

Composition of game sense in ice hockey

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<p>In this thesis the reader will be given insight on what game sense really consists of. In the following pages, game sense is broken down to many different sub categories which all are examined more closely and explained in a simple manner.</p> <p>The purpose for making this work is to help coaches to develop game sense in their players, but also for players to find tips to develop their game sense individually.</p> <p>This thesis includes many of the most recognized game sense theories from acknowledged authors, but also many recent theories from professional ice hockey coaches and bloggers. In addition to just including information of game sense in sports, you can find basic and modern learning theories from educational field.</p> <p>On top of the report on game sense, there is a small video library showing examples of many common game situations and the use of game sense. All of the video clips are built around the IIHF's four game situation roles, which are 1.puck carrier, 2.offensive player without the puck, 3.defending against the puck carrier and 4.defending a player without the puck. By using short video clips in this work, the viewer finds most of the commonly occurring game situations quickly without watching countless hours of material trying to find a specific game situation.</p> <p>In no manner this thesis is a full guide book on how to play ice hockey the right way. Instead this work will give the reader the knowledge on what exactly game sense is in ice hockey. Also it will show any coach how to implement game sense learning in everyday training and gives the basic information any growing player needs for learning game sense on their own outside team practices.</p>	
<p>Keywords Ice-hockey, game sense, hockey sense</p>	

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1 Introduction

There are tons of material in hockey literature and everywhere on the web on how to teach specific skills and tactics in ice hockey. Even the smallest details covering everything from the right recovery technique in a skating stride to a manual on how to improve the use of your stick's backhand can be found when searched. Because of the reason told in the previous sentence, technical- and tactical coaching level is at least on a decent level in most of the hockey countries in the world. Meanwhile game sense learning is left on its own weight in team practices.

The author had been previously coaching in Finland before moving to coach in the western border of Austria. In a small club in Austria the author noticed huge differences between players in the same age groups, even between two sets of twins. Few players had the talent and were better at playing hockey in general than the rest of the team, while there were two to four players in each age group who were a lot behind the majority of the rest. The differences were mostly technical but what was also clear was that the best group of players made mature and smart decisions in games. This raised questions such as: Why are there such big differences in skill level inside a group that have been training together for years? Could the right decisions on ice be taught early on? And how could the right decisions be taught?

Ice hockey as a sport is not just physical execution, but instead it is mentally very demanding activity and is shifting towards a more tactical approach year by year all over the world. At the same time game sense is considered more and more desirable trait in players from juniors to professional level. This is where the role of the coach comes in. Most coaches' on-ice season plans are filled with two sections, which are technical and tactical aspects of the game. This is because it is generally thought that game sense, which is often also referred as hockey sense, is a talent which some players simply possess when most lack it partly or completely. Ice hockey from an individual player's point of view is a series of decisions made on the ice. Hockey sense is a tool for a player, which helps them end up in the right decisions that will help their team.

In the recent years hockey sense has gained more attention in the top end of ice hockey coaching and is working its way through to every level of ice hockey. Of course hockey sense is also learned doing normal tactical drills or even flow drills, but not enough. That's why in today's ice hockey it's important to implement a whole new section into the season plan, called hockey sense.

The purpose of this thesis is to search the answers to the questions asked earlier in this introduction, as well as break down hockey sense and help any coach or player in improving their own hockey sense or skill to pass it on. For players and coaches to study, this thesis also includes a video library of examples of different game situations and decisions what players make in them to gain the most favourable outcome.

2 Game sense in ice hockey

Besides skills like skating, shooting and puck handling, there has always been one trait in an ice hockey player that is evaluated by everyone who watches the game. That trait is hockey sense. Sometimes it seems that certain players have eyes on their backs, or just knows exactly where their line mate is going to be and, by using that knowledge, makes amazing plays that rest of the players simply can't perform. When players stand out from the rest with great hockey sense, they often are considered great players even if they lack in some other areas of the game. Even though hockey sense is considered more of a gift than a teachable skill, it is a huge part of the game, but there happens to be ways to teach that to our young players. (Jamie McKinven, glassandout.com 22.10.2014)

In all its simplicity game sense can be constructed of three different aspects of the game: tactical knowledge, reading the situation, and decision making skills. When a player outside a game situation knows or thinks they know which play or act is the most beneficial for their team inside a certain moment in a game, they are using their tactical skills. Therefore tactical skills give a player a base on which to make multiple decisions towards a desirable goal. For every aspect in life to master anything, it is important to first learn the basic events inside and surrounding that which you are trying to master. To learn what goes on inside the game a player must use their cognitive skills, perception, attention and concentration to be able to see forehand in what direction the play is going. By other words this is reading the situation. When a player is aware of what is going on around them and knows what usually follows after their decisions, they are ready to execute good decisions inside fast moving game situations. Even if a player knows what should be done after thinking and weighing all the options it's the quickness of finding the right decisions, which can be the difference between a marvelous and a very hazardous play. (Martens 2004, 179-192)

In addition to Martens's views in the definition of game sense, Jeremy Rupke, the creator of howtohockey.com has gone even deeper in discovering what game sense really is. The following list, as stated on howtohockey.com by Jeremy Rupke, hockey sense consists of six aspects and/or skills that are specific for ice hockey.

Experience – The better you understand the game the more effective you will be

Habits – Recognizing cues allows your habits to kick in, allowing you to perform tasks with very little hesitation

Anticipation – Anticipating the moves of your team mates and opponents allows you make better decisions

Decision Making – You always have multiple options on the ice, good decision making will make you more effective

Pattern Recognition – Hockey is a game of patterns and plays, when you recognize a pattern you can predict where your team mates will be (according to plays you work on at practice)

Influence – You can influence plays with or without the puck, your position, actions, and amount of pressure will influence the opponents' next move.

“In short, hockey sense means being one step ahead of the play. It’s about going to where the puck will be, and reading where your team mates and opponents will be.”(Jeremy Rupke, howtohockey.com 1.3.2013)

In the next sub chapters I will dig deeper into the six parts of hockey sense presented by Jeremy Rupke, but I will also introduce a part of article about perceptual cognitive ability written by Jocelyn Faubert and Lee Sidebottom.

2.1 Perceptual-cognitive ability

A huge part of player’s overall hockey sense, is the ability the read the game. Inside the game there are several moving objects including both players and the puck. It is a complicated task for any player to keep track of everything that goes around them, not mentioning seeing the ever occurring patterns and predicting what is going to happen next. Ice hockey especially being such a fast sport with many variable situations and outcomes can’t be viewed easily as a whole and thus puts a big strain on human brain and its psychological capacities. As the level of the game increases, so does the speed, and reading the game, in other words perceptual-cognitive ability becomes a huge fac-

tor determining if the player can play at the higher levels of ice hockey. (Faubert & Sidebottom 2012)

2.1.1 MOT – Multiple Object Tracking

In the year 1988 Zenon W. Pylyshyn and Ron W. Storm introduced MOT – Multiple Object Tracking. In their work they studied how people track multiple moving objects inside a restricted area. In the study about MOT, subjects are presented with a dynamic field with a group of elements which are constantly moving and can interact with each other. The subjects' task then is to focus on as many of the presented elements as possible and track their movement. It didn't take long for researchers to realize MOT relates strongly with sports, especially team sports. In order for a player to be able to read the game thoroughly, they must be aware of their surroundings, which means they have to track multiple variable elements inside the game, in other words use MOT. In the figure 1 is an example of a situation where MOT is important: football goalkeeper has to see the opponent players as well as their own defenders and the ball. In sports, for effective and fast decision making a good level of MOT in a player gives great advantage over players with lower MOT ability, so this means players in ice hockey benefits from MOT specific training. On general level, usually four different elements can be tracked by normal adults. However the number drops down to three in the older age. Studies have shown that elite athletes' MOT ability is higher than other people and sub-elite athletes, and that training the MOT ability can increase the ability on all levels of sports. (Faubert & Sidebottom 2012)

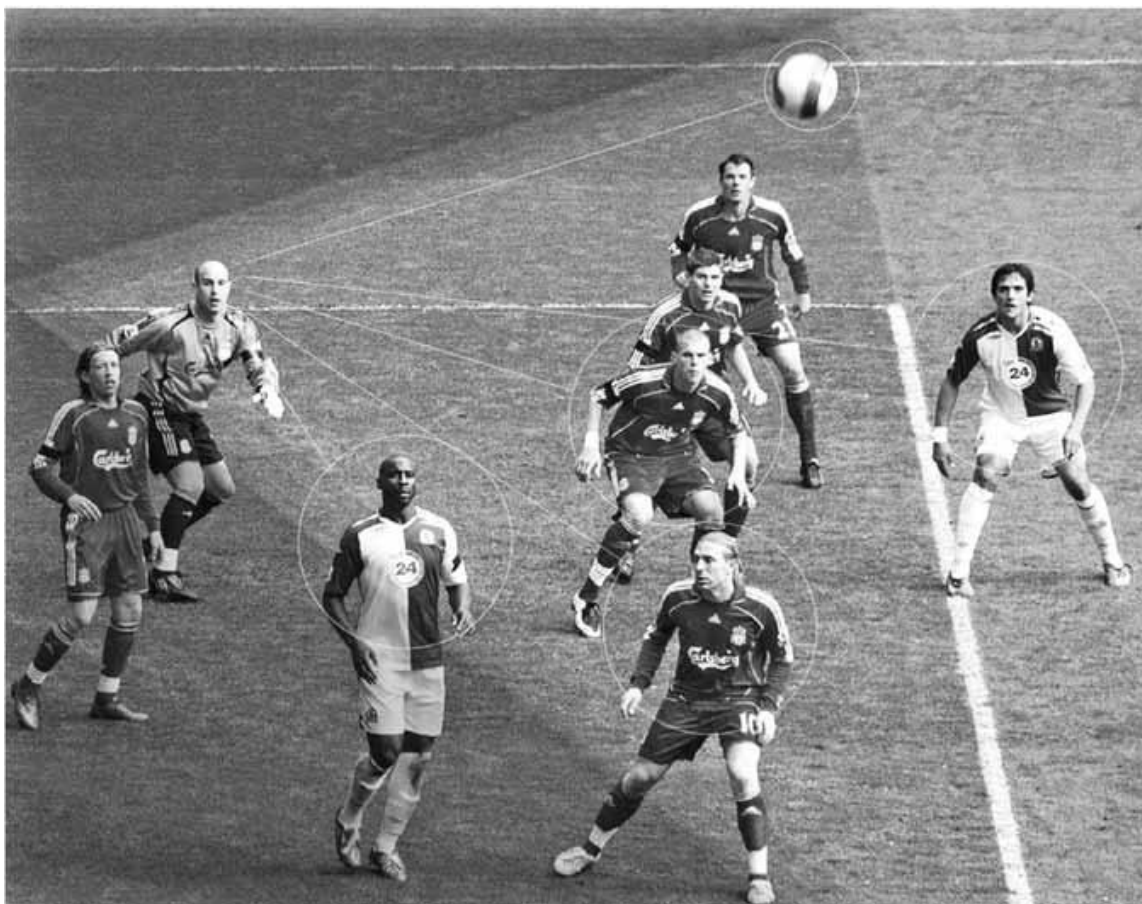


Figure 1. "Illustration of several core principles from a goalkeeper's (GK) perspective during live action that relates to the perceptual-cognitive task: (a) the GK must track multiple elements, (b) the GK must track these elements using central but also large portions of the peripheral visual field, (c) the GK must efficiently use information from a large area of the visual field, (d) the GK must process all of this information at very fast speeds." (Faubert & Sidebottom 2012)

2.1.2 Large visual field

Most of the information a hockey player gets from his surroundings is through their eyes. The player can hear commands and suggestions from their teammates behind their back, but usually decisions inside the game are made by information they see. The area which a player sees at one moment at a time is called visual field. Visual field consists of central field of focus, which is only three degrees; the rest is called peripheral visual field. The three degrees is not enough for any player to gain all the information they need of their surroundings, even in the brief moment. Earlier studies have shown that players change their field of focus rapidly, but during high-speed gameplay this, so called, "search strategy" style would leave the player with blurry non-connecting snap-

shots of their surroundings, and as a result they couldn't get all the information needed for a good play. Newer evidence shows that at least elite level athletes have adopted a style called "centralized gaze", which gives the player field of focus in the most important part of the game, but also the ability to concentrate in the events that take place inside the peripheral visual field. By spreading attention all across the visual field, a player increases the amount of critical information acquired during high-speed gameplay.

For centralized gaze tactic, Figure 1 can also be used as an example: the keeper can keep his main focus on the ball, but at the same time require information of the players he can see inside his peripheral visual field. The advantages of centralized gaze are unlimited in ice hockey, but one of the most effective ways it comes in hand for example is when trying to read a situation when player is trying to find out where a pass may end up; in this situation a player must be able to see all the possible passing options as well as the player with the puck. As it is better to gain additional information instead of just knowing what happens in your central field of focus, it's safe to say that every level athlete theoretically benefits from large and dynamic visual field.

As it is that large visual field is a great part of MOT, it can be included easily in MOT based training. In one instance, a subject is given a light controlled 8 ft square projection with a stationary "visual pivot" in the middle of the screen. The subject's task then is to shift attention between several moving objects inside the given area without removing centralized gaze from the visual pivot. This helps the subject to hone their skill in focusing in attentional information outside their central field of focus. (Faubert & Sidebottom 2012)

2.2 Experience

"The game of hockey is a continuous series of "common reoccurring situations." The more players are exposed to the situations, the better they become at reacting to them." (Hal Tarse, evelethoyouthhockey.com)

Commonly agreed fact is that usually the more experienced players in the team make more mature decisions with the puck and also position themselves better on the ice. This originates from the player playing through the same situation over and over again

during his career, and if the player has ability to think critically and constructively about his own performance, he will learn each of the countless times he plays through that certain situation, thus building his hockey sense. Experience can be compared to a databank in your head of what happens in hockey and how well can you contrast it in the situation you are at the moment. This databank gives you insight on what would be the best decision to execute at the moment. In order to have a great hockey sense, only experience is not enough. The player must have good coaching during his younger playing years, which would help him in many ways. In team practices, if the team is not training solely on a skill, it usually is going through different scenarios on the ice, just for example such as 2-2 or 3-2 attacks. It is then the coach's responsibility to imply the most important scenarios for that specific team. Training these scenarios over and over again with all the available options, the players learn to use the best option in the game with only little hesitation or no hesitation at all. As even the most common scenarios are never exactly the same, experience is not just doing the same thing from day to day, but finding the best option for the ever so slightly changing situations. Especially giving the player the correct feedback on the situations where the player has not realized if he had made the right decision or not, is important skill for coaches and it's also a huge factor in the hockey-sense building process during any player's career. (Hal Tearse, minnesotahockeymag.com 6.2.2015)

2.3 Habits

The best players seem to do even the most difficult skills and tricks easily and it seems that doing so is like a reflex to them. It's not talent; it is hours and hours of training one specific situation and the correct decisions that go hand in hand with it. When an execution inside a play comes from the spine without thinking much of it, it is called a habit. All habits however are not always good and they can serve an unbeneficial outcome for the whole team. For example: trying always to get the "Hollywood pass" which mostly ends up in the opponent's blade. At this point it is up for the player preferably with the help of a coach to change the bad habit into a good one. Ice hockey is a fast game and moving in even faster direction all the time, so the ability to execute a play without thinking is important. And that's why, from young age on, building the

right habits for the fastest situations of the game, is in a key role in player development. (Hal Tearse, elevethyouthhockey.com)

Moving on from a level to a higher one can come as a shock for many even the most talented players. On the higher level the game is usually faster and the player has less time to make the right decisions in game situations than what they got used to on a lower level. At these points in players' careers it's important to grow a set of skills, or so called habits, that can be executed without hesitation. Pro Hockey Development Group (PHDG) and Belfry hockey together has come up with a great tool for players to adapt easily to the change of level.

“Training-To-Game Transfer” is a development program that helps a player to measure their success rates and identify habits during game play. The program also manufactures a personalized development plan for the players, which measures improvement and possible changes considering individual habits. The goal of the program is to help players to get in charge of their own game, instead of letting the wrong kind of habits to dictate their gameplay, and also make the leap to the next level easier. Every player's skill inventory consists of a set of skills, which the player uses during gameplay. These skill sets in the inventory can be categorized in to two kinds: “Translate-Able” skills, which are skills and habits that the player can use throughout their career from level to level, and skills/habits, which give you success on your current level, but are useless on the next one. All starts with the individual player identifying their own skill sets; which skills can translate to the next level and what will become obsolete on the next level. For a player to rely heavily on the non-translate-able skills can be damaging for their career, because it always takes a longer period of time to adapt to the higher level. It can be considered a major reason why you can see in everyday hockey dominating players on lower leagues, but who flop every change they get in the bigger leagues. For players who you see succeeding from level to level, the case is almost always, that the players intentionally learn and improve their translate-able skills for their gameplay throughout their whole careers. (Joe Lund – Belfry hockey, prohoc.com)

2.4 Pattern Recognition and Anticipation

Walter Gretzky once said to his son Wayne: “Skate to where the puck’s going to be, not to where it has been.” (Jill Rosenfeld, 2000) That quote is as accurate now as it was when he said it. Anticipating where the puck or the game will move in the next few seconds gives a player the needed edge to buy himself time and space with the puck or steal it away from the opponent depending on the situation. You may ask: when there are ten fast moving parts plus yourself inside the game, how can you anticipate anything what might happen next? It is said that the players who possess good hockey sense are good at reading the game. This basically means that they see different patterns between the elements of the game that usually occur in situations familiar to them. When the particular player notices this familiar pattern, they remember what happened in the last several times in that same kind of situation, and therefore can anticipate what will be happening next in that certain situation they are in. That said, you can’t have good anticipation ability without skill to recognize patterns in the game play. Playing the game of hockey gives you first hand praxis of the ever occurring situations and patterns in the game, but for aiming high in hockey it takes more. Players who want to develop their hockey sense must become students of the game, meaning that they watch hockey on TV, watch other same level hockey games and most importantly, think critically all the time while watching; why is that player doing that? Could’ve there been any other outcomes? What would have I done in that situation and why? (Jamie McKinven, glassandout.com 22.10.2014; Darryl Belfry, howtohockey.com 1.3.2013)

“Players who study the game away from the rink make better decisions come game time, because they’ve rehearsed their actions over and over in their minds. They already know what they’ll do when a certain situation presents itself. Instead of reading and reacting, the top players are constantly recognizing and reacting.” (Jeremy Weiss, howtohockey.com 1.3.2013)

2.5 Decision Making

Decision making skill in a player is a combined result of all aspects of hockey sense presented before in this thesis. Better decisions are usually made when the player has time at their disposal, especially when carrying the puck. For the player to acquire that needed time, they must be effective with their skating and positioning. Many researchers have found in their studies that expert players use a so called “two glimpse tactic”, in which the player on their way to the puck looks in the general direction where the puck could be played to map the situation, and looks again after getting possession of the puck. As a contrast, lower level players lift their heads up only after touching the puck. By looking before and after the gain of possession of the puck, players have better awareness of their surroundings and so forth, more time in their hands.

The player, whether holding the puck or no, has options inside options, for example shoot to score, shoot for rebounds or shoot for deflections, and what is the best possible option in that specific moment is determined by so much more than just the player and their closest opponent. Like already covered in the perceptual-cognitive ability section of this thesis, it is very important for the player to follow all the moving parts of the game to be fully aware what is happening, and also use their pattern recognition and anticipation skill to find out what will be happening next. (Hanna Willman-Iivarinen, miratioblog.blogspot.fi 17.5.2015)

As ice hockey is a very fast moving and hectic sport, in situations where a player hasn't got time to think, decision making in games come down to intuition: how your teammates usually position themselves, how familiar you are with the situation, team tactics and personal habits. Intuition for every player is however personal, and usually improves all the time during one's career. The next picture shows factors affecting intuition in sports: (Hanna Willman-Iivarinen, miratioblog.blogspot.fi 17.5.2015)

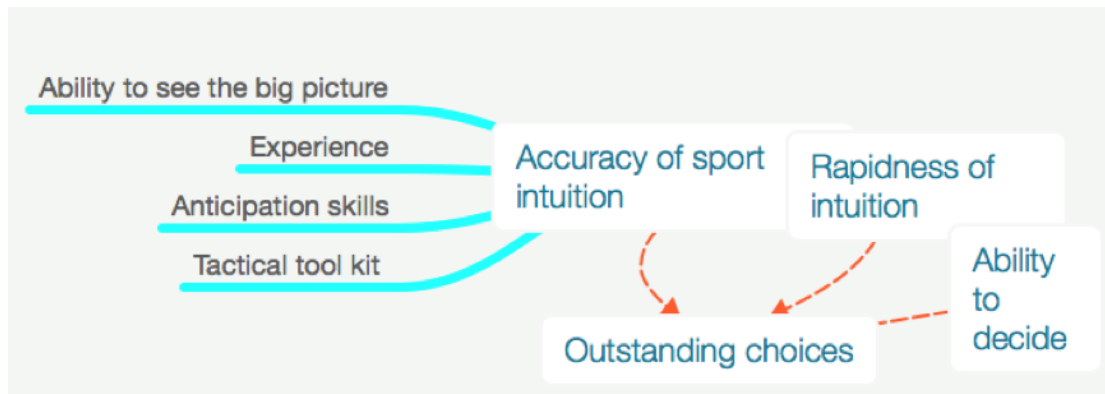


Figure 2. Sports intuition (Hanna Willman-Iivarinen, miratioblog.blogspot.fi 17.5.2015)

2.6 Influence

In perceptual-cognitive ability section of this thesis we talked about how a player has to be aware of most of the moving parts on the ice to fully decide what would be the next best move. Now turn that thing around and you get influence. By being one of the moving parts your opponent is following and at the same time trying to determine the best possible play, you influence their decision making process. On many levels of hockey and teaching hockey sense, influence is the forgotten aspect of game sense, but in fact it can be a very powerful tool to be used on the ice, when used right. As every player has a value to the opponent on the ice, you can influence the play with or even without the puck. You influence the game by positioning, by your speed, by your decision making and also by communicating with your teammates. Many ice hockey coaches and experts use terms such as creating space and creating time on the ice; this is part of the influence aspect of game sense. There are tons of ways to use your influence on the ice but maybe the most recognizable ways consists of giving pressure to the puck carrier when playing defense and moving actively into empty space when playing offense without the puck to create a passing option for the puck carrier. Faking and deceiving the opponent is also a big part of influence on the ice. You can use a body fake or a fake pass to buy yourself more time with the puck, and therefore possibly improving your decision making for that specific situation. In conclusion, everything a player does on the ice influences somebody from the opponent team, and when individuals in the team learn to harness the skill of effective influencing to the detail for their own advantage, it can be enormously helpful for the outcome of every game. (Jeremy Rupke, howtohockey.com 1.3.2013; thehockeysource.tv)

2.7 Game situation player roles in ice hockey

Inside ice hockey game an individual player encounters different game situations. These situations can be categorized into four classes by the role the player plays during a certain situation. Each situation role has the main goal set by the coach for the team, but they also differ from each other on a more detailed level. In the next sub-chapters I will explain what the four roles consist of and the objectives of an individual player in each of the situations. (IIHF 2008, 6.)

2.7.1 Offense: Puck carrier

Puck carrier in offense play is the player in possession of the puck in this situation. Puck carrier is responsible for the puck to end up in the opponent net or in a situation where the team has the possibility score. In order to succeed in this role, the player must have good decision making skills as well as the needed puck handling skills in order to execute the right decision.

Taken as a direct quotation from International Ice Hockey Federation (2008, 7) the objectives for the role of a puck carrier are:

- Offensive pressure towards the opponent's goal and/or open ice \mathcal{A} move!
- Shoot
- Pass - see the nearest passing opportunities
- Carry the puck - challenge the opponent, notice the positioning of the opponent.
- Keep moving to create time and space
- Fake before taking the puck.
- The best passing direction is often behind you
- Give and go (whenever the opponent is playing zone coverage).
- Use the space by continuing to skate
- Act to the actions of the defensemen after a screen

2.7.2 Offense: Non-puck carrier

In 5 on 5 offense play, when there is one player in possession of the puck, the four other players are called non-puck carriers. They don't have the immediate responsibility of the situation, but that doesn't mean they can slack off. The non-puck carriers must support the puck carrier in making the right decision by communicating, positioning and skating. For a great player, it doesn't mean you have to be in possession of the puck all the time, if you have a good ability to read the game and be in the right place in the right time.

Taken as a direct quotation from International Ice Hockey Federation (2008, 8) the objectives for the role of a non-puck carrier are:

- These players help maintain the "balance of power". They:
- Create width and depth
- Defensive readiness to balance
- Fake before cutting.
- Cut to a passing situation
 - From your own side towards the puck
 - From the wide to stretch
- Support
 - Make screens; for the puck carrier and for players without the puck
 - Find empty space - cut through it, clear it, go into it
 - Read and act on the state of the oppositions defending (How ready are they?)

2.7.3 Defense: Defending against puck carrier

In defense, there is always at least one player who has responsibility against the opponent player in possession of the puck. According to where the puck-carrier is on the ice surface, the responsibility of this role can vary dramatically e.g. giving pressure during forecheck versus defending a one on one rush in D-zone. In this role the player must balance between trying to steal the puck right off from the puck carrier or just contain-

ing them from making a decisive play; so the ability to read the fast moving situation is crucial for a player in this role.

Taken as a direct quotation from International Ice Hockey Federation (2008, 8) the objectives for the role of a defending against puck carrier are:

- The principals of this are:
 - pressure the puck and player
 - stay in the play
 - win the puck
- Take away the opponent's space - prevent the shot
 - Move within stick-contact range and block the nearest passing possibility
 - Lead the Puck carrier - steer with your stick
 - Steal the puck only when within a stick length.
 - Keep the opponent out of the play and/or take the puck and move.
- If stealing the puck fails
 - Stay in the play
 - Keep track of the puck and know your role

2.7.4 Defense: Defending against non-puck carrier

As in offense, so in defense, there are 4 players who are not in immediate proximity of the puck during 5 on 5 play. The players playing this role can have a minor role where they can support the player defending against puck carrier, but somewhere else on the ice surface a player in this role can have a huge responsibility e.g. a defender playing in front of their own net guarding an opponent non-puck carrier. Playing in this role demands most of all awareness from the players in order to stay on top of what is happening all over the ice, because even though everyone might have their own responsibility on the ice, mistakes can happen, and supporting teammates is crucial for a successful team.

Taken as a direct quotation from International Ice Hockey Federation (2008, 8) the objectives for the role of a player defending against non-puck carrier are:

- Be active and move
- Keep track of your opponent and the puck
 - Readiness to support
 - Readiness to attack
- Your distance from your opponent depends on how threatening he is:
 - Stay within stick-contact range in the slot
 - The opponent's distance from the game situation, where the puck is, affects your positioning. Further away he is – further away you can be
- Always play in a low triangle formation in the defensive zone
 - Position yourself correctly, observe and move
 - "Support and play"
 - Talk - let the others know your screens and cuts

3 Teaching and learning hockey sense

As stated before in this thesis, hockey sense is a huge part of the sport. It then should be one of the main objectives in junior hockey coaching. In the following sub-chapters you will find some examples for coaches to imply hockey sense in team practices as well as means for players to improve their own hockey sense and readiness for different game situations and also why hockey teaching hockey sense is important.

The following table, cited in its original state from Ashleigh Zuccolo (*Game Sense Research in Coaching: Findings and Reflections*, 2014), shows a list of sports literature containing game sense research and discussion.

Table 2. Findings of current *Game Sense* research

Author/s	Year	Title	Conclusion/Findings
Light	2004 (a)	Coaches' experiences of game sense: opportunities and challenges	<p>Four main strengths identified:</p> <ul style="list-style-type: none"> • Working off the ball • Transfer from practice to the game • Creating independent players • Player motivation <p>Coaches reported:</p> <ul style="list-style-type: none"> • Implementing <i>Game Sense</i> required too much time • <i>Game Sense</i> altered the coach-player relationship • <i>Game Sense</i> takes longer to develop players, although had more desirable long-term development
Evans	2006	Elite level rugby coaches interpretation and use of game sense	<p>Use of <i>Game Sense</i>:</p> <ul style="list-style-type: none"> • Test skills • Developing independence, perception and decision-making • Develop game specific fitness <p>Factors influencing coaches' interpretation and use of <i>Game Sense</i>:</p> <ul style="list-style-type: none"> • Coaches' beliefs about learning • Coaching culture

Evans	2007	Developing a sense of the game: Skill, specificity and Game Sense in rugby coaching	<p>Three main strengths identified:</p> <ul style="list-style-type: none"> • Transfer from practice to the game • Working off the ball • Player motivation <p>Coaches reported:</p> <ul style="list-style-type: none"> • <i>Game Sense</i> takes time to see improvement in players' performance, even though improvements are arguably long term • The facilitator role of the coach can create doubt in the coach about their role
Evans & Light	2008	Coach Development Through Collaborative Action Research: A Rugby Coach's Implementation of Game Sense Pedagogy	<p>Coach reported:</p> <ul style="list-style-type: none"> • It was difficult to implement questioning • <i>Game Sense</i> improved their relationship with players • Practice sessions flowed better • <i>Game Sense</i> increased the level of intensity in practice <p>Players reported:</p> <ul style="list-style-type: none"> • They were more active, less static • They had increased motivation at practice • They had more input in decision-making • <i>Game Sense</i> improved their relationship with the coach
Evans & Light	2010	The impact of Game Sense on Australian rugby coaches' practice: A question of pedagogy	<p>3 main strengths identified:</p> <ul style="list-style-type: none"> • Test skills in game-like situations • Develop decision-making through implicit learning • Develop match-specific fitness
Evans	2012	Elite rugby union coaches' interpretation and use of Game Sense in New Zealand	<p>Emerging themes:</p> <ul style="list-style-type: none"> • The place of games in training • Creating specificity and replicating match conditions • Exciting, motivating and inspiring players <p>Coaches reported:</p> <ul style="list-style-type: none"> • Time was a factor in <i>Game Sense</i>, as it is needed for questioning and discussion • Using <i>Game Sense</i> encouraged players to make decisions in competitive pressure situations • Players became excited when there was an opportunity to play games in training

Pill	2013(b)	Using Appreciative Inquiry to explore Australian football coaches' experience with game sense coaching	Two coaches using a <i>Game Sense</i> coaching approach and the factors that sustain this coaching: <ul style="list-style-type: none"> • Coaches see themselves as educators • Coaches engage in regular reflective practice • Coaches appreciate the “holistic” nature of play involves on-the-ball and off-the-ball coaching • Coached believe a <i>Game Sense</i> approach creates a different relationship with the players • Coaches attributed a <i>Game Sense</i> coaching approach to improved team performance
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3.1 Teaching hockey sense through team practices

There is no simple answer how a coach can stick game sense in their players' heads. Nevertheless it's safe to say everything starts with selecting a purpose for your training. You can have for example skill-, tactical-, or in this case hockey sense oriented training. Many coaches emphasize on repetitions in practice, but just doing repetitions for the sake of repetitions does no one any good. After the purpose, the coach must create the right environment for their selected purpose. Environment consists of many different components, such as depth of knowledge, professional experience, communication and teaching style. Most often the environment in hockey sense training is created with two of the most common teaching styles, which are tell and try based training while the other being discovery with feedback styled training. The ultimate goal in both of these styles of training environments is that the players ultimately understand why they are doing certain drills, how they should be done and how can they apply what they've learned from the drill to game situations. (outliershockey.com, Game Development)

3.1.1 Modified games to emphasize a particular tactical skill learning

For many young players, five on five game might seem very demanding in the tactical sense of mind. Even though experience comes from playing the game, for some players understanding everything that's going on the ice can lead up to not learning the basic functions of the game. It is then more beneficial for a coach to use small area

games in practices. Small area games in this concept don't just mean smaller ice surface but also different number of players, shape of surface and rules of the game. The biggest gain in using small area games comes from the versatility in which they come. You as coach can emphasize in a certain tactical or technical aspect of the game and create huge amounts of repetitions all within a game environment. By simplifying the mental demands for individual player in small area games gives them better focus on the task at hand and at the same time it is easier for the coaches to give feedback for the players when they know exactly what the goal of the drill is. (Bill Beany, usahockeymagazine.com, issue: 2010-10)

Here are just a few benefits in using small area games in everyday practices: players get more touches to the puck, they have to play in close quarters which each other and goaltenders get more shots than in a normal five on five game. Players also learn the value of a fast transition and making fast decisions under heavy pressure. Most importantly, from the players' and many coaches' point of view, it is a very fun way of training (Paul Cannata, The Value Of Small Area Games In Ice Hockey Development)

“Is this allowing the game to teach hockey sense? I do believe that we, as coaches, can help players decipher the game, but to me learning is achieved through the experience gained by playing the game. Allow the small area modified game to be the teacher and watch how smoothly it transfers to a full ice game. Replicate the game in practice and develop players who can make sense out of chaos.” (Bill Beany, usahockeymagazine.com, issue: 2010-10)

3.1.2 Read and react game situation drills

Ice hockey consists more or less of commonly occurring situations; however these situations vary from each other in smaller ways. Factors inside the game such as the opponent team's tactics, score of the game etc. affect the approach of both teams in certain situations. For a player to have a good understanding of the game they have to know the most common situations inside the game and anticipate by reading where the game is going next. Just somewhat knowing every situation isn't enough. On top of just identifying the situation at hand a player with a great game sense can also read the

play second to second and react quickly to what's happening in that same moment without hesitation.

For coaches coaching a group in a learning phase of their career it is helpful to teach the most commonly occurring situations inside the game. A good approach is to chop the situations down to a smaller scale for example into 2 on 1 and 3 on 2 drills. Instead of telling the players how to do it one way and stick to it, it is better to give a few examples and discuss multiple options to handle the situation. That way both sides in the drill are forced to read what option the other side takes and then, by reacting accordingly, manage the situation in the best possible manner. Giving the players multiple options for multiple situations, but still concentrating in one specific situation at a time helps the players to learn the pieces of what the game consists of and at the same time develop them faster as players in comparison to teaching every situation only one way. By chopping the situation down to a smaller drill it is also easier for the coach to see all the players and give feedback, which is important so the players don't learn the wrong way from the start. (Hal Tearse, Minnesota Youth Hockey Coaches Association, e-newsletter, May 2007)

“Read and react is merely the recognition of a situation that a player has seen thousands of times and a learned response based on experience. We call it Hockey Sense.”

(Hal Tearse, Minnesota Youth Hockey Coaches Association, e-newsletter, May 2007)

3.1.3 Guided discovery and inquiry approach for learning

In traditional way of education teaching and learning has been used to mean the same thing. The assumption is that for every minute the teacher or coach teaches their subjects, they learn the exact same amount. This would mean every student in a class or every player in a team would be on the same level. Unfortunately this is not the case. In reality learning is completely different thing than teaching, as learning means how well the student or player understands what they are trying to be taught at the moment and teaching implies what and how the teacher or coach is trying to get their subjects to learn. Too many coaches in ice hockey curse their players for not learning, even though the coaches themselves think they have been teaching the right thing. This kind of

mentality from a coach is utterly wrong. Every coach should try to focus on what is the best way to get their players to learn.

If a coach is commanding players in a practice to do a task or a play in a certain way, of course the player will do it that way and succeed at that moment, but as discussed before in this thesis, situations vary from each other and even though the way that the coach told the player works at one time it might not work the second time around. Especially with young players it is important for them to know why they are doing a drill or a small area game in a certain way, because that gives them self-critical thinking about their own playing performance and also activates them in a way that they can find a solution in another similar but ever so slightly changed situation. The guided discovery based learning then is the opposite of commanding players in practices. Why would guided discovery be a better approach than commanding? As an example, there is no case in history where a parent commands their infant to learn walking; the child tries and fails multiple times, but eventually learns the skill of walking by discovery on their own. Now this doesn't mean coaching is useless and doesn't serve a purpose, but instead a coach's role is more of a guide on the road to discovery.

By using the guided discovery method of training, the players will find motivation in finding out new things on their own instead of just following commands from the coach. Of course there can be situations when a player simply can't progress on a learning basis and following other players doesn't help either or the whole team is having problems figuring out the goal in training. This is when the coach steps in and brings the guidance into the guided discovery method. By inquiring from players, what would be the best way in a certain situation and why did or didn't something work in a desirable manner and facing them up against problems inside the game are a few examples of guiding the player in the right direction. But why would the guided discovery method be better than telling the players what to do and how to do when it can take more time? The ultimate goal of coaching with the guided discovery method is to breed smart players who learn to solve problems and think by themselves on the ice instead of always looking to the coach for a precise script to play with. Because no matter what, the environment on the ice will change every single time, and the script told for the previous shift won't work anymore. The whole process of teaching players to learn independently is a long and a hard one but the results can be outstanding. That's also

why the guided discovery method of training should be more of a coaching style than just a single approach to one drill or sector of the game. (Dr. Mariappan Jawaharlal, huffingtonpost.com 6.5.2011; Shane Pill, ausport.gov.au; Jerome Bruner's learning theories; Legge, Harari 2000)

3.2 Individual hockey sense learning

Learning hockey sense is as much the player's responsibility as it is the coach's. Same as in school or in any aspect of life, you can't rely on the teacher alone to get you on a great level. If you want to be exceptional on the ice you need to have an exceptional hockey sense and no one can help you to get it without you doing most of the work.

Only about ten to fifteen years ago, there was no talk about how to implement hockey sense into team practices, but instead it was considered a gift among only a few players. Those days the players who possessed "the gift" usually were the players who spent most of their childhood on ponds playing shinny hockey with other kids. By playing the game not so seriously, playing without risk and not fearing mistakes makes you play creatively, and creativeness being one of the corner stones of hockey sense, spending the extra hours on the pond gives you a huge advantage. Those countless hours playing and having fun at the same time all the while watching and imitating other guys on the ice is the difference between common and a great player in the future.

"It was kind of cool to play shinny hockey with the older kids and watch what they were doing and model my game after them. It definitely inspired me to be as good as they were." (Chad Rau, usahockeymagazine.com, issue 2009-01)

In today's hockey world the pond is left for the ducks and more and more kids rely solely on organized ice hockey practices. Systems are the easy way out for coaches to make their players play in unison with a shared goal. That's why more and more teams play the game by systems thus harming creativity and game reading abilities of players. Short term goals are easy to reach, but in the long run the players will lack the edge in the tough situations where independent decisions are needed.

“In today’s world there is so much structure in youth hockey that players may be fundamentally better but they don’t know how to compete. We used to call them ‘hockey school players.’ They can do a drill but they can’t play the game,” (Doug Palazzari, usahockeymagazine.com, issue 2009-01)

(Harry Thompson, usahockeymagazine.com, issue 2009-01)

The most important thing for a player who wants to improve their hockey sense is to start thinking on and off the ice. Think every little situation: what happened? Why it happened? And how could it have been done better? By being critical about your own playing and execution instead of doing everything always the same way makes you more ready for the next time the same kind of situation presents itself. And by thinking you build the situation databank in your head, called also by other name: hockey sense. (Jeremy Weiss, howtohockey.com 1.3.2013)

3.2.1 Video

Since filming of hockey games started ages ago, coaches have used video as a tool to give feedback on team tactics and individual performances of players. Now lately the video meetings have come a part of younger and younger teams, but as a tool it’s still mostly used for honing the team’s game system, pointing out mistakes or good successful plays and analyzing goals. As in fact, video can be used for so much more than that, and also for so much younger players than many coaches are used to.

For player development and individual hockey sense learning it is important for an individual player to get to know how the game of hockey works, what are principalities and commonly occurring situations inside the game, how different events affect the next play etc. The obvious way is to attend practices, listen to the coach and of course, playing. This all happens under good guidance and supervision, but the time is limited. For players who want to get better and improve their hockey sense it’s important also to work alone on the matter. This is where video comes in. Nowadays it is easy for anyone to find game highlights and other video material on the internet. So for any age players, watching hockey and using the pause button to review

certain plays can be seriously beneficial. Watching hockey can in some relation be counted as similar experience as playing the game itself, of course only from the hockey sense of view. Watching your own games from video you get the bird's eye view of your own performance and by analyzing it you may find things you can develop and try differently in the next game. When you are watching your own game and especially following your own performance, you use a trick you can also use following any game from video or from the stands: You follow only one player at a time and therefore you happen to see all the decisions you or they make, and because you see all the ten players on the ice and the direction of the plays, you can be able to tell whether the decisions were right or wrong for those situations. After watching and analyzing, it's easier to recognize everything that happens on the ice and finding the correct decision that goes hand in hand with a specific situation, thus improving one's hockey sense. In conclusion: Understanding the game inside out is the first step on a road to good hockey sense, and there is no better tool for that than video. As Jeremy Weiss from Weiss Tech Hockey states:

“BECOME A STUDENT OF THE GAME. Players who study the game away from the rink make better decisions come game time, because they've rehearsed their actions over and over in their minds. They already know what they'll do when a certain situation presents itself. Instead of reading and reacting, the top players are constantly recognizing and reacting.”

(Jeremy Weiss, Jeremy Rupke, howtohockey.com, 1.3.2013; 5 REASONS TO USE VIDEO ANALYSIS TO ACCELERATE HOCKEY PLAYER DEVELOPMENT, prodigy-hockey.com; Martens 2004, 192-193)

4 Objectives and research methods

4.1 Project planning

I have been coaching in a small club on the western border of Austria for the last two seasons, and immediately from the start, noticed that the level of game sense and basic awareness inside the game is on very poor level in this part of the hockey world. I was interested to improve the general level of game sense in the club starting from the youngest of players up all the way to under 20 age group. I started using techniques and training methods I had learned in school as well as researching additional information to help me on my quest. No longer than after two full seasons in 2015 I noticed, that what I was doing didn't pay off and I needed was a faster way, a some sort of tool to help the players and also other coaches in the club, to get the basic idea of hockey sense rooted into the players' heads.

In the spring of 2015 I started planning on what sort of tool I should create to reach my goals of making my players smarter on the ice. After observing and conversing with the club's other coaches earlier on what kind of methods they have used in training and what have they been talking to their players I noticed all of them relied heavily on command based coaching, telling the players what to do without any kind of explanation on why. From my education I knew, this was not the best way to teach hockey sense in children. But what was the best way? That was the question, I needed an answer for.

The simplest way I knew, how to reach players in a short period of time was to let them know of the four game situation roles introduced by the IIHF in 2008. Around the western border of Austria, such concept was not heard of and what I thought was that is there a way to easily teach the four game situation roles and the basic concept of hockey sense without series of long lectures? I thought, using video would be a good start.

I started my research about game sense and using video as a teaching material in the summer of 2015. There had been a lot of game sense related reports and manuals done

before, which most of referenced on the few books related on the matter. What I then decided was just to get the basics from the same sources what everybody else were using, but include more of recent opinions and findings of professionals around hockey and education, who were not recognized authors in the actual matter. I made this decision in order to get as much variety and different views on the matter of game sense. What I found opened a whole new world for me.

4.2 Project implementation

After all the research and the problems what I found in the club I was working in, it was pretty clear how the product should be constructed. If you are trying to teach someone game sense, the first thing to do is to explain what game sense is. The first part of the thesis breaks game sense completely down into sections which are easily related with everyday ice hockey playing and training. The first part also includes the four game situation roles by the IIHF, which was the base for the whole product. In order to make the breakdown of game sense, I relied both on the customary sources as well as new findings and observations in the professional ice hockey world.

The second part of the thesis I did with the thought what I would've wanted to read the first day I started ice hockey coaching. Especially on how to transfer the information of game sense, learned in the first part, into the players and coaches in any organization. As it is not a full scale manual on how to train hockey sense throughout the season, it gives great tips and techniques to coaches willing to up their game sense teaching game. As was the idea from the start, this work should not be intended only for coaches but also for individual players who are willing to get better in the hockey sense aspect of the game. That's why there is a completely own section for players.

As the last part came the product itself. It is a small video library sorted in accordance with the four game situation roles by IIHF. The idea for making short video clips came from the thought of teaching the basics of game sense and the four game situation roles faster than what is normally used to. The methods used in creating the clips were simple. All of the clips are from one game between Finland and Russia in the 2015 World Championships and show a single situation with one player to follow through-

out the clip. In all its simplicity the video library was built to show examples of well executed actions done inside each of the four situation roles.

4.3 Project description

As the final product I view the whole package, as in the literature review which explains the composition of game sense as well as the video library. As an entirety it works as tool for both the coaching and the playing sides of the ice hockey world.

The importance of game sense in today's ice hockey is huge and I felt I needed to find more information on it, but at the same time help others struggling with the same problem I had before starting my research. The need for these kinds of explanatory report guides are still huge in western Austria, where I worked, and this work I put together might help other people around ice hockey in much faster time than doing the research alone around the libraries and the internet.

The literature review itself is aimed for anyone who wants to widen their knowledge of the concept of game sense. It gives insight from many different perspectives from a wide spread of sources and can be simply used to learn the whole thing once or use one section which needs improving.

The video library is made of 33 short clips which are sorted into their respectful category of the four game situation roles. The video clips are used as examples of game situations on the IIHCE website in Finnish. The original English versions are stored in Dropbox and my own personal computer. As it is not directly meant to be teaching material, it can be used by coaches as video tool to show players what to consider during each of the most common situations in ice hockey. It is also beneficial for players to sit down and watch through the clips or instead find the problem areas they are struggling in in order to better their game.

Now that I have finished and take a look at the whole package what I had created, I feel I succeeded in what I was aiming for from the start. At first I didn't fully understand game sense, but after countless hours of research I managed to compress all I

had learned on a few pages. As reading it again from start to bottom, I feel that it can be a great alternative to doing the research on one's own and also a tool to help others.

5 Summary and discussion

As is with all the compressions of one's research, one of the problems with this thesis was to make everything click and fit together. There are tons of contradictory information about game sense out there and it can be confusing to make sense of all. For this thesis I decided to take the main concept on game sense from Jeremy Rupke, the founder of howtohockey.com website. Immediately after reading an article about hockey sense, where he had collected opinions and observations from a variety of professional ice hockey coaches, I knew I had found what I was looking for. Their opinions fueled the rest of my research and I found they were on the same track with most the recognized authors, who have written about game sense, e.g. Martens. On top of the same ideas, the coaches in the article had so much more to give in the way of diversity of experience and years of professional observations.

An aspect of the game which cannot be considered as a part of game sense, but can still help anyone's personal game and development is playing style. Not a single one of any ice hockey players in the world is exactly similar, and that's why pro hockey coaches construct their lines usually by which roles fit together rather than putting the best all in the same line. For young players, their own individual playing style is not always clear, but also why should it be clear, can be a mystery. What follows, sheds a little bit of light on the matter. Every player ever to play hockey has strengths and they have weaknesses. This means basically that there is an average level in every skill inside a group. It depends how big of a group you're comparing yourself into, but in essence you can draw an average from where ever you need, but usually the group size to draw the average from would be the league you're playing in. Now, there can be a player who's technical and mental skills are set exactly on the average, but this is highly unlikely. Commonly, players have some skills which are over the average and some which are under. The skills where you are better than the average player are your strengths and the ones where you cannot excel as well as most of the other players are your weaknesses. From an early age on it is important to get to know what your weaknesses and your strengths are. The next part however might be a little bit trickier. You have to balance between working on everything the same amount or emphasizing on some-

thing whether you are trying to bridge the gap between your strengths and weaknesses or improving mostly your strengths. For children at the start of their hockey careers it is normal to work on every skill and learn the basics to a certain level where you can execute all the aspects inside the game. For example, it is useless to coach kids only to be fast skaters if they have to stop every time they are passing and receiving a pass. For older juniors and adult players however the choice is more complicated.

As you get older you usually start playing either defenseman or a forward, and more specifically a winger or a center. You just might find out that you fit in one position better than the other. That is not a coincidence. There are certain skills and tactics that go hand in hand with the positions and it is your strengths that make the choice for you to play in a certain position. On top of positional play there are roles inside the team which can be filled, for example, the dangler, who skates the puck up to the offensive zone, or the sniper, who is designated to shoot the puck more than the others. If you are chosen to play a certain role or you choose to play one by yourself, it is then known to you what at least one of your strengths is. It is then very important to get to know your strengths and weaknesses. First of all it gives you a guideline on what position and role suits you the best but more importantly, learning all that, you can find out your own personal playing style. After you have decided your style of playing, the next step is to decide which skills to work on. Should you work on some of your weaknesses to bring them on a level where they don't hold you back, or to improve your strengths even further to get better results for your team? Most coaches tell their players to play their best, and if you know what your best is then you should use that inside the game as much as you can. In other words, crafting your own playing style around your strengths makes you play better than trying to do everything on the ice. For example, if you don't know anything about baking, you probably shouldn't start a pastry shop. (Jeremy Weiss, howtohockey.com 1.3.2013)

You can look at game sense in two ways: The big picture, where everything just seems to come automatically or in a detailed manner, where every small decision including for example positioning to the exactly right spot within centimeters counts on what the end result will be. That was a problem for doing this thesis. I had to decide which path I take. For me the answer was to introduce the concept of game sense in a very simple

way, but at the same time encourage players and coaches to strive for perfection, to make their players think that they can learn from every single second they are on the ice. The main message I therefore wanted to tell with this thesis is that game sense is something a player learns and the coach teaches. Coach cannot do all the work and learn hockey sense for the player.

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7 Attachments

Video clip library of most commonly occurring game situations inside the IIHF four game situation roles.