymnastics. Further investigation would be needed to examine the role of the gymnastic coach at the competition site.

Trial competitions. The importance placed on a gymnast's participation in trial

competitions was only discussed by coaches of female gymnasts. The longer careers of males might explain the fact that coaches of males did not elicit this category. Indeed, males usually start gymnastics around the age of six and reach their peak, at approximately 18 or 19 years of age, while women start at around age five and reach their peak at approximately 13 or 14 years of age (Chisholm, 1987; Durand-Bush & Salmela, 1993). One reason for this differential in career development was brought up by Sale (1980), who indicated that, as female passes through puberty, the increase in body fat, breast development, and hip development act to decrease the strength-mass ratio, particularly in the arms and shoulders. Therefore, females usually reach their peak in strength-mass ratio before or early in puberty. On the other hand, the strength-mass ratio of males increases following puberty because of the change in body composition and body proportions characterized by an augmentation of muscle mass. Because of this physiological fact, it would not seem unreasonable to assume that coaches of females need to place their gymnasts in competitive situations more regularly so that they learn to deal with competitive stress early and effectively in their career. The following two meaning units illustrated the career length between men's and women's gymnastics:

I think that on the girl's side you have a very limited time to do your task, to make a gymnast. For men, it's completely the opposite. They stretch their careers. One's fighting for puberty the other one is waiting for it. (M4)

A female gymnast has to be established by the time she's 11 years old. I guess the way I see the two sports differently is that you should learn to love the sport of men's gymnastics and then get good. In women's you have to get great and then you'll probably hate it. It's healthier on the men's side. Also, for girls, the performances go up very fast and suddenly it starts to decline. In men's gymnastics, it could be a long process where you can ride for a long time at the same level. (M3)

In sum, the longer careers of male gymnasts, which are due to the differential demands of the necessity of waiting for post-pubertal maturation in order to perform strength specific events such as rings, reduces the importance of participating in many trial competitions since the learning is distributed over a longer period of time.

Organization

The large number of categories, properties, and dimensions included in the organization component (24% of all meaning units) is an indicator of the complexity of the

coaches' knowledge in the organizational process (Table 9). Working with parents, working with assistants and dealing with gymnasts' personal concerns were three categories of coaches' knowledge which determined the socially complex organizational structure needed for the development of elite gymnasts. The category of planning training included various aspects of coaches' knowledge important to consider in preparing gymnasts for training and competition. Finally, the category, monitoring weight and esthetics, was discussed only by coaches of female gymnasts, reflecting a specific variable not present in male gymnastics.

Working with parents. Expert gymnastic coaches indicated that it was important to inform parents regularly on the progress and goals of their child. Accordingly, keeping open relationships between the coach and the parents was stressed as an important variable of successful coaching in youth sports (Gould, 1982; Hellstedt, 1987; Martens, 1987; Smoll, 1986). Besides informing parents on the gymnast's goals, coaches of female gymnasts also reported that they kept parents informed on the parents' expected roles in the gymnast's performance by educating them and bringing them to understand the kinds of experiences their child would have in training and competition. The fact that this property was not elicited by coaches of males can be explained by the older age of competitive male gymnasts. For instance, because of their young age, female gymnasts were characterized by some coaches as having more dependent relationships with their parents, who, consequently, could have a greater influence on their child's performance. These types of situations added an extra demand on coaches of female gymnasts to structure the role of the parents more explicitly as illustrated in this meaning unit:

The parents are not allowed in the gym at all. They can peak in but we find that if the parent is hanging around the kid doesn't do well. She doesn't want to fall in front of her mom or dad. We explain that to the parents initially when parents join the club. (F1)

Although this type of parental influence on gymnasts' performances was not elicited by coaches of males, the intimate working relationships between coaches and parents emerged as an important aspect of gymnastic coaching for both coaches of males and females. Accordingly, some studies indicated that parents who do not understand and appreciate the demands put on their child could become a source of stress to young athletes (Scanlan, Stein, & Ravizza, 1991; Smoll, 1986). For instance, Scanlan et al. reported that "striving to meet the expectations of the parent" was a major source of stress among a group

of 26 elite figure skaters. Therefore, an important variable of coaching expertise with young athletes relies on the working relationships that coaches develop with parents. More importantly, the quality of this relationship appears to be more crucial when athletes face competitive stress in their developmental years, or before age 18 (Hellstedt, 1987), as is the case with female gymnastics.

Working with assistants. Expert gymnastic coaches also worked closely with their assistant coaches. Given the complexity of gymnastic routines, expert coaches reported that they shared responsibilities with their assistant coaches for the development of their elite gymnasts. They mentioned that they worked in coaching teams and that some responsibilities were given to assistant coaches according to the respective strengths and weaknesses of each.

Coaches of females also found that it was important to share the responsibilities of training the gymnasts with athletic therapists, sport psychologists and nutritionists. The presence of a nutritionist on a coaching team for developing female gymnasts is understandable if one considers that success in female gymnastics is not only a function of technical expertise but also of physical appearance and esthetics (Calabrese, 1985). Additionally, the presence of an athletic therapist and a sport psychologist on the coaching team, which was only mentioned by coaches of females, can be justified by the young ages and brief careers typical of female gymnasts. For instance, the limited time before puberty that female gymnasts have for reaching their full potential, makes them more vulnerable to stress and injury which can slow down and even end their careers (Lindner, Caine, & Johns, 1991). Consequently, coaches of females might perceive the role of the athletic therapist and sport psychologist as being more important than would coaches of males.

Dealing with gymnasts' personal concerns. Part of the coach's organizational task is to take time to deal with gymnasts' personal concerns. The gymnasts' concerns identified by both coaches of males and females related to the gymnasts' relationships with their families, personal and social lives, education, and retirement / leaving. Additionally, one coach of males mentioned the importance of dealing with gymnasts' financial concerns. The fact that most female gymnasts are under parental support for most of their career, while many male gymnasts are financially independent (Boulogne, 1978), explain why coaches of females did not elicit finance as a gymnast's personal concern.

The importance placed on dealing with gymnasts' personal concerns further stressed the coaches' educational role when interacting with elite athletes. Expert gymnastic coaches

avored and structured a positive climate of open discussion with their elite gymnasts. This is consistent with certain authors (Martens, 1987; 1990; Orlick, 1986; Weiss, 1991) who outlined important skills that coaches should endorse for developing psychological skills in young athletes. Among others, Martens (1990) suggested that adopting a positive approach and developing good listening skills were critical when working with youngsters. Accordingly, expert coaches not only cared about their gymnasts' athletic development, but also assumed a role in their development as a person, as illustrated by coach F6:

...we can't treat them just "gymnastically". And that's one of the reasons my kids and I are close. Because I know they're people and I know they have these [personal] problems. We deal with it mostly at the end of practice so it won't interfere with their training. There are certain kids that I check on an every other day basis. If they don't want to talk, that's fine. But most of them open up.

Nevertheless, although expert coaches showed concerns for their gymnasts' welfare, for their lives and their problems, when it was time to work in the gymnasium, nothing else was more important. They were tough on themselves and their gymnasts, tolerating no excuses, or compromises as illustrated again by coach F6:

We are really giving to our athletes. No matter how I feel, I force myself to get into a positive mood: "time to get going", "life is wonderful". We really try to make sure that there's sort of a "team positiveness" and no one person will run or manipulate this gym. So I'm not good when a kid tries purposely to feel sorry for herself. So I tell her to go get a drink, change her mind set, come back and if she don't have the ability to change her mind set, she's not training in this event today. Usually I start gentle, I check to see if everything's okay. I'll try to change their mood by alleviating whatever hurts. If it's a pain thing, I can leave out a trick that's painful. But if it's, "I feel sorry for myself today," that's not acceptable and that's dealt with without mercy.

Similarly, Walton (1992) reported that being committed to their athletes' personal growth as well as their athletic development were important characteristics of great coaches such as James "Doc" Counsilman, John Wooden, and Vince Lombardi. Thus, knowing when to be compassionate and understanding and when to be tough, demanding and abrasive appear to be important characteristics of expert coaches.

Planning training. The most pervasive category of knowledge included in the organization component was planning training. Coaches reported that for gymnasts' involvement in gymnastics, it was a year long commitment for training and usually included

three to five competitions per year. This result is in agreement with other authors' recommendations for an annual training and competition plan in gymnastics (Gajdos, 1987, Simard, 1980). Generally, these authors and the expert coaches agreed that July to November is a preparation period characterized by general and specific conditioning exercises, the learning of new routines, and the improvement in the techniques and esthetics of more established routines. December, January and February are pre-competitive months marked by a gradual improvement for complete execution of the routines which will be used in the competitive period. The competitive period is between March and May and the training in this period is aimed at maintaining consistency and stability in the execution of the routines. Finally, June is the only resting period of the year.

A second property which emerged in the planning category was the evaluation of talent. Expert coaches mentioned that the detection of new talent occurred mainly through their subjective evaluation of a gymnast's physical and mental abilities. For example, coach M4 mentioned:

There are two kinds of tests. You look at him physically and see if he's fast or slow, that's the first assessment, looking at physical abilities. The other one is if you see that he reacts fast, is bright and listens. I like good listeners.

The coaches' subjective evaluation of talent was consistent with statements made by other authors (Russell, 1987; Salmela & Régnier, 1983) concerning the high level of reliability of an experienced and unbiased coach's evaluation of talented athletes. The type of cues and knowledge used by expert and novice coaches to detect talent could make an interesting investigation within an expert-novice paradigm.

Another property included in the planning training category was group dynamics, which has not received any attention in the gymnastics literature. Expert coaches discussed the importance of organizing training in order to have gymnasts interacting together and helping each other in training, as illustrated by this meaning unit:

So I think maybe that is one of the things I know I always try to instill in my athletes, that if two of you are on this event and you're both doing the same thing and one seems to be doing it quite well, or you're having a problem with it, well, help each other out. (M9)

Further investigation is certainly needed to examine the effect of the group on performance in a sport such as gymnastics where training involves an interaction between team members, yet competing takes place at an individual level. Researchers on group dynamics in sport have

not yet investigated this kind of issue (Widmeyer, Brawley, & Carron, 1992; Widmeyer, Carron, Brawley, 1993).

Part of the coaches' planning tasks was to set rules that gymnasts need to follow in training, such as being on time for practice. Setting rules for outside the training environment, such as curfews, was only discussed by coaches of females. An explanation for this difference between men's and women's gymnastics was brought up by one coach of females who indicated that, because of their age, coaches have social responsibilities towards the young girls. Still, as the girls got older, this coach reported that the social rules became more flexible:

J'ai des balises [en ce qui à trait à leur comportement à l'extérieur du gymnase] qui dépendent de l'âge des athlètes. Evidemment, parce que j'ai des responsabilités civiles je ne peux pas me comporter en bon père de famille, il y a des risques à ne pas prendre. Donc avec les filles un peu plus veilles, c'est un peu plus lâche, avec les plus jeunes, c'est plus serré. (F4)

The music choice for a gymnast's routine on the floor was reported as an important property of planning only by coaches of females. This is comprehensible considering that there is no music for the floor routines in men's gymnastics. Two other properties discussed only by coaches of females included the establishment of club goals and the prevention of injuries by reducing stress. The establishment of club goals might be more important to coaches of females because of the higher rate of participation of girls in gymnastics (Weiker, 1985), consequently requiring a better structure at the club level. For instance, Weiker showed that in the United States, the gymnasts' distribution by sex throughout the different clubs was 12.3% male and 87.7% female. Finally, coaches of females probably emphasized the importance of reducing stress injuries because they are the major cause of injury in women's gymnastics (Caine, Cochrane, Caine, & Zemper, 1989, Lindner & Caine, 1990; Snook, 1985). The modification in a gymnast's training following a minor injury was mentioned by both coaches of males and females and consisted mainly of reducing stresses on the gymnasts' injured body parts.

Setting goals for the gymnasts was an important aspect of the coaches' training planning. Generally, expert coaches set long - and short - term goals which were specific and challenging. Coaches of females reported that goals should also be flexible. For coaches of males the flexible dimension of planning was discussed in the daily training plan property. The dimensions that expert coaches used to set individual goals corresponded to the criteria found in the literature on goal setting such as setting flexible, challenging, long-term / short-

term and specific goals (Burton, 1993; Gould, 1986; Locke & Latham, 1985). In fact, only one criterion of Burton's suggestions was not explicitly discussed by expert coaches for setting goals: setting positive goals as opposed to negative goals.

Making training plans daily and a few weeks before competition were two properties of planning training that were only discussed by coaches of males. These two properties stressed the emphasis put by coaches of males on the conditioning aspect of the training. Indeed, strength and flexibility have been identified as important determinants of performance in men's gymnastics (Régnier & Salmela, 1987; Salmela, 1983). The nature of men's gymnastics implies that they need a great deal of power and flexibility on events such as pommel horse, rings, parallel bars, and horizontal bar. Although women also need strength and flexibility for performing, making a specific plan to train these attributes appeared to be less important to coaches of females. However, coaches of females did mention that they use conditioning programs, such as running, for monitoring their gymnasts' weight and esthetics.

Monitoring weight and esthetics. One important aspect of organizing for coaches of females was to monitor their gymnasts' weight and appearance. Although coaches of females discussed this issue as being an area of intervention, they did not report any serious cases of eating disorders among their gymnasts. Their role was mainly to make gymnasts aware of the impact of their physical appearance on their performance, to control weight through an adequate conditioning program, and to monitor nutritional habits using proper educational advice.

This category of knowledge, which did not include properties such as dealing with anorexia or other serious eating problems, was coherent with results of a study which examined weight concerns of competitive female gymnasts (Harris & Grecco, 1990). These authors indicated that highly skilled gymnasts were less likely to be dissatisfied with their bodies and less concerned about their weight than the less skilled gymnasts. In sum, the high performance gymnastic coach's role in the weight and nutrition of high level gymnasts was to educate gymnasts rather than to actually deal with any eating disorders.

Training

The competition, organization and training components are all at the heart of the expert coach's mental model for developing elite gymnasts. The categories of knowledge

included in the training component (22% of all meaning units) consisted of the coaches' time involvement in training, the intervention style used in training, the training of technical skills and mental skills as well as a competition simulation category (Table 10).

Coaches' time involvement in training. Expert coaches of both male and female gymnasts mentioned that their involvement in training with the gymnasts varied between 20 and 60 hours per week. They also indicated that they did not spend more than 30 hours each week with the same group of gymnasts. Gajdos' (1987) findings support these results by suggesting that the total training load for a gymnast in a week should vary between 1200 and 1400 minutes or between 20 and 23 hours. Similarly, Massimo (1986) indicated that a sample of 48 elite female gymnasts reported that they trained an average of 25 hours per week.

Intervention style. The emerging properties, elicited by both coaches of males and females, within the intervention style category are representative of the different leadership styles comprising in the LSS (Chelladurai & Saleh, 1980). In fact, the four styles mentioned by coaches of both sexes, which consisted of being supportive, giving responsibilities, providing instructional and positive feedback were similar to the four categories of the LSS: giving social support, being democratic, providing training instructions and giving positive feedback.

Additionally, expert gymnastic coaches mentioned using other ways of intervening to enhance their athletes' performances. For instance, coaches of males discussed the importance of being dictatorial, demanding respect from the gymnasts, and using peer pressure. On the other hand, coaches of females discussed the importance of keeping some distance from the gymnasts and asking for quality training. These different properties elicited by coaches of males and females did not provide any particular pattern of intervention that could be explained by a coach's gender or an athlete's gender or age. In effect, the properties discussed by coaches of males and females appeared to represent more individual styles than styles adopted for different ages or genders. These different styles of intervention used by expert coaches in training support the idea of a situational approach to leadership effectiveness (Horn, 1992).

Technical skills. High performance coaches teach a large arsenal of sophisticated skills to elite gymnasts. Many of these skills cause gymnasts to experience a certain level of

fear which can slow down the learning process (Feigley, 1987; Massimo, 1986). Expert coaches mentioned that there is no substitute for a progressive type of learning; they teach a technical skill one step at a time towards the ultimate execution of the skill. This way of teaching is important for solidifying a gymnast's learning and reducing fearful behaviors. In this sequence, special attention is given to the gymnast's physical readiness. Coaches developed a program of conditioning and drills that maximized the acquisition of elements needed for the execution of the skill. All this was taught in a safe environment with the planned provision of physical assistance. In sum, three of the properties under the technical skills category -- teaching progressions, gymnast's physical readiness, and safety, which included manual assistance -- are coherent with the literature on how to teach various gymnastic skills (Alt, 1980; Bajin, 1980; Fink, 1980; Gluck, 1980). These three properties contain a large and cohesive amount of coaches' knowledge on various progressions, procedures and training methods, that can be applied to a wide variety of gymnastics moves.

Although several properties included in the technical skills category were similar between coaches of males and females, some differences were also elicited. First, coaches of men mentioned that progress was measured through the consistency of the gymnast's performance in training. This property might be more important to coaches of males given the fact that men participate less often in trial competitions than do females, as was discussed in the competition component. Second, executing a skill as soon as it was learned rather than waiting until the skill was mastered was elicited only by one coach of males as a way to teach a technical skill. This property might reflect an individual difference in teaching methods. Finally, the higher demands placed on female gymnasts at a younger age might explain why coaches of females emphasized the mental readiness and the physical readiness of their gymnasts as two separate elements when training technical skills, while coaches of males appeared to assume that when gymnasts were physically ready to execute a skill, they were also mentally ready as illustrated by the following meaning unit:

All my programs are based on a pyramid with psychological preparation at the top. If you're physically ready and technically ready then [in your head] you'll feel that you're ready, so I keep saying you have to be physically ready. (M3)

Although coaches of females appeared to emphasize the mental readiness of their gymnasts when teaching technical skills more than did coaches of males, both coaches of males and females elicited the importance of developing gymnasts' mental skills for training and

competition.

Mental skills. The development of mental skills was another category of knowledge included in the training component. Mental skills were perceived by the coaches as mental abilities which were taught and developed in training. Such skills included: ability to deal with stress, motivation, awareness, self sufficiency, self confidence, aggressiveness / intensity, and ability to deal with pain.

In a study examining the predictors of success in Canadian male gymnasts, Régnier and Salmela (1987) found that controlling anxiety was the top ranked psychological ability for performance success. Accordingly, expert coaches in the present study emphasized that athletes must learn to handle pressure if they are to compete well, especially when success is determined by tenths or hundredths of a point. The strategies that coaches used to develop gymnasts' abilities to deal with stress were mainly to teach them to think positively and to help them recognize what they could and could not control.

Moreover, expert coaches thought that gymnasts must recognize their strengths and weaknesses in order to maximize their strengths and correct their weaknesses. This ability was labeled by the coaches as awareness. Main coaching strategies used to develop gymnasts' awareness were to make them understand the skills they did and the skills they needed as well as to teach gymnasts to be truthful about themselves. In the applied sport psychology literature, developing awareness has been discussed as a "critical element of peak performance" (Ravizza, 1986).

Motivation was another mental skill that coaches tried to develop in training. Expert coaches developed gymnasts' motivation by inducing the gymnasts' will to learn. Encouragement, combined with supportive, positive criticism and technical input, were generally the strategies elicited by coaches to motivate their gymnasts. These strategies that coaches used in training to develop motivation were consistent with the motivational goals of elite young gymnasts, that is, to demonstrate that they are getting better at gymnastics (Roberts & McKelvain, 1987).

A mental skill discussed only by coaches of females was the development of self-sufficiency, an ability closely related to awareness. The distinction between developing awareness and self-sufficiency was that self-sufficiency was defined more in terms of development of a personal identity whereas awareness referred to the development of gymnastic skills. The development of the gymnasts' sense of their own individuality appeared to be stronger for coaches of females. This seems understandable when

considering that female gymnasts reach their peak in gymnastics between the ages of 13 and 14, an important period of psychosocial adjustment (Erikson, 1963). On the other hand, male gymnasts go through this period before reaching their peak in gymnastics. Strategies used by coaches of females to develop gymnasts' self-sufficiency included guiding them in their relationships with friends, peers, and parents.

Developing aggressiveness / intensity was another mental skill elicited only by coaches of females. Aggression was defined by the coaches as the gymnasts' disposition for fighting or determination to perform best on an event. The coaches' definition of aggression did not have the negative connotation that it has in contact sports where aggressive behavior is defined in terms of physical and verbal acts exhibited to harm an opponent (Widmeyer, 1984). Coakley (1993) recently reported that sport participation and the exhibition of aggressive behavior is more socially accepted for men, supporting a greater need for coaches of women to develop this quality in female gymnasts. This result is also consistent with the most accepted theories and research evidence in sport which suggests that aggression is a learned social behavior (Husman & Silva, 1984; Thirer, 1993).

Another mental skill, discussed by only one coach of females, was self-confidence. Although self-confidence has been described as a crucial variable of competitive performance (Gould, Weiss, Weinberg, 1981; Mahoney et al., 1987) it received little support from expert gymnastic coaches as an important mental skill to develop in training. Coaches might prefer to develop other mental skills such as awareness and the ability to deal with stress, which would ultimately have an effect on an athlete's self-confidence and performance.

Finally, a mental skill discussed only by coaches of males was the ability to deal with pain. This is consistent with the greater importance that coaches of males gave, in the training component, to strenuous physical conditioning. Régnier and Salmela (1987) also found that "tolerance for pain" was an important determinant of performance in men's gymnastics.

Simulation. Expert coaches used a lot of simulation in training. The description of simulation in training by expert coaches was similar to what Schmid and Peper (1983) referred to as "simulated meet training," in which gymnasts practised their routines while being exposed to all possible stimuli which could occur during the real competition. The various types of simulation used in training were illustrated by coach F2:

We spend time just preparing for competition programs, that's written and documented. That introduces them to simple things, just like simple

simulation with their friends watching them. We do things like cold turkey routines, no warm up. We go right on and they have to focus right away. We've got [mental] simulations like finals of World Championships, being last on an [event]. We try to create a scenario: we put in an accountability factor -- "You missed every one of your routines." We increase the pressures. Over a period of time they learn how to go to a competition. We set 30 second warm-ups so they know what the skill is and in what order. They know it'll take them 22 seconds to do their three skills, they've got 30 seconds, so they've got 8 seconds to play with. All those things allow them to become competitors.

This meaning unit, loaded with a number of specific constructs from the sport psychology literature, such as the notions of social facilitation, modeling of uncertainty, dealing mentally with setbacks and time management, is a good example of how expert gymnastic coaches use simulation to prepare their gymnasts for competition. According to the coaches, this kind of simulation helped athletes to more effectively meet the competitive challenges. In the applied sport psychology literature, simulation has also been described as an important tool to help athletes perform to their potential in competition (Nideffer, 1985; Orlick, 1990; Rushall, 1992; Tutko & Tosi, 1976).

Coach's Personal Characteristics

The component, coach's personal characteristics (21% of all meaning units), reflected coaches' philosophies, beliefs, and opinions on various issues. The categories emerging from the interviews and included in this component were: personal approach to coaching, sources of satisfaction, perceptions of qualities of successful coaches, opinions about gender differences in gymnastics, coaches' evolution of knowledge and coaches' personal concerns (Table 11). For the following discussion, the coaches' personal approach to coaching and sources of satisfaction were regrouped under the theme coaching philosophy.

Coaching philosophy. When working with young athletes, the approach which guided expert coaches was the development of self-sufficient individuals as well as high level athletes. The gymnast's development as a person was always considered first when setting athletic objectives and designing a training program. Although different properties were elicited in the personal approach to coaching category, they were all directed towards the same philosophy: that expert coaches are devoted to the personal development of their athletes and their sport. Expert coaches were committed to their athletes as long as the gymnasts showed the desire and the effort to learn. This approach to coaching was

consistent with what coaches identified as their sources of satisfaction. They mentioned that their main sources of satisfaction were: developing successful individuals, developing good gymnasts, developing other coaches and maintaining an open relationship with the gymnasts. Expert coaches' approach to coaching and sources of satisfaction were in agreement with their knowledge elicited in the organizing and training components. Mainly, when coaches elicited that they were supportive in training and that they spent time dealing with gymnasts' personal concerns in organizing, they were supporting their personal philosophy.

The coaching philosophy of great and successful coaches (Hauswirth & Pridham, 1993; Walton, 1992; Wooden, 1988) are coherent with the personal approaches of expert gymnastic coaches. For example, John Wooden's definition of success reflected his coaching philosophy. He defined success as, "Peace of mind which is a direct result of self-satisfaction in knowing you did your best to become the best that you are capable of becoming" (Wooden, 1988, p.89). Wooden never challenged his players to win the game but always challenged them to do their best. For Wooden, much like the expert gymnastic coaches, real success was in the players' minds, not in the game score or in the minds of others. Similarly, dedication, pride in performance, and mental toughness are words that Vince Lombardi attributed to his players (Walton, 1992). Walton reported that Lombardi once said that, "The quality of a man's life is in direct proportion to his commitment to excellence, regardless of his chosen field of endeavor" (p.15). Walton also indicated that Lombardi's famous quote, "Winning isn't everything, it's the only thing," was misinterpreted and that his real words were, "Winning isn't everything - but making the effort to win is."

These examples, combined with the results of the present study, indicate that the focus of successful and expert coaches is not on achieving outcome goals such as winning. Instead, successful and expert coaches seem to have as their primary objectives the human development of their athletes. Interestingly, by helping athletes to reach their personal excellence rather than trying to obtain an ultimate performance outcome, expert and successful coaches are also developing high level athletes.

Perceptions of qualities of successful coaches. Expert coaches elicited 14 different qualities that they perceived as important in order to be successful gymnastic coaches. The qualities listed in Table 11 indicate that expert coaches did not base their perceptions of successful coaches exclusively on their technical knowledge. Indeed, most of the qualities elicited dealt with coaches' abilities to handle relationships with assistant coaches and with

gymnasts.

Coaches appeared to think that the better a coach can communicate with the gymnasts the more productive will be the gymnasts' efforts to perform at a high level. In gymnastics, hard work is a guiding principle that thrives with elite gymnasts. Accordingly, expert coaches mentioned that the psychological atmosphere created by the coach is critical to favoring gymnasts' hard work. In sum, by eliciting many personal qualities as characteristics of a successful coach, expert coaches communicated the fact that there is more to successful gymnastic coaching than teaching technique, mechanics, and execution of skills.

These perceptions of expert gymnastic coaches were supported by a study conducted by Massimo (1986), who asked world class gymnasts to specify the characteristics they looked for in a quality coach. The results demonstrated that the most important ability, even above technical expertise, was "skill in the handling of personal interactions between coach and gymnast" (p.47). Consequently, in a complex sport such as gymnastics, the quality of the interaction between the coach and the athletes is an important performance variable. The psychological climate created by the coach is crucial in the teaching and assembling of technical skills into a finished product. Thus, special training should be offered to coaches in order to help them generate the most favorable training environment for their athletes' learning.

Differences between men's and women's gymnastics. Many of the expert coaches discussed the similarities and differences between men's and women's gymnastics. In general, differing opinions concerning these issues emerged from various coaches. For example, three coaches of females mentioned that teaching technical skills to males and females was similar, whereas three coaches of males said it was different. Moreover, three coaches of females agreed with two coaches of males that the interaction style with male and female gymnasts was different, whereas three other coaches of females said the interaction was the same.

Generally, when it came to teaching skills, coaches of female gymnasts perceived no gender differences, perhaps because they did not elaborate on the age related and task differences of men's and women's gymnastics as the coaches of males did. For example, coach F5 said:

I don't think there's a difference in training [technical skills] between male and female gymnasts, although I think coaches of men have convinced themselves there's a difference.

On the other hand, three coaches of males perceived teaching skills to male and female gymnasts differently because of the time pressure factor in women's gymnastics, as illustrated by coach M3:

I always coached girls and boys differently because women's gymnastics is so brutal, short, and you're so pressured by the time frame: 'You must have this trick by the end of the week'. A female gymnast has to be established by the time she's 11 years old.

When discussing interaction styles, three coaches of females and two coaches of males perceived that coaches of men and coaches of women used different styles since in men's gymnastics there is less structure and more interaction between the coach and the gymnasts, as is reflected in these meaning units:

I think there's a lot more demand on coaches who coach women. [I can] say to my young adult boys or men that this is how we're going to do something and reason with them. I'm not saying you can't reason with girls but I enjoy the input I get from them [boys]. Rather than me doing all the talking and all the direction, I like that they're able to give me some type of an input; they're helping me set the path for them. (M9)

I coached guys early in my career, I didn't feel I could use the authoritarian "tell them" approach. It was more of a warm relationship; less task, more relationship oriented. So it tended to get loose but not too much. Whereas the girls, you either do it or you don't. It is much more structured. (F8)

Nevertheless, three coaches of females said that their coaching interaction style would be the same with male gymnasts: using discipline and being open for discussion. This idea is reflected in the following meaning units:

I would use the same approach if a male or a female made a mistake. I don't think there's a difference in the way people feel when they make a mistake, and I don't like the approach used with some male athletes where it's sort of a joke- maybe it helps them get rid of it right away, but I don't think it helps them to focus. (F5)

La différence entre la gymnastique féminine et masculine peut s'expliquer par le modèle classique de l'hypercontrôle que les entraîneurs féminins prennent, dès le début et aussi à cause du système éducatif où une fille ça n'a pas ça obéit. Donc je pense qu'il faut essayer de battre ce système pour permettre à l'individu de s'exprimer ou de verbaliser. (F4)

In sum, a generalization that can be drawn from these results is that, of the coaches who elicited the gender difference category, most of the coaches of females perceived the coaching of men's and women's gymnasts more similarly than did the coaches of males. However, this difference is explainable by the fact that coaches of females overlooked the evident age related and task differences for explaining similarities and differences between men's and women's gymnastics, whereas coaches of males, as well as the three coaches of females who did perceive differences in coaching interaction style, focused on these differences.

The gender of the coaches did not emerge as a factor which could explain the differences elicited in how coaches felt about dealing with male and female gymnasts. For example, of the coaches of female gymnasts, two male and one female coach mentioned that teaching technical skills was the same in men's and women's gymnastics. Similarly, one male and two female coaches perceived differences in the interaction styles for coaching male and female gymnasts, while three male coaches did not perceive any differences. Thus, the gender of the coach did not appear to be a variable which could explain the different perceptions about men's and women's gymnastics.

One issue that coaches of males and females elicited and agreed upon was the fact that the maturation of female gymnasts is faster than that of their male counterparts. Additionally, coaches of males elicited some properties concerning differences between the two sports, such as the difficulty in getting financial support for males, which can be explained by the nature of the two sports and the age differences between male and female gymnasts.

Evolution of knowledge. Coaches elicited six sources by which learning occurred or knowledge was acquired to become an elite coach. Coaching clinics, formal education, experience as a coach, experience as a gymnast, other experienced coaches and caring individuals were all elicited by at least one coach of males and one coach of females. This finding demonstrates the various sources by which expert coaches acquired their knowledge.

The knowledge source elicited by all the coaches as being important was their experience as a coach. In agreement with this finding, Gould et al. (1990) found that elite American coaches responding to a questionnaire ranked their experience as their main source of knowledge. Gould et al. suggested that this result reflected a lack of formal coaching education programs available to coaches in the United States. However, the qualitative approach of the present study indicates that some kinds of coaches' knowledge is difficult to acquire by means other than experience. For example, coaches' knowledge acquired to deal

with competition stress, to evaluate gymnasts' talent, or to develop a personal approach to coaching would be difficult to simulate and teach in a formal education coaching program.

The experience criteria, or the numbers of years on the job, set by Hayes (1981) as one measure of expertise provided a better explanation of why elite coaches unanimously rated their experience as their main source of knowledge. Nevertheless, the Gould et al. (1990) study and the present study suggest that coaching education programs should provide more mentor-type coaching apprenticeship programs and opportunities for coaches to learn from real experience in the field.

Personal concerns. Occasional lack of confidence and difficulty in keeping a balanced life were two concerns elicited by expert coaches. In discussing situations in which they lacked self-confidence, the coaches also acknowledged that these experiences presented an opportunity to learn about their strengths and weaknesses. Thus it seems that expert coaches refined their ability to restructure their own knowledge or use external resources, such as their assistants, in response to increased anxiety or setbacks. Learning from errors as well as redefining failures and setbacks so that they worked for and not against them, appeared to be one of the personal characteristics of the expert coaches. These kinds of attitudes have also been observed in elite athletes or in individuals who consistently perform to their potential (Al Huang & Lynch, 1992; Orlick, 1990).

On the other hand, Weiss et al. (1990) reported that low perceived coaching competence was discussed as a negative aspect of coaching by novice coaches. Consequently, increasing coaches' self-confidence through positive experiences appears to be an important element of a coach's development as well as of an athlete's performance. Presently, the techniques designed to improve an athlete's self-confidence (Bunker & Williams, 1986), have not yet been sufficiently addressed for coaches (Howe, 1993).

The other personal concern elicited by the expert coaches was the difficulty in keeping a balance between their coaching tasks and their personal life. Similarly, Zitzelsberger (1991) indicated that it was "very difficult" for elite Canadian coaches to maintain a balance between their coaching occupations and their interpersonal relationships. The amount of time spent coaching as well as the flexibility required in scheduling were the major reasons attributed to interfering with the quality of the personal lives of the expert gymnastic coaches of the present study. This difficulty of maintaining a balance between one's coaching and one's personal life does not seem to be an issue affecting only elite coaches. Indeed, Weiss et al. (1990) also reported that excessive time demands was a negative aspect of coaching for

novice coaches.

The personal concerns elicited by expert coaches indicated that coaching education programs should address more seriously issues such as time management, personal organization, and coaches' identification of their needs and priorities. Because coaches' job conditions are not ideal, a short-term solution might be to teach coping strategies in order to help coaches deal more effectively with their various professional and personal demands.

Athletes' Personal Characteristics

The gymnasts' personal characteristics and levels of development component (16% of all meaning units) consisted of variables related to the gymnasts that could affect the training, competition, and organization components. The categories which emerged from the interviews and which were included in this component were: gymnasts' personal qualities, variables affecting performance and the three stages of learning (Table 12).

Gymnasts' personal qualities. The discussion of gymnasts' personal qualities represents expert coaches' views of the attributes necessary to meet the performance demands of gymnastics. Expert coaches perceived success in gymnastics as being limited not only by gymnasts' physical and technical abilities but also by some important psychological attributes. The various types of gymnasts' qualities perceived as important by expert coaches were coherent with multidisciplinary approaches used to understand gymnastic performance (Russell, 1987; Salmela, 1983). Nevertheless, because the physiological and technical determinants of high level gymnasts are defined better than the "intangible" psychological variables (Régner & Salmela, 1987), special attention was given by the expert coaches to discuss the psychological qualities that are prerequisite to gymnastic performance.

Hence, a high level of physical and technical abilities combined with the ability to learn fast, to be success-oriented, committed, aware, and, for female gymnasts, to be enthusiastic and self-sufficient, were defined as the gymnasts' prerequisite qualities for elite performance in gymnastics. These qualities constituted the core of a gymnast's potential and were consistent with characteristics that have been reported as common in elite gymnasts (Chisholm, 1987; Salmela, 1983).

Variables affecting performance. Three variables related to the gymnasts' personal histories were discussed by coaches as affecting their work in the training, competition, and

organizing components. These three variables were gymnasts' fear of movements or of performing, gymnasts' major injuries, and gymnasts' school life.

Although expert coaches had strategies to teach technical skills safely and progressively in training, they gave examples of athletes who struggled harder to deal with the fear of executing a movement in training or with the fear of performing in competition. Coaches discussed cases of athletes where fear prevented them from learning new skills and retarded their performance of skills already learned. This is consistent with Feigley's (1987) statement that in high level gymnastics "fear is the major psychological barrier preventing learning and success" (p.13).

Major injuries was another obvious variable that could significantly affect the progression of a gymnast's career. Coaches discussed cases of gymnasts who broke a leg or an arm in training and had to stop competing from six months to a year. Lindner and Caine (1992) also mentioned that injury was an important factor limiting high level performance in gymnastics.

A third variable elicited by the coaches as affecting gymnasts' development was the gymnasts' difficulties at school. Because the gymnasts' school success was perceived by expert coaches as more, or at least, equally important as gymnastic success, coaches would never hesitate to redefine a gymnast's performance goals in order to diminish school difficulties or prevent failure in school. Similarly, one coach of males mentioned that the high level of involvement of one of his gymnasts in his school work interfered with his gymnastic career. Therefore, because expert coaches favored school success as much as gymnastic performance, a gymnast's school work could become a variable that affected the coaching process.

Weight problems and language differences were two final variables mentioned as affecting performance. Coaches of women elicited weight problems as a variable that could negatively affect a gymnast's appearance and performance. Accordingly, Lindner and Caine (1992) found that weight was a limiting factor of performance in women's gymnastics. Finally, because of the difficulty to communicate with English-speaking gymnasts, one coach of males revealed that the integration of French-speaking gymnasts on the national team was a variable that interfered with performance. This property is representative of the kind of issues that faced the national team in Canada, a bilingual nation with 75% English and 25% French speaking people (Halliwell, 1989).

Stages of learning. The coaches' identification of gymnasts' stages of learning added a developmental variable to coaches' knowledge. Although the initial interviews allowed the identification of three stages of learning for coaches of males and females, in the subsequent telephone interviews coaches suggested that the third stage should be divided into two, thus resulting in four stages of learning instead of three.

Despite the fact that the gymnasts' stages of learning might need refinement, it is evident that expert coaches take into consideration the gymnasts' levels of development when coaching. Because there is not yet an existing developmental model for coaches to use in gymnastics (Durand-Bush & Salmela, 1993), expert coaches' knowledge of gymnasts' different stages of learning was tacit by nature and was acquired through experience. Furthermore, the categories of knowledge included within each stage of learning were generally in agreement with models of talent development (Bloom, 1985) and guidelines to assess children's psychological readiness for competition (Coakley, 1986).

In the first stage of learning, when the gymnasts are between the ages of five and eight for females and the ages of six and 12 for males, coaches' intervention style and content to be taught was straightforward and focused on gymnasts' skill development rather than on participation in competition. Accordingly, Coakley (1986) suggested that children should not begin competing before the age of eight but that "it is never too early to engage in expressive physical activities " (p. 59). Expert coaches' intervention in the first stage of the gymnasts' learning was also consistent with Bloom's (1985) description of teachers' / coaches' roles in the "early years" of talented performers, which was mainly to not be concerned with objective measures of achievement.

The gymnasts' second stage of learning, between the ages of eight and 13 for females and the ages of 12 and 16 for males, corresponded to Bloom's "middle years" of talented performers. Coaches' intervention in this stage was more systematic than in the first stage and most of the learning time was devoted to the acquisition of technical skills. Over a period of four to five years, the gymnasts developed their physical and technical skills, a sense of competence, and their identity as gymnasts. Gymnasts who did not develop these elements usually stayed in the second stage of learning and needed to re-evaluate their personal goals and their overall commitment to gymnastics. Conversely, gymnasts who developed these elements, continued to the third stage by strengthening their commitment to gymnastics and by doing whatever was necessary for an international career.

Coaches' intervention in the third stage of learning, which typically began at age 13 for females and at age 16 for males was similar to Bloom's (1985) description of teachers' /

coaches' roles in the later years of talented performers. Mainly, expert coaches focused on improving technical abilities and, more importantly, on developing gymnasts' mental skills to help them take charge of their own performances. The ultimate goal of this third stage was to make the gymnasts independent of the coaches' expertise. The division of this stage of learning into two stages, as suggested by the coaches in the subsequent interviews, was characterized by a desire to qualify the gradual changes in the gymnasts' dependency which occurred throughout this stage. Hence, a fourth stage would mark the transition between gymnasts as being dependent on the coach and being independent and would typically occurred around the ages of 18-19 for male gymnasts and approximately at age 14 or 15 for female gymnasts. Despite these suggestions, expert coaches agreed with the general patterns described in each of the three gymnasts' stages of learning.

The expert coaches' knowledge of gymnasts' stages of learning emphasized the importance that should be placed on creating sport specific developmental models to guide coaches in their intervention. In Canada, developmental models to assist coaches exist in sports such as volleyball and tennis, and are presently being reviewed for men's gymnastics (Durand-Bush & Salmela, 1993).

Contextual Factors

The contextual factors (11% of all meaning units) were defined as variables other than the coach and the gymnast which could influence the coaching process and ultimately the gymnasts' performance. Coaches of males and females discussed parents and job conditions, while only coaches of females elicited their assistants as contextual factors important to consider when coaching gymnastics (Table 13). In a sport such as gymnastics, where performance occurs in a stable environment (Knapp, 1963), contextual factors are limited in number. In fact, Salmela (1976) classified gymnastics as a sport without any event uncertainty and in which successful performance was measured by the "exactitude" and "virtuosity" of the movement. Accordingly, the categories of knowledge elicited by expert gymnastic coaches within the contextual factors component were not related to the gymnasts' events but rather to other variables which can interfere with the coaches' intervention.

Parents. While expert coaches worked closely with parents within the organization component, this variable also emerged as an important contextual factor. Coaches' and parents' differing expectations concerning a gymnast's performance and a lack of or too

much support of a gymnast's career were two properties that coaches of males and females discussed as affecting their intervention. Coaches of females also mentioned that parents' involvement in gymnasts' careers was important due to the young age of the gymnasts. Finally, coaches of males discussed the involvement or absence of parents within the club activities which included mainly administrative tasks, such as organizing bingo or other fund raising activities for the club. This issue reflected the differences in the organization of the clubs within which coaches worked and will be further discussed as part of the job conditions property.

The emergence of a category labeled, parents, in the contextual factor component indicates that the interpersonal relationships between coaches, parents, and athletes could vary considerably and that they were perceived by expert coaches as an unstable factor. The ideal parent described by expert coaches corresponded to Hellstedt's (1987) definition of parents as having "moderate levels of involvement" in the athlete's career. This type of parent provides direction to the athlete, but with enough flexibility so that the athlete is allowed significant involvement in the decision making process. Parents of this type are supportive, set realistic goals for their children, and are interested in feedback from the coach about their children's skill development without interfering with the coach's work. This is also consistent with Bloom's (1985) description of the impact of parents on the careers of talented performers, whether they be athletes, artists, or scientists.

The importance given by expert coaches to the parent issue stressed a need to examine more closely parental influences upon children's sport behavior. Little information has yet been obtained directly from parents about their beliefs, attitudes, values, and expectations concerning the sport experience of their children. Brustad (1993) stated that "individual factors among parents have not been recognized and pursued as potentially important contributors to understanding children's motivated behavior" (p. 72). Brustad also recommended the use of qualitative research methods to obtain a greater depth of understanding on this issue.

Job conditions. A second category elicited by coaches of males and females within the contextual factors component was job conditions. The numerous non-coaching activities of gymnastic coaches along with the lack of funding and the lack of effectiveness of the Canadian gymnastic system were discussed most frequently as factors affecting the coaching process. These perceptions of gymnastic coaches were in agreement with the common belief held that, generally, coaches are overworked and underpaid (Taylor, 1992).

Furthermore, two coaches of females mentioned that there were politics involved between coaches and judges in women's gymnastics, reflecting an important characteristic of a sport such as gymnastics in which performances are assessed by judges. Finally, other properties listed in Table 13 and deploring coaches' poor job conditions were elicited by coaches of males. These various properties reflected the variations existing between gymnastic clubs in Canada. In effect, the funding, facilities and equipment seemed to vary greatly from one club to another, and from one province to another. Expert coaches wished that the structure for developing elite gymnasts could be rearranged in order to allow them to work together to produce a strong national team rather than competing against each other to place one of their athletes on the national team. This view of Canadian gymnastics was similarly outlined in the United States (Weiker, 1985).

Assistant coaches. Coaches of females mentioned that a lack of cohesion with their assistants could interfere with the coaching process. The close working relationships that some coaches of females had with their assistant coaches, nutritionists, sport psychologists, and medical assistants seemed to show that coaches of females emphasized working as a team more than did coaches of males. Consequently, a lack of cohesion with their assistants would have a greater influence on the coaching process in women's gymnastics than in men's gymnastics.

The emergence of assistant coaches as a contextual factor for only coaches of females highlighted an important feature characterizing the flexibility of the model elaborated to structure coaches' knowledge (Fig.1). Specifically, any variables that coaches identified as being central in the coaching process or as being part of the competition, training, or organization components could also emerge within one of the peripheral components. Other examples were parents, which was part of the organizing as well as the contextual factors components, and the concept of fear, which was an important element of the training as well as the gymnasts' personal characteristics components. These examples showed that any situations within the organizing, training or competition components that coaches lacked control over could become part of a peripheral component affecting a coach's mental model of a gymnast's potential. The fact that coaches of males did not elicit assistant coaches as a contextual factor indicated that working with assistants was not a variable over which they perceived they could lose control and would ultimately hinder the coaching process.

Conceptualization of Coaches' Knowledge

Up to this point the discussion has been centered around the description of expert gymnastic coaches' knowledge. The next section deals with how expert coaches utilize their knowledge to perform various cognitive activities and ultimately reach their goal of developing elite gymnasts. It includes a discussion of how coaches' knowledge is used through mental models and a comparison with the literature on expertise.

Mental Models of Expert Coaches

The modelling system (Figure 1) elaborated in an attempt to explain how expert coaches utilize knowledge to develop elite gymnasts is consistent with theoretical definitions of mental models (Brewer 1987; Glaser, 1987; Holyoak, 1984; Johnson-Laird, 1983). Generally, these authors suggested that mental models are specific knowledge structures that are constructed mentally to represent various situations. Accordingly, the core of understanding for expert gymnastic coaches consists of having a "working model" in their mind as to how to develop elite gymnasts.

When expert coaches estimate a gymnast's potential, they consider their personal characteristics (what they can and can not do), the gymnast's personal characteristics and level of development and any contextual factors. Using this information, they construct a mental model of what needs to be done to develop that particular gymnast. This model is then used as a basis to define which knowledge is important to be used in the competition, organization, and training components. It seems far less likely that gymnastic coaches have a ready-made schema which would contain the generic knowledge necessary for the development of elite gymnasts. Rather, the perception of a particular individual or any challenging situation would generate knowledge from different components which, combined, would provide a new model for each gymnast. This model, defined as the coach's estimation of a gymnast's potential, would then serve to establish the actions for developing that particular gymnast.

For instance, a coach's mental model can be built to develop a 12 year old gymnast who has the physical and mental abilities to succeed at the international level but who has difficulties at school. The given mental model would contain the appropriate knowledge to develop the gymnast as well as to handle demands and difficulties which may be encountered in the training, competition and organization components. For example, to deal with the

gymnast's difficulties at school, the coach may find a solution by talking to him about improving study habits at home or even by adjusting his training and school schedules. This kind of adjustment would be made within the limits of the mental model which was initially built by the coach. However, if the difficulties at school are so pervasive that they become a constraint, it would be difficult to deal with the situation without changing the coach's initial mental model of the gymnast's potential. For example, if the gymnast has failed half of his classes because of his high level of involvement in gymnastics, then the coach will need to significantly reduce the athletes' training time or modify his competition schedule. This kind of modification would require a reevaluation of the coach's mental model of the gymnast's potential by reassessing the gymnast's personal characteristics.

The relationship between the external world and a valid mental model has been described as a quasi-morphism (Holland et al. 1986; Holyoak, 1984). A morphism is defined as a mapping between two sets of states that are preserved under corresponding state changes (Holyoak, 1984). Consequently, the process of model construction can be defined as the progressive refinement of a morphism which maps specific conditions of the external world to a cognitive model. However, in a complex environment, such as coaching, the process of model refinement by the cognitive system is unlikely ever to be completed and new exceptions to a current model are always possible. The variability and uncertainty of the environment does not allow a cognitive system to map the changing conditions of events and consequently build a different mental model for every situation. Therefore, the concept of quasi-morphism, which captures only the relevant aspects of the environment for the construction of a valid mental model, is useful to account for the performance of a cognitive system (Holland et al., 1986; Holyoak, 1984). In other words, mental models of coaches are not necessarily a complete accurate understanding of a phenomenon, but rather a useful representation of how concepts interact. The accuracy of the representation depends on the level of knowledge of the coach that constructs the model.

For instance, a coach may estimate that two gymnasts have the potential to be on the national team. Obviously, the two gymnasts do not have the same personal characteristics, have different backgrounds and are not affected by the same contextual factors. However, an expert coach is able to extract the aspects that are relevant to the attainment of the goal and that need to be represented in the mental model. For example, it would not matter whether the gymnasts were born in Alberta or Ontario. For the purpose of developing an elite gymnast, athletes born in different provinces and otherwise alike could be mapped into an identical model.

As the analytical story, which was presented in the results section, indicated, the categories of knowledge processed by a coach can be arranged and rearranged in various ways. The knowledge embodied in a specific model is maintained until there is no subsequent evidence to modify it. Coaches need to reevaluate their model and make some changes in the knowledge triggered when unexpected events arise. The large arsenal of coaches' knowledge organized hierarchically through the different properties, categories, and components allows expert coaches to rapidly assess situations that do not fit their mental model and, consequently, make the appropriate changes.

The process of developing elite gymnasts by means of a mental model is similar to the process of model construction in problem solving outlined by Glass and Holyoak (1986) in Figure 2.

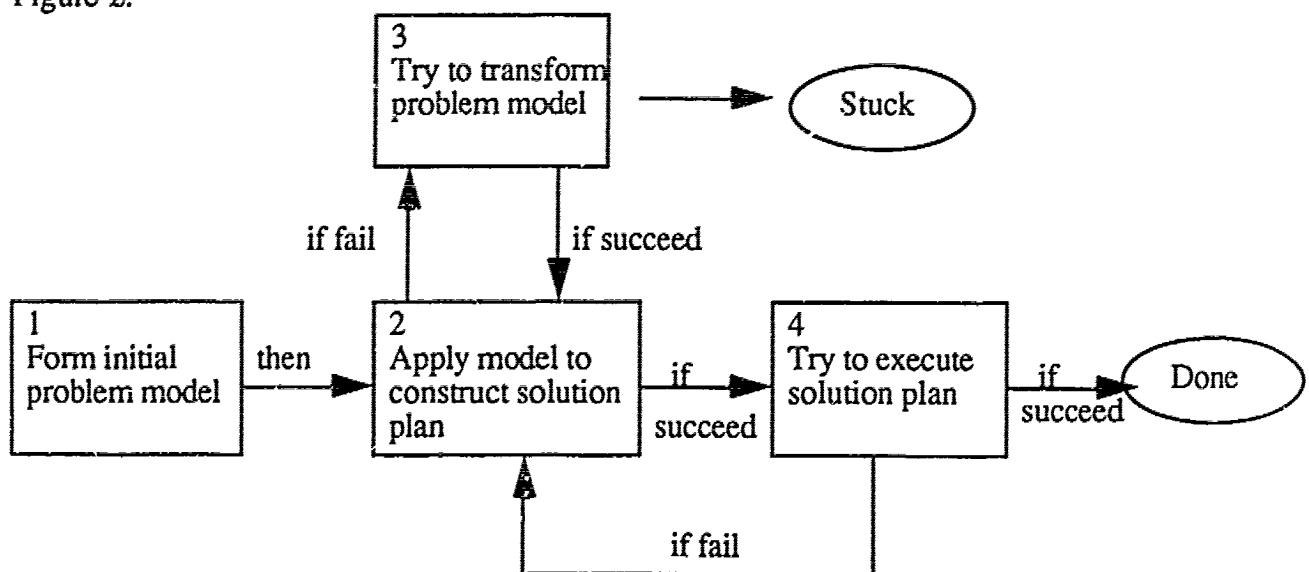


Figure 2 A Schematic Outline of the Process of Using a Mental Model to Solve a Problem (Glass & Holyoak, 1986).

The first step of Glass and Holyoak's schematic outline is to form an initial problem model, such as an expert coach's estimation of a gymnast's potential. In the second step, Glass and Holyoak proposed that the model is applied to construct a potential solution plan or to select operators that will help to reach the goal state. Likewise, in a second step, coaches might select the appropriate strategies, heuristics or procedures that correspond to their estimation of a gymnast's potential. If the problem solver's or the coach's mental model fails to trigger the appropriate solution plan, then some transformations to the mental model are required (step 3). For instance, if the coach's mental model of a gymnast's potential was initially built in

order to have the gymnast reach the international level without consideration of the gymnast's difficulties at school, failure of the model would require the coach to make transformations to the estimated gymnast's potential, using other knowledge that would fit the new model. Finally, in step 4, if the mental model matches with the constructed solution plan, then the execution of the solution plan or the application of coaches' knowledge can either fail or be successful. If this last step is successful then the problem is solved and the goal is reached, if it fails, additional changes in the initial model are required.

Changes to a mental model that have failed could occur until the relationship between the model and the environment is adequate for achieving the goal. When coaches are pressed to the limit of their expertise, or, using Glass and Holyoak's (1986) term, get "stuck", they lack the suitable category of knowledge for the construction of the mental model that would respond to the problematic situation. Another limitation placed on the performance of a cognitive system is the environment (Glaser, 1987), which was not included in the process described by Glass and Holyoak. Nevertheless, the gymnast's personal characteristics and the contextual factors emerged as two important environmental variables which could affect the efficiency of the mental model of expert gymnastic coaches.

The knowledge elicited by the expert gymnastic coaches and described earlier represents expert coaches' views of the knowledge base important for developing elite gymnasts. Coaches' expertise, however, seems to rely as much on how coaches organize their different properties and categories of knowledge when building specific mental models as on the nature of their knowledge. For instance, the mental representation that expert coaches construct allows them to succeed in pursuing the best path for developing an elite gymnast without having to consider all the others. Because coaches' knowledge is organized into a hierarchical structure of properties, categories, and components operating in parallel, it permits them to represent a gymnast's potential in terms of a small number of patterns or "chunks". A "chunk" of knowledge would, therefore, correspond to tightly connected properties and categories of knowledge activated simultaneously within a component as well as between different components. Accordingly, when coaches activate several properties of knowledge simultaneously they represent a complex and possibly unique problem situation. The nature of this organization determines the quality, completeness, and coherence of the mental model used which in turn determines the efficiency of the knowledge applied in the organization, training, and competition components. This kind of knowledge organization of expert coaches is consistent with findings in other domains of expertise.

Expert Coaches and Studies on Expertise

The illustration of the performance of a modeling system that captures expert gymnastic coaches' use of their knowledge has permitted the highlighting of some characteristics which have been consistently associated with expertise. In fact, four of the seven characteristics that Glaser and Chi (1988) found to be prominent among experts from different domains, also appeared as important descriptors of the expert gymnastic coaches.

First, studies have shown that experts perceive large meaningful patterns in their domain (Chase & Simon, 1973; Egan & Schwartz, 1979; Rutt-Leas & Chi, 1993; Starkes, 1987; Vickers, 1990). Accordingly, expert gymnastic coaches recognized and recalled large patterns of variables organized hierarchically into components, categories, properties and dimensions. This kind of knowledge organization allows them to construct mental models of specific situations and to optimally change their models in the face of unexpected events.

Second, experts have straightforward condition-action rules in which specific conditions trigger a sequence of actions (Anderson, 1983; Chase, 1983). This statement was supported by the predominance of procedural and conditional knowledge elicited by expert coaches within the organization, training, and competition components. Procedural knowledge includes information about the actions that must be performed, or "knowing how" (Anderson, 1990); conditional knowledge refers to knowing which strategies or procedures are appropriate for a given situation (Shoenfeld, 1985). For instance, once expert coaches have estimated a gymnast's potential, their various behaviors in the training, competition, and organization components are directed mainly by some procedural and conditional knowledge. Therefore, the estimation of a gymnast's potential guides coaches' behavior and serves to generate procedures and strategies that are central and serve as the basic actions for the attainment of the goal. Furthermore, by eliciting the kind of constraints that could interfere in the coaching process, expert coaches showed that they can quickly find a solution to specific or ambiguous situations, much like experts in other domains (Chase, 1983).

Thirdly, the categories of knowledge of expert coaches were conceptually complex, including many properties and dimensions. For example, parents and assistants were included in various properties and dimensions and were present in both the organization and contextual factors components. This illustrates the various levels of knowledge that expert coaches have about different concepts and indicates that their categories of knowledge are not built around surface features but constructed from principles that they have acquired through their coaching experience. In other words, when eliciting knowledge coaches always provide

a specific framework of applications which, if not present, would require other kinds of procedures. For instance, when coaches elicited the concept, "parents," within the organization component, they discussed the types of meetings they planned with parents. However, within the contextual factors component the concept, "parents," was discussed in terms of the kinds of support that parents should give to their child and the difficulties that coaches encountered with certain types of parents. This result is consistent with studies which have shown that experts represent knowledge in their domains at a deeper level of understanding as compared to a more superficial level for novices (Chi et al., 1981, Russell, 1990; Rutt-Leas & Chi, 1993).

Fourth, the emergence of a component labeled, coach's personal characteristics, indicated that expert coaches make judgements about their own knowledge and abilities. To make such judgements about one's own personal abilities an individual needs to have a certain level of metacognitive knowledge (Flavell, 1979; Marzano, Brandt, Hughes, Jones, Preisseisen, Rankins, & Suhor, 1988; Paris & Winograd, 1990), which has been associated with expertise (Russell, 1990; Salmela & Russell, 1992; Wall, 1986). Wall referred to metacognitive knowledge as the conceptual awareness of one's entire knowledge base including procedural, declarative, and affective aspects. When expert coaches make judgements concerning their abilities to teach certain skills or convey their messages to their gymnasts they need to be aware of a considerable part of their knowledge and skill repertoire. This aspect of metacognition has been defined by Paris and Winograd (1990) as "cognitive self-appraisal" or the ability to reflect on one's knowledge states and abilities.

The other aspect of metacognition is "cognitive self-management" and refers to the ability to form and plan, to use a variety of strategies, and to monitor and revise ongoing performance (Paris & Winograd, 1990). The knowledge elicited by expert coaches in the training, competition, and organization components has demonstrated a high level of coaches' cognitive self management. For instance, to develop elite gymnasts, expert coaches know what facts and concepts are necessary for the task, which strategies, heuristics or procedures are appropriate, and how to apply the selected strategy, procedure or heuristic.

In sum, these results are congruent with four of the seven characteristics of expertise summarized by Glaser and Chi (1988): 1) experts are fast because they have straightforward condition-action rules, 2) experts represent problems in their domain at a deeper level, 3) experts perceive large meaningful patterns in their domain, and 4) experts have strong self-monitoring skills. However, due to the methodology used in the present study and the nature of the research questions, Glaser and Chi's characteristics of expertise were not directly

tested and therefore need to be interpreted with caution. Nevertheless, the mental models framework used to explain how expert coaches utilize their knowledge to develop elite gymnasts provides useful insights into the cognitive structures and processes of experts.

Overview of the Results and Future Directions

As an exploratory but in-depth study designed to characterize and formalize the nature of expert gymnastic coaches' knowledge, the present study identified and conceptualized a wide range of knowledge at a considerable level of detail. The next section provides a general outline of the knowledge elicited within each component of the coaching model as well as a summary of the characteristics underlying coaches' expertise. Along with this overview, some directions are proposed for future investigations.

Expert Gymnastic Coaches' Knowledge

The knowledge elicited within the competition component indicated that expert gymnastic coaches of males and females are minimally involved when the gymnasts perform in competition. Nevertheless, coaches of males discussed the importance of their role at the competition site when gymnasts are not on the competition floor. Finally, coaches of females mentioned having their gymnasts participate in trial competitions regularly, while coaches of males did not. Although expert gymnastic coaches' intervention in competition appeared to be limited, more investigations, using different methodologies, are needed for having a complete understanding of their work in competition. For example, systematic observation methods could provide valuable information on gymnastic coaches' behavior in competition.

The organization component of expert gymnastic coaches' knowledge highlighted an important interacting role of the coaches with their gymnasts, assistants, and parents. The social relationships role of the coaches and their consequences on the athletes' development is an issue that has received little attention in the sport psychology literature and which needs further exploration (Coakley, 1993; Vanden Auweele & Wylleman, 1995). The other categories elicited in the organization component showed some differences in the knowledge evoked by coaches of males and females. Generally, coaches of females appeared to put more emphasis on the esthetic and nutritional aspects of their gymnasts' performance, whereas coaches of males elicited more knowledge concerning the organization of the

physical conditioning aspects of their gymnasts' training.

The knowledge of expert gymnastic coaches elicited within the training component provided detailed information concerning important aspects for developing elite gymnasts. These categories were labeled as coach involvement in training, intervention style, technical skills, mental skills, and simulation. Properties of these categories extensively discussed by the expert coaches, such as teaching progressions, being supportive, and helping athletes to deal with stress are coherent with the literature on coaching and the sport psychology literature (Chelladurai, 1984; Fink, 1980; Nideffer, 1985; Orlick, 1986). On the other hand, properties thoroughly discussed in the sport psychology literature such as developing an athlete's self-confidence (Gould, et al., 1989; Weinberg & Jackson, 1990; Weinberg et al., 1992) or developing concentration skills (Nideffer, 1985; Nideffer, 1986; Orlick, 1986; Ravizza, 1983; Schmid & Peper, 1986) received little support from the expert coaches in the present study. These findings certainly need further investigation to find out how coaches apply the concepts conveyed in the applied sport psychology literature, or how they compensate for them.

The coaches' personal characteristics component highlighted a high level of coaches' knowledge regarding their own abilities, perceptions, and beliefs. The categories elicited by coaches of males and females including their personal approach to coaching, sources of satisfaction, perceptions of qualities of successful coaches, opinions about male versus female gymnastics, evolution of knowledge, and personal concerns, emerged as important determinants of coaches' behaviors affecting the organization, training and competition components. Therefore, before studying the coaching process in any sport, an assessment of the coaches' personal characteristics appears to be crucial for providing a complete understanding of the phenomenon under study.

A second peripheral component of the coaching model, the gymnasts' personal characteristics and levels of development, focused on an obvious and critical variable in the coach's work: the athletes. The athletes' levels of development, personal qualities, and personal variables which affect performance emerged as three categories of knowledge that coaches should be aware of in their intervention. These categories of knowledge have a direct impact on the coach's work in the training, competition and organization components. Therefore, the personal characteristics of the athletes trained by the coaches under study is a variable important to assess when studying the coaching process.

A last component emanating as an important variable influencing gymnastic coaches' work was contextual factors. This result might appear surprising when considering the stable

environment in which gymnastic performance occurs. Nevertheless, expert coaches elicited variables, not related to their own personal characteristics, or to the gymnasts' personal characteristics, which could affect their work in the training, competition and organization component and ultimately the gymnast's performance. Two categories discussed by coaches of males and females as contextual factors were parents and job conditions, while coaches of females elicited the additional category of assistant coaches. These contextual factors, although not as obvious as the changing environment in open skills sports, have, nevertheless, a direct impact on the coaching process of gymnastic coaches. Therefore, even in closed skills sports, such as gymnastics, an assessment of the contextual factors affecting a coach's work is crucial when studying the coaching process.

The major components which emerged as critical aspects to consider for coaching in gymnastics appear to be generalizable to coaching in general. Indeed, the model derived from expert gymnastic coaches was proposed as a conceptual model for studying coaching (Côté, Trudel, & Salmela, 1993), and was subsequently used as a framework to investigate coaches' expertise in team sports (Salmela, Draper, & Laplante, 1993) and figure skating (Laplante & Salmela, 1993), as well as serving as an organizing system to classify the existing literature on direct observation of coaches' behaviors (Trudel, Côté, & Donohue, 1993). In sum, with the absence of general models for studying coaching in various sports, the components of the model derived from the present study can serve as a conceptual framework for explaining which factors are most important in the coaching process, and what sorts of relationships among these factors are most significant.

Coaches' Expertise

Generally, the modelling system that captured the expert gymnastic coaches' use of knowledge indicated that expert coaches, much like experts in other domains, 1) perceive large meaningful patterns in their domain, 2) have relevant and specific strategies and procedures to deal with various situations which allow them to quickly solve problems, 3) represent knowledge at a conceptually complex level, and 4) have a high level of metacognitive knowledge. Furthermore, the grounded theory approach used to examine coaches' expertise, led to a detailed description of expert gymnastic coaches' knowledge and has opened some avenues of research in coaching expertise.

In fact, by focusing on what Ericsson and Smith (1991) defined as the first research step for understanding expertise, the present study has provided knowledge and tasks

encountered regularly in the normal environment of expert coaches. This knowledge, representing real coaching situations, can now be used in cross-sectional investigations that focus on specific tasks or problems. For example, scenarios containing real coaching problems can be included in decision-making questionnaires, eliminating the methodological issue recently raised by Chelladurai (1993) regarding the adequacy of decision making questionnaires based on the literature. Similarly, tasks encountered in the normal environment of expert coaches can be used to infer differences in the cognitive processes of expert and novice coaches.

Finally, the underlying model of the process used by expert coaches to develop athletes was an important basis for formalizing and rationalizing coaching knowledge. Indeed, the identification of relevant knowledge under each component and the assessment of the information used by coaches to build a mental model of a situation appears to be necessary for obtaining a true understanding of coaching. As Csikszentmihalyi, Rathunde, and Whalen (1993) recently suggested, "whenever a domain is rationalized, it becomes easier to measure performance in it and therefore to recognize promising talent" (p. 29). The effort of the present study to rationalize the coaching domain could make the detection, nurturing, and support of coaching talent easier. Furthermore, a greater comprehension of coaching could be realized by using the components of the coaching model as a framework to study different sports.

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APPENDIX A: The Consent Form**CONSENT FORM**

The present study, Identification of High Performance Expert Gymnastic Coaches' Knowledge," carried out by Jean Côté and supervised by Dr. John Salmela, is part of a Ph.D. Dissertation. It is typical for dissertations such as this to provide a full interview transcript in the appendix and to use quotes from the interviews in parts of the the dissertation and in future publications.

We assure you that your interview transcript and any quotes used will remain anonymous. Any references identifying individuals or institutions will be deleted.

STATEMENT OF CONSENT

I consent to have parts or all of my interview transcript used under the conditions outlined above in the dissertation and / or future publications.

Researcher:

Participant:

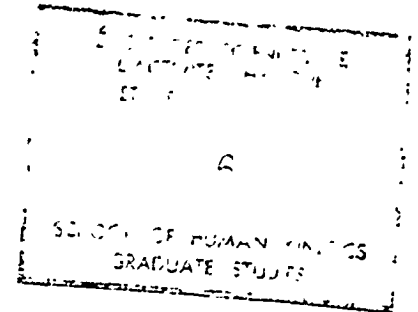
Witness:

Date:



28 Juillet 1992

Comité de déontologie
UNIVERSITE D'OTTAWA
125 University
Ottawa, Ontario - K1N 6N5



A QUI DE DROIT,

J'aimerais par la présente vous confirmer que messieurs Jean Côté et Abderrahim Baria étaient inscrits au programme de doctorat en sciences de l'activité physique au Département d'éducation physique de l'Université de Montréal pour les sessions d'hiver et d'été 1991.

Leur directeur de thèse, le Dr John Salmela ayant passé de son poste de professeur titulaire à l'Université de Montréal à un poste similaire à l'Université d'Ottawa, les deux étudiants ci-haut mentionnés ont décidé de poursuivre leurs études de doctorat avec le Dr Salmela.

Le projet de recherche, subventionné par Sport Canada, sur lequel messieurs Côté et Baria travaillent a été conçu et a débuté à l'Université de Montréal en suivant les règles du Comité de déontologie de notre institution. Messieurs Côté et Baria sont présentement dans la phase de rédaction de leur thèse respective de doctorat à l'Université d'Ottawa.

Fait pour valoir ce que de droit,

Claude Alain
Directeur
Département d'éducation physique

CA/roa

Copie : Dr John Salmela

APPENDIX B: Sample Interview with Coach F2

HOW DID YOU BECOME INVOLVED IN GYMNASTICS?

In grade 9, I had a particular association with a physical education teacher who was somewhat of an idol. He became a close friend and I kept in contact with him through the years. He was a gymnastic person. Through it I joined the local gymnastic club that worked out of our high school. At that time, [club name] was the foremost club in the country for girls gymnastics and had some of its members before the formation of the [club name] started there. The girls went there and I went on to train in the [name] club and some of the clubs that formed in and around [city]. At that time we were the center of the [province] Gymnastic Association, so my becoming a life member last summer at the June National AGM was an indication that although I'm in my early 40's, I'm being inducted in a life membership situation with people who are in their 60's and 70's. It's rather interesting because I have been in the sport now for over 30 years.

SO YOU WOULD HAVE SEEN CHANGES.

Yes. I started off as a gymnast who had talent, but the talent never came to fruition for whatever reason: time, place, coaching. We all have our reasons for why we never did it.

IN TERMS OF THE STRUCTURES OF THE PROGRAMS, HOW DOES IT COMPARE TO WHEN YOU WERE A GYMNAST?

In those days, we were amateurs in the real sense of the word. And I think that throughout the world there was a naivety, a kind of a British epic- "put up dukes!" But we've got to make sure we've got the rules before we do it. And that's how we trained. It was gentlemen training. After training at the [name] club, it was a ritual, you had a beer. You talked and there was camaraderie. We used to still compete when I was in my mid-teens at a local club.

My first Olympic games as a coach was 1972. I remember the routines that were being done: full twists, double twists -- "My God, what will they think of next?" My best 12 year old now would be the 1972 Olympic champion. What happened is like a mathematical equation: you give it a little bit more and you've done it. It allows you to

extrapolate to a greater magnitude. I think we're at a point now, I'm not sure what limitation the mind has on how we can develop. Our sport is going ahead, don't limit yourself. Don't try and catch up I'm going to catch up to you when I'm behind, you're going to have to find a back route to get where you are and to be with them or to get ahead of others. I think that's where we are.

WHEN DID YOU GET INTO COACHING?

I started when I was in the fourth year of University. I was 20-21 years old and I just had a knee operation and the cartilage removed. It was the time to move over. [Person] at the time was pregnant with her son, She was getting a little tired. In 1970, I started working with her on the National team. So I've literally never coached anything but National teams. I started at that level and I didn't come through any system because there wasn't any. [Association's name] at that time was the club. They had the junior team, senior team, and I worked with [coach's name]. So I worked with both juniors and seniors. I stepped on the floor of the Olympic games in 1972. That was my first major competition.

I guess I've seen many people come and go. From a generation of coaching, there's no one who's had as many generations as I've had. I find it rather interesting. I can look at different clubs: [club name], [club name], [club name], there seems to be a sort of formula at the formation stage. I operated from my experience, the right chemistry that happens, good coaches seem to find the right kids. In our sport, you don't play, you train for many years and you build on this knowledge base. It's hard.

I know I'm riding the crest of an athlete or two because they're seniors. But I've never failed to realize that the junior and my novice kid program are the basis of my house. Kids at the top do the icing on the cake but they're not the cake. I have four generations of kids in place. I know who they are. So many clubs ride the crests; they go over the top and back to the beginning. And the beginning for us takes five to six years to develop.

SO YOU DESIGN A SYSTEM AND TAKE FOR GRANTED THAT IT WILL PRODUCE REGULARLY?

I have the novice and junior champion and we just came from [competition] where our two very young ones were second and third. All things considered, they'll be on the team. I have kids who haven't competed whom I know will be on the team. I have faith in

this system. We're always up-grading it.

IF YOU'VE GOT THE RIGHT SYSTEM YOU CAN CREATE GOOD PEOPLE?

Exactly. I don't deal with one kid. Two months ago I lost a kid, six years of training, probably a 9.9 on bar routine. How do I feel? I don't feel anything. It's not that I'm not emotional but from a pure gymnastic point of view, there's not a ripple. Now I have four seniors, but also three or four juniors, four or five novices. So in a big picture, my system is not based on one athlete, one coach, one event. I can be replaced. If I'm replaced with a person that maintains the system, it's not me as a person that's important. It's the fact that someone has a system, it happens to be me. We work for the long run. We are educators. We happen to educate in the field of gymnastics. So we have a moral program. Ethics that are educated. You're a team. How do team members act? Interact? What is selfishness? What's PMs starting at 13? Let's cut the crap. This is how you deal with people. You have a problem, you talk it out, this is a family. Family sticks together. Family is number one. You take care of your own.

HOW DID YOUR SYSTEM COME ABOUT?

There are two things to consider. There is something called [club name]. In Europe for four years I had the same system. I had the novice National Champion. It was her first year as a National Novice and she was the champion. Behind her I had the system set up. I set up that system and the coach who took over for me followed it through but he died, and the club had no system. Now [club in Canada] has the same system. So it's not [club name]. Too many people feel we are what we are because I've got [club name], that's a lot of crap. It's not bragging. It's the fact that I have a system, and I make it work.

HOW DID YOU DEVELOP THAT SYSTEM?

Well, I'm an honest person to myself. I have a little friend inside my head and we talk. He plays a certain role in my life. I present ideas and concepts, and he plays an objective role and challenges this and that. Like a devil's advocate. I talk with my little friend, and we've got to ensure. Ensure means, you've got a foundation. Foundation comes with talented young kids. Young kids come from recreation. So I've always been an advocate of my

recreation programs. Good quality looking for kids. So I hire people. I make sure it works. I have a symbiotic relationship with my recreation, with my pre-competition and I allow my system to take care. So how I started, I don't know, just me! I've refined it over the years, having gotten an education, going to seminars.

Let's talk about athlete development models. How does an athlete develop, provincial string, national string? Show me how they work, the stages they go through, then I can answer whether this should change to this. People get into detail too quickly, they want to solve the immediate little problem. They want to produce the gymnast. This gymnast without six members, five other members of that team are not going to win or score. I'm an advocate of developing the team at the national level. I don't mind if someone else has a good athlete, that's not going to affect me, I'm going to work to beat him. There's two ways of doing it. First, you can take the feet of the other guy and drop them or you can work harder to be better than him.

I saw the young Russian girl. We were told, "Wow, she's the greatest thing since sliced bread." So fine, if she can set a new standard. Unfortunately, we saw her, and she's pretty good but she will be simulated by the system. She'll become a westernized kid again. So I was a little disappointed, because I wanted her to be good. I thought she could be the standard I could set. Now I have to find another means. I want to be improving from our sixth place position but I have a little difficulty because I don't see the system within that country. There's too much diversified as far as individual clubs. It's based on the ego too much on the ability of my fellow coaches. If I counted all the 96 kids in the country, is there a system that's developing them? To get them all together on that one day at our Olympics in 1996. Are they all going to be there together, red hot and ready to take third place? I don't think so. It's too bad.

WHAT IS HAPPENING WHEN COACHES FOCUS ON ONE ATHLETE THAT BRINGS RECOGNITION FOR A CLUB?

How many big people do you know? People who have no vision. If you take life, it scares you when you think of the people with poor hand-body coordination. We all drive 2000 pound cars at 100 miles an hour; that scares the shit out of you. And if you're going to be coaching, how many people have quality vision, have moral ethics? We're stuck with many who don't. They grasp at anything. That doesn't mean that they're not good technicians. Maybe their kids will beat my kids. But I'd like to think at least we have a system based on

clear vision and it proves itself. I mean, if we had two or three [club name] with the coaches staff and the attitude, we'd clearly be one of the top countries in the world. In our country, top coaches can produce an athlete of 9.6, 9.7.

I've just come back from a major international world competition against the U.S.S.R. national team, the U.S.S.R. vs the world. [My gymnast] was last out of 12 kids- six were Russians, and the others Chinese. She scored a 33.8, which is about a 9.6, 9.65. She was last. I didn't feel bad. I think she did a good job. So I came back and did some thinking and I said "Dammit, I'm going to start now to prepare for 1996." I'm going to find the kids, and nothing will prevent the fruition of that 1996 team to be ready on that day. Sure, we'll compete here. But everything has its purpose. We'll have dedicated coaches and programs. So we're spending between now and this summer in finding those kids. We're working and thinking ahead. There's interacting planning. We interact with the athletes. I don't sit back and just accept things. My little man says, "Come on, come on."

DO YOUR ASSISTANT COACHES GO THROUGH ANY KIND OF COACH TRAINING?

Yes. We have four areas. We have the coaching diploma program, which is a two year diploma course that will certify up to level three the academic sport sciences. We also have a recreation program and community programs. That allows our coaches to make some money and gain some coaching experience. Then we have the elite sports school. The prime reason for its existence is the laboratory environment where my coaching students can get hands on experience with athletes of that quality. The fourth area is myself and my coaching staff and how we get interacted together; they work with me with novice, senior and junior athletes. They spot. Then they move to verbalized coaching and by the second year some of them are on the floor of Canadian championships with us. When we interact with these three areas we get a wealth of interaction.

Today if I got another 10 talented children, I couldn't take them. There is a limitation. space, staff and money. My dream goal, if it were possible, would be to step out of the gym and become a director. The question is who's going to fund it. We are a club based system. Democracy says everyone has a right. We have 160 clubs in [the province]. And every club has a dream: a competitor on the national team. So if you were to put a national, or provincial training center with [coach's name] and six or eight other coaches and he took the cream, he'd kill the other part of the system. Somewhere down the line, you can't touch the status

quo. The unfortunate thing is that the status quo does not allow for the next level in gymnastics.

We have about 60,000 registered gymnasts in [the province], and we don't have the ability, given our system to produce a 9.8, 9.9 athlete and given the requirements. They're too busy taking care of the grass, roots, keeping things going. I'm the oddity. I'm the one who wants more. I know we can do more. So I've come to grips with that to a certain extent. The soviet system wasn't weak because they wanted sport to represent what they consider a superior, political system; they were willing to put the money in it.

HOW IS IT FUNDED HERE?

Well the distance of the gymnasium is structured equally. We are part of the college, so there's no charge, which would normally be the case. A number of the staff are actually faculty members. [Coach's name] is a technician within the college so we are members. We need a lab with athletes in it so it becomes part of my job.

Now there is a certain amount of money coming in because there is a tuition for the actual coaching portion. That goes into certain operational costs for my part time staff who aren't part of the college. There's a fund raising factor where the parents are involved. We do not get any money from the college itself. Lots of clubs with their own initiative and a good parent organization can generate quick money. I don't have that ability. I'm part of a big system that's in place and I've got to apply capital, grant this year maybe change some mats, get new parallel bars, etc.

If you know the system well enough as we do and plan well, you can get things changed over a period of time. We have a pair of bars from the 1968 Olympics, 22 years old and we still train on them. I've cut the base and welded a section. The floor that we use is a 1972 Munich Olympic floor that's 18 years old. People say, "Boy, you are so lucky!" Like the old saying: "The harder I work, the luckier I get!" So we do well, our kids are happy. [Athlete's name] is the first athlete that's ever left me in 18 years.

WHY DID SHE LEAVE?

To be honest I can't say that I know. She was a child. Part of a session, [an assistant coach] whipped her down in the gym where I was trying to communicate with her and I was trying to get her to understand. She couldn't conceive what we were trying to do or say. I think

she was getting a little bit uptight. Many times when you're trying to help someone, the helping creates its own tension. She was from an oriental family, and by nature very quiet. I made a statement to her mother during a parent-coach interview, I said to her mother, "I just don't know how to get to her." So, they showed up one morning at 8:00- mother, father, daughter: "We're leaving." The communication wasn't there. I think [athlete's name] went home one day and said, "I'm not happy." In simplistic terms, I can understand that; we're trying to get her to improve. Mom took that as, "they don't know how to coach her." I've coached the kid for six years, they come in with a pre-typed letter, they have already talked to another club and within five minutes it's over. And I thought, "communication," that's the optimal word here. I didn't accept the letter. I told them I want 24 hours. I want you to think about this. So I laid out things for them. The next day they said, "We thought about it and we're going to follow through." Fine. [Coach's name] has worked out things with [athlete's name] in her own way. They acknowledge each other but for me I see her and I don't say hello. I don't consciously make eye contact. I may come around, but right now I'm hurt and I don't want to admit it. There's no malice. I don't hate her.

DIFFERENT KIDS MUST PRESENT DIFFERENT PROBLEMS AS THEY GROW UP.

I'm a firm believer of that psychology in general. I see how much we deal with it on a day to day basis. When you look at the families today, the stresses and strains, divorce, separation, it exists. It's real. One deals with kids on an unbelievable level. Today I dealt with three athletes: alcoholism, physical abuse, and just stress and strain in the family. I dealt with death in the family yesterday. A girl broke up with her boyfriend after three years. So I dealt with that, I am a small seat councillor everyday of my life.

I've never been told, but I think that it really counts for a child, not to give answers. Try to get them to open up to have them see more questions. When you see more questions, that eases the ones that you thought were the only ones. The more you see questions, the more you see options. When they're ready for a decision, it's got to be theirs. For example, mom and dad get separated. "Dad wants me to decide what to do." We talked about it and I asked her, "Do you want to make a decision?" She says, "No." "Good," I said, "don't decide, just tell your dad, 'this is me, this is what I feel comfortable in, if you want to change this relationship, then you can make that decision! I'm not going to do it!'" He may decide against you or for you but it will be his decision. I asked her if she could live with that and she said yes. So all of a sudden this kid feels she has control over her life. I think coaches

should have this kind of training. It just scares me to see what parents do to their children and to themselves. I think there are more things you have to do as a parent besides setting them in front of the T.V. and taking them to Burger King. We have to teach them options. There's also a fanatical side to this, which I don't believe in either. They still have to play, be natural, and give cuddles and hugs.

WHO COUNCILS THE COUNCILLOR?

The little man walks on the beach. I really feel comfortable with [me] as a person. And when I deal with him [the little man], I like what he thinks. I like how he can have a certain emotion when emotion is felt. I like how he's objective and fair and he tries to be a good person, but sometimes it fails. You can see the fault of forgetting to write a little note. Generally speaking though, the man is fair, honest and he does the best he can. He's dependable, loyal, trustworthy. If I had to weigh the good and the bad, I would want him on my side. I feel he does represent the sport of gymnastics for his country. He has an ego, but it's been set aloft over the years. He's like a fat man, he doesn't need a lot of food. I know who I am. In fact, a good example: one of my kids at the junior competition two weeks ago said to [coach's name]: "My coach thinks he's the head coach." It wasn't a negative comment. It's like: "He's controlling the gym."

WHEN YOU HAVE THE GYMNASTS GOING THROUGH, YOU'VE GOT A PRETTY CLEAR ROLE OF WHAT STAGE IN THE TRAINING THEY'RE AT AND WHAT FUNCTION THEY'RE FULFILLING, IS THAT THE CASE?

Very much so. I work on a Darwinian process and I do that downstairs with my athletes. You have to survive. You have to go through certain mutations, changes and once you get to a certain point, then it is a survival of the fittest. What I tell parents, and they don't believe me, they smile in my face, I say, "Your daughter decides whether she stays or not." They think, "Bullshit, you decide." My job is to service someone who twists, tumbles, flips and all the rest of it. But in the end, when she competes and puts everything together, the decision is made, I can't decide that.

HOW OFTEN DO YOU MEET WITH PARENTS?

Officially three times per year, and that's for academics as well as for the sport.

CAN YOU GIVE ME SOME EXAMPLES OF SOME DIFFICULT SITUATIONS IN TRAINING?

If you drop the kid, word goes around that you're a shitty spotter. There's [coach's name], and a couple of my young guys, who are just, "Wow." He spots and he's there every morning. The kids love him. The kids trust him, he's got "balls," and they love that. TRUST. The confidence that the kids have in you is as good as your last buck. If you drop a kid or two, that's it! People don't realize that that's the bond between a gymnastic coach and an athlete. We have an actual hands-on physical relationship. In some cases it can mean the difference between life and death, to not spot properly. So I have double spotting and lots of crash mats. And assistant coaches have to come through that. That's sort of the test. If they can come through that, then that's the beginning of a bonding process. Don't say too much, just say what you can do. Once that's there, those kids will follow them around. I can rubber stamp them. The kids have to rubber stamp them.

HOW IS A TRAINING SESSION ORGANIZED?

It's a hierarchy downstairs. [Older gymnast's name] is the queen, not the best, but she's the queen. when a little kid walks in, [older gymnast's name] looks her over, she'll watch her. [Older gymnast's name] doesn't know what she's doing, how come the kid is working hard. So [older gymnast's name] lets out the word: "Boy, she's a real hard worker, she's going to be good." All of a sudden, everybody likes this little kid. It happens at all levels. A couple of kids at the junior level and [older gymnast's name] has basically marked them, the word is out and it usually comes from [older gymnast's name]. Now, at the different levels, the juniors may comment on the novice. There's a little queen in every group and I let that happen and that's part of the system.

HOW MANY KIDS HAVE YOU GOT HERE?

A: In total we're talking about 55 including elementary and high school.

WHAT'S THE AGE RANGE?

Within the school, [gymnast's name] represents the oldest, she's 19; and she has been with us since she was seven and a half. So, basically her life has been with me and within the program. I think that's why we're so close. We're dealing with her retirement right now. It's good because she knows I'm here. She knows I'm objective. This year it's interesting, she became a woman and has a boyfriend and we talked about contraception. That was rather interesting. She was aware that we were aware and we laid down some ground rules because she didn't do it very well at the beginning. When it started, she acted as if she were at a new level, womanhood. She let some of the others know in a negative way that made her seem older and better, so we intervened and told her: "You're not the first and you're not the last so let's look at it and see how it's done properly." We all accepted it. So I think she left as a better person.

We go back from coming in at seven to eight years old, losing their teeth, through menstruation, to boys to womanhood. I talked to [gymnast's name],¹³ the other day on our way home. I don't know how we got on this subject. I asked her, "What do you consider a good kiss?" She said: "I don't want to talk about it with you!" I said: "Why not? I'm serious, what do you do?" She said: "well, we mmmmh, it's really nice and tender." So I said, "So you don't feel like you're just doing it... you feel like he cares for you?" She said: "Yes, that's a nice kiss." This is a 13 year old. Now I know this summer she had a boyfriend and now she's thinking of what she wants and her values.

[Assistant coach's name] is really brutal. Well, not brutal, but [gymnast's name] had a boyfriend at camp. Things didn't work out, that was okay but one day she had a small hicky on her neck. [This assistant coach] sat across the gym and yelled, "[gymnast's name], get over here!" She goes over and knows she's in trouble. "What's this? Who was it?" [Gymnast's name] mentions the guy and says she doesn't even like him. [The assistant coach] yells, "Over to the side of the gym, you've got to set some standards for yourself." So, it's not just coaching. I think the kids respect it. They know our heart is for them, and the work goes through the system.

Too many people think bloody gymnastics is kids. If I could put my knowledge into a gymnast in a computer program, we could all produce 10's. But the reality is that we're dealing with humans and all of them are variables. That's what's harder. Taking they're limited physically, if they're strong, weak, flexible or tight, their technical skills and

everything else, in the end, you have to package them along with their psychological profile. We have our three stages of development for the children based on ages six to eight, nine to 12, and 13 on up. In the final stage the psychological factor is first, their technical is second, and their physical is third. With the psychological number one, that will determine whether they will or will not be champions.

HOW DOES THAT CHANGE FROM THE OTHER TWO PREVIOUS PHASES? WHEN THEY FIRST COME IN WHAT DO YOU DO?

OK, in phase one what we're looking at is at physical because they basically don't have skills. We don't expect skills so we prepare them physically then you move into psychological number two. It's the hook stage, so we're looking at fun. Having a good time within the context of beginning to be nurtured into the sport and technical takes care of itself. And you find out what they can and can't do. In the 9-12 stage, they'll be preparing themselves in the technical sense to get ready for the sport and demands. So we spend a lot of time on technical number one. Then comes psychological because in that high leaning period there's a psychological fear. You're very distressed in springs and you have to hang in there. All of that takes place in that time frame. Physical is maintained. Once they're into that real learning you find out very quickly. The final is psychological because if they can't put it on the floor, the technical means nothing, the physical preparation means nothing. They choke, there's fear, they can't focus or they can't do certain things.

We spend time through just preparing for a competition program that's written and documented, that introduces them to simple things just like simple simulation, their friends watching them. We do things like cold turkey routines, no warm-up. We go right on there and they have to focus right away and we've got simulations like finals of world championships, being last on this. We try to create a scenario. we put in a countability factor- you missed it, everyone of your routines, we increase the pressures. And over a period of time they learn how to go to a competition. We have set 30 second warm-ups so that they know what the skill is, in what order. They know it'll take them 22 seconds to do their three skills. They've got 30 seconds so they've got eight seconds to play with. And all those things allow them to become competitors.

DO YOU USE SIMULATIONS OFTEN?

Yes. While the simulation is a reality here in Canada, I do not have the ability of competitions like eastern Europe or Europe where one can go anywhere in two hours by plane. Thus, Europeans compete a lot, two to three weekends in a row with different countries. I don't have that, instead, my girls come out of the blue suddenly and they haven't had a competition in two to three months. They're supposed to go head to head in a street fight with these kids. But they haven't fought in the street for two to three months. The awareness of street fighting is gone. I use the term street fighting with the kids because that is what it's all about. You can train in a boxing ring. The British Commonwealth champion in boxing could beat the shit out of you in a street fight because he put up this arms and kicked you in the nuts: that was the end of that fight. So we can form and train the kid to get in on the street fight. You have to get in there and get in front of the Russian on the beam; you have to be able to cope with the stress of being next after a fantastic routine. How do you simulate that? We try it. It's artificial. I'd love to be able to get up there and do a better job but I don't think I'm doing a much better job than I do. I don't know what else I can do besides simulations. We're trying to deal with that. It's something that I'm trying to look at for improving in the future.

WHAT ARE THE MAIN KINDS OF CONCERNS THAT PREVENT YOU AT DIFFERENT STAGES. YOU TALKED ABOUT OLDER GIRLS. WHAT ABOUT YOUNGER GIRLS? WHAT ARE THEIR MAIN CONCERNS?

It just runs the game of children growing up. Some of the things they perceive are quite comical from our perspective of adults but for them they're very, very real. The younger kids are usually very young behaviorally. You tell them rights and wrongs, to stand in line, make sure you bring your grips; it's their emotional stage, their second level and that really starts with interaction with girls. Everybody has a say. You go in order, you don't brood. Everyone is treated equally and you can only hope from a friend point of view that they become friends. I know that consciously sometimes we surround them a little bit or chase after them. Let's see, three in a group is bad because then it's going to be two against one and that's a problem so we tend to go in groups of fours or fives; that way there's always two together and that can be dealt with. We don't have a big problem unless the kid just can't cope, is not cutting it technically, is not beginning to learn, or fear comes in. We really don't

have that much of a problem.

This summer some coaches got a little too peeved or were working a little too hard. The perception by the kids, which we got through the grapevine, was that the coaches weren't having fun; so I talked to the staff about the concept of what fun is. Fun isn't laughing and giggling. It's enjoying what you're doing. I enjoy working out. What probably happened is that one of the staff was putting demands on the kids. The demands weren't unrealistic, as far as technical standards go, but he wasn't using correct methods. They were just more demanding. For example, he'd say, "This is no good," rather than bringing them in and explaining, "We've got to increase our performance standards, how can we do that, we've got to increase the number." Now we've got to be a little more aware about the forum. When your forum comments then you know why your forum comments. You actually paint the way. The kids have to be part of the process.

I KNOW YOU ASK A LOT OF QUESTIONS. HOW DO YOU DO THAT?

It's the old learning. I give mine, they give one at the initial stage. Over the years they give mine and I give one. That's my job, just like a good parent. I think that's what a good parent is because when you open the door and they do go out they're going out with a stride rather than a tentative step because they have been prepared, and know how to deal with it. They can't deal with everything but they have the ability to. With the information they have to extrapolate: I could do this or I'm going to think about that. You're giving them a rare advice to survive. I think that's good.

HOW DOES THIS KIND OF TEACHING APPLY TO COMPETITION?

I always say a good coach is a guy sitting down and having a coffee during a competition and relaxing because everything's under control. If I'm up there spotting and lifting and flipping and calling orders, it's like I'm having problems with these guys. But the fact that my little kid can comment on me sitting playing head coach in itself is a test to myself in that I guess I've been under control.

WHAT ARE YOUR TASKS IN COMPETITION?

I shouldn't have to do anything in competition.

YOU MENTIONED EARLIER THAT IN THE MIDDLE STAGE, BECAUSE THEY'RE LEARNING TECHNICALLY, THERE'S A LOT OF FEARS INVOLVED. CAN YOU TELL ME A LITTLE BIT ABOUT THAT? WHAT ARE THE KINDS OF FEARS THAT THEY HAVE IN COMPETITION AND IN TRAINING?

The potential, I think it's a potential fear and fear number one. This is important to the kids; it is acceptable and it is expected because they are human. Now, if we can physically prepare them, help them through progressions safely so that their motor pathways develop, we can actually let them out on their own, on an arial belt or on a safety crash mat, and it becomes systematic. Sure there's always the apprehension, the little butterflies before you do it, but there's a difference between that and sudden fear where they don't want to do it or they cry.

If I were ever to see a girl crying in our gym, it virtually doesn't exist, and if both the girl and the coach are hesitating, I may interject if the coach himself doesn't see it, and say, "Well, they're actually not ready." If they're not ready, they're not ready and that's a fact. If they're standing on a beam ready to do a skill and they're "afraid", then it's not the fear, they're actually not ready. So we take them back.

I don't think we've ever run into what I call a dead end. A dead end is when a kid's looking so frozen with fear or a psychological hang-up on the skill that they quit or won't do it or they'll hurt themselves. To me that's just poor coaching. This stage is literally a learning process, how does someone learn about positive reinforcement, not negative. The park versus the home. You just do everything that you learned, and if you do that faithfully, the next stage is to do it alone. All of a sudden, they're throwing up at the doors: Go do it!

THAT'S AN INTERESTING TRANSITION. WHEN YOU SEE A KID WHO'S DONE THE TRANSITION FROM LEARNING A NEW SKILL AND YOU SEE THE KID AND YOU KNOW THAT SHE'S READY. DO YOU TELL THE KID SHE'S READY, DOES SHE TELL YOU, OR IS IT A BIT OF BOTH; HOW DOES IT COME ABOUT?

Given the relationship, for the most part it is the coach who is the initiator and every few kids will say: "I want to do it alone." But on the other hand, very rarely do we say: "Okay, let's stop. You have to do it alone." There's a difference between "you're ready" and "you have to". Many times if I were to ask a kid when they learned a skill, they probably couldn't tell me. You know why? Because of the gradual process towards when they actually performed alone.

THERE IS NO PERCEIVED TRANSITION.

That's right. I mean [gymnast's name] did a vachenko vault three days ago for the first time. How can it be the first time? It was the first time she actually did it all alone. I don't know when it happened; someone told me. I wasn't even in the gym; I was with [a friend] downstairs and she had done it. She just basically said, "I'm going to do the next one," and the coach said, "Okay," so, she did it.

AND OBVIOUSLY, THERE WAS NO BIG DEAL AFTERWARDS.

No, there was no big deal. We have a kind of big deal in that we make sure it's noticed, so everybody gives a clap so the gym recognizes the first performance of a skill. That way she gets her recognition and it's not sluffed off as meaningless. However, the emphasis is not on, "Oh my God, you did it!" It's on, "You did it, good girl," it's a different emphasis.

It's expected. Plus we have tradition. She knows she's a junior. She's the bronze medal junior Panamerican Games. That's the next goal. I tell them, "Once we get this we'll take a look at the double-back." And all of a sudden, I've laid out a goal, a plan for her for one year. Whether she recognizes it or not, she takes it in and says, "Okay, yah." today wasn't immediate. It's more like, "This is what we're going to do," so she has a little, little thing in her mind. Then I'll say, "Let's spend a little more time on this." Suddenly, six months later she's got it and you ask her, "When did you learn it?" "Oh, I don't know." "Well, how long have you been working on it." "I don't know." It's not bumping into a wall realization that you're at the next stage. It's like life.

YOU SEEM TO TALK TO YOUR ATHLETES A LOT. ARE YOU IN THE GYM EVERY DAY?

Every day. About 30 hours a week plus faculty and teams, and the scary part sometimes is I don't know who can take over for me.

YOU HAVE TO LOVE THIS. THAT'S WHAT YOU WERE SAYING BEFORE ABOUT THE PEOPLE THAT CAME IN, LIKE [NAME], OR PEOPLE THAT GOT INVOLVED IN GYMNASTICS WHO JUST LOVE THIS SPORT.

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I'll go a long way with those people because I know their heart is in the sport. Sometimes I wish I had more time to develop my [assistant coaches], some of them come all ready as a piece of clay. I spend two years trying to shape them a little bit. Others come as raw clay. I just start working with them and getting them to become real people, then they're gone. Thus, sometimes I do feel that I've failed in that sense, that in two years my students just don't have the time, lots of time. Plus a lot of them are so screwed up by that time or have certain value systems entrenched in them that you can't really do anything with them. Others are sponges; they're rarely ready to be given the next stage in their career development. They grab it and then it's gone. They become your friends, they have kids themselves.

DOES IT BOTHER YOU ABOUT THEIR AGE?

Right from the beginning I don't push the fact that they're students and that I'm a so-called teacher. I try to work comfortably at a certain level with them. Rather than trying to come to me, I go to them; by going down to them, I can bring them up to me. If you stay up, the bridge between you and them is too far. So I go down with them and become their friend. You go and have a beer with them. Through those conversations and interactions, they grow with you. I go down to level six and I go up and back up to 10 rather than staying at 10 pulling them up. So you have to get down, you have to regress a little. And in regressing, many times I then become a stronger 10. Maybe I become an 11 and I go back down to seven. I learn from them, I really do. I restore my batteries, I restore my faith in the learning process. It's been very useful. That, once more, is a symbiotic relationship.

IT SEEMS, JUST BY TALKING TO YOU THAT YOU TALK A LOT AND YOU'RE OBVIOUSLY INTERACTING A LOT. DO YOU HAVE WRITTEN FEEDBACK?

No, the only thing written I get is a report card; it's not that meaningful. The parents need it, but the kids get constant feedback. I think they know where they are regularly; I just try to think if there's an improvement area, but you have to be careful. You can talk too much personally, technically is another thing. I like to get in and get back out. Like what I talk to [older gymnast's name] about on any given day, I will not come back to it the next day or the next day. I back off, that issue is done, and they feel really comfortable with it. Now, if it arises or has to be talked about again, fine, we'll do it again. We need to let them work with it, give them their time and space.

CAN YOU THINK OF SIGNIFICANT THINGS THAT HAPPENED IN YOUR LIFE OR PEOPLE THAT YOU REMEMBER?

The people who were most influential were the ones I met when I was young up to age 18. After 18 it kind of dropped off. Then there were these old gymnastic people who, as I grew older, gave me a wealth worth to teach myself on. I think you also get less and less influenced as you grow older. I had people who cared for me, who were real honest, good people. It was a simpler life in that time. They gave me their values. With my own parents my father was of pretty scratchy nature. I was brought up a certain way, duty and sticking by your family were important. These kids downstairs are my family. It's an extended family but they're mine, and I'm their father. So I'm the person in charge.

HE'S A WONDERFUL GUY [YOUR FATHER].

It's a very interesting process in life; I really believe the child becomes the adult, who becomes the child. I see it in training: the parents move towards a certain age and they begin to rely on you. Before, you were the one who relied on them, now they're asking you for your opinion. One day we may have to take care of them as they did when we were children. And I see that all the time in sport as well. My role right now is to help my kids, coach them through the system.

I know one day I'll be 60-65 and there'll be 20 or 30 of these people there teaching their students; it's like being British again. You have to know your history. It's also cultures that do that. I think in Canada we're a mosaic, not a melting pot. So I'm a believer in that and I think it's something that always transcends in what I do.

YOU ALREADY HAVE A HISTORICAL PERSPECTIVE.

That's right. Already my students come back. They've got their own kids. I know they say, "He's my teacher." I've got to add two or three more generations, 10 more generations. All of a sudden I'll have created them. It's a good sense that allows you to press on and not give up. If there's no roots, the tree just pulls off and blows away. I've got roots. But they're not just my roots. They're [coach's name] roots, who's already 65 and goes back to Ireland. I can go back and find his lineage; it's part of my lineage. [Another coach's name] over to the other side is Hungarian. Somewhere on that tree, that's me. I'm part of them. They

were both in somebody else's mold so we're all part of somebody else's mold.

WHAT DO YOU THINK OF THE THREE TO FOUR PEOPLE OF WHOM YOU HAVE THAT RESPECT OF AND WHO PROVIDE YOU IN A PARTICULAR WAY? IS THERE SOME COMMON TRAIT OR DID YOU FIND SOMETHING DIFFERENT IN EACH ONE?

I would probably say tradition. Maybe we're different people, but I would say the value system is the same. I think we're pretty common. They take from me, they gave me values good or bad, worked hard and stuck to it. That's common. Whether they spoke English or German, it was the same thing. They were traditionalists. We've lost so much traditionalism. It's not common any more in North America. I'm not sure how much it's been lost in other countries.

WHAT'S THE DIFFERENCE BETWEEN SOMEONE LIKE YOURSELF AND SOMEONE ELSE WHO ALSO HAS GOOD VALUES?

At 13, I was a person who had a certain quality that was moldable. I happened to have stepped in a gymnasium and it's purely accidental. I happened to have liked a person, [coach's name], and he started me in the sport at the age I was moldable. These people happened to be at the right place at the right time. Once the hook took place at age 13, the continuation followed. If you're fortunate enough at a certain stage in your life to be injected with something into your blood, it can be a curse or it can be a most wonderful thing. I'm fortunate. My love for [gymnastics], is based on the fact that I am part of it. It is something that goes back to Young and Ling in the 17th -16th centuries. I don't know how far we can go. I am part of a big, big tradition. I could have gone into volleyball and maybe done the same thing with you in volleyball. It happened to be gymnastics.

[Coach's name] was lucky too. He went through a similar one with the [name] club. We both touched similar people. He is there too doing the same thing, 20-40 miles down the road. [Coach's name] and I have a very similar background and competed against each other. He had [assistant coach's name], who is still judging today, at 75 years of age. [Coach's name] and I had the ability or desire within us to actually take what we were given. Maybe we're of a certain nature, a certain type of person who takes on these types of things. [Coach's name] has German background, I have British background. We're not different at

all.

When I registered in University in 1970 I went to [Asia]. I lived in [Asia] for about a year for men's gymnastics. At that time the [Asians] were the world champions. I had started with [gymnast's name] a year before coaching for women, so I had a female side to me. I'm not sure what happened in [Asia]. I started working with the [Asian] team. I think I was intuitively a good coach. I worked with them, and they liked me. When I came back I just seemed to have gone into women's gymnastics.

WHAT ARE THE SIMILARITIES OR DIFFERENCES BETWEEN COACHING MEN AND WOMEN?

There's no difference. I approach it the same. My success in coaching both was really very similar. I did find a couple of different things. First of all, they were not prepared like I would prepare my gymnasts. They had never been spoken to. They were never helped to develop ideas, thoughts, understanding the processes. I wasn't really prepared for that. I sort of got a reputation indirectly: "He's crazy, he wants us to move ahead!" The amazing thing is: these guys were ready to move. They just didn't know they were ready. They had never been given the skills to say: "Yeah, I've got this, this, and this." That's the difference I did find with the men. They were not educated. Now in all fairness, I would have to then question, how many females coach the way I do also. So I think it's an unfair generalization to say males are worse. If I approached males, I would do the same thing. Male, female, monkey, dog, I don't care, it's the same process.

IS THERE A DIFFERENCE IN THE SKILLS THAT THEY NEED TO LEARN?

Academic. Totally academic. Once more, skill is skill. Break it down, analyze it. It's the process of teaching the skill. You look at male videos for two to three months and then you go teach it. It's that simple, because they do nothing that we do not.

CAN YOU THINK OF YOUR WORST EXPERIENCE THAT YOU'VE HAD? SOMETHING THAT WAS DIFFICULT FOR YOU?

Not really. I mean, first of all, we are like a radio. We have the ability to receive. If you chose to receive something, then there's a consequence. It may be positive, it may be

negative. I basically receive things in a manner that I always learn. It becomes an experience. It may have a negative impact at the beginning but it's translated into a learning experience. I mean, I do stupid things sometimes but after that I just shake my head and laugh at myself. It's only when you've gone through things like national coaching for a certain number of years- his name is [coach's name]. It was bad timing. The question is, do you give up or does he give up? So you go head to head. But I have beliefs. I believe in my sport. And I've basically held on and he's no longer with us or around us.

I have some trouble with some of the Russian coaches. I think their value systems are nonexistent. It's for the almighty dollar or their ego. So I work harder to produce my values. I'm going to fight the market. I'm going to bury the bastards. I can't change them. It's not for me to say they're wrong. Is Saddam Hussein wrong? He has a value system that's different than ours. How can other value systems work together? I don't know. We have to but I don't know. Maybe we will one day come up with a value system that will be universal. We're talking another millennium. But there have to be values. I have a value system I'm working to modify to a certain extent on certain occasions for certain reasons. Categorically, I cannot set their value system unless I'm doing good coaching. I can do well and can produce athletes that beat my athletes. But I would hate to see if we were run by them, where everything was, "Me, me, me". Too many people approach life with that attitude: "It's not my problem."

WHEN YOU PREPARE YOUR COACHES, WHAT ARE THE MAJOR OBSTACLES OR DIFFICULTIES THEY'RE GOING TO BE CONFRONTED WITH?

I don't think we're going to see anything new or different. First of all, the process that I go through with them is through examples to a great extent. We discussed a competition in Montreal: "Here in the audience you see... what do you see?" We start talking about it. All of a sudden you get into why her coach made a decision to take her skill out or not. Is it based on safety? Technical? You want to win, you want to give them experience. So, which one is your overriding factor? Safety. It's not pushing, it's not the ego.

So we walk through life, through competition, through what happens in the gym. I have an eight year old learning a new skill. She comes in willing to please you, so you can get more out of her. Do you do it by demanding or do you go back to the basic process of learning. She wants to learn. If she tries to do it and wants to do it, where's the problem? Maybe she's not technically ready, maybe she's not strong enough. You've got to go back to

the system. You can't just simply say: "you're a chicken." You've got to talk.

So, once more I get into it and I see how they start to think. It was pretty good. They didn't go very deep, but they talked about progressions and, most importantly, about the bond between the coach and their athletes.

IS THERE ANYTHING ELSE WE HAVE NOT COVERED WHICH YOU FEEL IS AN IMPORTANT ASPECT OF YOUR JOB?

We covered pretty much what I think is important for coaching in gymnastics.

4.

4.

4.

APPENDIX C: Sample Meaning Units Representing the Category, "Working with Parents."

1.

I talk to the gymnast first about what I want to do then I talk to the parents when they come to pick their kid up and I gradually spell out my philosophy to them, make them aware of what my goals are and what I want to do. The parents were very receptive to that, they didn't have a problem. F1.

PROPERTY: knowledge of gymnast's goal (dimension: inform parents).

2.

It's a hard concept for the parents to understand when their kid places first but made a lot of errors, not doing what they were capable of. They won't make the national team if they make those kinds of errors, we help parents to understand that. F5.

PROPERTY: knowledge of gymnast's goal (dimension: inform parents).

3.

Dans la génération que j'ai pour post 92 jusqu'à 96, j'ai neuf petites filles là-dedans, les parents disaient. "elles ne font pas de compétitions, elles ne gagnent pas de médailles". J'ai dit aux parents "Bien oui, mais, c'est correct ça, avant de déboucher sur le marché du travail et d'avoir un diplôme qu'est-ce que vous voulez que votre enfant fasse, il faut qu'il passe à l'école; qu'est-ce qu'il fait pendant ce temps là, il est formé avant d'avoir le diplôme". Puis j'ai dit: "vous voulez le diplôme de compétition immédiatement, c'est pas légitime, c'est pas honnête." Donc j'ai dit que, ce qu'on fait, on fait une formation. Quand elle va entrer dans le système de compétition elle va être formée pour y faire face, entre temps on va la faire compétitionner sur d'autres éléments qui vont être indicateurs de ce qu'elle va pouvoir faire. F4.

PROPERTY: knowledge of gymnast's goal (dimension: inform parents).

4.

But we don't allow parents in the gym and they know not to talk to their kid when they're at a competition, some kids don't like their parents there so we tell them, "Tell her you're not coming but sneak in later where she can't see you or get someone else to video," some kids just freak out when their parents are there. F1.

PROPERTY: expected parents' roles in gymnast's performance (dimension: inform parents).

5.

Another difficulty is when an athlete is having difficulty performing when parents are in the audience. We try to explain the situation to the parents. We don't say, "Don't show up," we tell them there're ways a parent can show up so the child doesn't know you're there. If the child's preference is that they're not there we try to explain to them why the child feels this way. "Right now at this point in their development it's better that you not be there but as soon as possible, you should be there." They have the right to enjoy what their children can do. F5.

PROPERTY: expected parents' roles in gymnast's performance (dimension: inform parents).

6.

C'est l'athlète qui doit s'engager à faire le programme et non pas le parent, le parent s'engage à la portion de responsabilité qui lui revient; j'essaie de communiquer cette notion aux parents. Aussi, l'athlète doit se dire, moi c'est ça que je veux faire et souvent ça amène le parent à être un peu plus humble ou un peu plus conscient parce que l'athlète va vraiment exprimer un peu plus ce qui pense ce qu'il est en mesure d'accomplir, de réaliser ou de contrôler. F4.

PROPERTY: expected parents' roles in gymnast's performance (dimension: inform parents).

7.

In that case [parents pushing their child], we try to get them to lay off and focus on the performance. We try to inform the parents if we notice it; we try to prevent it from the beginning. We try not to have parents focus on scores when they're young. F5.

PROPERTY: expected parents' roles in gymnast's performance (dimension: inform parents).

8.

Typical concerns that parents consult about are for example, "I don't know if I want my kid here four hours a day five days a week. What will happen with school? When's she going

to eat? When am I going to see her?" Those kinds of things are valid comments. But we ask the questions, "What does your daughter want to do? Does she want to become a high performance athlete? What are her goals?" If those are her goals then these are the hours she needs to spend in here and these are the reasons why we have to spend so many hours on bars, so many on this. Then we just ask, "What do you want them to do? Do you want them to be out on the street or would you rather have them be here in the gym where they're doing something good?" F1.

PROPERTY: knowledge of gymnast's goal (dimension: inform parents).

9.

The parents are not allowed in the gym at all. They can peek in but we find that if the parent is hanging around, the kid doesn't do well. She doesn't want to fall in front of her mom or dad. We explain that to the parent. Initially when a parent joins a club we have a meeting with them first and set out all our standards and rules, where we want to go. They phone us up with any problems they have or any questions. F1.

PROPERTY: expected parents' roles in gymnast's performance (dimension: inform parents).

10.

We see the parents daily when they drop the kids off, hi and bye, it's not formal. We have one formal meeting every year at the end. It's about what we're going to do with the kids the next year and how they did last year. It's a kind of on-going report card, we talk to them all the time, at competitions and the kids know what goals they have and if they don't tell their parents the parents are pretty open and ask us what's going on. F1.

PROPERTY: knowledge of gymnast's goal (dimension: inform parents).

11.

The relationship with the parents are now easier because the club's got a reputation and there's already a standard. Before we were building that reputation so it was always convincing the parents, the kids that we knew what we were doing. We had to spend a lot more time on that. But now we don't have to and we coach the kids, not the parents; but parents know where their child is going. F1.

PROPERTY: knowledge of gymnast's goal (dimension: inform parents).

12.

[I meet with parents] officially three times per year, and that's for academics as well as for the sport.

F2. PROPERTY: knowledge of gymnast's goal (dimension: inform parents).

13.

Your mother shouldn't pack your things, that type of thing. If they are doing well or if there's a problem, we certainly speak to the parents. We have interviews three times a year, like a teacher-parent interview. F6.

PROPERTY: expected parents' roles in gymnast's performance (dimension: inform parents).

14.

J'ai monté un système là-dessus [pour interagir avec les parents]. Avant, une fois que les parents me laissaient l'athlète dans les mains, ils devenaient un petit peu aveugle, ils dépendaient exclusivement de moi. Maintenant, je négocie l'année, à chaque année. C'est à dire qu'une fois que l'année est terminée, il n'y a plus de gymnastes, il n'y a plus de parents, il n'y a plus rien. On recommence, on fait l'évaluation du plan de l'année précédente et puis on s'engage dans une situation de partenaires, où les parents deviennent partenaires de la performance aux mêmes titres que je le suis. Je définis les rôles et les responsabilités les parents sont partenaires donc de la partie financière, de la partie transport, de la partie support et stabilité apportés à la maison et la partie d'éducation face à l'échec, pas vraiment face à l'échec, mais d'éducation comportementale à la maison. Je leur donne des outils. Je leur dis, c'est votre partie, puis ça vaut aussi cher, ça vaut 0.5 points ou 1.0 points. F4.

PROPERTY: expected parents' role in gymnast's performance (dimension: inform parents).

15.

We see parents at a lot of competitions. We also see the parents at practice when they drop off the kid or pick them up. We generally have one or two formal meetings a year where we talk about where the child should go. F5.

PROPERTY: knowledge of gymnast's goal (dimension: inform parents).

16.

On rencontre les parents et les filles, et on présente leurs objectifs. Je pense que de plus en plus les parents ont leur mot à dire [dans la carrière de leur fille]. F3.

PROPERTY: knowledge of gymnast's goal (dimension: inform parents).

17.

Ses parents ont pris des mesures dernièrement qui ont portés fruits. Ce qui va nous rester à faire c'est peut-être de convaincre les parents en terme de direction au niveau scolaire. Parce qu'ils veulent l'envoyer à une école privée nous croyons qu'il vont tout simplement lui mettre la corde au cou. Il y aurait peut-être un système sport étude qui serait plus approprié pour elle. F3.

PROPERTY: expected parents' roles in gymnast's performance (dimension: inform parents).

18.

Ce sont les parents qui s'organisent directement avec les professeurs. Moi je me suis organisé avec le plan de travail que le professeur avait fait. Je pense que la prochaine étape va de bien conseiller les parents par rapport au choix de l'école secondaire pour lui donner une chance finalement. F3.

PROPERTY: expected parents' roles in gymnast's performance (dimension: inform parents)

19.

Durant les compétition, on voit les parents, ils viennent encourager leurs enfants. Le compte rendu se fait une fois l'an. Comme les filles sont assez jeunes, les parents viennent toujours les chercher à tous les jours à l'entraînement, elles ne prennent pas le transport en commun, donc, on les voit comme ça, bonjour, bonjour, ça va bien c'est juste superficiel. Mais une fois l'an, on s'assoit pour leur présenter l'année qu'on a prévue pour leur enfant.

F7. PROPERTY: knowledge of gymnast's goals (dimension: inform parents)

20.

[Lorsqu'il y a des imprévues] on informe la fille en premier lieu par exemple, pour les jeux de l'amitié on était à Barcelone, on a reçu le fax et on a dit à la fille tu téléphoneras à tes parents Ca c'est un évènement rare, la plupart du temps on le sait au moins un mois à l'avance que la fille va aller à telle compétition, on peut quand même avertir les parents. Par contre, les

blessures, par exemple notre fille qui a manqué le Jeux du Canada à cause d'une blessure. Donc à ce moment là, on informe les parents, ou d'autres fois quand je te disais jusqu'à la dernière minute on essayait de préparer la fille, puis la semaine avant si on voit que ça ne sera pas possible on la retire de la compétition. À ce moment là, on va avertir les parents, on va leur dire qu'on a essayé mais on considère que pour sa santé c'est préférable de la retirer de la compétition. Je pense que ce sont les contacts qu'on a avec les parents. On ne veut pas trop avoir de contacts avec eux. On aime bien que les parents soient au courant de la situation, de l'année, des compétitions, etc. S'il y a un problème quelconque c'est sûr qu'on va avertir les parents. Mais, si c'est une année qui roule normalement, une rencontre par année est suffisante. F7.

PROPERTY: knowledge of gymnast's goals (dimension: inform parents)

21.

On essaie d'avertir un petit peu les parents. Autant qu'on prépare leurs gymnastes, c'est important de leur faire comprendre un petit peu la situation de comprendre qu'à la fin d'un entraînement des fois la fille est fatiguée peut-être qu'elle n'a pas le goût de parler de son entraînement; que ça ait bien été, ou que ça ait mal été. C'est important que les parents comprennent un petit peu plus, qu'ils soient plus derrière eux. F7.

PROPERTY: expected parents' roles in gymnast's performance (dimension: inform parents)

22.

I'm notorious for sending a lot of papers, newsletters, and communications home, but I found that the best communication is face to face communication, I'm always available after the workout to discuss with parents about their child progress. M3.

PROPERTY: knowledge of gymnast's goals (dimension: inform parents)

23.

Nous, on fait un vin et fromage en septembre et on invite tous les parents du compétitif et on met toutes les planifications sur la table. Tous les coachs sont là, on parle aux parents, on leur explique ça va être quoi l'année, pourquoi il faut ramasser 200\$ au casino; c'est parce qu'il faut payer les salaires de lui et lui et lui. S'ils ont des questions sur le développement de leur enfant on les écoute. Il y en a qui vont poser des questions et d'autres qui vont juste jaser de tout et de rien ils parlent du Canadien, des Nordiques, whatever. M7.

PROPERTY: knowledge of gymnast's goals (dimension: inform parents).

24.

[En ce qui à trait aux parents qui pensent que leur gars va être un champion olympique], ça habituellement je leur donne l'heure juste là-dessus. Moi, les contes de fées pour que les parents investissent plus ou whatever ça finit par craquer et ça peut-être dramatique. M7.

PROPERTY: knowledge of gymnast's goals (dimension: inform parents)

25.

Je ne les rencontre pas d'une façon formelle [les parents], par contre, lorsqu'ils viennent chercher leur enfant, je leur parle. C'est arrivé occasionnellement, par exemple, lorsque le club est entré dans le programme de sport-étude que j'ai fait une réunion de parents, j'ai expliqué ce que c'était sport-étude, comment je l'envisageais, ainsi de suite. Quand on a des nouveaux groupes, on fait des réunions de parents pour présenter la philosophie du club mais une fois que la roue est partie, c'est différent. M5.

PROPERTY: knowledge of gymnast's goals (dimension: inform parents)

26.

We have quarterly meetings with parents. For the first hour, we do it with the group. If we have six boys we invite the six parents for a BBQ. I lay out the yearly training plans and the proposed meets. The general goals for each of the fellows. Every three months we're suppose to have a quarterly meeting; it's either myself and the parents or myself, the parents and the gymnast. M3.

PROPERTY: knowledge of gymnast's goals (dimension: inform parents)

27.

We have parent interviews three times a year for informing them about the progress of their gymnasts. That's about the only contact with the parents. For the first three years that I was here, it was very similar. I was lucky in a sense because I had very good parents and the interviews were done in a "civilized" manner. We still tried to communicate their concern with certain things, either with myself or academic. We have different reactions from parents. Some are very understanding. Others have no sense of reality. So far all interviews were positive. M4.

PROPERTY: knowledge of gymnast's goals (dimension: inform parents)

28.

Like with [this gymnast], I'm extremely close with his family. When I first met them, the husband was more jealous of me being friends with his wife than of me being his son's coach. For some reason, and it's like that in a lot of clubs, it tends to be the mother who does everything, for example, comes to pick-up the kid, etc. So those are the people you're always in contact with. And at first she was the one I was in contact with, I went over and had coffee with her, to talk about her son's gymnastics. M9.

PROPERTY: knowledge of gymnast's goals (dimension: inform parents)

29.

[Je communique avec les familles des gymnastes] légèrement, légèrement. Ils savent les objectifs, l'orientation. Il y a des rencontres à l'occasion, on les voit en compétition, dans des démonstrations, dans des fêtes. M6.

PROPERTY: knowledge of gymnast's goals (dimension: inform parents)

APPENDIX D: Letter and Analytical Story Sent Back to all Coaches for Assuring the Accuracy of the Higher-Inference Findings.

January 25, 1993

Dear Gymnastic Coach

We are proud to announce that the analysis of your interview and the interviews of 16 of your colleagues is finished. The content analyses of the interviews consisted of looking at similarities and differences between meaningful pieces of information emerging from each interview in order to define a knowledge domain representative of expert gymnastic coaches. We did separate analysis for coaches of male gymnasts and coaches of female gymnasts. From this and other research it is becoming evident that experts share fundamental similarities in the way their knowledge is both organized and utilized. It was our goal in the analysis process to provide a general picture of the knowledge required to develop elite gymnasts. Our hope is that our interpretation and conceptualization of the interview transcripts represents as closely as possible what you told us and that it will ultimately help in the development of future coaches and athletes.

From the research on expertise it is apparent that as individuals become proficient at any given activity they organize and structure their knowledge hierarchically into categories which contain similar kinds of knowledge. Accordingly, the goal of the interview analyses was to inductively build specific and general categories of the knowledge relevant to developing elite gymnasts. Enclosed are a figure and a story which describe and conceptualize the categories of knowledge perceived as important for developing elite gymnasts. The figure, "a dynamic model of coaching" is a general model which accounts for the main components and categories of knowledge involved in gymnastic coaching. The story, conceptualizes the different components of the model. The purpose of the story was to explain how the main components of the model interact to reach the goal of developing elite gymnasts. It is a general analytical account which does not take into consideration individual differences

To validate our inferential process we would appreciate your suggestions and comments concerning the story and the model. Please write any comments on the documents concerning any areas that you agree or disagree with or areas that you find are missing

:

information. If you can suggest terms that you think might better describe a specific phenomenon please note these as well. After examining the documents, please answer the following questions on a separate sheet. Once again, the goal of the model and the story is to provide a general picture of the knowledge involved for developing elite gymnasts.

QUESTIONS

- 1) Does the model and the story "fit" what you are doing? If not explain why
- 2) Is there any other information that is not there that you think is important?

Thank you again for your collaboration

Jean Côté

John Salmela

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COACHING PROCESS FOR DEVELOPING ELITE FEMALE GYMNASTS

When working with young athletes the philosophy of a gymnastic coach is to develop self-sufficient individuals as well as high level athletes. The gymnast's development as a person will always be considered first when setting athletic objectives and designing a training program.

For a coach, the development of elite gymnasts involves numerous tasks which can be classified into three components: organization, training, and competition. These three "performance components" which are in constant interaction, are defined as the "Coaching Process." Included in the performance components are tasks and variables that a coach perceives as important in the development of elite gymnasts. When a gymnast has the physical skills for high level gymnastics, a coach, taking into consideration some external factors or "peripheral components", can estimate a predicted level of performance for the gymnast. The peripheral components consist of the coach's personal characteristics, such as his or her philosophy about coaching, the athlete's personal characteristics and level of development, such as the gymnast's commitment for training, and some contextual factors, such as the coaching conditions. Throughout the Coaching Process, the coach's predicted level of performance for each gymnast can be raised or lowered depending upon the effects of these peripheral components.

Therefore, not long after a gymnast has entered the Coaching Process a coach will have knowledge of the peripheral components affecting the gymnast, and the performance level she can reach. The coach will then keep the estimation of the gymnast's predicted performance in mind when intervening in the Coaching Process.

The organization component of the Coaching Process is aimed at setting up optimal conditions for training and competition. Organization tasks include long- and short-term planning to give general direction to the club and gymnasts. Tasks also include some planning with the gymnasts, parents and assistants in order to set objectives and determine the work needed to be accomplished by each individual to reach the objectives. Although each gymnast has her own training program, the training is organized for groups so that gymnasts can help each other and work together toward their personal objectives. Finally, one additional variable to consider when organizing training is a system to monitor gymnasts' weight and nutritional habits. The organization component is constantly monitored and adjusted by the coach during the Coaching Process according to how it interacts with the training and competition components.

The training component of the Coaching Process involves the coach's knowledge of three different stages of learning for gymnasts, since different skills will be taught at each stage. In general, the elite coach will be minimally involved in the gymnast's first learning stage (5-8 years old), where the acquisition of physical skills such as flexibility and strength are the focus. The work of the coach in the second (8-13 years old) and third stage (13-19 years old) of a gymnast's development is to teach technical and mental skills. The training of complex routines are based on a teaching progression of basic movements which are slowly and safely integrated. While coaches may use many different techniques to help gymnasts to deal with fear inducing movements and develop their skills, one important aspect of training is to simulate competition so that gymnast can practice performing under various distractions and stress. The training component is constantly monitored and adjusted by the coach during the Coaching Process according to how it interacts with the the organization and competition components.

The competition component of the Coaching Process usually involves minimal intervention of the coach. In the gymnast's first learning stage, the gymnasts generally don't compete. Their physical abilities are evaluated through simulated exercises and games. In the gymnast's second and third learning stages competitions serve two purposes. learning and performing. Some competitions will be approached as learning experiences to help gymnasts prepare for more important competitions where performance is the focus. In competition the coach generally has very little interaction with the gymnast; his or her main role is to make sure that the gymnast is mentally prepared for each event. The results and attitudes of gymnasts during competition will indicate the effectiveness of the training and organization components and modifications can then be made to improve the Coaching Process. In effect, the competition component also acts as an evaluation component.

The tasks performed in the organization, training, and competition components involve challenges or demands that can be handled separately without affecting the flow of the Coaching Process. For example, if a gymnast has difficulties at school, a coach may find a solution by talking with parents about improving study habits at home. If this strategy works, then the school demands will not have had any effect on the training or competition components of the Coaching Process. Similarly, if a gymnast has fear for the execution of a movement, a coach will have strategies to deal with that fear in training, which, if successful, will not affect the organization or competition components.

Demands on the Coaching Process are solved through the coach's personal characteristics component where knowledge and strategies are rapidly retrieved and applied.

..

The knowledge of a gymnastic coach has been acquired and is always updated through his or her experience as a coach, through interactions with other experienced coaches or caring individuals, and, more formally, through his or her education and coaching clinics.

Sometimes, the demands on the coaching process are so pervasive that they become constraints which are difficult to satisfy without changing the Coaching Process or the gymnast's predicted performance. These constraints, which are not part of the coach's tasks, are a part of the peripheral components, and need to be solved in parallel with the organization, training and competition components. Modifications to the Coaching Process and the gymnast's predicted performance can be temporary or permanent depending upon the types of solutions provided. For example, if a gymnast has a major problem with school and coach's previous arrangements with parents and teachers have not worked, then the coach will need to reduce the gymnast's training time. This kind of modification hinders the Coaching Process and requires a reevaluation of the gymnast's predicted performance. The major constraints found to have a negative impact on the gymnast's predicted performance are: the athlete's personal characteristics such as a major injury or a lack of talent or commitment, some contextual factors, such as the parents' lack of support, a lack of cohesion with assistant coaches or poor job conditions. Furthermore, the coach's personal characteristics, such as his or her belief system, the coach's personal approach to coaching or his or her personal life can also create constraints that hinder the Coaching Process.

On the other hand, the peripheral components can also positively affect the Coaching Process. Mainly, if a coach has initially overestimated the negative effects of the peripheral components acting on a gymnast's performance, then the standards of the predicted performance need to be raised. Accordingly, the Coaching Process needs adjustments to meet the requirements of a higher predicted performance. For example, if the high level of commitment of a gymnast for training was initially underestimated by the coach, the Coaching Process would need to be modified in order to respond to a higher predicted performance.

Adjustments to the Coaching Process as a result of the impact of the peripheral components are also achieved through the coach's personal characteristics component. Unlike meeting the demands of the Coaching Process, satisfying a constraint emanating from a peripheral component is not an all-or-nothing matter, different solutions can affect the Coaching Process in various ways. A coach needs to find an optimal solution to satisfy any constraints and at the same time maintain the gymnast's predicted performance at a high level. Similarly, the positive effects of the peripheral components need to be rapidly detected by the

coach to modify the Coaching Process by setting a higher standard of performance than the one originally planned.

COACHING PROCESS FOR DEVELOPING ELITE MALE GYMNASTS

When working with young athletes the philosophy of a gymnastic coach is to develop self-sufficient individuals as well as high level athletes. The gymnast's education and development as a person will always be considered first when setting athletic objectives and designing a training program.

For a coach, the development of elite gymnasts involves numerous tasks which can be classified into three components: organization, training, and competition. These three "performance components" which are in constant interaction, are defined as the "Coaching Process." Included in the performance components are tasks and variables that a coach perceives as important in the development of elite gymnasts. When a gymnast has the physical skills for high level gymnastics, a coach, taking into consideration some external factors or "peripheral components", can estimate a predicted level of performance for the gymnast. The peripheral components consist of the coach's personal characteristics, such as his philosophy about coaching, the athlete's personal characteristics and level of development, such as the gymnast's commitment for training, and some contextual factors, such as the coaching conditions. Throughout the Coaching Process, the coach's predicted level of performance for each gymnast can be raised or lowered depending upon the effects of these peripheral components.

Therefore, not long after a gymnast has entered the Coaching Process a coach will have knowledge of the peripheral components affecting the gymnast, and the performance level he can reach. The coach will then keep the estimation of the gymnast's predicted performance in mind when intervening in the Coaching Process.

The organization component of the Coaching Process is aimed at setting up optimal conditions for training and competition. Organization tasks include planning the training to give short term and long term direction to each gymnast. The typical organization of a training session consist of conditioning exercises to increase flexibility and strength as well as specific drills to teach technical movements and routines. When approaching a competition (3 to 5 competitions a year) the training will be modified by reducing the conditioning exercises and by asking more execution of full routines. Organization tasks also include some planning with the gymnasts, assistant coaches and parents in order to set objectives and determine the work needed to be accomplished by each individual to reach the objectives. The organization component is constantly monitored and adjusted by the coach during the Coaching Process according to how it interacts with the training and competition components.

The training component of the Coaching Process involves the coach's knowledge of three different stages of learning for gymnasts, since different skills will be taught at each stage. In general, the elite coach will be minimally involved in the gymnast's first learning stage (6-12 yrs old), where the acquisition of physical skills such as flexibility and strength are the focus. The work of the coach in the second (12-16 yrs old) and third stage (16-25 yrs old) of a gymnast's development is to develop flexibility and strength and teach technical and mental skills. The training of complex routines are based on a teaching progression of basic movements which are slowly and safely integrated. While coaches may use many different techniques to help gymnasts to deal with fear inducing movements and develop their skills, one important aspect of training is to simulate competition so that gymnast can practice performing under various distractions and stress. The training component is constantly monitored and adjusted by the coach during the Coaching Process according to how it interacts with the the organization and competition components.

The competition component of the Coaching Process usually involves minimal intervention of the coach. In the gymnast's first learning stage, the gymnasts generally don't compete. Their physical abilities are evaluated through simulated exercises and games. In the gymnast's second and third learning stages the role of the coach will be to keep the gymnast focus on his task at the competition site and on the competition floor. At the competition site the coach task is to help the athlete control distractions such as other competitors, or bad accomodations. On the competition floor the coach generally has very little interaction with the gymnast; his main roles are to make sure that the gymnast is mentally prepared for each event and to manually assist the gymnast if needed. The results and attitudes of gymnasts during competition will indicate the effectiveness of the training and organization components and modifications can then be made to improve the Coaching Process. In effect, the competition component also acts as an evaluation component of the coaching process.

The tasks performed in the organization, training, and competition components involve challenges or demands that can be handled separately without affecting the flow of the Coaching Process. For example, if a gymnast has difficulties at school, a coach may find a solution by talking to him about improving study habits at home or even by adjusting his training and shool schedule. If one of this strategy works, then the school demands will not have had any effect on the training or competition components of the Coaching Process. Similarly, if a gymnast has fear for the execution of a movement, a coach will have strategies to deal with that fear in training, which, if successful, will not affect the organization or

competition components.

Demands on the Coaching Process are solved through the coach's personal characteristics component where knowledge and strategies are rapidly retrieved and applied. The knowledge of a gymnastic coach has been acquired and is always updated through his or her experience as a coach, through interactions with other experienced coaches or caring individuals, and, more formally, through his or her education and coaching clinics.

Sometimes, the demands on the coaching process are so pervasive that they become constraints which are difficult to satisfy without changing the Coaching Process or the gymnast's predicted performance. These constraints, which are not part of the coach's tasks, are a part of the peripheral components, and need to be solved in parallel with the organization, training and competition components. Modifications to the Coaching Process and the gymnast's predicted performance can be temporary or permanent depending upon the types of solutions provided. For example, if a gymnast has a major problem with school and coach's previous arrangements with him have not worked, then the coach will need to significantly reduce the gymnast's training time or bring some modifications to his competition schedule. This kind of modification hinders the Coaching Process and requires a reevaluation of the gymnast's predicted performance. The major constraints found to have a negative impact on the gymnast's predicted performance are: the athlete's personal characteristics such as a major injury or a lack of physical abilities or commitment, some contextual factors, such as the parents' lack of support, or poor job conditions. Furthermore, the coach's personal characteristics, such as his personal approach to coaching or his concerns can also create constraints that hinder the Coaching Process.

On the other hand, the peripheral components can also positively affect the Coaching Process. Mainly, if a coach has initially overestimated the negative effects of the peripheral components acting on a gymnast's performance, then the standards of the predicted performance need to be raised. Accordingly, the Coaching Process needs adjustments to meet the requirements of a higher predicted performance. For example, if the high level of commitment of a gymnast for training was initially underestimated by the coach, the Coaching Process would need to be modified in order to respond to a higher predicted performance.

Adjustments to the Coaching Process as a result of the impact of the peripheral components are also achieved through the coach's personal characteristics component. Unlike meeting the demands of the Coaching Process, satisfying a constraint emanating from a peripheral component is not an all-or-nothing matter, different solutions can affect the

Coaching Process in various ways. A coach needs to find an optimal solution to satisfy any constraints and at the same time maintain the gymnast's predicted performance at a high level. Similarly, the positive effects of the peripheral components need to be rapidly detected by the coach to modify the Coaching Process by setting a higher standard of performance than the one originally planned.

APPENDIX E: Additional Document Sent Back to Four Coaches Describing the Components, Categories, Properties and Dimensions of the Coaching Model .

DEFINITIONS OF THE VARIABLES OF THE COACHING MODEL FOR DEVELOPING ELITE FEMALE GYMNASTS

COMPONENTS are defined as the factors involved in coaching. The central components of the model, organization, training and competition, are the Performance Components because they are directly involved with the accomplishment of the goal. The Performance Components are also defined as the Coaching Process. The outside components of the model are the Peripheral Components because they have potential to positively or negatively affect the Coaching Process.

CATEGORIES are defined as the elements of the components. They consist of knowledge under each component that a coach perceives as important for developing elite gymnasts.

PROPERTIES are defined as elements of a category. They help to provide characteristics of a category.

DIMENSIONS are the locations of properties along a continuum. Some dimensions are listed on a continuum as two extremes since some coaches identified them as opposite. Other dimensions listed only one end of the continuum since they were no coaches who identified with the opposite end of the continuum.

A-ORGANIZATION

The organization component involves applying one's knowledge towards establishing optimal conditions for training and competition by structuring and coordinating the tasks involved for reaching the goal. The task of organizing can take place before, during or after training and competition. Included in the organizing component are the following categories.

A-1. PLANNING TRAINING is defined as planning, evaluating or controlling training programs for a gymnast or a team. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

A-1.1 -Training season

all year

3-5 competitions per year

A-1.2 -Evaluating talent

physical abilities

mental abilities

A-1.3 -Individual goals

long term/short term

flexible

specific

difficult

A-1.4 -Club goals

long term

A-1.5 -Training rules

presence

A-1.6 -Social rules

presence

A-1.7 -Prevent injuries

reduce stressors

A-1.8 -Minor/overused injuries

maintain training

A-1.9 -Group dynamics

encourage interaction btw gymnasts

A-1.10 -Music choice

important

A-2. WORKING WITH ASSISTANTS involves describing the roles, functions or tasks of assistant coaches in the process of developing elite gymnasts. Any episodes clarifying the relationship between the coach and the assistant coaches, or the gymnasts and the assistant coaches are included in this category. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

A-2.1 -Assistant coaches

share responsibilities

A-2.2 -Sport psychologist

share responsibilities

A-2.3 -Nutritionist

share responsibilities

A-3 WORKING WITH PARENTS involves describing the roles, functions or tasks of parents in the process of developing elite gymnasts. Any episodes clarifying the relationship between the coach and the parent in preparing gymnasts for competition. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

A-3.1 - Knowledge of gymnasts goals

inform parents

A-3.2 - Parents expected roles in gymnast performance

inform parents

A-4. HELPING GYMNASTS WITH PERSONAL CONCERNS involves intervening formally or informally in gymnasts' personal lives. Gymnasts' personal concerns include issues that are not directly related to gymnastics but can have an impact on a gymnast's performance. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

A-4.1 - Gymnast's relationship with family

counsellor

A-4.2 - Gymnast's social life

counsellor

A-4.3 - Gymnast's education

counsellor

A-4.4 - Gymnast's retirement/leaving

counsellor

A-5. MONITORING WEIGHT/ESTHETIC is defined as establishing a program to prevent weight problems and valuing the importance of being attractive . Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

A-5.1 - Physical appearance of gymnasts

importance is emphasized

A-5.2 - Weight/nutrition of gymnasts

monitor

B-TRAINING

The training component involves applying one's knowledge towards helping gymnasts acquire and perform different skills in training. Included in this component are the following categories.

B-1. COACH INVOLVEMENT IN TRAINING is defined as the amount of time a coach spends in the training process. Included in this category is the following property and dimension:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
B-1.1 - <u>Time involved</u>	20-30 hrs/week

B-2 INTERVENTION STYLE involves knowledge concerning the interaction style preferred in training. Included in this category are the following properties and dimensions.

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
B-2.1 <u>Give responsibilities to gymnasts</u>	important
B-2.2 <u>Supportive</u>	if needed
B-2.3 <u>Keep some distance</u>	important
B-2.4 <u>Ask for quality training</u>	important
B-2.5 <u>Feedback frequency</u>	often/seldom
B-2.6 <u>Type of feedback</u>	positive/negative instructional

B-3. TECHNICAL SKILLS involves using knowledge to teach fearful movements or technical skills. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
B-3.1 - <u>Teaching progression</u>	important
B-3.2 - <u>Safety</u>	important
B-3.3 - <u>Gymnast physical readiness</u>	important
B-3.4 - <u>Gymnast mental readiness</u>	important

B-4. MENTAL SKILLS Involves knowledge used to train mental skills. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
B-4.1 - <u>Self-sufficiency</u>	train
B-4.2 - <u>Self-confidence</u>	train

B-4.3 - <u>Aggressivity/intensity</u>	train
B-4.4 - <u>Stress and distraction control</u>	train
B-4.5 - <u>Motivation</u>	train
B-4.6 - <u>Awareness</u>	train

B-5. SIMULATION: involves using scenarios in training to simulate the mental and technical demands of competition. Included in this category is the following property and dimension:

<u>PROPERTY</u>	<u>DIMENSION</u>
B-5-1 - <u>Simulation of competition demands</u>	use

C-COMPETITION

The competition component consists of using knowledge to help gymnasts perform according to their potential in competition. Some competitions are specifically aimed at preparing gymnasts for other competitions. Included in this component are the following categories.

C-1. TRIAL COMPETITION is defined as participating in a real competition aimed at helping gymnasts to become more confident and to improve skills. Included in this category is the following property and dimension:

PROPERTY

C-1.1 -Participation in competition

DIMENSION

for learning

C-2. COMPETITION FLOOR is defined as the coach's actions and influence on gymnasts during competition. Included in this category are the following properties and dimensions:

PROPERTIES

C-2.1 -When performing

C-2.2 -Between events

C-2.3 -Technical feedback

DIMENSIONS

spectator

keep them focused if necessary

not immediate

D-COACH'S PERSONAL CHARACTERISTICS

The component coach's personal characteristics involves any variables that are part of the coach's knowledge, philosophy, perceptions, beliefs or personal life that could influence the organization, training or competition components. Included in this component are the following categories:

D-1. COACHING PHILOSOPHY: is defined as the personal principles underlying the coaching intervention. Included in the coaching philosophy are the following properties and dimensions:

PROPERTIES

D-1.1 -Personal approach to coaching

D-1.2 -Personal satisfaction

DIMENSIONS

committed to athlete's learning
develop the whole person
emphasis on team
based on experience and theory
Developing talented athletes
Developing successful
individuals
Developing other coaches

D-2. PERCEPTIONS: are defined as personal thoughts or opinions about different aspects of gymnastics. Included in the perceptions category are the following properties and dimensions:

PROPERTIES

D-2.1 -Qualities of successful coaches

D-2.2 -Teaching technical skills
to males vs females

DIMENSIONS

consistent
performance oriented
enthusiasm
positive
caring
technical knowledge
integrator of theory and practice
perfectionist

similar

D-2.3 -Interaction style with male
vs female gymnast different/same

D-2.4 -Physical maturation of
female gymnasts faster

D-3. EVOLUTION OF KNOWLEDGE: Deals with ways by which learning occurs and how knowledge was acquired to become an elite coach. Also, sources from which knowledge is retrieved to solve demands and constraints. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

D-3.1 -Coaching clinics

important

D-3.2 -Education

important

D-3.3 -Experience as a coach

important

D-3.4 -Experience as a gymnast

important

D-3.5 -Other experienced coaches

important

D-3.6 -Caring individuals

important

D-4. PERSONAL CONCERNS is defined as a coach's personal worries or anxieties concerning certain issues. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

D-4.1 -Doubt in competence

occasional

D-4.2 -Balance between coaching and personal life

difficult

E-ATHLETES' PERSONAL CHARACTERISTICS AND LEVEL OF DEVELOPMENT:

The component athlete's personal characteristics involves any variables dealing with the description of gymnast's stage of learning, personal abilities, and other personal variables affecting the Coaching Process. Included in this component are the following categories:

E-1. GYMNAST'S PERSONAL QUALITIES is defined as personal qualities of the gymnast that could have an effect on the Coaching Process. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
E-1.1 - <u>Self-sufficient</u>	high level
E-1.2 - <u>Committed</u>	high level
E-1.3 - <u>Aware</u>	high-level
E-1.4 - <u>Ability to learn</u>	fast
E-1.5 - <u>Success oriented</u>	born with it
E-1.6 - <u>Talented</u>	important

E-2. GYMNAST'S TRAINING AND COMPETITION VARIABLES is defined as factors that could affect the gymnast in training or competition, these factors will therefore have an effect on the Coaching Process. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
E-2.1 - <u>Injury</u>	major
E-2.2 - <u>Fear of movements or of performing</u>	high level
E-2.3 - <u>Weight</u>	problem
E-2.4 - <u>School difficulties</u>	affect gymnast's progress

E-4. GYMNAST'S FIRST STAGE OF LEARNING: Involves the development of beginning gymnasts, generally between 5 and 8 years old. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
E-4.1 - <u>competition stress</u>	minimal
E-4.2 - <u>Level of development</u>	5-8 yr olds

E-4.3 - <u>Coach involvement</u>	minimal
E-4.4 - <u>Intervention style</u>	telling approach
E-4.5 - <u>Content to be taught</u>	physical skills
E-4.6 - <u>Importance of the first stage</u>	foundation

E-5. GYMNAST'S SECOND STAGE OF LEARNING: Involves the development of intermediate gymnasts, generally between 8 and 13 years old. Many gymnasts will not go beyond the second stage of learning. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
E-5.1 - <u>Level of development</u>	8-13 yr olds
E-5.2 - <u>Intervention style</u>	stay or move on
E-5.3 - <u>Content to be taught</u>	strict and flexible
	technical skills
	mental skills

E-6. GYMNAST'S THIRD STAGE OF LEARNING: involves the development of elite national and international gymnasts, generally between 13 and 19 years old. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
E-6.1 - <u>Level of development</u>	13-19 yr olds
E-6.2 - <u>Content to be taught</u>	mental skills
	technical skills

F-CONTEXTUAL FACTORS

The component contextual factors is defined as unstable factors, aside from the athletes and the coach that need to be considered when intervening in the organization, training and competition components. Included in this component are the following categories.

F-1. PARENTS: involves situations in which parents influence the Coaching Process. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
F-1.1 - <u>Involvement in gymnast career</u>	important
F-1.2 - <u>Expectations for gymnasts performance</u>	differ from coach
F-1.3 - <u>Support for the gymnast</u>	lack/too much

F-2. ASSISTANT COACHES: involves any situations in which assistant coaches influence the Coaching Process. Included in this category is the following property and dimension:

<u>PROPERTY</u>	<u>DIMENSION</u>
F-2.1 - <u>Cohesion</u>	lack

F-3. JOB CONDITIONS: deals with any job conditions that influence the Coaching Process. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
F-3.1 - <u>Non coaching activities</u>	club management other job
F-3.2 - <u>Funding</u>	lack/ok
F-3.3 - <u>Politics</u>	presence
F-3.4 - <u>Canadian elite gymnastic system</u>	ineffective

DEFINITIONS OF THE VARIABLES OF THE COACHING MODEL FOR DEVELOPING ELITE MALE GYMNASTS

COMPONENTS are defined as the factors involved in coaching. The central components of the model, organization, training and competition, are the Performance Components because they are directly involved with the accomplishment of the goal. The Performance Components are also defined as the Coaching Process. The outside components of the model are the Peripheral Components because they have potential to positively or negatively affect the Coaching Process.

CATEGORIES are defined as the elements of the components. They consist of knowledge under each component that a coach perceives as important for developing elite gymnasts.

PROPERTIES are defined as elements of a category. They help to provide characteristics of a category.

DIMENSIONS are the locations of properties along a continuum. Some dimensions are listed on a continuum as two extremes since some coaches identified them as opposite. Other dimensions listed only one end of the continuum since they were no coaches who identified with the opposite end of the continuum.

A-ORGANIZATION

The organization component involves applying one's knowledge towards establishing optimal conditions for training and competition by structuring and coordinating the tasks involved for reaching the goal. The task of organizing can take place before, during or after training and competition. Included in the organizing component are the following categories.

A-1. PLANNING TRAINING is defined as planning, evaluating or controlling training programs for a gymnast or a team. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

A-1.1 -Year plan

3-5 competitions per year
train all year

A-1.2 -Evaluating talent

physical abilities
mental abilities

A-1.3 -Individual goals

long term/short term
specific
difficult

A-1.4-Daily training

structured/flexible
written/not written
conditioning and technique
gymnast's weaknesses

A-1.5 -Minor/overuse injuries

maintain training

A-1.6 -Group dynamics

encourage interaction btw gymnasts

A-1.7 -Training rules

presence

A-1.8 -Few weeks before competition

perform full routine
reduce conditioning

A-2. WORKING WITH ASSISTANTS involves describing the roles, functions or tasks of assistant coaches in the process of developing elite gymnasts. Any episodes clarifying the relationship between the coach and the assistant coaches, or the gymnasts and the assistant coaches are included in this category. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

A-2.1 -Assistant coaches

share responsibilities

A-3 WORKING WITH PARENTS involves describing the roles, functions or tasks of parents in the process of developing elite gymnasts. Any episodes clarifying the relationship between the coach and the parent in preparing gymnasts for competition. Included in this category are the following properties and dimensions:

PROPERTIES

A-3.1 -Knowledge of gymnasts goals

DIMENSIONS

inform parents

A-4. HELPING GYMNASTS WITH PERSONAL CONCERNS involves intervening formally or informally in gymnasts' personal lives. Gymnasts' personal concerns include issues that are not directly related to gymnastics but can have an impact on a gymnast's performance. Included in this category are the following properties and dimensions:

PROPERTIES

A-4.1 -Gymnast's relationship with family

A-4.2 -Gymnast's puberty and adolescence

A-4.3 -Gymnast's education

A-4.4 -Gymnast's retirement/leaving

A-4.5 -Gymnast's finances

DIMENSIONS

counsellor

counsellor

counsellor

adjust training and

school schedule

counsellor

counsellor

B-TRAINING

The training component involves applying one's knowledge towards helping gymnasts acquire and perform different skills in training. Included in this component are the following categories.

B-1. COACH INVOLVEMENT IN TRAINING is defined as the amount of time a coach spends in the training process. Included in this category is the following property and dimension:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
B-1.1 <u>-Time involved</u>	30-60 hrs/week

B-2 INTERVENTION STYLE involves knowledge concerning the interaction style preferred in training. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
B-2.1 <u>Dictatorial</u>	often/seldom
B-2.2 <u>Supportive</u>	if needed
B-2.3 <u>Respect from gymnasts</u>	demands
B-2.4 <u>Peer pressure</u>	used
B-2.5 <u>Feedback frequency</u>	often/seldom
B-2.6 <u>Type of feedback</u>	positive/negative instructional

B-3. TECHNICAL SKILLS involves using knowledge to teach fearful movements or technical skills. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
B-3.1 <u>-Teaching progression</u>	important
B-3.2 <u>Safety</u>	important
B-3.3 <u>Physical preparation</u>	important
B-3.4 <u>Manual assistance</u>	important
B-3.5 <u>First execution of a skill</u>	as soon as it is learned
B-3.6 <u>Measuring progress through gymnast performance</u>	consistency

B-4. MENTAL SKILLS Involves knowledge used to train mental skills. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

B-4.1 - Ability to deal with pain

train

B-4.2 - Awareness

train

B-4.3 - Ability to deal with stress

train

B-4.4 - Motivation

train

B-5. SIMULATION: involves using scenarios in training to simulate the mental and technical demands of competition. Included in this category is the following property and dimension:

PROPERTY

DIMENSION

B-5.1 - Simulation of competition demands

used

C-COMPETITION

The competition component consists of using knowledge to help gymnasts perform according to their potential in competition. Included in this component are the following categories:

C-1. COMPETITION SITE includes the coach's actions and influence on gymnasts at a competition but not during the gymnast's performance. Part of this category are the following properties and dimensions:

<u>PROPERTY</u>	<u>DIMENSION</u>
C-1.1- <u>Controlling distractions</u>	help gymnast
C-1.2- <u>Practice</u>	routines

C-2. COMPETITION FLOOR: includes the coach's actions and influence on the gymnast during his competition. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
C-2.1- <u>Keep them focused</u>	if necessary
C-2.2- <u>Technical information</u>	No/some reminders
C-2.3- <u>When gymnast perform</u>	observe

D-COACH'S PERSONAL CHARACTERISTICS

The component coach's personal characteristics involves any variables that are part of the coach's knowledge, philosophy, perceptions, beliefs or personal life that could influence the organization, training or competition components. Included in this component are the following categories:

D-1. COACHING PHILOSOPHY: is defined as the personal principles underlying the coaching intervention. Included in the coaching philosophy are the following properties and dimensions:

PROPERTIES

DIMENSIONS

D-1.1 -Personal approach to coaching

not money oriented/greater need for money

develop gymnasts who work hard
develop mature individual

D-1.2 -Personal satisfaction

relationship with gymnast

developing self sufficient individual

developing good gymnasts

developing other coaches

D-2. PERCEPTIONS: are defined as personal thoughts or opinions about different aspects of gymnastics. Included in the perceptions category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

D-2.1 -Qualities of successful coaches

consistent

interpersonal skills

balanced life

good teacher

committed

technical knowledge

common sense

creative

hard worker

D-2.2 -Teaching technical skills
to males vs females

similar/different

D-2.3 - <u>Interaction style with male vs female gymnasts</u>	different
D-2.4 - <u>Physical maturation of female gymnasts</u>	faster
D-2.5 - <u>Competition for males vs females</u>	more difficult for females
D-2.6 - <u>Number of male vs female gymnasts</u>	more females
D-2.7 - <u>Creativity for female gymnastic</u>	limited
D-2.8 - <u>Financial support for males vs females</u>	more difficult for males
D-2.9 - <u>Politics in female and male gymnastics</u>	more in female gymnastics

D-3. EVOLUTION OF KNOWLEDGE: Deals with ways by which learning occurs and how knowledge was acquired to become an elite coach. Also. sources from which knowledge is retrieved to solve demands and constraints. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

D-3.1 - <u>Coaching clinics</u>	important
D-3.2 - <u>Education</u>	important
D-3.3 - <u>Experience as a coach</u>	important
D-3.4 - <u>Experience as a gymnast</u>	important
D-3.5 - <u>Other experienced coaches</u>	important
D-3.6 - <u>Caring individuals</u>	important

D-4. PERSONAL CONCERNS is defined as a coach's personal worries or anxieties concerning certain issues. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

D-4.1 - <u>Wondering if the intervention is "right"</u>	occasional doubt
D-4.2 - <u>Keep a balance life</u>	difficult

E-ATHLETES' PERSONAL CHARACTERISTICS AND LEVEL OF DEVELOPMENT:

The component coach's personal characteristics involves any variables dealing with the description of gymnast's stage of learning, personal abilities, and other personal variables affecting the Coaching Process. Included in this component are the following categories.

E-1. GYMNAST'S PERSONAL QUALITIES: defined as personal qualities of the gymnast that could have an effect on the Coaching Process. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
E-1.1 - <u>Technical/physical abilities</u>	high level
E-1.2 - <u>Commitment</u>	high level
E-1.3 - <u>Awareness</u>	high level
E-1.4 - <u>Ability to learn</u>	fast
E-1.5 - <u>Competitive character</u>	high level

E-2. GYMNAST'S TRAINING AND COMPETITION VARIABLES is defined as factors that could affect the gymnast in training or competition, these factors will therefore have an effect on the Coaching Process. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
E-2.1 - <u>Major injury</u>	affect gymnastic progress
E-2.2 - <u>Fear of movements or of performing</u>	high level

E-3. GYMNAST'S PERSONAL LIFE: defined as any issues in gymnast's personal life that could change the Coaching Process. Included in this category are the following properties and dimensions:

<u>PROPERTIES</u>	<u>DIMENSIONS</u>
E-3.1- <u>Involvement in school</u>	affect gymnastic progress
E-3.2 - <u>Integration of french speaking gymnasts with other national gymnasts</u>	difficult/not difficult

E-4. GYMNAST'S FIRST STAGE OF LEARNING: Involves the development of beginning gymnasts, generally between 6 and 12 years old. Included in this category are the following properties and dimensions:

PROPERTIES

E-4.1 -Level of development

E-4.2 -competition stress

E-4.3 -Coach involvement

E-4.4 -Intervention style

E-4.5 -Content to be taught

DIMENSIONS

6-12 yr olds

minimal

minimal

telling approach

conditioning/basic mvts

E-5. GYMNAST'S SECOND STAGE OF LEARNING: involves the development of two groups of gymnasts: first intermediate gymnasts generally between 12 and 16 years old who went through the first stage of learning and second gymnasts who don't start gymnastics until they are 11 or 12 years old, thus the second stage become the first stage of learning for them. Included in this category are the following properties and dimensions:

PROPERTIES

E-5.1 -Level of development

E-5.2 -Gymnast's first experience with gymnastic

E-5.2 -Gymnast's involvement in training decision

E-5.3 -Content to be taught

E-5.4 -Gymnast's potential

E-5.5 -Critical period

DIMENSIONS

12-16 yr olds

some gymnasts

low

work on problems

physical preparation

revealed

talent development

E-6. GYMNAST'S THIRD STAGE OF LEARNING: involves elite national and international gymnasts, generally between 16 and 25 years old. Included in this category are the following properties and dimensions:

PROPERTIES

E-6.1 -Level of development

E-6.2 -Gymnast's involvement in training decisions

E-6.3 -Career duration

DIMENSIONS

16-25 yr olds

High

10-15 years

F-CONTEXTUAL FACTORS

The component contextual factors is defined as unstable factors, aside from the athletes and the coach that need to be considered when intervening in the organization, training and competition components. Included in this component are the following categories.

F-1. PARENTS: involves situations in which parents influence the Coaching Process.

Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

F-1.1 -Helping to organize club activities

involved/not involved

F-1.2 -Expectations for gymnast's performance

differ from coach/don't

F-1.3 -Support the gymnast

lack

F-3. JOB CONDITIONS: deals with any job conditions that influence the Coaching Process. Included in this category are the following properties and dimensions:

PROPERTIES

DIMENSIONS

F-3.1 -Non coaching activities

other job

management

F-3.2 -Funding

lack

F-3.3 -Salary

low

F-3.4 -Recognition

low

F-3.5 -Canadian system for developing elite gymnasts

ineffective

F-3.6 -Communication between coaches in Canada

Bad

F-3.7 -Working with many gymnasts

difficult

F-3.8 -Coach's job in Québec as compared to Ontario

more difficult in Québec

F-3.9 -Talented young gymnasts

lack

APPENDIX F: Documents Given to Judges to Assure the Credibility of the Coding Process

MEANING UNIT CODING

1. CREATING TAGS

OBJECTIVE: To divide the text into meaning units (MU).

TASK: To pay attention to topics, not to content. Focus on transitions from one topic to another. The important thing is to identify what the MU is about, not what the MU says.

TWO QUESTIONS TO ASK WHEN TAGGING:

T1. Is the MU meaningful when read out of the interview context?

If YES: Write the topic in the margin that best describes the MU. It's easier if you use terms used by the individual under study. Do not be concerned with the aptness of the chosen topic (tag), it can be changed later.

If NO: expand the MU to include more lines before or after the MU. Then ask question T1 again.

T2. Does the MU contain more than one topic?

If YES: Divide the text into smaller units and ask question T1

If NO: Continue on to the next MU.

2. CREATING CATEGORIES

OBJECTIVE: To regroup similar tags into categories.

TASK: To compare all the tags from the interview so that tags with similar meanings can be grouped into categories.

ONE QUESTION TO ASK WHEN CATEGORIZING:

C1: Are all the tags grouped together similar or different?

If Similar: Invent a label (category name) that best captures the similarities of the chosen tags. Some tags may fall into more than one

category.

If Different: Remove the tags that don't fit with the rest of the category. Put them with other more similar tags or create a new category.

Note: It is the tags, not the MUs, which are compared while creating categories. However, if a tag's meaning is no longer recognized, go back to the original document and find the MU to help clarify the tag in question.

3. CATEGORY ANALYSES

OBJECTIVE: To analyze the content of each category.

TASK: To identify and summarize the content of each category, identifying the following aspects:

- a) communalities in the content (MUs) of each category
- b) uniqueness in the content
- c) confusions and contradictions in the content
- d) relevance of the content with regard to the research project.