

## **Behavioral Scouting – An evaluation tool for mental qualities and mental skills in ice hockey**

Jesse Welling



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<p><b>Author</b> Jesse Welling</p>	<p><b>Group</b> DP 6</p>
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<p>The importance of psychological factors is obvious in sports and lately the topic has gained increased attention. Coaching is developing all the time towards a more comprehensive approach, where attention is paid to the technical, tactical, physical and mental requirements of a sport. In team sports, coaches are now also paying more attention to individual athlete development. In addition, the importance of scouting and recognizing talent is increasing and more and more resources are being devoted to this task.</p> <p>Mental qualities have been under evaluation for a long time in ice hockey. Lately their importance has even been considered most essential. The connection between mental qualities and elite performance is accepted. But the absence of a consistent and clear understanding of the mental requirements of ice hockey still exists today. The concepts and terminology that are used are inconsistent. So far, there has not been a concrete tool to help players, coaches and scouts define the required mental qualities and mental skills and establish a common language and clear evaluation criteria for the psychological factors in ice hockey.</p> <p>Evaluating the mental factors and profiling a player helps the player and the coaches develop a comprehensive individual coaching process. The aim of coaches is to help players develop and reach their maximal potential. The foundation for the development process is that the player knows himself and the coach knows the player. The player's increased self-awareness plays a key role. It is vital that the player and the coach can communicate. It is easier to get to the point and increase understanding when discussion is based on concrete actions and behaviours instead of solely on the abstract mental qualities. However, it is also relevant to understand how the mental factors appear in actions and behaviours.</p> <p>The Behavioral Scouting –tool enables one to evaluate ice hockey players' mental qualities and mental skills by evaluating their concrete and observable actions and behaviours. The tool gives as an end result the player's mental quality profile in graphical form. The tool is intended to help coaches, scouts and players link the important and concrete actions and behaviours with the essential mental qualities required in ice hockey. It defines the psychological factors and establishes the common language and clear evaluation criteria for players, coaches and scouts. It increases a player's self-awareness and it helps increase communication and understanding between the different parties. It also helps coaches and scouts make comparison between different players which helps them in the player selection process. The tool is designed to be easy to use and actions and behaviours that are under evaluation are easy to see and understand.</p>	
<p><b>Key words</b> Mental qualities, mental skills, evaluation, ice hockey, scouting</p>	

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# 1 Introduction

The importance of psychological factors in elite level sports is commonly recognised. Lately in ice hockey psychological factors are even considered the most crucial element in achieving and playing at an elite level. However, different sports have different psychological requirements. The comprehensive analysis and research information of the psychological requirements of ice hockey is very limited. Lack of consistent and clear understanding of the mental requirements is obvious. Player evaluation in terms of mental factors is very incoherent and the used terminology is diversified. Which are the most essential psychological factors considered necessary to succeed at an elite level in ice hockey? How can they be recognised and observed from a player's actions and behaviours? Discussion requires common understanding of the terminology and the concepts.

In team sports comprehensive individual coaching is emphasised nowadays. At the same time, the importance of mental coaching is receiving a lot of attention. There is a need for applied tools to help coaches evaluate athletes' essential mental factors for a specific sport. Evaluation can reveal certain characteristics that the coach or the athlete is not aware of. Studies have proven so far that there is no ideal personality for sports and very different personalities can achieve success in the same sport. There is no consistent evidence of personality differences between different sports either. But, it is a widely accepted and researched fact that elite athletes differ when it comes to psychological skills, abilities and attributes they have or use. However, the information is not in simplistic form enough and applying the information in practice is considered challenging.

The aim of this project was to define the essential mental qualities and mental skills required in ice hockey and link those to the concrete and essential ice hockey specific actions and behaviours. The plan was to create a practical tool for coaching and player evaluation. Using the tool increases a player's self-awareness which is crucial considering the individual's development process. It also increases the coach's understanding of the player. The purpose was also to establish a common language and evaluation criteria for players, coaches and scouts considering the psychological factors. Linking the abstract psychological factors with concrete actions and behaviours enhances the learning and helps these different parties to get on the same page.

During this thesis I consider the effect and importance of the psychological factors in elite level sports. I also analyse the requirements of ice hockey comprehensively. The sport psychology theory and research information and ice hockey analysis serve as the basis for creating the list of mental qualities and skills and the criteria of actions and behaviours in the tool. The player evaluation is processed from the professional scouts' point of view.

The topic of the thesis is current and important. It was selected because of my personal interest in the subject and my perception of the need for such a tool. I wanted to get a deeper understanding of the psychological factors and their effect on the behaviours in ice hockey. I wanted to use that information to create a practical tool to help coaches and scouts in their demanding work with player development and talent identification.

## **2 Psychological factors and behaviour in sports**

### **2.1 Sport and exercise psychology**

Sport and exercise psychology is a rapidly growing branch of science. It studies people and their behaviours in sport and exercise activities and applies that information for practical use. The aim is to understand how psychological factors affect a person's performance and how participating in physical activity affects a person's psychological development. The aim is to improve performance and/or increase well-being. In elite level sports the focus is strongly on achieving success. (Matikka & Roos-Salmi 2012, 23; Weinberg & Gould 2003, 4-20.)

Sport psychology was born from the will to improve athletes' performance. The first sport psychology research was published in 1898 by Norman Triplett. He wanted to understand why cyclists rode faster when they raced in groups or pairs compared with when riding alone. That research opened the door to the research trend of sport psychology and social psychology which focused on how an audience, group dynamics, the size of a group as well as other external factors had an effect on performance. Nowadays sport and exercise psychology is more popular than ever before and it keeps growing. During the last 30 years the knowledge has exploded and it is gaining increased attention, acceptance and recognition of its usefulness all over the world. (Lintunen et al. 2012, 30; Matikka 2012, 23-29; Weinberg & Gould 2003, 8-21.)

### **2.2 Psychological coaching**

In 2010 the Finnish Psychology association clarified elite athletes' perception of and experience from psychological coaching. 47 % of respondents felt that there is not enough psychological coaching on offer. Elite athletes wanted most help and support in situations that are associated with performing in competitions. Athletes also expected help and support on developing their personality and increasing their self-awareness. (Matikka & Roos-Salmi 2012, 14-15.)

Psychological coaching is always attached with other areas of coaching. It means paying attention to factors that have an effect on individual development, performance, life management and well-being. The interaction between an athlete and a coach also always involves psychological influence. In elite level sports deliberate psychological coaching should be started right

after puberty. It means clarifying thoroughly the psychological factors that have an effect on performance by using questionnaires and interviews. (Heino 2000, 14-15.)

Sports also differ from each other in psychological requirements. It is necessary to have detailed information about the psychological requirements of a particular sport to plan psychological coaching. The following factors have an effect on the psychological requirements of a sport: importance and role of physical condition and mental factors, duration of performance, quantity of repetitions in performance, recovery time, limited time to start or complete the performance, adaptation to other competitors' performance, need for progressive improvement in performance, level of concentration, effect of extrinsic factors, evaluation of performance and probability of physical risk. Unfortunately, very few sports have published comprehensive sport specific analysis of the psychological requirements to help athletes and coaches. The challenge for the future is to produce applied psychological tests for coaches to help them measure athletes' sport specific psychological qualities. This obtained information will help to set objectives for the psychological coaching. (Heino 2000, 15; Liukkonen 2004, 217-219 & 236-237.)

The plan for psychological coaching is part of a comprehensive coaching plan. It is important for a coach to know and understand the athlete to be able to help him. A coach needs to gather information about the athlete he is trying to help. Most important is to develop an understanding and appreciation for the personality of the athlete. Understanding the personality gives greater chance to design a truly effective mental training program. (Heino 2000, 15; Loehr 1989, 285.)

### **2.3 Personality and sport**

Athletes and coaches have become more aware of the psychological factors and their effect on performance. Personality traits affect many ways in sports. Personality has influence on the selection of a sport, ways to participate in sports, ways to react in training and competition situations, etc. Genetic background gives a loose framework for the development of personality whereas the environment has a strong effect on a human's growth and development. Upbringing methods, learned things and experiences have an effect on personality development. Each individual is a unique psychophysical complex whose personality is built on interaction with the environment. Regardless of the role of genetics sport psychology's primary attention

is on learning and environmental influences because personality development can be influenced. (Heino 2000, 33; Liukkonen 2004, 215; Weinberg & Gould 2003, 47.)

### Structure of personality

Structure of personality can be divided into three separate but related levels (Figure 1.). The most basic level of personality is **psychological core**. It includes a person's attitudes and values, interests and motives, and beliefs about himself and self-worth. Psychological core is the most internal level and hardest to get to know. It is also the most stable part of a personality. It remains fairly unchangeable over time. **Typical responses** are the ways one has learnt to adjust and respond to one's environment. Often, but not always, typical responses are good indicators of psychological core. Responses result from the interaction of psychological core and role-related behaviours. **Role-related behaviour** refers to how one acts based on a perceived social situation. Different situations and roles require different behaviour. Role-related behaviour is the most changeable aspect of personality. Understanding the different levels of personality and getting to know the real person produces insight into the individual's motivations, actions, and behaviour. (Weinberg & Gould 2003, 28-29.)

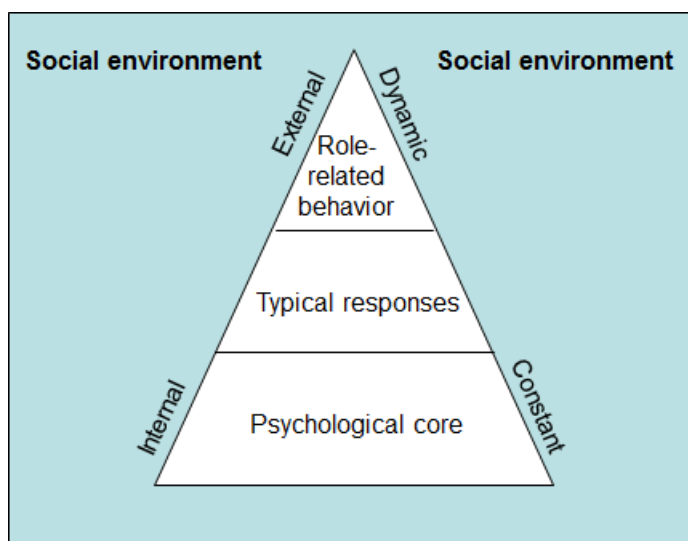


Figure 1. A schematic view of personality structure (Weinberg & Gould 2003, 29.)

### Approaches to personality

Personality can be looked at from several viewpoints. The **trait approach** focuses on the fundamental units of personality (traits), which are assumed to be relatively stable. The role of situational and environmental factors is minimized. The “big five” model of personality claims



that personality consist of five major dimensions, including neuroticism (nervousness, anxiety, depression, anger versus emotional stability), extraversion (enthusiasm, sociability, assertiveness, high activity level versus introversion), openness to experience (originality, need for variety, curiosity), agreeableness (amiability, altruism, modesty), and conscientiousness (constraint, achievement striving, self-discipline). The **situation approach** argues that the situation and the environment determine greatly an individual's behaviour. For example introverted and shy people might act assertively or even aggressively in certain situations. However, personal traits or situational factors independently cannot truly predict behaviour. The **Interactional approach** to study personality in sports considers personal and situational factors as equal determinants of behaviour. Knowing an athlete's psychological traits and the particular situation is helpful in understanding an athlete's behaviour. Traits and situational factors interact with each other in unique ways to influence behaviour. Most sport and exercise psychologists favour the interactional approach to studying behaviour. Also situation-specific personality measures are more reliable to predict behaviour than general trait or state measures because they take into consideration both personality of the participant and the specific situation. (Weinberg & Gould 2003, 30-33.)

### **Measuring personality**

Until recently, almost all personality measures for athletes have been general psychological inventories without specific reference to any sport. Sport specific personality tests predict behaviour in sport settings better than general personality measures. Some measures have also been developed for particular sports. These tests can help identify athletes' strengths and weaknesses in that sport. With that information it is possible to advise athletes on how to build the strengths and reduce or eliminate the weaknesses. Information is useful in an individual's development process. Testing can also reveal certain kinds of traits that the coach or athlete have not been conscious of. Unfortunately, very few sports have published comprehensive psychological sport specific analysis of the psychological requirements. (Liukkonen 2004, 235-237; Weinberg & Gould 2003, 34-36.)

Using psychological inventories exclusively to select players for a team is wrong because the tests are not yet accurate enough to be predictive. Some of the psychological tests may have limited use but they should be used with physical performance tests, coach evaluations and the actual levels of play. (Weinberg & Gould 2003, 38.)

When using psychological tests with athletes they should be informed beforehand about the purpose of the tests, what they measure and how a test is going to be used. They should also receive constructive and specific feedback about the results and concrete advice for training. (Liukkonen 2004, 236; Weinberg & Gould 2003, 38.)

### **Personality research in sport**

Personality traits and states can help predict behaviour and success in sport but they are not precise. The relationship between success in sports and personality is still far from crystal clear. So far, studies have shown that there isn't any ideal athlete's personality. A specific personality profile has not been found that separates athletes from non-athletes. In addition, it is good to remember that there can be successful athletes in the same sport with quite different personalities. However, successful female athletes have been found to differ markedly from non-athlete females in terms of their personality profile. Women athletes were more achievement oriented, independent, aggressive, emotionally stable, and assertive. Most of these traits are desirable for sport and apparently successful male athletes have similar characteristics. (Liukkonen 2004, 235-236; Morris 2000, 716-717; Weinberg & Gould 2003, 39-40.)

In today's elite level sports the difference between winning and losing is getting smaller all the time. Athletes are often very similar in their physical and technical abilities and it is recognized that psychological factors often distinguish successful athletes from their less successful counterparts. (Birrer & Morgan 2010, 78; Enhanger 2012; Liukkonen 2004, 236-237; Morris 2000, 716-717; Weinberg & Gould 2003, 43-44; Woodcock, Holland, Duda & Cumming 2011, 411.)

### **2.4 Mental qualities, mental skills and mental techniques in sports**

Recently researchers have turned their focus away from measuring traditional traits to an examination of mental strategies, skills and behaviours that athletes use and their relationship to success. They have tried to identify the mental qualities, skills and techniques that characterise elite performance. Evidence indicates that across several sports successful and less successful athletes differ in the mental qualities and skills they possess, and the effective use of the mental techniques they employ. Even though these are not personality traits in the traditional sense, they are reflecting behavioural aspects of personality and interacting with personality characteristics. (Holland, Woodcock, Cumming & Duda 2010, 20; Meyers & Schlessler 1989, 69; Weinberg & Gould 2003, 43-44; Woodcock et al. 2011, 411.)

The expressions “mental skills” and “mental techniques” are used more or less interchangeably in most literature. Vealey (1988) highlighted the importance of differentiating psychological skills and psychological techniques. According to Vealey, psychological skills are qualities that can be attained (e.g. having confidence) and methods are procedures or techniques adopted by athletes to develop those skills (e.g. positive self-talk). Holland’s and colleagues’ (2010) definition of skills and qualities were not synonymous. According to Holland and colleagues mental qualities are psychological characteristics displayed by athletes that facilitate optimal performance (e.g. robust confidence). The skill is the ability and competence to regulate and maintain that self-confidence, which is achieved using a specific mental technique. Sometimes the term “psychological strategies” is used with the same meaning as “psychological techniques”. Birrer et al. (2010) used the term strategies to refer to the means or the plan of action that is used to achieve the enhancement of psychological skills by using one or more psychological techniques. (Birrer & Morgan 2010, 78-79; Holland et al. 2010, 20; Vealey 1988, 326; Woodcock et al. 2011, 412.)

The ability to regulate optimal arousal, high self-confidence and expectations of success, feeling in control, focus on the present task, viewing difficult situations as challenging and exciting, productively perfectionist, positive attitudes and cognitions about performance, and strong determination and commitment among others are common mental characteristics that relate to peak performance. Also experiencing enjoyment, being disciplined, possessing automated coping skills and mental toughness, being prepared, competitiveness, regular use of mental techniques, optimism, a lack of fear, sport intelligence, and a willingness to sacrifice are found to be important qualities for elite athletes. (Holland et al. 2010, 20.)

## **Motivation**

Motivation can be defined as the direction and intensity of a person’s effort. Seeking out, approaching or being attracted to certain situations refers to a person’s **direction of effort**. How much one puts effort into a particular situation refers to the **intensity of effort**. For most people the direction of effort goes hand in hand with the intensity of effort. (Liukkonen & Jaakkola 2012, 48; Weinberg & Gould 2003, 52-53.)

Motivation has three general views which are parallel to the approaches to personality. According to the **trait-centered view** motivated behaviour is mainly a function of individual

characteristics (e.g. personality, needs, and goals). The **situation-centered** view contends that motivation level is defined mainly by situation. The **interactional view** of motivation considers both personal factors (e.g. personality, needs, interests, and goals) and situational factors (e.g. a coach's style or the win-loss record of a team). Sport psychologists have most widely endorsed the interactional view. (Liukkonen & Jaakkola 2012, 48; Weinberg & Gould 2003, 52-53.)

It is known that motivation has two sources, intrinsic and extrinsic. People with **intrinsic motivation** are driven inwardly to be competent and self-determined in their attempt to master the task. They enjoy the competition, excitement and action itself, they focus on having fun, they feel being in control of their own actions and they are committed to improve their competence. They are engaged with an activity for the pleasure and satisfaction they experience while improving and mastering difficult skills. **Extrinsic motivation** refers to motivation that comes from other people through positive and negative reinforcements. The activity is important because of a valued outcome, rather than the interest towards the activity solely itself. It is worth noticing that extrinsic factors on motivation (e.g. extrinsic rewards, being paid, negative reinforcement or being punished) might diminish the intrinsic motivation. In the short term these can be effective methods to increase motivation, but in the long run they are not as effective as intrinsic motivation. Intrinsic motivation is the more optimal source of motivation. Athletes with intrinsic motivation endure training even when obstacles occur. They show a high level of effort, commitment to the activity and they choose challenging tasks. They also feel less pressure because they are involved with the sport for themselves instead of solely for trophies or received glory and fame. (Liukkonen & Jaakkola 2012, 50-51 & 54; Weinberg & Gould 2003, 136-144.)

Intrinsic motivation consists of three factors. Perceived competence, perceived autonomy, and perceived social cohesion. **Perceived competence** refers to an athlete's confidence in his own abilities. Elite athletes' usually have very high perceived competence in their own sport because of the success they have achieved. Of course the situation is different for an athlete who is trying to return after an injury for example. Perceived competence is extremely important especially for junior athletes'. (Liukkonen & Jaakkola 2012, 51.)

*Self-esteem*, which is the corner stone of our personality, is built on an individual's perceived competence in different areas. These areas can be for example: social competence (ability to make friends and get along with other people), emotional competence (ability to understand

one's own and other people's feelings and the ability to get along with one's own feelings), intellectual competence (the ability to succeed in studies and work life, the ability to understand and know the essential things in life) and physical competence (skills in sports, physical fitness and feeling good about one's own body). The importance of these different areas depends on our own values and how important we consider it to be competent in a particular area. (Liukkonen & Jaakkola 2012, 51-52.)

Self-esteem is a relatively stable part of our personality. It is built from the experiences we get from our environment and other people. The base for self-esteem is formed in childhood and it means a person's overall sense of self-worth. Persons with good self-esteem perceive more positive than negative qualities in themselves. They have an honest and realistic self-image and they know their strengths and weaknesses. They emphasize their strengths and try to get rid of their weaknesses. High self-esteem means for example that a person holds on to aims that he considers to be right, even when resistance occurs. Persons with high self-esteem don't let other people insult or hurt them; they defend themselves and hold on to what they believe to be right. There is a connection between self-esteem and independency. Independent people are able to make their own decisions according to their own will and values. They don't try to all the time satisfy other people or act according to general expectations. Good self-esteem also means the ability to value other people and established authority without perceiving them as a threat. Good self-esteem means as well the ability to tolerate failures. Instead of blaming oneself, a person with good self-esteem sees failures as a part of the learning process. (Keltinkangas-Järvinen 1994, 17-23 & 123; Roos-Salmi 2012, 150.)

Satisfaction and positive experiences in sport activities have a positive effect on perceived competence. Perceived competence in turn has an effect on self-esteem and intrinsic motivation. (Liukkonen 2004, 223.)

**Perceived autonomy** refers to an athlete's awareness of his chances of affecting and making decisions concerning his training and coaching. Perceived autonomy is especially important for elite athletes. An authoritarian coaching style lessens an athlete's motivation in the long run. **Perceived social cohesion** refers to an athlete's bond to his team or the group he is training with. Perceived social cohesion is an important source of motivation and it is essential to focus on the development of cohesion inside a team. (Liukkonen & Jaakkola 2012, 53-54.)

People are involved in sports for a variety of different reasons and they are motivated by different methods and situations. It is crucial to understand why some people are so highly motivated to achieve their goals and some seem to go along with others. **Achievement motivation** refers to an individual's efforts to master a task and strive for task success, achieve excellence, overcome obstacles and persist in the face of failure, perform better than others, and experience pride in accomplishments. Achievement motivation in sports is often associated with *competitiveness*. Four different theories have evolved over the years to explain achievement motivation. Need achievement theory, attribution theory, achievement goal theory and competence motivation theory together suggest that high and low achievers can be differentiated by their motives, tasks they select, the effort they produce during competition, their persistence, and their performance. (Weinberg & Gould 2003, 59-73.)

Goal setting is a powerful technique to affect behaviour and enhance performance. Goal setting provides direction and focus to a performer's actions. It increases motivation and has an effect on effort and persistence. It can increase self-confidence and satisfaction and lessen anxiety. (Weinberg & Gould 2003, 330-348.)

Perceived competence, and how it is evaluated, is an essential factor in considering achievement motivation. Task and ego orientations determine how a person experiences success and how he evaluates his competence. **Task orientation** focuses on comparing performance with an individual's own standards and personal development. Perception of competence is formed from high effort and personal development. An athlete focuses on effort, learning process, and personal development instead of comparing his own performance to others. Athletes with task orientation do not fear failure. It is easier for them to feel good about themselves as well as demonstrate high perceived competence, because they base their perception of ability on their own standard of reference. An athlete with **outcome orientation** focuses on an outcome. Perceived competence is determined by reflecting on oneself in relation to others. An athlete is satisfied if he defeats others or gets the same results with less effort. On the other hand, an athlete is not satisfied if he loses, even if the performance was good. Outcome orientation with low perceived competence might cause lower performance than the athlete's ability enables. In addition, his effort and interest towards the task decreases. Research has shown consistently that an over emphasized outcome orientation is related to lower levels of enjoyment, self-confidence and commitment to training. It is also attached to anxiety in competitive situations. On the other hand, it is argued, that task orientation leads to a strong work ethic, persistence, and optimal performance. Task and outcome orientations are not mutually exclu-

sive. Everybody has features from both orientations, but it is important to understand the ratio between task and outcome orientations. There are no problems if outcome orientation is strong so long as the task orientation is strong enough. Actually, considering an athlete's motivation, the optimal situation is when both orientations are strong. This way his perceived competence as well as motivation endures even when facing defeat in competitions. Enhancing an athlete's perceived competence and feelings of control are essential ways to foster achievement motivation. (Liukkonen 2004, 223-227; Liukkonen & Jaakkola 2012, 54-57; Weinberg & Gould 2003, 65-73.)

The psychological climate has also an influence on an athlete's motivation. The climate can be task and/or outcome orientated. Coaches, parents and athletes themselves have an impact on the formation of a motivational climate. A task orientated climate has positive effects on satisfaction, enjoyment, commitment, a positive attitude towards the team, lower feelings of pressure, perceived competence and the belief that a high level of effort will lead to success. (Liukkonen & Jaakkola 2012, 57-65.)

### **Arousal, stress and anxiety**

Emotions affect an athlete's performance in many ways – both positively and negatively. Every athlete has an individual emotional zone which enables him to reach the optimal performance. Emotions can be pleasant or unpleasant and useful or harmful. Pleasant and unpleasant emotions do not determine their usefulness. Pleasant emotions can be harmful as well as unpleasant emotions can be useful depending on the individual. Athletes should learn to identify and regulate their emotions to reach optimal performance. Emotions also have a social effect. Showing positive emotions might increase the performance of other team members and decrease an opponent's performance. (Kokkonen 2012, 69-74.)

**Arousal** is a mix of physiological and psychological activity in a person. Highly aroused athletes are physically and mentally activated. It means that they have an increased heart rate, respiration and sweating. Arousal can be associated with both pleasant and unpleasant situations. A too high or too low arousal level is considered harmful for an athlete's performance. **Anxiety** is a negative emotional state. It is characterised with nervousness, worry and apprehension. Anxiety is associated with arousal of the body. *State anxiety* refers to a temporary and an ever changing emotional state whereas *trait anxiety* is part of an individual's personality. There is a direct relationship between the level of state anxiety and trait anxiety. However, an

athlete with high trait anxiety might have enough experience in a particular situation and because of that he doesn't perceive a threat and doesn't experience high state anxiety. An athlete may have also learned coping skills to reduce the state anxiety. Anxiety is a challenging emotion for an athlete because many times the reason is hard to define, and due to that it is hard to regulate. Fear of failure is one of the most common fears for athletes. It is strongly attached to an athlete's trait anxiety. Fear of failure reduces an athlete's possibilities of success. Instead of striving for success and performing well, an athlete directs his energy and motivation towards the avoidance of failure/loss and the avoidance of risk taking. Fear of failure also causes stress. **Stress** occurs when physical and psychological demands on an individual exceed substantially that person's response capability in situations where failure has important consequences. Event importance and uncertainty of the outcome are the common *situational sources of stress*. High trait anxiety, low self-esteem and social physique anxiety are the *personal sources of stress*. (Kokkonen 2012, 74-77; Weinberg & Gould 2003, 78-85.)

Arousal and anxiety can have a positive (facilitative) or a negative (debilitative) effect on performance. An athlete can perceive competitive situations as either challenging or threatening depending on his faith in own abilities and self-efficacy, perception of control and orientation in achievement motivation (task or outcome orientation). An athlete with strong faith in his own abilities and high self-efficacy, perceived control of the situation and the will to prove that he's a better athlete than other competitors perceives competitive situations as a challenge. An athlete with low faith in his own abilities, low perceived control and the will to avoid situations where he might look worse than other competitors perceives competitive situations as a threat, which will lead to lower performance. Some athletes perform better with low levels of arousal and state anxiety, whereas others perform their best with higher levels. Athletes should learn to regulate their arousal and state anxiety levels to achieve peak performance. Sometimes arousal and state anxiety levels need to be reduced, sometimes maintained and other times facilitated. A number of techniques have been developed to reduce anxiety, cope with stress and raise arousal. Also the coach can regulate an athlete's arousal and anxiety levels. Developing an athlete's confidence and perception of control helps them effectively to control their stress and anxiety levels. A highly confident athlete who has faith in his performance abilities and his ability to cope with stress, experiences less state anxiety. And when he experiences anxiety he tends to interpret his anxiety as facilitative instead of debilitative. A positive environment and a positive orientation towards mistakes and losing enhance an athlete's confidence. (Kokkonen 2012, 77-78; Weinberg & Gould 2003, 85-98 & 279-280.)



## **Self-confidence**

Research indicates that confidence consistently distinguishes highly successful athletes from less successful. Confident athletes have belief in themselves. They believe in their physical and mental abilities, skills and competencies to reach their potential. However, defining self-confidence is not easy. Sport psychologists define it as the belief that one can successfully perform a desired behaviour. Belief in achieving the set goal is essential. Self-confidence is an unstable quality which is affected by several factors (e.g., environment, experiences and social interaction). Self-confidence is frequently confused with self-esteem. Self-esteem is a relatively stable part of personality and its base is formed in childhood. It means a person's overall sense of self-worth. Self-efficacy means a person's perception of his ability to perform tasks successfully. It is a very situation-specific form of self-confidence. A self-fulfilling prophecy means that expecting and believing that something will happen actually helps it to happen. Also optimism is closely related to self-confidence. Recent research has revealed that self-confidence is multidimensional and it consists of several aspects. Thoughts and assumptions lead to feelings and feelings affect behaviour. To improve self-confidence it is important to recognise and control the thoughts, expectations and feelings behind the behaviour. It is proven that positive expectations produce positive effects in performance. Successful performance is the most powerful way to increase self-confidence. Other strategies to improve self-confidence include thinking confidently, acting confidently, using imagery, goal mapping, being in good physical condition and preparing both mentally and physically for an upcoming performance. (Roos-Salmi 2012, 149-156; Weinberg & Gould 2003, 308-326.)

## **Imagery**

Imagery is a form of simulation where the entire experience occurs in the mind. Recreating mentally previous positive experiences or imaging new events that have not yet occurred helps to prepare for performance. Anecdotal reports, case studies and scientific experiments have proven that imagery can positively enhance performance. Imagery can help athletes to improve concentration, build self-confidence, control emotional responses, acquire and practice sport skills, acquire and practice strategy, cope with pain and injury and solve problems in performance. (Weinberg & Gould 2003, 284-304.)

## **Concentration**

Concentration in sport settings typically involves focusing on the relevant cues in the environment, maintaining that attentional focus for the duration of the competition, being aware of the changing situation, and shifting focus when necessary. Researchers have found that successful athletes are less likely to become distracted by irrelevant stimuli than less successful athletes. They are able to maintain a more task orientated focus instead of worrying or focusing on the outcome. Concentration is a skill which can be developed with systematic training. (Arajärvi & Lehtoviita 2012, 206-216; Weinberg & Gould 2003, 352-377.)

### **2.5 Mental factors and talent identification in youth sports**

The study of expertise in sport as well as talent identification and development is a respected area within sport science. Also coaches and administrators have had a great interest in talent identification for a long time. Studies have shown that talent has a complex and individualistic nature, and therefore there is no consensus of opinion regarding the theory and practice of talent identification in sports. Shortcomings can be often fixed with appropriate interventions and weaknesses in certain areas are often compensated for by strengths in others. Research on the desirable mental factors of elite athletes has mainly focused on Olympic and World champions while young developing and talented athletes have received less attention. It is reasonable to assume that psychological requirements vary through developmental stages. A thorough analysis of the mental requirements of a particular sport is crucial to understanding the nature and development of key mental qualities in young athletes. It also has to be noted that studies have not been able to prove that psychological factors remain stable through the development period from adolescence to adulthood. (Holland et al. 2010, 19-22; Morris 2000, 715-716, 723 & 725; Williams 2000, 657.)

Holland et al. revealed the following psychological qualities required for young rugby union players in developmental rugby programs: enjoyment, responsibility for self, adaptability, squad spirit, self-aware learner, determination, confidence, optimal performance state, game sense, appropriate attentional focus and mental toughness. These 11 higher order themes were made up of 31 lower order themes (Table 1.). Players were asked which mental qualities they considered to be essential for young players' development.

Table 1. The Mental Qualities Perceived as Important for the Development of Youth Athletes  
(Holland et al. 2010, 25.)

<b>Higher Order Theme</b>	<b>Lower Order Theme</b>
Enjoyment	Enjoyment
Responsibility for self	Life balance Athletic lifestyle Prepared Respect Role model Sportspersonship
Adaptability	Adaptability
Squad spirit	Leadership Effective team player Social skills Peer support
Self-aware learner	Go getter Take criticism
Determination	Desire to improve Desire to succeed Work ethic
Confidence	Confidence to improve Confidence to win No fear of failure Physical confidence Self-efficacy
Optimal performance state	Optimal performance state Controlled aggression
Game sense	Creativity Decision making Effective game communication
Appropriate attentional focus	Appropriate attentional focus
Mental toughness	Leadership under pressure Determination under pressure Confidence under pressure Optimal performance state under pressure Game sense under pressure

### **3 Ice hockey as a sport**

Ice hockey is a team sport that is played on ice between two teams. Each team can have 20 players and 2 goalies in a line-up. Both teams have six players on the ice at a time (unless there is a penalty). These six players are usually goalie, right defence-man, left defence-man, right wing, center and left wing. The players' equipment consists of sticks, skates, protective equipment and uniforms. Teams are trying to put a hard rubber puck into their opponent's net by using the stick with their hands. The team that scores more goals wins the game. (International Ice Hockey Federation 2010, 21, 29, 35 & 41; Wahlsten Ja, Wahlsten Ju & Wahlsten S 1992, 8; Wikipedia 2012.)

#### **3.1 History of ice hockey**

The origin of ice hockey is unclear. There is evidence that games, similar to field hockey, were already being played 500 years before the birth of Christ. There are also famous Dutch paintings from the 16<sup>th</sup> century where some kind of bandy is being played. Different types of "stick and ball" –games have been played on ice in countries where winters are cold. Without knowing each other, the games have been most likely very similar. The Irish game of "hurling", a game called "shinny", which was played in Scotland and New England as well as Indian games which developed into lacrosse, are possible ancestors of ice hockey. (Athletic Scholarships; Honkavaara et al. 1989, 10.)

Rules and a structured form of ice hockey have their roots in Canada. Some theories locate the start in 1855, when soldiers in Kingston played a game which is said to be ice hockey. Also Halifax has been considered as the birth place of ice hockey. (Honkavaara et al. 1989, 10.)

More commonly the birth of ice hockey is said to have originated in Montreal during the 1870's. There are two different versions of this theory. The first places the birth of organized ice hockey in the year 1875, when JGH Creighton organized a game, where the rules were adapted from "shinny" and rugby. According to the second theory, three students from McGill University, WF Robertson, "Chick" Murray and "Dick" Smith, devised the first rules based on English field hockey in 1879. (Honkavaara et al. 1989, 10.)

Once it had started, the development of the game was very fast. The first known tournament was played in 1883 in Montreal and three years later the first national league, the Canadian

Amateur Hockey League started in Quebec and Ontario. Lord Stanley donated a trophy in 1893 and the sport spread to the USA, where the first professional league was established in 1904. Rules developed and ice hockey spread to Europe. The first games in Europe were played at the Prince's Skating Club in Knightsbridge, England, in 1902. Belgium and France played two international games on March 4, 1905. Three years later in Paris, France, LIHG (later IIHF) was founded. (Honkavaara et al. 1989, 10; International Ice Hockey Federation.)

### **3.2 Ice hockey analysis**

In ice hockey the objective for a team is to score a goal and prevent an opponent from scoring. According to these objectives the game can be split into an offensive and a defensive game. (Westerlund 1997, 532.)

The Finnish Ice Hockey Federation has comprehensively analysed ice hockey from the beginning of 1990's. Its purpose has been to clarify: What happens in a game? What things have an effect on winning a game? What is required to play the game from the point of view of an individual player and also the team? (Westerlund 1997, 530.)

#### **3.2.1 Game analysis**

Ice hockey is a transition game and the trend is that the game is getting faster all the time. Effective offence is based on good defence and effective defence is based on good offence. The direction of the game is changing very fast and the transition moments without delays from defence to offence and offence to defence are essentials. The most effective way to attack is fast counter attacks against an unorganized defence and most of the goals are scored from attacks that start from the offensive zone. That emphasizes the role of active defensive play after attack without delay. It is also important that the team can attack and create scoring chances without losing defensive readiness and giving counter attack opportunities to an opponent. Still, most of the attacks a team has in a game will lead to losing possession of the puck. A team will generate around 200 attacks in a game and on about 130 of these occasions the team will lose possession of the puck. (Alatalo 2005; Saarinen 2008a; Saarinen 2008b; Savolainen 2008; Westerlund 2007.)

The following fundamental variables describe a team's efficiency in the offensive and the defensive game:

1. Scoring efficiency
  - The number of scored goals divided by the number of shots from the slot
2. Offensive efficiency
  - The number of attacks that end with a shot from the slot divided by the number of attacks starting from defensive-, neutral- and offensive –zones
3. Offensive risk
  - The number of attacks that end with an opponent stealing the puck divided by the number of attacks starting from defensive-, neutral- and offensive –zones
4. Offensive readiness
  - The number of fast- and counter attacks divided by the number of attacks starting from defensive-, neutral- and offensive –zones

Variables in a team's defensive efficiency:

1. Goaltending efficiency
  - The number of opponent's scored goals divided by the number of opponent's shots from the slot
2. Defensive security
  - The number of attacks that the defence can prevent ending in a shot from the slot divided by the number of opponent's attacks starting from defensive-, neutral- and offensive –zones
3. Defensive efficiency
  - The number of steals divided by the number of opponent's attacks starting from defensive-, neutral- and offensive –zones
4. Defensive readiness
  - The number of defensive phases that do not end with an opponent's fast or counter attacks divided by the number of opponent's attacks starting from defensive-, neutral- and offensive –zones

(Saarinen 2008a.)

The following data was analysed from 54 Finnish national team games during the period 1.9.2005-13.5.2007 by Mika Saarinen, International Ice hockey Centre of Excellence (IIHCE). 231 goals were scored in those games. The average number of attacks per team in a game was 180 total and 120 on even strength. (Saarinen 2008a; Saarinen 2008b.)

The average number of shots in a game per team was 45 and 28 of these were on net. On even strength the average was 28 shots and 17 shots on net. An average of 2,1 goals were scored per team in a game total and 0,9 goals were scored on even strength. (Saarinen 2008a; Saarinen 2008b.)

Table 2. Starting zone of the attack. (Saarinen 2008a; Saarinen 2008b.)

<b>Starting zone</b>	<b>Even strength</b>	<b>Total</b>
Offensive zone	60% of goals from 20 attacks	60% of goals from 35 attacks
Neutral zone	10% of goals from 25 attacks	10% of goals from 35 attacks
Defensive zone	30% of goals from 75 attacks	30% of goals from 110 attacks

Table 3. Ways of gaining possession. (Saarinen 2008a; Saarinen 2008b.)

<b>Gaining possession</b>	<b>Even strength</b>	<b>Total</b>
Steal	35% of goals from 60 steals	20% of goals from 80 steals
Opponent's clear or dump	15% of goals from 30 clears or dumps	25% of goals from 50 clears or dumps
Rebound	40% of goals from 10 rebounds	40% of goals from 20 rebounds
Face off	10% of goals from 20 face-offs	15% of goals from 30 face-offs

Table 4. Quality of attacks. (Saarinen 2008a; Saarinen 2008b.)

<b>Quality of attack</b>	<b>Even strength</b>	<b>Total</b>
Counter attack	70% of goals from 20 counter attacks	55% of goals from 30 counter attacks
Organized attack	30% of goals from 90 organized attacks	45% of goals from 120 organized attacks

Kari Savolainen collected and analysed the following data from Finnish SM-league games during the 2008-2009 season. On even strength categories for attacks are rush, zone play and turnover. Rush means attacks against an organized defence starting from defensive or neutral

zone. Zone play means offensive zone offensive play against an organized defence. Turnover means attacks against an unorganized defence starting from a steal. Categories for special situations are power play, face-off won, penalty kill and empty net. (Savolainen 2009.)

In a regular season an average of 5 goals per game were scored in total. 1184 (58%) of scored goals were scored on even strength, 654 (32%) were during a power play and 200 (10%) were during other special situations. (Savolainen 2009.)

Table 5. Type of attack and scored goals on even strength. (Savolainen 2009.)

<b>Type of attack</b>	<b>n</b>	<b>%</b>
Turnover	443	37
Rush	375	32
Zone play	366	31
TOTAL	1184	100

Table 6. Scored goals from turnovers on even strength. (Savolainen 2009.)

<b>Zone of turnover</b>	<b>n</b>	<b>%</b>
Offensive zone	314	71
Neutral zone	71	16
Defensive zone	58	13
TOTAL	443	100

Table 7. Scored goals from rushes on even strength. (Savolainen 2009.)

<b>Type of rush</b>	<b>n</b>	<b>%</b>
Odd man – disadvantage	104	28
Even strength	69	18
Odd man – advantage	63	17
Rebound	58	15
Break away	55	14
Behind the goal-line	26	7
TOTAL	375	100

(Odd man – disadvantage, even strength and odd man - advantage means the situation on a blue-line. Behind the goal line means that the puck is first played deep into the offensive zone and then scored.)



Table 8. Scored goals from zone play on even strength. (Savolainen 2009.)

<b>Type of zone play</b>	<b>n</b>	<b>%</b>
Rebound	110	30
Passing from behind the net	77	21
Lateral pass	62	17
Shot from a defence man	51	14
Carrying the puck + shot	49	13
Break to the net	17	5
<b>TOTAL</b>	<b>366</b>	<b>100</b>

Table 9. Scored goals from special situations in a regular season. (Savolainen 2009.)

<b>Special situation goals</b>	<b>n</b>	<b>%</b>
Power play	654	77
Empty net	81	10
Penalty kill	69	8
Face-off won	50	5
<b>TOTAL</b>	<b>854</b>	<b>100</b>

Table 10. Scored goals from power play. (Savolainen 2009.)

<b>Power play goals</b>	<b>n</b>	<b>%</b>
Set play	226	35
Set play from blue-line	182	28
Rebound	136	20
Rush	71	11
Steal	39	6
<b>TOTAL</b>	<b>654</b>	<b>100</b>

Table 11. Scored goals from other special situations. (Savolainen 2009.)

<b>Other special situation goals</b>	<b>n</b>	<b>%</b>
Empty net	81	40
Penalty kill	69	35
Face-off won	50	25
<b>TOTAL</b>	<b>200</b>	<b>100</b>

### 3.2.2 Requirements of ice hockey

#### Tactical requirements

The aim in ice hockey is to score a goal and prevent an opponent from scoring. According to these aims the game can be split into an offensive and a defensive game. It is important that players cooperate towards the common aim in different game situations. (Westerlund 1997, 532.)

In practice tactical execution is based on an individual player's ability to make decisions. Good game sense refers to a player's ability to make beneficial decisions for his team. Game sense is divided into:

1. Understanding the game
  - Understanding the team's aims and principles of co-operation in different game situations
2. Reading the game
  - Observation of one's own team and the opponent, the puck's location, the puck's movement, direction and speed in relation to the playing surface
3. Decision making
  - Which playing skill a player chooses to solve the situation

(Westerlund 1997, 534-535.)

The game is getting faster all the time. Players need to anticipate, read the game, make right decisions and react quickly according to the game situation because situations are changing very quickly. A really good team player needs to be able to play in all four different game situation roles. In a game these roles are changing continuously. Being late all the time leads to a situation where players and a team need to play according to an opponent all the time. (Alatalo 2005; Tapola 2008; Westerlund 1997, 532; Westerlund 2007.)

In a game situation a player is always in one of the four game situation roles. Those roles are:

1. Offensive with puck
2. Offensive without the puck
3. Defensive against the puck carrier
4. Defensive against the non-puck carrier

(Cook 1982, 132; Westerlund 1997, 530 & 534.)

Winning game situations is based very often on acting faster than an opponent. To be able to cooperate with team-mates they need to have common aims in different situations. (Tapola 2008; Westerlund 1997, 532.)

Priorities in offensive situations are:

1. Scoring
2. Winning space towards an opponent's net
  - Game speed towards an opponent's net
3. Creating space
  - Puck possession
4. Defensive readiness

Priorities in defensive situations are:

1. Prevent scoring
2. Stealing the puck
  - Pressure
3. Denying space
  - Defending the middle
4. Offensive readiness

(Rautakorpi 2010; Westerlund 1997, 533-534.)

Tactical team skills are essential for competing and achieving success at a high level. A team's tactical systems are meant to help the team to play to its strengths and prevent the exploitation of possible weaknesses. Also the idea is to strike at an opponent's weaknesses and eliminate their strengths. The aim is to help and improve the co-operation between players and achieve the common goal. Also players' roles can be set according to tactical systems. (Walter & Johnston 2010, vii; Westerlund 1997, 532.)

Tactical systems can be divided into:

1. Defensive systems
  - in defensive zone
  - in neutral zone
  - in offensive zone
2. Offensive systems
  - in defensive zone
  - in neutral zone
  - in offensive zone

Tactical systems try to define the players' tasks in different situations. They are described mostly with figures or a series of numbers that relate to the players' positioning on the ice (for example offensive zone defensive system 2-1-2). (Westerlund 1997, 533.)

## **Technical requirements**

The required technical skills in ice hockey are skating, puck control, passing and receiving, and shooting. (Hockey Centre b.)

Skating is the most essential technical skill in ice hockey. It is categorized into forward skating (straight and cross-overs), backward skating (straight and cross-overs), starts, stops and turns. Key points in skating are: position, push, return and glide. (Davidson 2012, 31-66; Hockey Centre c.)

Versatile ability to control the puck in different positions combined with skating is the basis for puck control. Key points in puck control are touch for the puck, the rhythm of hands and

feet, the range of movements, the ability to see and sense the game. (Davidson 2012, 70-78; Hockey Centre d.)

Ice hockey is a team sport and possessing the puck is important. To be able to possess the puck players need to pass accurately and receive the puck while skating. Passing and receiving happens with forehand and backhand. Key points in passing are: eyes on the receiver, loose hands/arms (off the body), upper and middle body rotation, lower hand pull and push, upper hand pull, and turning wrists and blade towards the receiver. Key points for receiving are: eyes on the puck, stick/blade on the ice, loose hand/arms, upper and middle body rotation and turning the blade on the puck with the wrists. (Davidson 2012, 84-90; Hockey Centre e.)

Versatile shooting skill creates the base for scoring ability in a game. Shooting is categorised into: pull-shot, wrist shot, backhand shot and slap shot. Key points for different variations of shooting are: eyes on a target, loose hands/arms (hands off the body), upper and middle body rotation, weight transfer and turning the blade with the wrists towards the net. (Davidson 2012, 94-107; Hockey Centre f.)

### **Playing skills in ice hockey**

Usually performance consists of both a tactical as well as a skilled element. Playing skills in game situations means technical skills combined with game sense. (Hockey Centre g; Westerland 1997, 535.)

Finnish Ice Hockey Federation has categorised international elite level requirements for comprehensive and winning play according to the game situation roles as follows:

1. Offensive with puck
  - Quality of shooting
  - Passing as a playing skill
  - Puck control + changing the rhythm
2. Offensive without puck
  - Driving the net
  - Offering passing option
  - Supporting attacks
3. Defensive against puck carrier
  - Giving pressure by skating
  - Stick pressure + denying passing + covering the shot
  - Body checking as a playing skill
4. Defensive against non-puck carrier
  - Denying a passing option
  - Skating to the defensive side
  - Back checking by skating

(Hockey Centre a; Rautakorpi 2010.)

### **Physical requirements**

Ice hockey is high intensity game that includes intermittent skating and rapid changes in direction and speed. It is also a rough game that requires frequent intense physical contact and aggressive play. Because of the nature of the game physiological demands are very complex. Metabolically ice hockey is a unique sport requiring well trained aerobic and anaerobic pathways. The game requires intense glycolytic activity related bursts of intense muscular activity and also exceptional aerobic power and endurance. Involvement of the anaerobic system may be dependent on the efficiency of the aerobic system. The nature of the game requires also a large, lean body mass and exceptional muscular strength. NHL players have significantly higher anaerobic power outputs and muscular strength than minor-league players. The anaerobic

nature of the game causes fatigue and that leads to deterioration in skating and the fundamental skills. (Cox, Miles, Verde & Rhodes 1995, 185; Montgomery 2000, 815 & 821.)

Required physical qualities can be categorized into:

1. Skating power and speed
2. Skating endurance
  - a. Single shift
  - b. Entire game
3. Strength and speed in battles
4. Stick/puck handling strength and speed

(Suomen Jääkiekkoliitto. 42 & 43.)

At the professional level intense bouts of play (shifts) last on average 30 to 60 seconds. Recovery time between shifts is 2 to 5 min. The 60 minutes game consists of three 20-minute periods with 15-minute breaks. Typically a player receives 15-20 minutes of actual playing time which is spread over a period from 150 min to over 3 hours. However, some players might receive as much as 35 minutes playing time. A player skates approximately 250 to 300 meters during a shift and 5 to 7 kilometres during a game. A typical shift is interspersed with 5 to 7 2,0 to 3,5 second maximal bursts of maximal skating followed by longer periods of coasting. Frequent turning, shooting, and checking are activities that have an effect on the intensity of a shift. The proportion of energy from aerobic and anaerobic pathways depends on the characteristics of the shift. The long-term trend has been that game intensity during a shift has been increasing. The ATP-PC system provides energy for maximum intensity exercise for up to 10 seconds. After that, if the exercise intensity remains high, the energy is produced mainly through anaerobic glycolysis (lactic acid system). This system draws upon a muscle's glycogen or blood glucose stores (carbohydrates) for energy. Anaerobic glycolysis is peaking at 30-45 seconds. This is why a typical shift is 45 seconds on average. Lactate levels during a game vary from 2,9 mmol/L to 14 mmol/L. On average lactate levels are 5-7 mmol/L. One reason for relatively low lactate values has to do with the frequent play stops during each shift. On average, there is about 30 seconds for recovery because of the 2 play stops within a shift. During a hockey season players tend to improve their anaerobic fitness but not their aerobic fitness. (Cox et al. 1995, 185; Montgomery 2000, 815-817 & 825; Quinney et al. 2008, 753-754; Twist 1997, 45-46; Westerlund & Summanen 2001, 19-20.)

At the elite level the players' age range is from 20 to 35 years and the team average is approximately 25. Players' body mass and height have progressively increased since the late 1970's. Team averages in NHL are now greater than 185 cm for height and 90 kg in mass. According to a study of one NHL team's players, the average percentage body fat was 10,4% (estimated by using the Yuhasz equation). NHL players have progressively increased in size and improved in fitness over time. The Percentage of body fat has remained relatively unchanged. (Montgomery 2000, 818; Montgomery 2006, 183; Quinney et al. 2008, 756.)

According to a study of one NHL team's players, the average of predicted 1 RM in bench press was  $128,09 \pm 19,7$  kg among the 25-29 age group. Mean  $VO_{2\max}$  has ranged from 52 to 63  $\text{mL} \cdot (\text{kg} \cdot \text{min})^{-1}$  with elite hockey players. Mean values for peak anaerobic power was approximately 14W/kg. (Montgomery 2006, 184; Quinney et al. 2008, 757-758.)

Defence-men are generally larger (weight and height). They have also greater musculoskeletal fitness compared with other positions. Forwards have greater relative aerobic fitness and lower body fat. (Quinney et al. 2008, 759.)

According to 2005 NHL entry draft fitness assessment results (Table 11), the average height of drafted players was 6 feet and 1,3 inches (186,2 cm) and their weight was 192 pounds (87,1 kg). Body fat was 9,9% (Yuhasz equation). Vertical jump (jump mat) was 22 inches (55,9 cm) and standing long jump was 97 inches (246,4 cm).  $VO_{2\max}$  average was 53,4  $\text{mL} \cdot (\text{kg} \cdot \text{min})^{-1}$  (assessed with cycle ergometer). (Gledhill & Jamnik 2007.)



Table 11. Overall summary of NHL entry draft fitness assessment results – 2005. (Gledhill & Jamnik 2007.)

MEASUREMENT	2004 Combined Average	2005 - All Players Combined		
		AVERAGE	LOWEST	HIGHEST
<b>Body Composition</b>				
Height (ft:in)	6:1.4	6:1.3	5:9.0	6;7.8
Weight (lb)	192	192	160	241
Sum of 6 Skinfolds (mm)	61.6	64.3	31.1	122.6
Yuhasz % Body Fat	9.4	9.9	6.6	15.5
<b>Musculoskeletal Fitness</b>				
Sit & Reach (cm)	38	38	16	54
Curl-Ups (max consecutive #)	24	25	0	82
Vertek Vertical Jump (in)	25	24	18	32
Vertek Leg Power (ft-lb/sec)	1110	1098	772	1484
Jump Mat Vertical Jump (in)	22	22	17	28
Jump Mat Leg Power (ft-lb/sec <sup>2</sup> )	1045	1043	796	1466
Standing Long Jump (in)	100	97	79	110
Hand Grip - Rt (lb)	129	129	88	174
Hand Grip - Lt (lb)	125	126	92	158
Bench Press (150 lb - # of reps)	10	8	0	19
Bench Press (lb/lb body weight)	8	6	0	13
Push-Ups (max consecutive #)	24	24	3	41
Push-Ups x Body Weight (lb)	4608	4589	530	8451
Push Strength (lb)	233	229	119	315
Push Strength (lb/lb body weight)	1,2	1,2	0,7	1,7
Pull Strength (lb)	258	258	165	425
Pull Strength (lb/lb body weight)	1,4	1,4	0,9	2,1
Upper Body Power 4 kg Ball (in)	200	182	147	238
<b>Anaerobic Fitness</b>				
Peak Power Output (Watts) *	1044	969	638	1266
Peak Power Output (Watts/kg)	12,0	11,1	7,0	14,9
Mean Power Output (Watts) *	822	796	542	991
Mean Power Output (Watts/kg)	9,4	9,1	6,0	11,7
Fatigue Index (% Drop-off from Peak)	39,6	35,7	18,0	51,5
Average Overall RPM	399	387	250	492
<b>Aerobic Fitness</b>				
VO <sub>2</sub> max (litres·min <sup>-1</sup> ) *	5,03	4,66	3,44	5,90
VO <sub>2</sub> max (ml·kg <sup>-1</sup> ·min <sup>-1</sup> )	57,8	53,4	41,4	65,5
Note: For all measurements except Sum of 6 Skinfolds, % Body Fat and Fatigue Index, higher scores are better.				
* Because body weight is not taken into account in these values, comparisons between players are inappropriate.				

## Mental requirements

Applied studies and analysis of the mental requirements of ice hockey are very limited. However, mental qualities and mental skills are generally perceived as very important among coaches and scouts. Also top professional players consider mental factors as essential.

In 1979 Orlick, Hansen, Reed and O'Hara studied the psychological attributes of high caliber ice hockey players from the perspective of professional scouts, coaches and managers. Four major factors emerged from the interviews: *desire or determination, self-sacrifice or being a team player, coping well with the pressure or maturity and coachability*. (Barbour & Orlick 1999, 16-18; Westerland 1997, 543.)

Barbour and Orlick (1999) studied the mental skills of National Hockey League players by using questionnaires and interviewing NHL players. In-depth interviews were conducted with ten players and 27 players completed the questionnaire survey. The purpose of the study was to explore the mental skills used by NHL players and determine the extent to which Orlick's Wheel of Excellence elements (commitment, belief, full focus, positive images, mental readiness, distraction control and constructive evaluation) could be applied to these athletes. According to the study players have a very high level of *commitment*. It was evident that hockey was the center point of their lives. Players were committed to excel and they were driven by the desire to become the best they can. They showed goal setting skills and they were also prepared to make the necessary sacrifices to achieve the set goals. The ability to *fully focus* during practice was the most difficult mental skill to achieve. Players found it also difficult to achieve the optimal mental state on a regular basis for the games. All the players projected a strong personal *belief* in their own potential and abilities as professional players. Most of the players used *imagery*, mental rehearsal or visualization. Positive imagery was used as a mental preparation tool. Preparing mentally for games and practices (*Mental readiness*) was most discussed by players. A positive mental perspective was considered important in spite of the obstacles that occur during the season. They used positive self-talk, positive images and looked for the positive in all situations. Most players followed a very consistent and individualised procedure to prepare themselves for games. However, many players felt it difficult to prepare mentally for every game through the long season because of the demands of the schedule and amount of games they play. Also *Distraction Control* is an essential skill for the players when facing a variety of distractions throughout a season. Overall players had refined *constructive evaluation* procedures. They used constructive evaluation to improve their confidence and belief. The element of *Fun and enjoyment* was also found to be essential for the players. Players enjoyed the excitement, high pressure games and the simple skills of the game. Players seemed to embrace the game itself as an escape from the pressure that coaches, management or media set on them. They joked around in practice, played fun games after practice and socialised with teammates away from the rink in order to maintain the element of fun and enjoyment in their game and lives. (Barbour & Orlick 1999, 16-34.)

In the 1990's in Finnish ice hockey, among other things, the following qualities were defined essential considering the mental requirements of ice hockey: the need to achieve, aggressiveness, self-confidence, independency, the ability to cope with pressure, dominance and maturity of emotional life. *Need to achieve* described a player's volition, goals and will to succeed. It also meant an ability to work hard with perseverance. Positive *aggressiveness* was seen as a beneficial quality considering a player's performance. It was seen to appear as an energetic and physically tough performance while the player still plays according to the rules. It meant also that the player is not afraid of physical contact and one on one battles. *Self-confidence* meant a player's positive and realistic self-image and belief in his own potential. A self-confident player in a game situation was considered to be purposeful and willing to take responsibility. *Independency* meant a player's ability to handle the routines independently. Independence was described also as the ability to act in new and odd situations and hold on to one's own thoughts as well as being authoritative. *Ability to cope with pressure* meant mainly a player's ability to maintain or even improve the level of other qualities under pressure. *Dominance* was seen as an important quality in ice hockey. A dominant player was considered to be able to hold his own and be tough in one on one situations. Dominance was also considered linked with leadership inside the team. *Maturity of emotional life* described a player's ability to control his emotions and the affect they have on his actions. It was also linked with being a team player. (Westerlund 1997, 543-544.)

### **Psycho-social requirements**

In ice hockey, players cooperate with their teammates to compete against an opponent. But there is also competition between teammates for playing time and positions inside a team. The interactions and effects of these forces (competition and cooperation) on players are complicated. Team members need to interact, work and strive toward shared goals, adapt to environmental demands and balance individual needs with the needs of other members of the team. Members of an effective team are co-operative rather than competitive. They are supportive towards each other and willing to work towards the common goal instead of being divisive. (Cook 2009, 15; Weinberg & Gould 2003, 104 & 156.)

Many times talented teams perform poorly compared to teams with less talent. They fail to use the resources of their individuals. Teamwork and group dynamics play an important role in the success of an effective team. Every team develops its own structure and that depends

largely on the interactions of its members – how they perceive one another and what they expect of themselves and each other. In effective teams members trust and respect each other. There is an understanding that each member has diverse skills and backgrounds and that the team needs everybody's contributions. (Cook 2009, 13; Weinberg & Gould 2003, 156 & 159.)

In every team exists two types of roles. *Formal roles* are directly established by the nature and the structure of the organization. An example of a formal role in ice hockey is a goalie. All formal positions have specific performance roles within a team. Each of these roles is linked to certain expectations. Individuals are often trained and recruited to perform these specific formal responsibilities. *Informal roles* evolve as a result of the interaction between group members and are not formally prescribed by the organization. An example of an informal role is the team comedian. (Cope, Eyes, Beauchamp, Schinke & Bosselut 2011, 20; Weinberg & Gould 2003, 160 & 161.)

Players should understand and accept their roles. A player needs to know not only his own role and what is expected from him but also the roles of his teammates and what is expected from them. Players also need to accept and commit to their roles. Unclear or uncommitted roles hurt a team's performance. (Cope et al. 2011, 20; Weinberg & Gould 2003, 160 & 161.)

Another structural characteristic of an effective team are group norms. They can be either formally established or informally developed by the group. Group norms are the standards for behaviour that are expected of team members. They explain how the members are to behave and what acceptable behaviour is. Norms can greatly influence individual behaviour. (Bordens & Horowitz 2000, 340; Weinberg & Gould 2003, 159 & 162.)

Effective teams have clear and well-defined goals. Goals are SMART; specific, measurable, achievable, realistic and time bound. These goals should be mutually agreed and shared and the members should hold themselves accountable in achieving the goals. Every effective team shares a common sense of purpose. Members of an effective team understand that there will be times and situations when they need to place the team's needs before their own individual goals. The members recognise that sometimes they might have to make sacrifices for the overall good of the team. A commitment to achieve a common goal is often the factor that differentiates championship teams from mediocre teams. It is easy to say that we want to win the championship but it is a whole other thing to put in the effort necessary to pursue a championship – especially when difficulties and obstacles occur. One of the toughest areas of

team building is continual commitment to a team's common goal. (Cook 2009, 13-14 & 30; Janssen 1999, 13.)

Team cohesion is positively related to team performance. Teams that have a high level of cohesion are more likely to succeed and teams that are successful are in turn more cohesive. The relationship is circular but performance appears to have a stronger effect on cohesion than cohesion has on performance. Team cohesion includes task and social aspects of cohesion. Task cohesion refers to the degree to which team members' work together to achieve a common goal. Social cohesion reflects an individual's attraction to other team members. Task cohesion is more closely related to performance. (Weinberg & Gould 2003, 176-188.)

## 4 Player scouting and evaluation in ice hockey – The scout's point of view

The Central Scouting bureau evaluates amateur prospects for the annual NHL entry draft. Players are assessed by scouts on 10 task requirements: skating, shooting and scoring, positional play, checking, puck control, passing, hockey sense, desire and attitude, aggressiveness and toughness, and size and strength. The skills and tasks are not equally important for the different positions. (Montgomery 2000, 815.)

Some NHL scouts use the five S's to evaluate players: skating, size, skill, sense and spirit. Spirit refers to a player's guts and his willingness to go into the corners and fight for the puck. (Miller 2003, 85.)

The experts clearly believe that there is a set of psychological attributes that are vital for a player to have. It can be called character, spirit, make-up or attitude but it means for them many things. Psychological qualities and behaviours NHL scouts look for in players include, among other things, determination, grit, guts, battle level, competitiveness, courage, drive, fight, passion for the game and to compete, willingness to pay the price, perseverance, the ability to stay on track, coachability and willingness to take directions and follow instructions. (Miller 2003, 87.)

It is challenging for the scouts to read a player's potential and predict who will become a NHL player. Character has a significant role to play in making that decision but is challenging to measure. Several teams in the NHL use psychological testing to help their selection process. A test means conducting a standardised interview where the responses of the player are compared with the response patterns of other successful athletes or the ones who have failed in the past. (Miller 2003, 87-88.)

One test that has been in use with several NHL teams is the Athletic Success Profile (ASP). It measures 11 different factors: drive, determination, leadership, emotional control, coachability, trust, aggressiveness, responsibility, self-confidence, mental toughness and conscientiousness. *Drive* refers to a player's desire to win, to achieve and to be successful. A player with drive responds positively to competitive situations, he strives to accomplish difficult tasks and sets high goals. *Determination* means the willingness to put forth the required physical effort to be successful. A determined player is persistent in his work habits, practices long and hard, works

on skills, works independently and does not give up easily. *Leadership* represents the desire to affect others naturally and spontaneously. A leader enjoys the responsibility of being a leader and attempts to control the environment. In addition, a leader makes decisions and strongly expresses opinions. *Emotional control* means the ability to face stress in a calm and objective manner, and not let feelings or adversities affect performance. *Coachability* reflects the respect for the coach and the coaching process. A coachable player considers coaching essential to his development and he is receptive to advice. The player also cooperates with authorities and accepts the team captain's leadership. *Trust* means a player's acceptance of, and his belief in, other people. A trusting player is not jealous and he tends to get along well with other members of the team. *Aggressiveness* describes the tendency to initiate action and believing that taking the offensive is crucial to winning. An aggressive player is willing to use force to get the job done, doesn't accept others to be pushy and tries to get even with people. *Responsibility* describes the ability to accept and carry the consequences of one's actions. A responsible player accepts criticism, even when it's not deserved, can endure mental and physical pain and also might dwell on a mistake. *Self-confidence* means a player's belief in his own ability to be successful. A player handles unexpected situations and makes decisions with assurance. A player might also express his beliefs, ideas and opinions to coaches and other players naturally. *Mental toughness* reflects a player's ability to accept criticism and failures without their effect on his performance. A player doesn't become easily upset because of a setback or a poor performance and he recovers quickly from them. A player does not need excessive praise or encouragement either. It is acting with purpose and having focus, intelligence and control in the face of challenge or adversity. *Conscientiousness* means the willingness to execute things according to the rules. A player doesn't try to bend the rules to fill his personal needs. A player has a sense of duty and places the benefit of a team ahead of personal well-being. (Miller 2003, 87-100.)

## **Jukka Holtari**

Jukka Holtari is one of the Finnish pioneers in scouting. At the moment he works for the NHL team Boston Bruins as the team's European head scout. It is his fifth season in the Bruins' organization. He opened and described scouting in the 2007 International Coaches Conference in Vierumäki, Finland. The following chapters also include information from the personal interview, which was held 31.1.2012 in Jyväskylä, Finland. (Boston Bruins 2013; Holtari 2007; Holtari 2012.)

With scouting clubs try to find talent from inside and outside of the club. Information from scouting is helpful also for the coach in his work with developing the players. A scout and a coach watch the players from slightly different perspectives. A coach is closer to the player and he gets more easily emotionally attached with the player. He knows better the player's mental value and the mental contribution for the team inside the locker-room and on the bench. But, this might also lead to over appreciation of a player. A scout's perspective is more analytical. He follows the game and the player from the stands and sometimes might forget to appreciate the mental contribution that the player gives to the team off the ice. It is valuable if these two perspectives can be combined. (Holtari 2007.)

A scout can help the player receive feedback, which is helpful considering the player's development process. Scouts help the club maintain control of their player budgets by offering alternatives and options for player selection and team building. (Holtari 2007.)

Holtari considered it important to observe and scout the player in demanding environments if possible. National team tournaments in different age groups are good places to scout elite level players. However he thinks there are still players to be found outside of those tournaments, meaning smaller clubs at a lower level and in less populated areas. (Holtari 2007.)

A scout can be basically anybody. An agent should know a little bit about scouting. He might be working with a player over a long period of time, sometimes up to 15 years, and he should know what kind of player he is working for. A manager, anybody who runs the hockey club, should be a little bit of a scout as well. The coach is always a scout too; he should have at least a vision or prediction of where, at what level and how high the player is going to end up in his career – what is his potential. There aren't any specific background requirements for a scout, but any kind of hockey experience is beneficial for a scout. (Holtari 2007.)

A scout needs to be able to define a good player and good ice hockey. He needs to be curious and interested in the game and he should learn from the mistakes. A scout should be aware of rule changes on and off the ice and their effect on the requirements of the game. Writing down, preparing documents and reports is essential. That forces the scout to create an opinion of the player – a scout needs to have an opinion. It is impossible for a scout to remember all the information but written data enables the scout to get back and look at what he has been thinking of a player and what was his opinion after scouting and observing the player earlier. The written process confirms and doubles the learning experience. However, the data expires



quite quickly, three years old data is already questionable regarding its reliability because players develop and regress. (Holtari 2007; Holtari 2012.)

Scouting and observing the player several times is crucial. A scout must have the ability to combine information to create a predictive evaluation of the player's potential. Little information is considered more dangerous than no information at all. It means that observing the player only a little bit might lead to a situation where the scout thinks he knows the player, and that might lead to wrong assumptions and bigger mistakes. Usually scouts ask opinions from other people when they don't have enough information about the player themselves. (Holtari 2007.)

Holtari described player scouting as inconsistent and specific to team/club and person. Different scouts value and emphasize different qualities. Holtari has divided scouting and player evaluation into four categories: skating ability, hockey sense, puck skills and character. Holtari regards skating ability as very important and evaluates it from technical and physical perspectives. He divides hockey sense into two categories; understanding the basic principles of the game and natural (super) talent. Great hockey sense (super talent) is recognized as the ability to read all the available options and make the right decision (picking the best possible option). Holtari considers puck skills as a matter of repetitions and their importance as a matter of coaching philosophy. Character is essential and its importance is growing. Weaknesses on the mental side eliminate the other qualities but it doesn't happen the other way around. Character means to Holtari: competitiveness, attitude, energy, willingness to achieve, physical presence, grit, positive aggressiveness, determination, resilience, emotional control, coachability, trust, leadership, etc. (Holtari 2007; Holtari 2012.)

### **Jarmo Kekäläinen**

Jarmo Kekäläinen is the general manager of the National Hockey League club Columbus Blue Jackets. He worked for the St. Louis Blues (NHL) from 2002-10. In the St. Louis Blues he started as director of amateur scouting and in 2005 he was named as assistant general manager and director of amateur scouting. In that role, he was involved in all facets of hockey operations, including professional scouting efforts and overseeing the club's amateur scouting and draft preparations. Before the Blues, Kekäläinen was a member of the Ottawa Senators hockey operations department from 1995 to 2002. He worked as Ottawa's director of player personnel for three years and also oversaw the amateur draft and the club's scouting efforts in

Europe. The following information is from his presentation about identifying talent and building a winning team at the 2012 IIHF Youth Coaching Symposium, Helsinki, Finland. (Columbus Blue Jackets 2013.)

Kekäläinen defined talent and selection criteria as: a big heart (character), a sense and feel for the game, cerebral instincts down to the toes and fingertips, an ability to utilize skill and physical attributes. Talent means also the ability to use all of these to one's advantage in order to produce results on an individual level and as a team, especially under high pressure.

(Kekäläinen 2012.)

It is noticeable, that different roles require a different set of skills and physical attributes, but they all require the most important elements of talent which are the heart and the character, and sense and instincts for the game. Big heart and character mean: competitiveness, perseverance, work ethic, ambitiousness, ability to get in the "zone", and the ability to handle pressure. Also a burning desire to achieve and discipline to get the job done, willingness to take responsibility and carrying it through adversity, leading by example and by spreading a positive message, are all talents as well. (Kekäläinen 2012.)

According to Kekäläinen, physical attributes and skills are the "easier" part of the talent evaluation, but finding the mental elements (character, heart and soul) of talent is much more demanding and time consuming. (Kekäläinen 2012.)

Every team and club should create evaluation criteria which help to evaluate and select players inside and outside of the club. It is important that the coaching staff is on same page with the established evaluation criteria. Kekäläinen believes that evaluation criteria that focuses on the main components mentioned earlier will lead to long term success. He also mentioned important factors and issues like, being a team player, meaning loyalty and unselfishness as well as a player's motives (me or we). A work ethic that doesn't compromise is essential. It means 100% all the time, and that is attached with a player's honesty and character. Instincts and character are linked with the courage to execute without fear of failure. Players' ability to listen and their own will to learn is crucial when considering their commitment to the team. As a last thing he mentioned a player's ability to produce results and utilize his whole capacity on regular bases. It comes last because if a player fulfils the prior evaluation criteria he will most likely also score results regularly. (Kekäläinen 2012.)

Kekäläinen emphasized the importance of writing down and reporting obtained evaluation information. Regular and organized recording and reporting is very important for thorough knowledge. The next step in the player evaluation process is identifying the players you want or interest you and eliminating the players you don't like – narrowing the number of players down. The third step is to build a list of players for different roles and playing positions and updating that list constantly throughout the year – it is a process. Building a network to collect and gather information to support decision making is also valuable. That means identifying the people with knowledge and inside information and processing the obtained information. They can be coaches, players, trainers, etc. (Kekäläinen 2012.)

Kekäläinen categorized player evaluation into four categories: skating, skill, hockey sense/instincts and character. Style of skating is very deceptive and does not necessarily correlate with speed or quickness. The focus on skills should be on results, instead of pretty moves that don't lead anywhere. The same thing applies to hockey sense/instincts, the focus should be on the results in the offensive and the defensive game. According to Kekäläinen, the importance of character cannot be emphasized enough and it has to be seen on the ice. (Kekäläinen 2012.)

## 5 The aims of the project

The aim was to produce a tool that helps to evaluate systematically ice hockey players' mental qualities and mental skills. The purpose was to define the essential mental qualities and mental skills required in ice hockey and link those to the essential ice hockey specific actions and behaviours. The emphasis was on linking the abstract key psychological factors with the concrete and important actions and behaviours related to a successful player and a member of a winning team in ice hockey. The actual evaluation was targeted to focus on the observable actions and behaviours of a player and the aim was that the tool would give, as an end result, the player's mental quality profile in a graphical form. The observable actions and behaviours, and their identification, were considered crucial. In other words, how the mental qualities and skills are identified from the actions and behaviours of a player. It is worth noticing, that the Behavioral Scouting –tool is aimed at evaluating mental factors, so only the will and effort to execute the chosen criteria is under evaluation. Technical skills, physical qualities and the outcome are excluded from the evaluation. The information and the results it gives is meant to be helpful and easily utilized in practice.

The tool is planned to be simple, easy to use, logical and practical and it is meant to support the individual coaching process. The aim of the individual's mental coaching is to increase a player's self-awareness and understanding of their own development. It means that the player learns to know himself, he knows his strengths and weaknesses and he knows what to do to become a better player and a better athlete. Using this tool is meant to increase the player's self-awareness, it is meant to help the coach to know and understand the player and it is meant to help them both to interact and communicate. It helps them to discuss the concrete actions and behaviours and the abstract mental qualities at the same time and get on the same page. My personal perception is that a player understands the specific, detailed and concrete information better. Still, understanding creates the base for the development. The idea is that the player makes his own self-evaluation and the coach makes his evaluation of the player. They both need to really think how the player acts, how he behaves and what is the player's will and effort to execute the chosen criteria. Then the results can be compared and discussed. After that they both know where to focus and they can plan future actions together. This tool can also be useful for coaches, scouts and clubs in talent identification and player evaluation and selection processes as well. It also helps these different parties to establish a common language and set the common evaluation and selection criteria. The abstract terms and the mental quali-

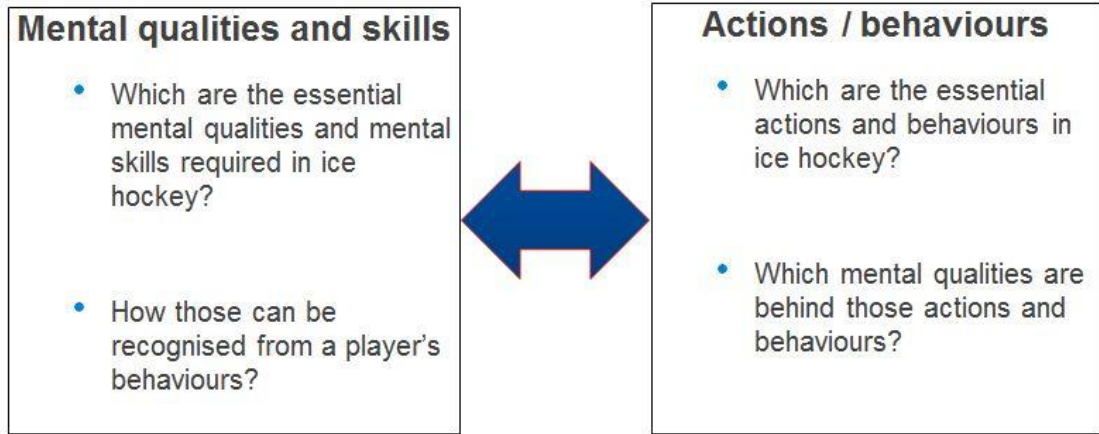
ties mean something a little different to all of us, especially how they are observed, evaluated and what are the absorbed criteria.

The importance of the mental qualities has lately been getting a lot of attention in ice hockey as well as in sports generally. Especially in ice hockey, the mental qualities are crucial because the sport does not establish strict limits in physiological, physical, technical or tactical requirements. Psychological factors have been evaluated for a long time with different kinds of methods and criteria. This tool was created because of my personal interest in the topic, my perception of the importance of the topic and my experience that there is a need for such a tool. To the best of my knowledge there isn't a tool like it – a tool that links the essential, specific and concrete hockey specific actions and behaviours with the essential mental qualities, and gives as an end result a player's mental quality profile in graphical form.

## 6 Project planning

I started to plan the tool in December 2008 as a part of a Facilitating Mental Training in Ball Games -course. The first version was aimed to be in use at the Pohjola-Camp 25.2.-1.3.2009. Pohjola-Camp is the first Finnish Ice Hockey Federation's nationwide camp where the best U16 (that year -94 born boys) male players are gathered together. The first version of the tool was aimed to evaluate a player's need to achieve and their competitiveness. I considered these as essential qualities necessary for achieving an elite level in ice hockey. Later I expanded the number of mental qualities and skills to eleven. I have developed the tool since 2008. The tool has been modified and fixed as issues have occurred or new ideas have presented themselves. I have used my own knowledge and experience and I have become familiar with sport psychology theory and research information while planning the tool. I have also discussed the idea, the tool and the topic with several experts in order to get a wider perspective and increase my own knowledge. My teachers Kari Savolainen and Markus Arvaja have been strongly involved with the development process.

During the development process I have been trying to define which mental qualities and skills are considered essential for playing and achieving an elite level in ice hockey and how they can be recognized and observed from a player's actions and behaviours. At the same time I have been thinking about which important actions and behaviours are considered necessary in order to succeed at an elite level and which mental qualities and skills are behind those actions and behaviours. This is how the list of actions and behaviours and the list of mental qualities and skills were formed. I planned a table using a Microsoft Excel program that enabled me to link the actions and behaviours with the mental qualities and skills. The actions and behaviours that are under evaluation are linked to certain mental qualities and skills with multipliers to emphasise and to give priority to certain mental qualities and skills. That table also enabled me to get the end result in graphical form. The figure (Figure 2.) below explains the development process and the questions I have been trying to solve and answer. I have also put effort in to planning the visual appearance of the tool to keep it as clear and user friendly as possible.



## How to link these?

Figure 2. Description of the development process.

## 7 The implementation of the project

The development process has been a long and slowly advancing process. It started with the purpose of developing a tool that would help evaluate players' mental qualities at the 2009 Pohjola-Camp. That year there were 176 selected players from eight different regions, players were divided into eight teams and each player played 5 games in 5 days. Some of the players were selected for an all-stars team and they played an extra game between themselves. The players were also tested on and off the ice with different tests. 42 players were scouted and evaluated with the tool by HAAGA-HELIA Degree Program in Sports and Leisure Management students during the camp. Each student had 3-5 players to be evaluated and they were taught how to use the tool. The players didn't know that they were being evaluated with the tool and neither were they aware of the criteria. 25 of the evaluated players got selected for the U16 prospect group and 17 did not make it. The data from that camp was presented to Mr. Oliver Stoll – a German sport psychologist. He analysed the data with the SPSS program and found the results interesting – the reliability was good. The selected players differed significantly in every category of the criteria. The results raised interest in the tool and it motivated me to keep developing it. The tool was updated and also used at the 2010 Pohjola-Camp by the teams' scouting staff.

The tool has been used with the teams that I have been coaching. I used the tool during the 2010-11 season with the Vierumäki A juniors. At the same time I developed the function that gives the mental quality profile of the player as an end result of the evaluation. I also modified the tool to better emphasise and assist the individual coaching process. The player's self-evaluation became part of the process as well. At the beginning of the 2011-12 season the tool was used with the JYP Jyväskylä Finnish SM-league team. But a change of coach prevented finishing the process with the players. Personal interviews were not held with the players and the results were not presented to the players. At the moment the tool is being used by the Finnish SM-league team Rauman Lukko. In addition, I presented the tool at the 2012 International Coaching Symposium, Helsinki, Finland. People have been interested in the tool and it has received positive feedback. They have praised the concreteness and practicality of the tool and the importance of the topic.



## 8 Description and result of the project

The list of actions and behaviours are categorised into: on ice / in game behaviours, on the bench / off the game situation behaviours and general behaviours. On ice behaviours are split into four game situation roles, which are offence with the puck, offence without the puck, defence against the puck carrier and defence against the non-puck carrier. There are 34 actions and behaviours for defence-men and 35 actions and behaviours for forwards under evaluation. The criteria are identical between the defence-men and the forwards except “Strives to screen the goalie” is left out from the defence-men evaluation. Each criterion is explained with detailed information and after each criterion there is a space for written notes. The scale is from 1 to 4, where 1 equals bad, 2 equals weak, 3 equals good and 4 equals excellent. The idea was to exclude the average grade in order to get more deviation. The list of mental qualities and skills consists of 11 attributes, which are: need to achieve, work ethic, courage, game courage, commitment, athleticism, self-esteem, leadership, social skills, coachability and ability to control performance emotions. These upper theme qualities and skills are split into sub-qualities and skills. The sub-qualities and -skills are linked to certain actions and behaviours. A Microsoft Excel spreadsheet application was used to create the tool. The following figure (Figure 3.) describes the idea of the tool and how it works.

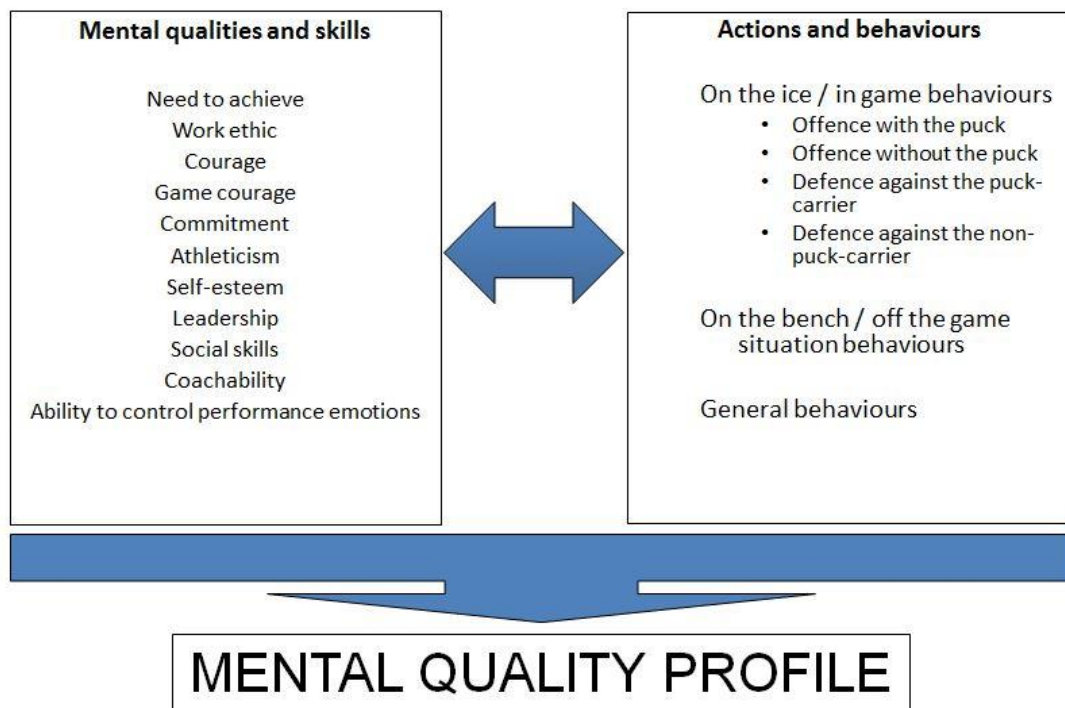


Figure 3. The ultimate idea of the tool.

## 8.1 List of actions

The list of actions includes the following important actions and behaviours considered necessary for success at an elite level or to achieve an elite level in ice hockey. Actions and behaviours are evaluated with a 1 to 4 scale (1 = Bad, 2 = Weak, 3 = Good, 4 = Excellent).

### On the ice / in game behaviours

#### Offence with the puck

1. Has courage to take responsibility with the puck
  - Tries to take initiative offensively
  - Has courage to do brave and creative acts with the puck
  - Tries to keep the puck for his own team (maintain possession), avoids giving the puck away
  - Plays bravely and creatively also in tight situations
2. Wants to produce a goal
  - Has courage to challenge and strives to score a goal
  - Strives to score a goal by playing the puck towards the net by shooting, passing or driving the net
3. Tries to follow the team's offensive rules and values (offensive discipline)
  - Gives the puck away when needed, plays for the team
  - Plays the puck into a safer area to maintain defensive readiness
4. Plays situations until the end / wants to battle
  - Follows up his own rebound
  - Has courage and is willing to play in tight situations, does not avoid physical contact
  - Is willing to win 1 on 1 battles and gives all to maintain possession for his team
  - Is "hungry" in front of the net
  - Works until the end, does not give up
5. Reacts quickly to puck loss
  - Continues playing immediately in a defensive role (non-stop grip of the game)

### **Offence without the puck**

6. Seeks / offers passing options (wants to get the puck)
  - Helps the puck carrier by offering a passing option
  - Wants responsibility with the puck
7. Tries to create time and space for the puck carrier
  - Helps the puck carrier
  - Prevents opponent from getting/reaching the puck carrier
  - Creates empty space for the puck carrier
8. Strives for loose pucks / plays situations until the end / is willing to battle
  - Is willing to win 1 on 1 battles
  - Fights and tries until the end
  - Gives all to win loose pucks
  - Has courage to play in tight situations, does not avoid physical contact
9. Strives to screen the goalie (concerns only the forwards)
  - Is ready and willing to go in front of the net
  - Tries to get in front of the goalie
  - Is "hungry" in front of the net
10. Reacts quickly to puck loss
  - Continues playing immediately in a defensive role (non-stop grip of the game)

### **Defence against the puck carrier**

11. Strives to give pressure to the opponent's puck carrier
  - Takes time and space away from the opponent as soon as possible
  - Back-checks
  - Works until the end, does not give up
12. Strives actively to steal the puck / is willing to battle
  - Is willing to win 1 on 1 battles, does not avoid physical contact
  - Strives for loose pucks
13. Strives to block shots
  - Tries to get in front of the shot and prevent the opponent from getting the puck to the net
  - Places his body in front of a shot when needed (does not dodge)/sacrifices his body

14. Strives to protect own net
  - Gives/does everything to prevent the opponent from getting into scoring range or having a scoring opportunity
15. Reacts quickly to a puck steal
  - Continues playing immediately in an offensive role (non-stop grip of the game)

### **Defence against the non-puck carrier**

16. Is willing to defend against the non-puck carrier
  - Is striving to cut down the opponent's options by taking out his own man (tries to prevent a pass to his own man)
  - Makes it difficult for the opponent to play the game
17. Is ready / willing to go and get the loose puck
  - Gets first to the puck (has courage to go into tight situations), does not avoid physical contact
  - Takes responsibility
18. Strives to protect his own net
  - Prevents the opponent from screening the goalie, keeps the area in front of the net "clean"
  - Gives/does everything to prevent the opponent from getting into scoring range or having a scoring opportunity
19. Skates to the defensive side
  - Returns quickly to the defensive zone
  - Supports his line's (five men unit) defensive game, keeps his line tight, picks up his own man in time
20. Reacts quickly to a puck steal
  - Continues playing immediately in an offensive role (non-stop grip of the game)

### **On the bench / off the game situation behaviours**

21. Follows the game, listens to the coach
  - "Lives" the game, observes the game and is focused on the game no matter what the situation is
22. Is ready and willing to go on the ice no matter what the situation is
  - Is focused on his own performance no matter what the situation is
  - Takes leadership, wants to go on the ice in tough and tight situations

23. The player has positive and energetic body-language
  - He is energetic and focused on the relevant no matter what the situation is
  - Player is excited and willing to play
24. Encourages team-mates
  - Is loud and encourages his team-mates
25. Demands better performance from a team-mate / the team
  - Takes responsibility and responds in the right way according to the situation
  - Demands better performance from team-mates, for example better passes, focus or effort
  - Is not the same thing as blaming, bitching and moaning
26. “Lives” the game with emotion and feeling
  - Celebrates goals
  - Enjoys own success
  - After failing tries harder/more

### **General behaviours**

27. Behaves as an athlete and leads by example
  - The player has appropriate clothing
  - Trains well and takes care of the amount and quality of the nutrition and rest
  - Does warm-ups, cool-downs and supportive practices/acts carefully and properly
  - Doesn’t wait to be told, doesn’t expect others to take care of him
  - Understands what is best for himself and acts accordingly
28. Is willing to learn / improve
  - Is interested in his own performance
  - Asks for feed-back and advice
  - Concentrates, listens and tries to act according to instructions
  - Is willing to try again, does not give up
29. Gives his best effort (gives all he has)
  - Gives all he has, for example, in physical tests, does not give up
  - Comes out of the “comfort-zone” and strives for the best possible result/performance

30. Takes leadership off the ice
  - Takes and carries responsibility
  - Shows by example
  - Is the "first in line"
  - Creates a positive atmosphere in the team
31. Has courage to express his own opinion
  - Expresses his own opinion when needed
  - Answers openly and honestly
32. Maintains his own performance level in games and practices
  - Can play and practice with his own good performance level regardless of the opponent or situation
  - Has a good "everyday" work ethic
33. Evaluates his own performance productively and realistically
  - Believes in his own abilities and opportunities
  - Evaluates himself realistically
  - Recognises and understands his own strengths and weaknesses
34. Is goal orientated
  - Sets goals and is committed to them
35. Gets along with others
  - Is liked and appreciated by his team-mates

## 8.2 Mental qualities and skills

The following mental qualities and skills were selected for the tool. They were considered the most essential when playing at an elite level and achieving the elite level in ice hockey. The upper theme qualities and skills consist of selected sub-qualities and –skills. These sub-qualities and skills are linked to the actions and behaviours described earlier.

**Need to achieve** consists of:

- Competitiveness, will to be better than others, will to win
- Enjoying being successful
- Ambition
- Goal orientation and goal setting

**Work ethic** consists of:

- Effort, persistence
- Determination
- Will to battle
- Will to practice, develop and learn

**Courage** consists of:

- Holding one's own
- Courage to play in tight situations, is not afraid of physical contact

**Game courage** consists of:

- Courage to take brave and creative action, courage to take initiatives

**Commitment** consists of:

- Game discipline
- Emotionally engaged
- Willingness to play for the team/team-mate

**Athleticism** consists of:

- Initiableness
- Responsibility for own performance and performance level

**Self-esteem** consists of:

- Positive and realistic self-image
- Faith in own abilities

**Leadership** consists of:

- Will to carry responsibility
- Strive to affect and lead team-mates
- Courage to express own opinion

**Social skills** consist of:

- Gets along with others
- Is liked and appreciated among team-mates

**Coachability** consists of:

- Respects coach and coaching process
- Receptiveness

**Ability to control performance emotions** consists of:

- Ability to cope with pressure
- Environment, mistakes, etc. and their effect on performance
- Mental and physical preparation
- Ability to maintain focus on performance



## 9 Discussion

Talent identification plays a significant role in elite level ice hockey. Lots of resources are used for player scouting, evaluation and selection processes. Scouts and coaches evaluate players constantly to identify and select the best possible players to build a winning team or to find the future elite players. Coaches also need to evaluate players to be able to help them to develop. Coaching the individuals is emphasized in team sports nowadays and the importance and the role of mental coaching is considered crucial.

It is believed that mental factors have a major role in achieving and playing at an elite level. Mental factors are considered an essential part, maybe the most essential, in player scouting, evaluation and selection. The players also consider the mental factors crucial. Still, this is the area where we have the least research information. Unfortunately, the research information about the mental requirements of ice hockey is very limited. It seems that the mental factors are evaluated on a very general and abstract level. Definitions of the mental requirements of ice hockey are imprecise and inconsistent. We lack the specific and detailed research information about the mental requirements and how a particular mental quality or mental skill can be identified from a player's behaviours and performance. According to my experience and knowledge from the source material mental factors are considered and evaluated many times as a single complex. Lots of different qualities and skills are listed that go under that single complex. The connection to specific actions and behaviours are defined vaguely, if at all. "Gut feeling" seems to play a major role in evaluating players' mental factors even with the experts. Is it possible to evaluate and compare players systematically and equally without specific and clear criteria? Is it possible to process, summarize, compare and study the collected data and information without a specific tool and criteria? Are the different people (coaches, scouts, players, etc.) on the same page considering the mental requirements of ice hockey? Do they understand the abstract mental factors and their consequences in the same way? Can they identify the mental factors consistently? The Behavioral Scouting –tool was planned to help to solve these issues and answer these questions.

Generally in sports psychology it seems that the information, terminology, definitions and concepts are partly inconsistent and unclear. Therefore it was challenging to structure and parse the theory. It feels important to establish a common and consistent language. Also the interrelationship between the psychological factors was complex and ambiguous. At the same time, very few sports have introduced comprehensive analysis of the mental requirements,

even though the importance of the mental factors is widely recognised. Researchers do not exactly know which factors they should look for. Athletes have been tested many times with different general psychological tests without specific reference to the sport or even sports generally. There are some specific psychological tests and also interviews are used to evaluate athletes' psychological factors and these methods have been lately in use in ice hockey as well. But, the received information and the feedback for the player often remain at an abstract level. It is also challenging to apply these techniques and methods in practice.

Instead of evaluating particular mental qualities or mental skills directly, the Behavioral Scouting –tool focuses on evaluating the observable, specific and concrete actions and behaviours. A player's will and effort to execute the chosen criteria is under evaluation and the outcome is "excluded". These actions and behaviours are linked to certain mental qualities and skills and as an end result it gives the mental quality profile of the player. This way it is possible to look at the abstract mental factors from a different perspective and it increases the consistent understanding of the mental factors. Using the Behavioral Scouting –tool helps people set the common language and it helps them concretise the mental factors.

The tool is helpful for the individual coaching process and increasing a player's self-awareness is one of the main objectives of the tool. Increased self-awareness enhances learning and development. I believe that a player needs concrete, specific and detailed feedback and information to develop. The tool is helpful also in the player selection process; systematically carried out evaluation helps to make comparisons between players. The tool helps also organizations establish a common language and evaluation / selection criteria concerning the mental aspect of talent identification.

The observable actions and behaviours are planned to be "easy to see", although some of the things in the criteria require more time and a better understanding of the player to get a thorough view of him. More experience and feedback from a practical use of the tool is still needed. It will help to update and improve the lists of actions and behaviours, as well as the list of mental qualities and mental skills. The table of multipliers was challenging to create and it feels like it is an endless swamp – new ideas occur constantly. Experience from practical use will certainly help to update that table as well. Research to study the tool's reliability and validity is also needed. It requires at least 200-300 players to be evaluated by two evaluators.

The scale from 1 to 4 was selected with the idea of getting more deviation. A wider scale should be considered. Also a scale with an average grade, for example 1-5, should be considered. A 1 to 4 scale might actually give less deviation and it might be difficult to find a grade to fit with the player. A similar tool for evaluating goalies' mental factors is needed as well. Specific actions and behaviours, as well as the mental qualities and skills for goalies should be defined.

To get the tool more user-friendly and improve its practicality, it should be made an internet based program on a server. That would enable many new possibilities including: possibility to process and summarize the data more easily, possibility to select the wanted criteria and modify the tool to meet the needs of the user, add "not found" to the scale, etc. I have already started to work on getting the tool on a server and a web based program. Also, tutorial video clips containing selected scenes that present the criteria would help users get familiar with the criteria in the tool.

So far, the experience from using the tool has been positive. The information, results and the profile it gives seems to fit the player and the player is recognisable according to the end result. There is great need for applied psychological tests for coaches to help them measure athletes' sport specific psychological qualities. I believe this tool is useful to help to fill that need. The Behavioral Scouting –tool could be modified to work in most game sports. The idea of the tool has inspired experts in Germany to develop a similar tool for soccer. The Football Federation of Saxony-Anhalt (Germany) has been using the tool within their talent identification program for three years.

## Bibliography

Alatalo, M. 2005. IIHF International coaching symposium 2005, Vienna – The transition game. URL:

<http://www.iihce.fi/suomeksi/Seminaarit/IIHFVienna2005/tabid/442/language/fi-FI/Default.aspx>. Quoted: 27.1.2012

Arajärvi, P. Lehtoviita, T. 2012. Keskittyminen. In Matikka, L. Roos-Salmi, M. Urheilopsykologian perusteet. [Principles of sport psychology]. Liikuntatieteellinen Seura ry.

Athletic Scholarships. Ice hockey history and how the game is played – Origins and roots.

URL: <http://www.athleticscholarships.net/history-of-ice-hockey.htm>. Quoted: 24.1.2012

Barbour, S. Orlick, T. 1999. Mental Skills of National Hockey League Players. URL:

[http://www.zoneofexcellence.ca/Journal/Issue02/Mental\\_Skills\\_Nat\\_Hockey.pdf](http://www.zoneofexcellence.ca/Journal/Issue02/Mental_Skills_Nat_Hockey.pdf). Quoted: 29.6.2013

Birrer, D. Morgan, G. 2010. Psychological skills training as a way to enhance an athlete's performance in high-intensity sports. Scandinavian Journal of Medicine & Science in Sports. Vol 20, Supplement 2, October 2010. 78-87.

Bordens, K. Horowitz, I. 2000. Social Psychology. 2. ed. Lawrence Erlbaum. Mahwah, NJ, USA.

Boston Bruins. 2013. Scouting Staff. URL: <http://bruins.nhl.com/club/page.htm?id=39034>.

Quoted: 1.7.2013.

Britannica, online encyclopedia. Norm.

<http://www.britannica.com/EBchecked/topic/418203/norm>. Quoted: 5.2.2012

Columbus Blue Jackets. 2013. Hockey Operations – Executive Staff. URL:

<http://bluejackets.nhl.com/club/page.htm?id=48248>. Quoted: 2.7.2013

Cook, M. 1982. Soccer coaching and team management. EP Publishing Ltd.

- Cook, S. 2009. Building a High-Performance Team – Proven techniques for effective team working. IT Governance Publishing, Cambridgeshire, United Kingdom.
- Cope, C. Eyes, M. Beauchamp, M. Schinke, R. Bosselut, G. 2011. Informal roles on sport teams. International Journal of Sport and Exercise Psychology. Vol 9, No 1. March 2011. 19-30.
- Cox, M. H., Miles, D. S., Verde, T. J., Rhodes, E. C. 1995. Applied physiology of ice hockey. Sports Medicine, Vol 19, No 3. March 1995. 184-201.
- Davidson, R. 2012. Pelaa parempaa jääkiekkoa – 50 olennaista taitoa pelin parantamiseksi. Kariston kirjapaino Oy, Hämeenlinna, Finland.
- Enhanger, K. 2012. Henkinen valmennus ratkaisee. MTV 3 - Tulosuutu 8.1.2012.
- Gledhill, N. Jamnik, V. 2007. Detailed Assesment Protocols For NHL Entry Draft Players. URL: <http://centralscouting.nhl.com/link3/sections/cs/public/combine/protocol.pdf>.  
Quoted: 25.2.2012
- Heino, S. 2000. Valmentautumisen psykologia. VK-Kustannus Oy, Lahti, Finland.
- Hockey Centre a. Kansainvälisen pelin vaatimukset - Pelaajan voittava pelaaminen pelitilanne-rooleissa. [Requirements of international game – Player’s winning play in game situation roles]. URL:  
<http://www.iihce.fi/suomeksi/Harjoittelujapelaaminen/Kansainv%C3%A4lisenpelinvaatimukset/tabid/737/language/fi-FI/Default.aspx>. Quoted: 29.2.2012
- Hockey Centre b. Lajitekniikat -ja taidot. [Sport specific technical skills]. URL:  
<http://www.iihce.fi/suomeksi/J%C3%A4%20harjoittelu/Lajitekniikatjataidot/tabid/222/Default.aspx>.  
Quoted: 28.4.2013
- Hockey Centre c. Luistelu. [Skating]. URL:  
<http://www.iihce.fi/suomeksi/J%C3%A4%20harjoittelu/Lajitekniikatjataidot/Luistelu/tabid/116/Default.aspx>. Quoted: 28.4.2013

Hockey Centre d. Kiekonhallinta. [Puck control]. URL:  
<http://www.iihce.fi/suomeksi/J%C3%A4%C3%A4harjoittelu/Lajitekniikatjатаidot/Kiekonhallinta/tabid/229/Default.aspx>. Quoted: 2.5.2013

Hockey Centre e. Syöttäminen ja vastaanotto. [Passing and receiving]. URL:  
<http://www.iihce.fi/suomeksi/J%C3%A4%C3%A4harjoittelu/Lajitekniikatjатаidot/Sy%C3%B6tt%C3%A4minenjavastaanotto/tabid/1129/Default.aspx>. Quoted: 2.5.2013

Hockey Centre f. Laukominen. [Shooting]. URL:  
<http://www.iihce.fi/suomeksi/J%C3%A4%C3%A4harjoittelu/Lajitekniikatjатаidot/Laukominen/tabid/231/Default.aspx>. Quoted: 2.5.2013

Hockey Centre g. Pelitaidot. [Playing skills]. URL:  
<http://www.iihce.fi/suomeksi/Jääharjoittelu/Pelitaidot/tabid/224/Default.aspx>. Quoted: 2.5.2013

Holland, M. Woodcock, C. Cumming, J. Duda, J. 2010. Mental Qualities and Employed Mental Techniques of Young Elite Team Sport Athletes. *Journal of Clinical Sport Psychology*. Vol 4, Issue 1, March 2010, 19-38.

Holtari, J. 2007. International Coaches Conference 2007, Vierumäki, Finland – Scouting – Helping to Improve Your Team or Club. URL:  
<http://www.iihce.fi/suomeksi/Seminaarit/ICC2007/tabid/132/Default.aspx>. Quoted: 1.7.2013.

Holtari, J. 2012. Personal interview. European head scout for Boston Bruins of National Hockey League (NHL). 31.1.2012, Jyväskylä, Finland.

Honkavaara, A. Kauhala, H. Laelma, J. Leinonen, K. Otila. Wallenius, P. 1989. *Kaukalon Leijonat. Suomalaista jääkiekkoa 60 vuotta*. [Rink Lions – 60 years of Finnish ice hockey]. US-Mediat Oy. Rauma, Finland.

International Ice Hockey Federation. 2010. IIHF Rule Book. URL:  
[http://www.iihf.com/fileadmin/user\\_upload/PDF/Sport/rulebook2010/Rulebook\\_10\\_51\\_-\\_29\\_September.pdf](http://www.iihf.com/fileadmin/user_upload/PDF/Sport/rulebook2010/Rulebook_10_51_-_29_September.pdf). Quoted: 13.2.2012

International Ice Hockey Federation. The early beginnings. URL:  
<http://www.iihf.com/se/iihf-home/history.html>. Quoted: 24.1.2012

Janssen, J. 1999. Championship team building – What every coach needs to know to build a motivated, committed & cohesive team. *Winning the Mental Game*. Tucson, USA.

Kekäläinen, J. 2012. International Youth Coaching Symposium 2012, Helsinki, Finland. URL:  
<http://www.iihce.fi/suomeksi/Seminaarit/IIHFYouthCoachingSymposiumHelsinki2012/tabid/3033/Default.aspx>. Quoted: 2.7.2013

Keltinkangas-Järvinen, L. 1994. Hyvä itsetunto. [Good self-concept]. WSOY. Juva, Finland.

Kokkonen, M. 2012. Tunteet ja niiden säätely kilpaurheilun keskiössä. In Matikka, L. Roos-Salmi, M. *Urheilupsykologian perusteet*. [Principles of sport psychology]. Liikuntatieteellinen Seura ry. 69-83.

Lintunen, T. Rovio, E. Haarala, S. Orava, M. Westerlund, E. Ruiz, M. 2012. Urheilupsykologia, liikuntapsykologia ja valmennuksen psykologia. In Matikka, L. Roos-Salmi, M. *Urheilupsykologian perusteet*. [Principles of sport psychology]. Liikuntatieteellinen Seura ry. 30-37.

Liukkonen, J. 2004. Urheilupsykologia. [Sport psychology]. In Mero, A. Nummela, A. Keskinen, K. Häkkinen, K. *Urheiluvalmennus*. [Coaching in sports]. VK-Kustannus Oy, Lahti, Finland. 215-239.

Liukkonen, J. Jaakkola, T. 2012. Urheilijan motivaatio. In Matikka, L. Roos-Salmi, M. *Urheilupsykologian perusteet*. [Principles of sport psychology]. Liikuntatieteellinen Seura ry. 48-65.

Loehr, J. 1989. Psychological skills training for competition. In Groppe, J. Loehr, J. Melville, S. Quinn, A. *Science of coaching tennis*. Human Kinetics. USA.

Matikka, L. 2012. Mitä urheilupsykologia on? In Matikka, L. Roos-Salmi, M. *Urheilupsykologian perusteet*. [Principles of sport psychology]. Liikuntatieteellinen Seura ry. 23-37.

- Matikka, L. Roos-Salmi, M. 2012. Urheilupsykologian perusteet. [Principles of sport psychology]. Liikuntatieteellinen Seura ry.
- Meyers, A. Schlessler, R. 1980. A Cognitive Behavioral Intervention for Improving Basketball Performance. *Journal of Sport Psychology*. Vol 2, Issue 1, 69-73.
- Miller, S. 2003. *Hockey Tough*. Human Kinetics. Illinois, USA
- Montgomery, D. 2000. (Garret, W, Jr. Kirkendall, D. 2000) *Exercise and sport science. Physiology of ice hockey*. Lippincott Williams & Wilkins. Philadelphia, USA.
- Montgomery, D. 2006. Physiological profile of professional hockey players – a longitudinal comparison. *Applied Physiology, Nutrition & Metabolism*. Vol 31, No 3, 3 April 2006, 181-185.
- Morris, T. 2000. Psychological characteristics and talent identification in soccer. *Journal Sports Science*. Vol 18, Issue 9, September 2000, 715-726.
- Quinney, H. Dewart, R. Game, A. Snyder, G. Warburton, D. Bell, G. 2008. A 26 year physiological description of a National Hockey League team. *Applied Physiology, Nutrition & Metabolism*. Vol 33, 6 June 2008, 753-760.
- Rautakorpi, J. 2010. Meidän peli –koulutuspäivät 2010 – Meidän peli + kansainvälisen pelin vaatimukset. [Our game – seminar 2010 – Our game + requirements of international game]. URL:  
<http://www.iihce.fi/suomeksi/Seminaarit/Meid%C3%A4nPelikoulutus%C3%A4iv%C3%A4t2010/tabid/1128/language/fi-FI/Default.aspx>. Quoted: 25.1.2012
- Roos-Salmi, M. 2012. Itseluottamus. [Self-confidence]. In Matikka, L. Roos-Salmi, M. *Urheilupsykologian perusteet*. [Principles of sport psychology]. Liikuntatieteellinen Seura ry.
- Saarinen, M. 2008a. Pelitilanteiden määrät jääkiekko-ottelussa. [Quantity of game situations in ice hockey game]. URL: <http://www.iihce.fi/suomeksi/Artikkelit/tabid/246/language/fi-FI/Default.aspx?Categories1=605>. Quoted: 25.1.2012



Saarinen, M. 2008b. Pelitilanteiden määrät jääkiekko-ottelussa tasakentällisin. [Quantity of game situations on even strength in ice hockey game]. URL:  
<http://www.iihce.fi/suomeksi/Artikkelit/tabid/246/language/fi-FI/Default.aspx?Categories1=605>. Quoted: 1.2..2012

Savolainen, K. 2008. Pelinopeuden kehittäminen koulutuspäivät 2008 – Johdatus pelinopeuden kehittämiseen. [Developing game speed –seminar 2008 – Introduction to developing game speed]. URL:  
<http://www.iihce.fi/suomeksi/Seminaarit/PelinopeudenKehitt%C3%A4minen2008/tabid/136/language/fi-FI/Default.aspx>. Quoted: 28.1.2012

Savolainen, K. 2009. Suomi-kiekko tulevaisuusseminaari 2009. [Finnsh-hockey future seminar 2009]. URL:  
<http://www.iihce.fi/Portals/0/Library/MAALIANALYYSI%20%20seminaariversio.pdf>.  
Quoted: 18.2.2012

Suomen Jääkiekkoliitto. Valmentajan käsikirja, taso 4: 15-19 vuotiaat. [Coache's manual, level 4: 15-19 years old]

Tapola, J. 2008. Pelinopeuden kehittäminen koulutuspäivät 2008 – Yksilön pelitaidot osana pelinopeutta. [Developing game speed –seminar 2008 – Individual's skills as a part of game speed] URL:  
<http://www.iihce.fi/suomeksi/Seminaarit/PelinopeudenKehittäminen2008/tabid/136/language/fi-FI/Default.aspx>. Quoted: 28.1.2012

Twist, P. 1997. Complete conditioning for ice hockey. Human Kinetics.

Vealey, R. 1988. Future directions in psychological skill training. The Sport Psychologist. Vol 2, Issue 4, December 1988, 318-336.

Wahlsten, Ja. Wahlsten, Ju. Wahlsten, S. 1992. Aloituskiekko. [Face off –puck]. WSOY. Porvoo.

Walter, R. Johnston, M. 2010. Hockey plays and Strategies. Human Kinetics. USA.

Weinberg, R. Gould, D. 2003. Foundations of sport & exercise psychology. 3. ed. Human Kinetics.

Westerlund, E. 1997. Jääkiekko. [Ice hockey]. In Mero, A. Nummela, A. Keskinen, K. Nykyaikainen urheiluvalmennus. [Modern coaching in sports]. Mero Oy. 527-544.

Westerlund, E. 2007. International Coaches Conference 2007, Vierumäki, Finland - Art and Science of Coaching. URL:

<http://www.iihce.fi/suomeksi/Seminaarit/ICC2007/tabid/132/Default.aspx>. Quoted: 1.7.2013.

Westerlund, E. Summanen, R. 2001. Let's beat them in ice hockey. Polar Electro Oy.

Wikipedia. 2012. Ice hockey. URL: [http://en.wikipedia.org/wiki/Ice\\_hockey](http://en.wikipedia.org/wiki/Ice_hockey). 23.1.2012.

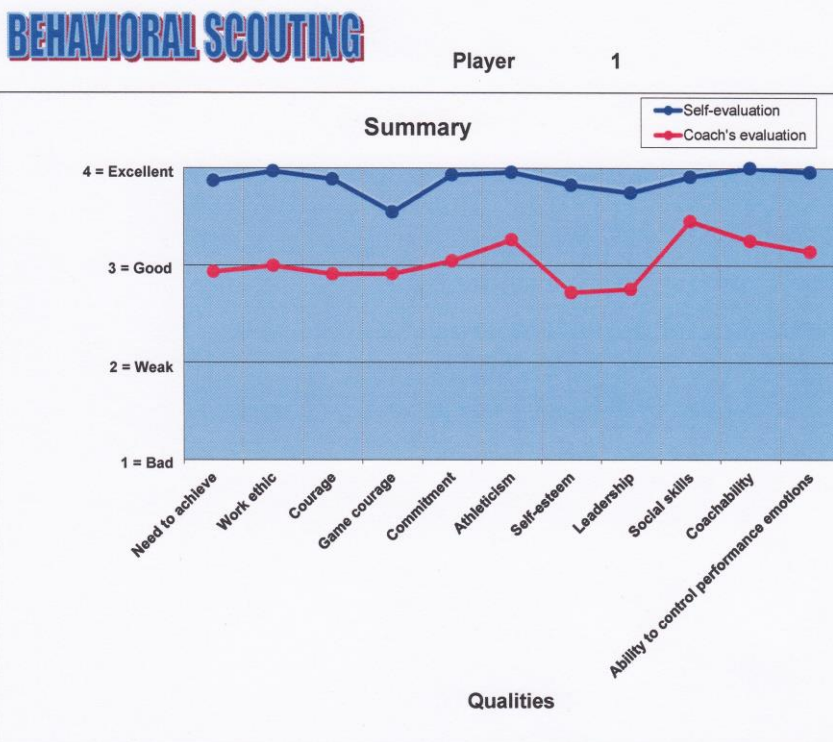
Williams, A. Reilly, T. 2000. Talent identification and development in soccer. Journal of Sports Sciences. Vol 18, Nr 9, September 2000, 657-667.

Woodcock, C, Holland, M. Duda, J. Cumming, J. 2011. Psychological Qualities of Elite Adolescent Rugby Players: Parents, Coaches, and Sport Administration Staff Perception and Supporting Roles. Sport Psychologist. Vol 25, Issue 4, December 2011, 411-443.

# Appendices

## Appendix 1. An example of an evaluation

BEHAVIORAL SCOUTING		SUMMARY					
Player information:		Forward		Date: 30.10.2013			
First name	Last name	Date of birth	Position	L/R	Team / Club	Height (cm)	Weight (kg)
Player	1	1.1.1981	LW	L		185	90
Evaluate the player by giving a grade that describes best his behavior 1 = Bad, 2 = Weak, 3 = Good, 4 = Excellent							
					Self-evaluation	Coach's evaluation	
On the ice / in game behaviors							
Offence with the puck							
1. Has courage to take responsibility with the puck					3	3	
2. Wants to produce a goal					3	2	
3. Tries to follow the team's offensive rules and values (offensive discipline)					4	3	
4. Plays situations until the end / wants to battle					4	3	
5. Reacts quickly to puck loss					4	3	
Offence without the puck							
6. Seeks / offers passing options (wants to get the puck)					4	3	
7. Tries to create time and space for the puck carrier					4	3	
8. Strives for loose pucks / plays situations until the end / is willing to battle					4	3	
9. Strives to screen the goalie					4	2	
10. Reacts quickly to puck loss					4	3	
Defence against the puck carrier							
11. Strives to give pressure to the opponent's puck carrier					4	3	
12. Strives actively to steal the puck / is willing to battle					4	3	
13. Strives to block shots					4	4	
14. Strives to protect own net					4	3	
15. Reacts quickly to a puck steal					4	3	
Defence against the non-puck carrier							
16. Is willing to defend against the non-puck carrier					4	4	
17. Is ready / willing to go and get the loose puck					4	3	
18. Strives to protect his own net					4	3	
19. Skates to the defensive side					4	3	
20. Reacts quickly to a puck steal					4	3	
On the bench / off the game situation behaviors							
21. Follows the game, listens to the coach					4	4	
22. Is ready and willing to go on the ice no matter what the situation is					4	3	
23. The player has positive and energetic body-language					4	3	
24. Encourages team-mates					4	2	
25. Demands better performance from a team-mate / the team					3	2	
26. "Lives" the game with emotion and feeling					4	3	
General behaviors							
27. Behaves as an athlete and leads by example					4	4	
28. Is willing to learn / improve					4	3	
29. Gives his best effort (gives all he has)					4	3	
30. Takes leadership off the ice					3	2	
31. Has courage to express his own opinion					4	3	
32. Maintains his own performance level in games and practices					4	3	
33. Evaluates his own performance productively and realistically					4	2	
34. Is goal orientated					4	3	
35. Gets along with others					4	4	
Add comments							
Note the player's behavior during losing or critical situations. Does a game situation or the importance of a game have a positive or a negative effect on the player's performance?							



	SELF-EVALUATION	COACH'S EVALUATION
<b>Need to achieve</b>	<b>96,72 %</b>	<b>73,28 %</b>
Competitiveness, will to be better than others, will to win	97,73 %	73,58 %
Enjoying being successful	100,00 %	75,00 %
Ambition	94,39 %	72,45 %
Goal orientation and goal setting	100,00 %	75,00 %
<b>Work ethic</b>	<b>99,13 %</b>	<b>74,88 %</b>
Effort, persistence	100,00 %	76,79 %
Determination	99,19 %	73,39 %
Will to battle	99,44 %	72,22 %
Will to practice, develop and learn	96,00 %	78,00 %
<b>Courage</b>	<b>97,09 %</b>	<b>72,67 %</b>
Holding one's own	100,00 %	75,00 %
Courage to play in tight situations, is not afraid of physical contact	96,95 %	72,56 %
<b>Game courage</b>	<b>88,64 %</b>	<b>72,73 %</b>
Courage to take brave and creative actions, courage to take initiatives	88,64 %	72,73 %
<b>Commitment</b>	<b>98,20 %</b>	<b>76,08 %</b>
Game discipline	100,00 %	79,72 %
Emotionally engaged	87,50 %	60,00 %
Willingness to play for the team/team-mate	98,36 %	75,66 %
<b>Athleticism</b>	<b>98,91 %</b>	<b>81,52 %</b>
Initiativeness	97,73 %	81,82 %
Responsibility for own performance and performance level	100,00 %	81,25 %
<b>Self-esteem</b>	<b>95,61 %</b>	<b>67,98 %</b>
Positive and realistic self-image	100,00 %	50,00 %
Faith in own abilities	95,28 %	69,34 %
<b>Leadership</b>	<b>93,63 %</b>	<b>68,87 %</b>
Will to carry responsibility	95,64 %	72,09 %
Strive to affect and lead team-mates	83,33 %	50,00 %
Courage to express own opinion	87,50 %	62,50 %
<b>Social skills</b>	<b>97,73 %</b>	<b>86,36 %</b>
Gets along with others	96,43 %	78,57 %
Is liked and appreciated among team-mates	100,00 %	100,00 %
<b>Coachability</b>	<b>100,00 %</b>	<b>81,25 %</b>
Respects coach and coaching process	100,00 %	81,25 %
Receptiveness	100,00 %	81,25 %
<b>Ability to control performance emotions</b>	<b>98,98 %</b>	<b>78,57 %</b>
Ability to cope with pressure	95,83 %	75,00 %
Environment, mistakes, etc. and their effect on performance	100,00 %	75,00 %
Mental and physical preparation	100,00 %	80,00 %
Ability to maintain focus on performance	100,00 %	80,43 %