

Goalie and scoring analysis: MOL, Mestis and Liiga

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<p>The purpose of this thesis is to determine whether the repetition of different scoring situations and goaltenders actions differ between different levels of men's ice hockey. Furthermore the purpose is to find the skills and knowledge that are needed to succeed in high level. When starting the research, two questions were made: 1. Does lower skill level of an ice hockey goaltender affect his actions in different scoring situations? 2. Does higher level of hockey affect on what type of scoring situations occur in a game?</p> <p>First part of the research, done in 2010, we marked down all shots from 30 ice hockey games. Ten games from each of these leagues or tournaments: SM-Liiga (Finland 1st season 2009-2010, Men's Ice Hockey World Championships 2009, and NHL (National Hockey League) season 2009-2010. All the subjects were males aged 17-35 years. Every game we marked had numerous skaters, and two goalies. All the marked games were selected randomly.</p> <p>Second part and the core of this research, done in 2013-2014, consisted same type of research that was done in 2010. Shots and goaltender actions from ten games were marked and analyzed from Hungarian 1st league MOL, season 2013-2014, and from Finnish 2nd league Mestis, season 2013-2014.</p> <p>All of the collected data was analyzed and then compared in order to find answers, if there were differences between different levels of ice hockey leagues, as stated in study questions.</p>	
<p>Keywords Ice hockey, Goaltending, Scoring</p>	

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1 Introduction

Ice hockey is played all around the world in various different levels. There are over 1.6 million registered players in 72 countries and the ultimate goal for many players is to achieve the top level. We both have been involved in ice hockey for several years as playing goalies trying to achieve higher level and later on as coaches trying to help our players to reach their goals.

There are five main variables: technical, tactical, physical, social and mental, which have an effect on what level the player is capable of competing. General idea that you have to be faster, stronger, and smarter to play in higher level, applies also in ice hockey and goaltending. We wanted to look inside the game to find variables that are seen in a way of playing and executing certain situations that occur: How different scoring situations are played by the goalies, whether there are differences in what type of situations occur in the game between different levels - eventually to help goalie to prepare for playing in higher level.

The purpose of this study was to examine the most important parts of the game, scoring, and preventing goals being scored, in its simplest form. Most studies are made about goal scoring from player's view, but we also wanted to examine the subject from goaltenders perspective. We searched for differences that occur in goaltending, and goal scoring between the top and secondary levels in men's game. What factors affect from player perspective: Does he score a goal or not? Goalie perspective: how does goaltender prevent the goal from happening? We wanted to focus on game performance. For the research, we planned a tool for analyzing every shot in a single game, then to compare differences in goaltending and scoring situations between top- and secondary level. By identifying factors of goalies play in the game, and the nature of scoring situations in higher level, we wish to find tools to help goalies practice and prepare better for reaching the next step, to play at higher level.

The leagues we chose to observe were Liiga (Finland top league), Mestis (Finland second league) and MOL-league (Hungary top league). Reason for choosing these leagues was that we worked as goaltending coaches for club teams in Mestis and MOL-

league during the season 2013-14, and observing games from those leagues, we could assume that there are differences between low and high level leagues. We had done same kind of research in 2009, comparing Liiga, World Championships, and the NHL in the season 2009-10. By using the data from our previous study, we wanted to make a comparison between the lower level league, such as MOL (Hungary), and Mestis, to league like Liiga that is considered one of the best ice hockey leagues in Europe.

In discussion part we bring our own interpretations of the data. We discuss about differences that occur between goalies in different level in the game. We also give our views of the differences seen while analyzing the games.

2 What is ice hockey

“Simple game of wise men – Simple game of simple men”

Quotations about ice hockey (Sihvonen 2012)

A simple definition of ice hockey: “A game played on ice in which two opposing teams of skaters, using curved sticks, try to drive a puck into the opponent's goal.”

(<http://www.thefreedictionary.com>).

Rules of ice hockey make the game as it is. They limit the actions of the players. The ice rink, nets, and both teams with their equipment are regulated by the rules (Nevalainen 2001, 7). Official game of ice hockey is played under normal circumstances so that there are six players from two teams simultaneously on the ice, five skaters and one goaltender (OHF 2014). The objective in ice hockey game is to score more goals than opponent. Team that scores more goals wins the game. Game consists from infinite amount of different situations. Variables that affect in these situations include position of players, where puck locates on the ice, and their movement direction and speed. The number of situations in a game compared to playing time is consistent, but the distribution depends on the skill difference between players and teams. (Nevalainen 2001, 7)

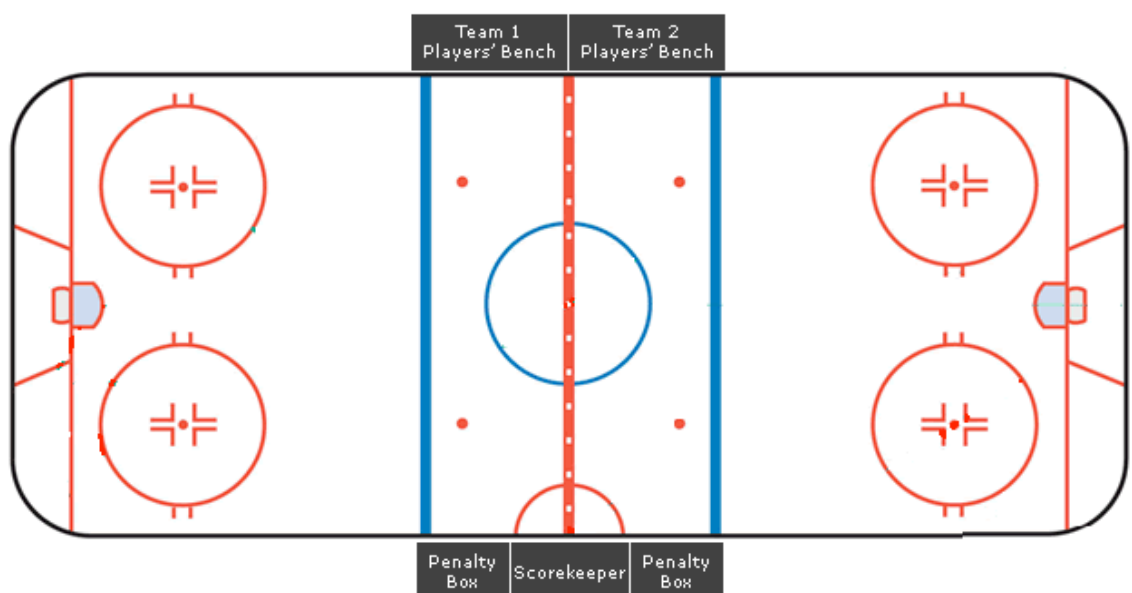


Figure 1. Ice hockey rink (NHL-size). (OHF 2012)

2.1 Scoring

Considered one of the best hockey player of all time once said:

“You miss 100% of the shots you never take“

Wayne Gretzky (BrainyQuote 2014)

Main purpose of ice hockey is to score more goals than the opponent. To score goals great technique and accuracy, but also aggressive attitude, good decision making, and opportunity resulting from a solid team play is required (Brown & Stenlund 1997, vii). Scoring a goal has a lot to do with attitude. There is no single personality profile of a scorer but one needs to be committed, assertive and confident. Anyhow several top players have listed these following attributes of a good scorer:

- Get in to good scoring position
- Shoot hard, and shoot to score
- Shoot quickly and on net
- Being able to catch goalie moving

(Miller 2003, 134-135)

Martikainen, 2011, categorizes following scoring skills of an elite player:

- Ability to shoot quickly from movement
- Supporting actions: rebound, deflection, screen
- Playing towards the slot (areas 1, and 2) with or without the puck

(Martikainen 2011, 28)

In this section scoring is approached from player perspective. Playing offensive game is not just playing against opponent skaters because the ultimate goal is to find best way to beat the opposing goaltender. It is important to understand from where and how is the best way to beat the goaltender (Setters 2006). When trying to score the shooter is playing against goalies anticipation and game reading, ability to move, reaction time and puck control. Ways to improve the scoring efficiency are threat from non-puck carrier, with element of surprise, quick and hard passes, and good quality of the shots

(IIHCE 2013). Shooting is the most important technical skill for scoring (USA Hockey 2006). There are four basic hockey shots: wrist shot, snap shot, slap shot and backhand shot (Brown & Stenlund 1997, 15). The wrist shot is a silent killer of goalies. A good wrist shot makes no noise, which adds to its effectiveness. Wrist shot is the best goal scoring shot of them all. (Brierly 2010, 103-014)

2.1.1 Scoring situations

Usually these scoring opportunities are divided into ten different type of scoring situations that occur in the game. Koho & Luukkainen, 2012, and SJL, 2008, categorized the scoring opportunities as follows:

1. Regular shot – Shot taken by a player skating towards the net, or from a standing still –position, when there is no distraction or other variables involved.
2. Shot from lateral moment – Shot taken while player moving laterally on the ice with the puck.

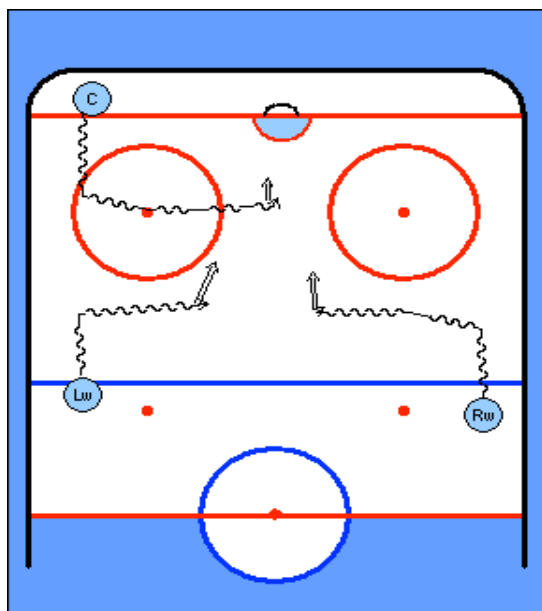


Figure 2. Shot from lateral movement

3. Breakaway – Shot taken from a clear 1 on 0 situation against the goalie. No other player involved or distracting.

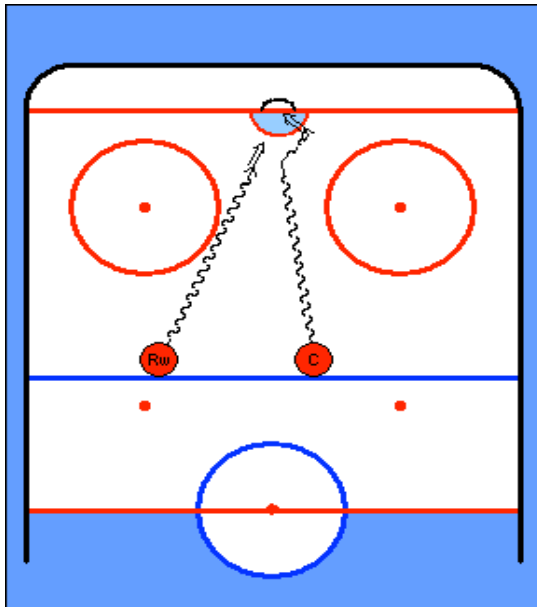


Figure 3. Breakaway

4. Shot from lateral pass – Shot taken immediately after a lateral pass across the ice. These can happen from various places and distances from the net.

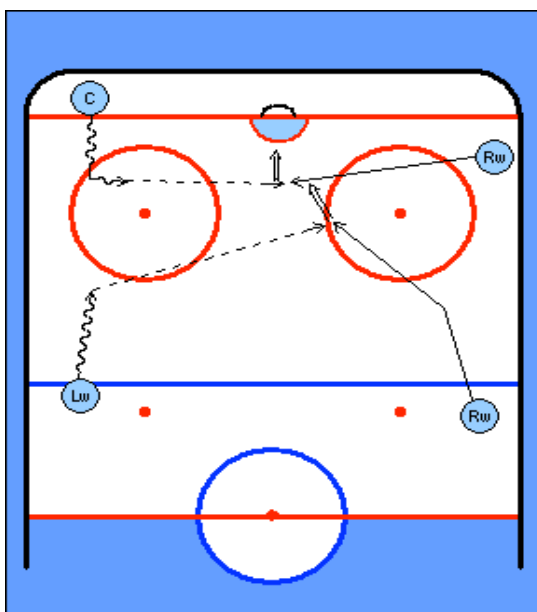


Figure 4. Shot from lateral pass

5. Shot from North – South –pass – Shot taken immediately after pass where puck is moving away from the net in North to South -direction. These can happen from various places and distances from the net.

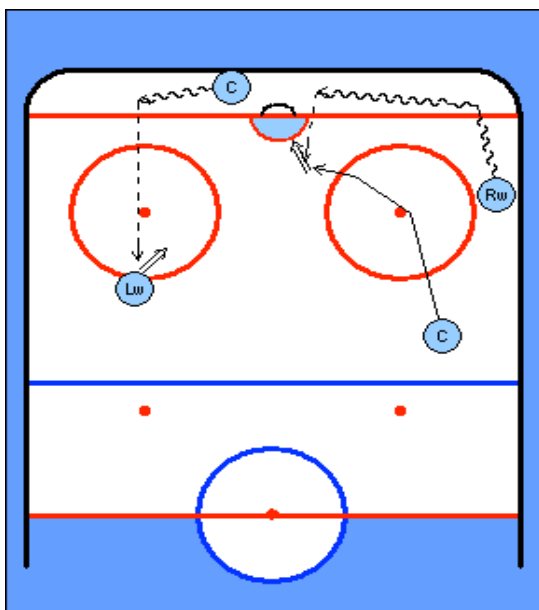


Figure 5. Shot from North-South-pass

6. Shot from net drive starting above the goal line – Puck carrier is driving to the net above the goal line under some pressure by the opposing player.

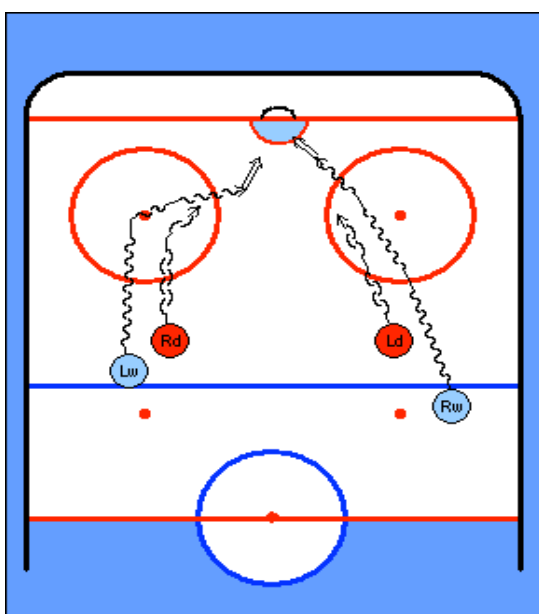


Figure 6. Shot from net drive starting above the goal line

7. Shot from net drive starting behind the goal line – Puck carrier is driving to the net from below the goal line

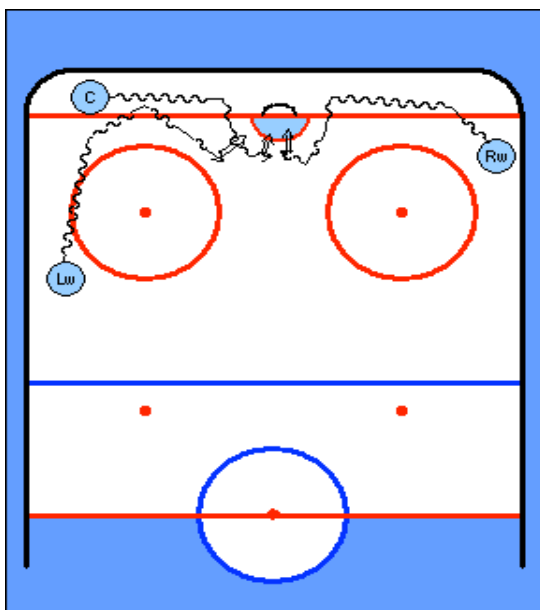


Figure 7. Shot from net drive starting behind the goal line

8. Shot from rebound – Shot taken from directly after a bounce that that comes into play from goaltenders initial save

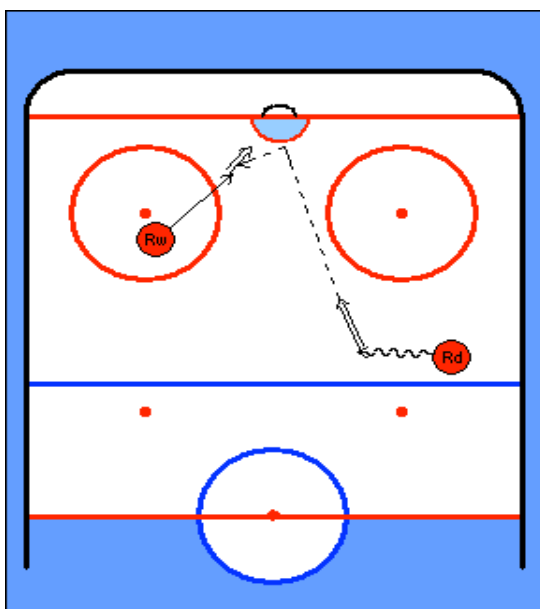


Figure 8. Rebound

9. Screen shot – Shot taken while goaltenders clear view to the puck is blocked by a player

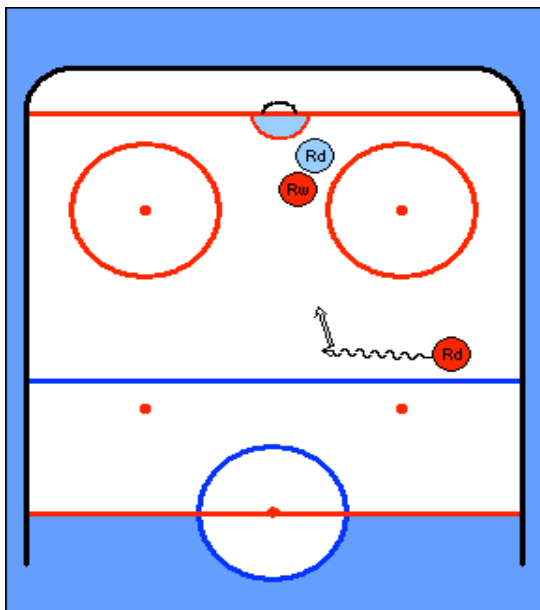


Figure 9. Screen shot

10. Deflection – Situation where puck changes its trajectory after the initial shot

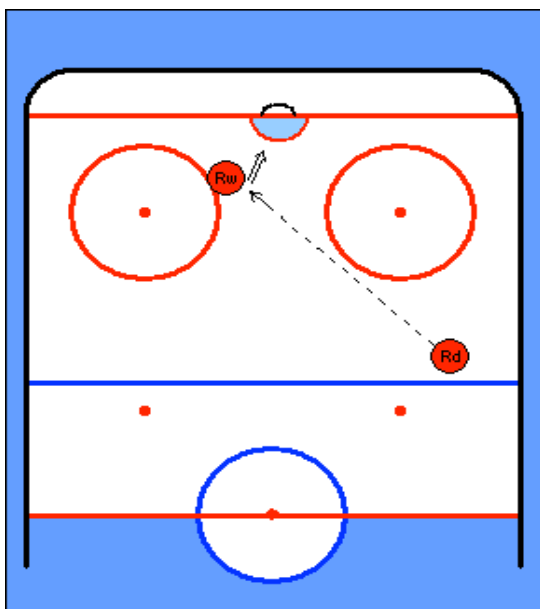


Figure 10. Deflection

11th scoring situation can be added as “Other”, where none of the above-mentioned situation is applicable. Etc. puck bounces and other unclear situations. Modern approach doesn’t include breakaway as a separate scoring situation but uses the “loose puck” as one category (IIHCE 2013) which can be seen same as the 11th situation “other”.

2.1.2 Scoring areas

Offensive zone is usually divided into four different sectors.

1. Net front – Scoring chance when the shot is made right in front of the net
2. Inside the house – Shots coming between the dots and closer than top of the circles (scoring circle)
3. Point – Shots coming between the top of the circles and blue line
4. Small angles – Shots coming from outside the dots

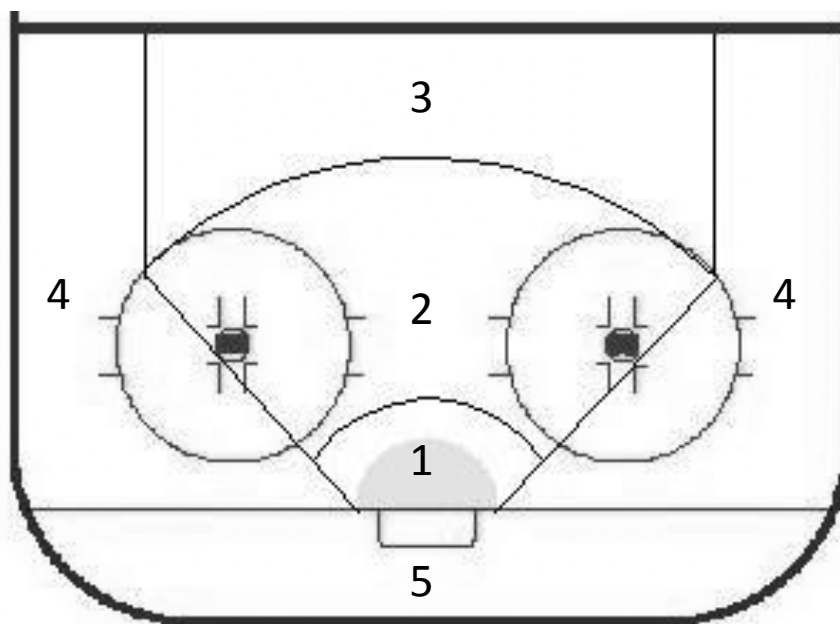


Figure 11. Scoring sectors (Modified from SJL 2008)

Shots coming from neutral zone or behind the net can be seen as fifth scoring sector. (Koho & Luukkainen 2012, 82)

There are studies made about goal scoring through the years. Important findings from studies that relate to understand the game of ice hockey is that most goals are scored from areas 1 and 2. (Saarinen, 2007)

2.2 Goaltending

Goaltender in ice hockey is really specialized position. It requires well-developed technical, tactical, and mental skills in combination to prevent the opposing team from scoring a goal. Goalies also must develop physical characteristics that include quickness, quick reaction time, hand-eye coordination, split-second decision making, while also having a high self-motivation to perform at an elite level. (Gordon, Snyder & Game 2008, 80) Although goaltender is part of the offensive and defensive plays of the team, the biggest responsibility is preventing the opponent from scoring a goal. (Niemelä 2011, 5)

Ice hockey goaltender is considered being the most important individual player in the team. Some knowledgeable hockey people place the value at 60% or more of team's performance. (Niemelä 2011, 5) Generally goalie is considered being half of the team as goalies mistakes are usually seen directly in the result of the game.

2.2.1 Saving techniques

Goaltender should be able to choose the right saving technique according to the scoring situation, from where the shot is released from, and where is it aimed. Goalie needs to make an assessment for every single situation and choose the best possible way to stop the puck. Controlling the puck, maintaining balance, readiness for a possible rebound, are factors to be considered in every scoring situation occurring. (Koho & Luukkainen 2012, 82)

There are three models of basic saves: Stand up, Half Butterfly, and Butterfly (Niemelä 2011, 15).

Body's center of gravity needs to be matched with the puck line when making a stand up save. Slight lateral move (shuffle) on feet is taken toward the pucks trajectory.

Glove side save should always be caught in order to avoid rebounds. On blocker side, goaltender deflects the puck into corner of the ice not by hitting, rather by using the force coming from simultaneous move from feet (shuffle), and from pushing the blocker hand slightly towards the shot. (IIHCE, 2013)

Half butterfly save is used to shots which direction can be read well by a goalkeeper. Motion with hands is strongly established and this technique gives a little more reach than a normal butterfly. This saving motion leaves some holes on ice level. (Nordman 2013, 32)

Butterfly save is the most efficient technique used when shot is taken close to the net. Goaltender drops down on his knees and pushes his hip in front. Saving motion with stick, glove, blocker or body is established in order to control the puck. (IIHCE 2013)

2.2.2 Positioning, scoring areas, and save selection

“Most fans go wild when they see a goalie make what looks like a great save, but the chances are what they are seeing is a save that was made from being out of position”

Mike Richter (InGoalMagazine 2012)

Proper positioning takes hard work and conditioning. When playing deep you don't have to move as much while following the puck; but if you want to station yourself for the best opportunity of making the save, a lot more movement is necessary. (Daccord 1998, 127)

The purpose for good positioning is that at the moment of shot, goalie is at the line of puck and middle of the net (puck line). From there goalie can make either a reaction or a cover save to stop the puck (SJL 2008). Playing too deep in net, trusting solely on reflexes, and making reaction saves might be dangerous for a goalie as doing that he shows a lot of net for shooter. Playing too far out may cause troubles also as it is much longer distance to travel laterally for cross-ice passes and rebounds, or to go stop rim behind the net. It is considered that best place for goalie to position depth wise is at

the top of goalie crease (Daccord 1998, 123:127; Koho & Luukkainen 2012, 79). Anyway how far the goalie should come out from the net is always dependable on the game situation (SJL 2008).

Justification for goalies positioning in different scoring situations is based on reaction. Goaltender is not able to save all shots with reaction saves and needs to rely on blocking saves at times (Koho & Luukkainen 2012, 80). When goaltender sees the shot coming clearly and has time to make the reaction save he should use it, but in close situations, being screened or quick one-timers from lateral pass the best option for goalie is to take away as much of the net as possible and hope to block the shot. (Daccord 1998, 126)

As in Figure 10, scoring areas in defensive zone are divided into four sectors. The save selection is depending from which sector the shot is coming from. Things affecting to this are how much net the goalie can cover with different type of save techniques, how much reaction time goalie has in use, and what is convenient for continuing playing after making the save. (Näckel 2013)

Shot taken behind the top of the face-off circle line (Scoring area 3) are considered reactive saves for goaltender. All of these shots should be saved either by staying up, going down to butterfly, or half-butterfly as the directions of the shot is being read. Basically these shots are fairly easy to save unless there is a screen, non-puck-carriers are offering a passing option, or deflection is possible. It is important that goalie doesn't anticipate, but reads the pucks trajectory, and then making the reaction save. (Koho & Luukkainen 2012, 85; Näckel 2013)

Shots coming from small angle areas are ones taken from board side of the face-off-dot-line. Basic rule is to stop these types of shots by staying on feet. As the angle for the shooter to score gets smaller horizontally, it stays the same vertically. Butterfly save is efficient for low shots, but it leaves some holes under arms, and high parts of the net. By challenging the shooter by stepping out from the net, shooters chance to score is reduced dramatically. Another option for goalies to play these small angle-scoring situations is to use one-knee-down position. In this position, far side knee is dropped

down, and the post side (puck side) stays up covering the short side, hands stay in front of the body. One-knee-down position should only be used when shot is taken closer to the net, for example in net drives, and rising from the corner scoring situations. (Koho & Luukkainen 2012, 83-84; Näckel 2013; IIHCE 2014)

Scoring effort from a player occurring in “scoring circle” (Area 2) is not always stopped by goaltender with reaction save, but also by blocking. Because goalie wants to cover the most of the net, best saving technique to be used is butterfly save. It is important that goalie positions on top of the goalie crease when making a save. When shot is released from furthest end of this scoring area, goaltender should make an effort to strongly react to stop the shot. When shot comes from the closest point of the area, best option is to bring hands close to body, and try block the shot. (Koho & Luukkainen 2012, 84; Näckel 2013)

Scoring situations located close to the net (goal mouth) are a result from a player either by skating the puck in, passing the puck into this zone, or from loose pucks and rebounds. It is important for a goalie to find the most efficient way to block as much net as he can, still maintaining readiness for possible continuous of play. These situations should mostly be played by using butterfly cover -, or paddle down saves. Paddle down position is firm and steady but a little narrower stance than a butterfly. (Koho & Luukkainen 2012, 84-85; Näckel 2013)

As important to make the right selection of what saving technique to use when shot is released, it is to have patience to read and anticipate what is going to happen (Näckel 2013; Daccord 1998, 142). Good goaltender reads the situation and player, looking for clues in shooter’s eyes, posture and positioning (Daccord 1998, 142).

2.2.3 Scoring situations

From goaltender perspective the scoring situations are divided into ten (or eleven) categories as mentioned earlier (2.1.1 Scoring situations). For each type of situation, basic principles can be determined. In below are actions the goaltender should intend to play

the situation, as presented by Koho & Luukkainen, 2012, SJL, 2008 and Tuononen, 2006:

1. Regular shot – In these kind of situations goalie should usually position himself at the top of the crease and make the save by using appropriate fundamental saving technique according to the shot. Good puck control should be established in these kinds of situations. Goalie should be able to cover the puck or deflect it outside the dangerous scoring areas.
2. Shot from lateral movement – It is important for goalie to stay in controlled basic stance during the lateral movement and maintain readiness to make save motion at any time. Goalie should place himself at the top of the crease and stay in the middle line between the puck and centre of the net during the movement.
3. Breakaway – Goalie needs to gain enough depth to match the puck carrier's speed while starting the backward motion. While matching the puck carrier's speed goaltender should stay in his basic stance. That allows goalie to patiently wait the skater's decision, either to making a saving motion to a shot, or a lateral move if player dekes.
4. Shot from a lateral pass – For a shot coming above the top of the circle goalie should attempt to move on feet, and to stop his movement on top of the goalie crease by maintaining/gaining the depth before making a save. In situation occurring closer than top of the face off circles, goaltender most likely doesn't have enough time to move on feet, in order to gain the puck line. Therefore, goaltender should slide on the ice in order to gain the puck line and to be able to cover bottom of the net.
5. Shot from North – South –pass – In order to adjust his movement and to gain the puck line, It's important for a goaltender to visualize the point where the shot is coming from. Shots taken further than the top of the face of circle line, and before making a save, goalie should attempt to move on feet, stop the mo-

tion on top of the goalie crease by maintaining/gaining his depth from the goal line. Scoring situation occurring closer than top of the face off circles, goaltender most likely doesn't have enough time to move on feet, in order to gain the puck line. Therefore, goaltender should slide on the ice in order to gain the puck line and to be able to cover bottom of the net.

6. Shot from net drive starting above the goal line – Goalie needs to maintain his position according to the puck line. When puck carrier drives towards the net usually one defensive player forcing him goalie needs to stay ready for the possible shot at all times. If player with the puck skates closer to the net driving in, goaltender has to move laterally with the puck or try to intercept the puck.
7. Shot from net drive starting behind the goal line – When puck is behind the goal line goalie needs to position himself on the puck side post. After puck comes over the goal line, goalie needs to rotate his body to square up to the puck. If shot is released from small angle goalie should execute stand up- or one knee down save. If player skates across the crease with the puck goalie must follow the lateral movement either on feet with quick lateral shuffles or sliding on the ice. Sliding on the ice is considered being the most efficient technique.
8. Rebound – Goaltenders actions in rebound situations depend on what technique was used to make the save for the previous shot. Important factor is also the time that goalie has for moving, and/or recovering between the initial- and rebound shot. Whether there is a rebound or not readiness for the next situation should always been maintained. Goaltender must try to maintain good balance and control after the save causing the rebound to have best possibility to play the next shot. If there is a high rebound and goalie has enough time, should recover movement back on feet to basic stance behind the puck line be used. If rebound stays close (1st and 2nd scoring area) following movement should be done by sliding on the ice whether the initial save was made staying on feet or by using butterfly technique. Rebounds that stay close to net mouth goalie should try to cover or play the puck away from the dangerous area.

9. Deflection – Goaltender needs to read and anticipate the possible threat of a deflection in order to be ready for it. If deflection occurs in front of the net area goalie must move behind, and as close as possible of the point of deflection, to maximize the net coverage. Getting closer to the point of deflection is important because it is almost impossible to make a reaction save when puck changes its direction. If point of deflection is on the side or diagonally behind the goalie, it may be hard to get close to it. More important for a goalie is to move towards the puck side post in order to reach the puck line.

10. Screen shot – Goalie should always fight for the sight in order to see the shot. Desired way trying to see the shot is done by looking from the side of a screening player. By doing that basic goalie stance can be maintained. Other option is to look over the screening player but in this case the basic stance is lost and readiness to move is reduced. If shot cannot be seen caused by the screening players, coverage 'goalie should look for best possible coverage of the net and to position himself close to the screen.

3 Previous study

Our previous study, made in 2010, works as a base for our thesis. We were interested in differences between scoring and goaltending in different level of men's ice hockey. As we were able to get game videos from different leagues, we decided to analyze hockey games not only from players view, but look for goaltenders actions also. We both agreed there to be differences in goaltending in different level leagues. As Torenius, 2014, wrote, there are differences in type of hockey played in different leagues.

We were looking for answers to these questions:

1. How goalie positioning affects to scoring efficiency and result of shot?
2. How goalie readiness affects to scoring efficiency?
3. How used saving technique affects to scoring efficiency?
4. Comparison on scoring situations and goalie play between these three levels?

Leagues we chose to follow were SM-Liiga (season 2009-2010), 2009 Men's Ice Hockey World Championships, and National Hockey League (NHL, season 2009-2010). Reason behind choosing these leagues/events was to find differences between Finnish goaltenders, to compare them to goalies playing in high level ice hockey events or leagues. Karen Crouse, 2014, wrote about goaltending before Sochi 2014 Olympic Games: "Beginning with Markus Mattsson in 1980, Finland, a country of 5.41 million people, has produced more N.H.L. goalies than any other European country, according to the league. The 30-team N.H.L. contains eight goaltenders from Finland, including four regular starters. The only countries with more are Canada (29), the United States (14) and Sweden (12)." We assumed Finnish goal-tenders to be more controlled in their save execution than others, and wanted to get data of what separates world's best goalies.

3.1 Methods

The number of games we selected was 30: Ten games from SM-Liiga (season 2009-2010), ten games from 2009 Ice Hockey World Championships, and ten games from National Hockey League (NHL) season 2009-2010. The number of subjects (goal-

tenders) we followed was 60 (N=60): 20 subjects from each league or an event (SM-Liiga, World Championships, NHL) (N1=20, N2=20, N3=20). The number of shots analyzed in the research was 1895 (N=1895). The shots analyzed per league or an event: SM-Liiga, 557 shots (N1=557), World Championships, 624 shots (N2=624), NHL, 714 shots (N3=714). Because games were selected randomly, and because there was only 14 teams in SM-Liiga, and only 16 teams in the Hockey World Championships, some teams and some goaltenders were observed more than in one game. 60 minutes (regular time) from each game was included to this research in order to get same type of data from every game.

Every single shot was marked down using a follow up tool that had seven different variables based on actions by the shooter and goalie.

3.1.1 Analyze from shooter view

Situations were breakdown in to four different variables from the shooter perspective:

- 1) What type of scoring situation
 - 2) Which scoring area shot was taken from
 - 3) What was direction of shot
 - 4) What was result of the shot
-
- 1) Scoring situations were divided into 11 different categories. More detailed explanation of the situations is seen in chapter 2.1.1 Scoring situations.
 1. Regular shot
 2. Shot from lateral movement
 3. Breakaway
 4. Shot from East-West pass
 5. Shot from North-South pass
 6. Press up to goal
 7. Rising from corner
 8. Rebound

9. Screen shot
10. Deflection
11. Other

2) What area the shot was taken from. Area was divided into sectors according to figure 12. Area was determined at the moment when puck was released from blade.

1. 1,5m from crease
2. Slot
3. Point
4. Small corners
5. Behind goal line / neutral zone

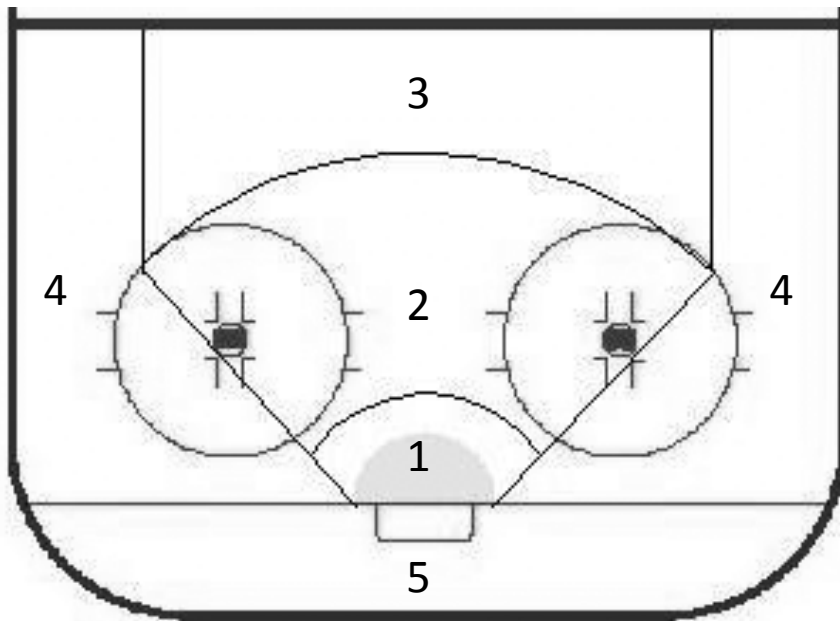


Figure 12. Scoring areas.

3) Direction of shot was categorized in 6 different ways:

1. High left
2. High right
3. Low left
4. Low right
5. 5-hole / stomach
6. Empty net (when direction of shot was irrelevant)

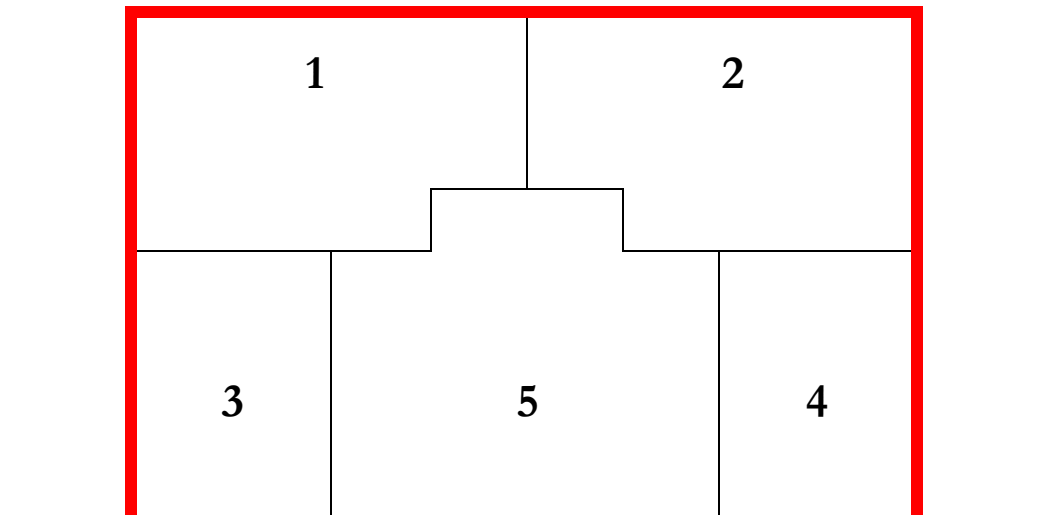


Figure 13. Direction of shot.

4) Result of shot was divided into 4 categories

1. Save, puck control
 - Covering puck
 - Controlled save, rebound to 4th or 5th scoring area
2. Save, no puck control
 - Cover saves
 - Rebound to 1st, 2nd or 3rd scoring area
3. Goal
4. Miss the net (also posts)

3.1.2 Goaltenders perspective

There was three variables observed on goalies actions:

- 1) Readiness
 - 2) Positioning
 - 3) Used saving technique
- 1) Goaltenders readiness was divided to seven different categories. Set from the moment of shot being released:

1. In game stance (stand up)
 2. In game stance (ice) (butterfly/post load)
 3. Not in game stance (stand up)
 4. Not in game stance (ice)
 5. In movement (stand up)
 6. In movement (ice)
- 2) Goalie positioning was divided to four different categories based on where goalies skates were set at the moment of the shot:
1. Edge / Outside of crease
 2. Inside the goalie crease
 3. Post
 4. Outplayed (goalie wasn't able to make a move to get behind the puck line)

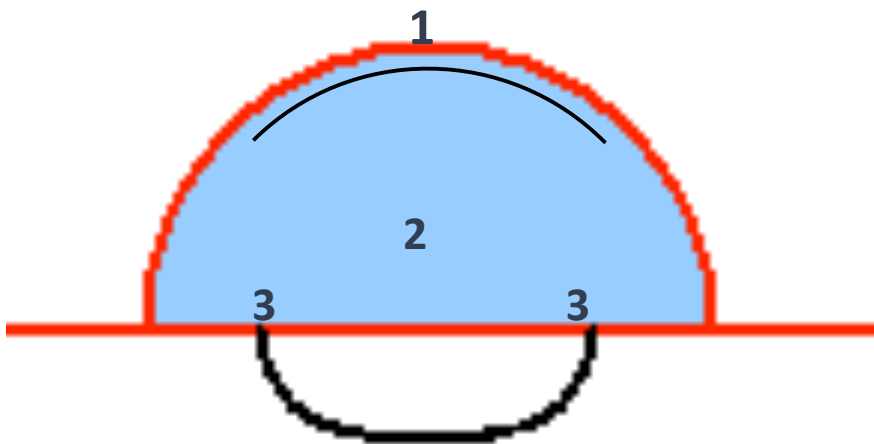


Figure 14. Goalie positioning variables

- 3) Saving technique was divided to 6 different categories
1. Stand up
 2. Butterfly-style reaction
 3. Butterfly-style cover
 4. Other controlled

5. Other uncontrolled
6. No save movement

3.2 Results and conclusions

Goalie positioning has great effect on lowering the scoring efficiency when compared goalie position edge or outside of the goalie crease to position inside the crease or at goal post. Especially in close situations (1st scoring area) there seemed to be significant effect to scoring efficiency when goalie can play near the puck at the edge of goalie crease.

Goaltenders preparedness also had great effect on scoring efficiency. Especially movement on ice while not being in game stance, not in game stance standing up or on ice, increases the scoring efficiency. We can say that it is really important for goaltender maintain good form and balance of stances in order to lower scoring efficiency in these kind of scoring situations

Data about used saving technique indicates that Butterfly-style is most efficient way to make saves and especially the ability to make a reaction save instead of just cover save. Anyhow, the importance of diversity in save bank was seen to low scoring efficiency. Stand up saving technique, when used in correct place, as well the ability to apply other saving techniques when needed, is important. Data shows that top goalies can stop seven pucks from ten by using uncontrolled saving techniques when something unexpected happens.

Differences found between NHL, SM-Liiga, and World Championships:

Some interesting details came up when comparing different leagues: In ten analyzed games from the NHL, there were 157 more shots taken, and 20 more goals scored compared to ten game research from SM-Liiga. In the NHL there were over twice as many so called “dangerous” scoring situations (east-west pass, north-south pass, screen, deflection and rebound) compared to SM-Liiga.

One significant difference was in regular shots. The number of goals scored with a regular shot in the NHL was significantly higher than in World Championships or SM-Liiga: NHL, 11 goals, SM-Liiga, 4 goals, World Championships, 7 goals.

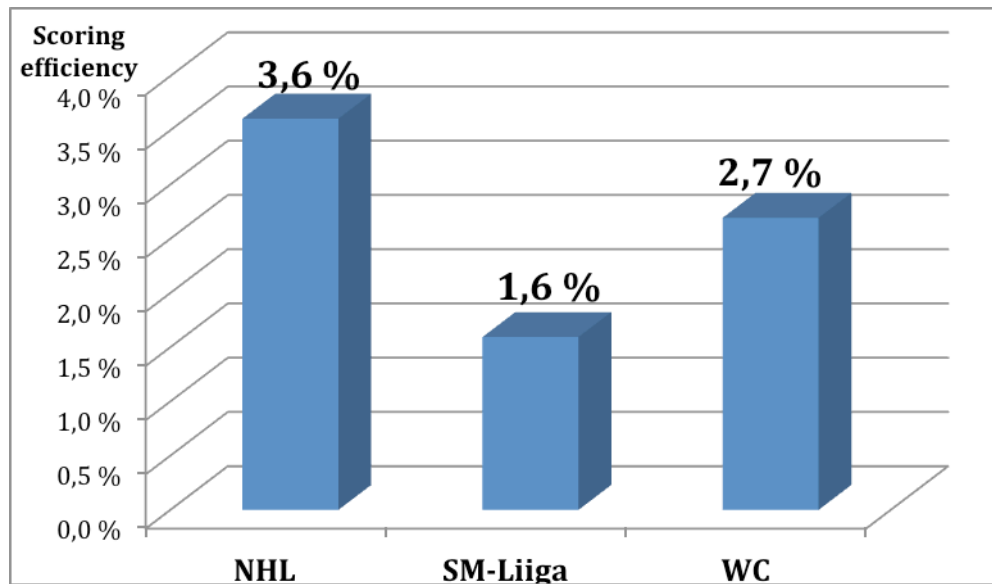


Figure 15. Scoring efficiency with a regular shot.

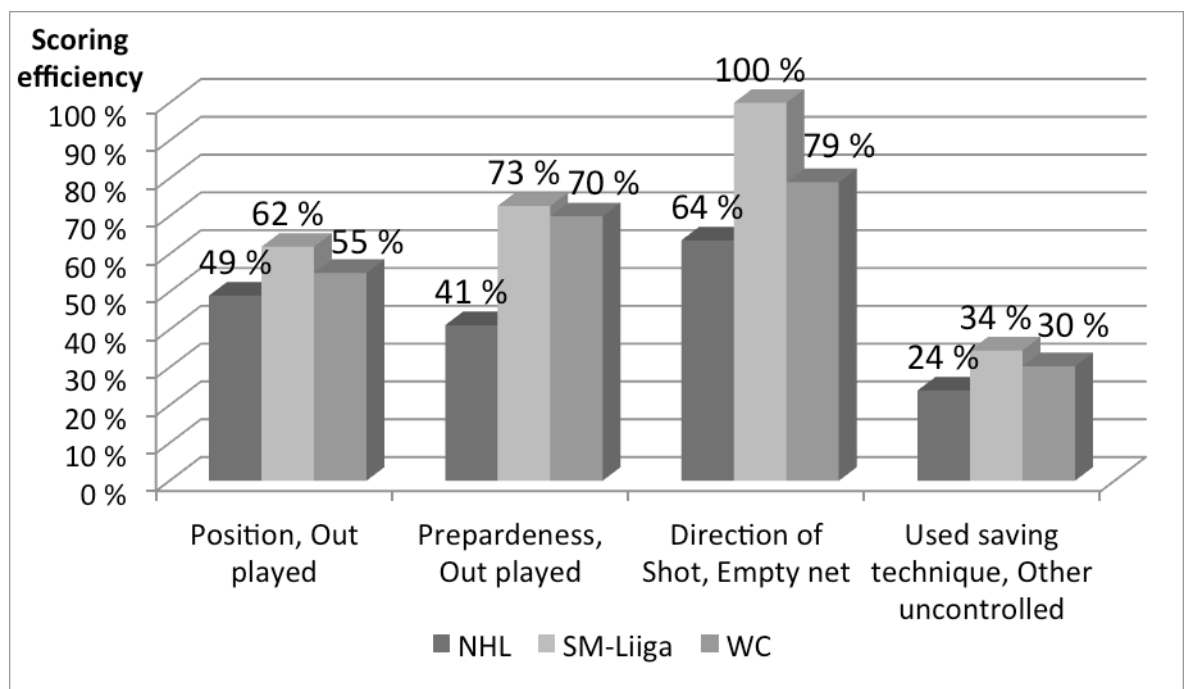


Figure 16. Scoring efficiency when goalie had to adapt.

In the NHL, goaltenders are able to make more "game saves" by stopping the average of 50% of shots even when they were outplayed in a scoring situation, same percentage being in SM-Liiga only 25%. Also the ability to make a save when using an uncon-

trolled saving technique was higher in NHL compared to World Championships and SM-Liiga. This supports the ideology of diversity in save bank, importance of agility, good reaction skills, and a mental set of fighting every situation till end, being factors that high level league goalies have.

4 Aim of the study, research questions, and hypothesis

In this research goalies from Hungarian top league, MOL, and goalies from Finland second league, Mestis, were analyzed in game situations on seven different variables to be compared against goalies in Finland top league, SM-Liiga. The purpose was to find skill differences between lower and top level goalies in playing in game situations, and the difference in the nature of the game at top level compared to lower levels.

In this research we wanted to find answers to these following questions:

- 1) Does lower skill level of an ice hockey goaltender affect his actions in different scoring situations?
- 2) Does higher level of hockey affect what type of scoring situations occur in a game?

Based on the questions hypothesis are:

- 1) Lower level goalies play scoring situations differently compared to goalies in higher level.
- 2) Type of scoring situations occurring in the high level league differs from low level.

5 Research methods

We used exactly same methods as in the previous research, in order to precisely compare all the results. Every single shot was marked down using the same follow up tool than as our research done in 2010. Again in every single game, 60 minutes (regular time) was included. This research included only Mestis and MOL leagues. Previous study results made in 2010 from SM-Liiga were used for comparison.

5.1 Target group

The number of games we randomly selected was 20: Ten games from MOL (Hungary 1st) season 2013-2014, ten games from Mestis (Finland II) season 2013-2014. The number of subjects (goaltenders) we followed was 40 (N=40): 20 subjects from both leagues (MOL and Mestis) (N1=20, N2=20). The number of shots analyzed in the research was 1601 (N=1601). The shots analyzed per league: MOL, 727 shots (N1=727), Mestis, 874 shots (N2=874). Because games were selected randomly, and because there was only 7 teams in MOL, and 12 teams in Mestis, some teams and goaltenders were observed more than in one game.

5.2 Data collection

The data we collected from MOL and Mestis was done using same methods that were used in our previous study in 2010. All games were watched on video during the 2013-2014 season. All shots and goaltender actions were marked again by using game videos. No empty net goals were included into this research (goaltender pulled from net). Overtime shots were not marked in order to get the same data from each game. Shots where goaltender didn't react at all (e.x. shot missing the net) were not counted into our research. Blocked shot that didn't make it all the way to the net to cause goaltender action were not marked. Shots/Clearances from the other end of the ice, which goaltender just stopped for his teammate to pick, were not marked (not a scoring attempt).

6 Results

Because total number of analyzed shots differs between the leagues, the results in diagrams are presented in percentages of total shots on net.

6.1 Goaltending variables

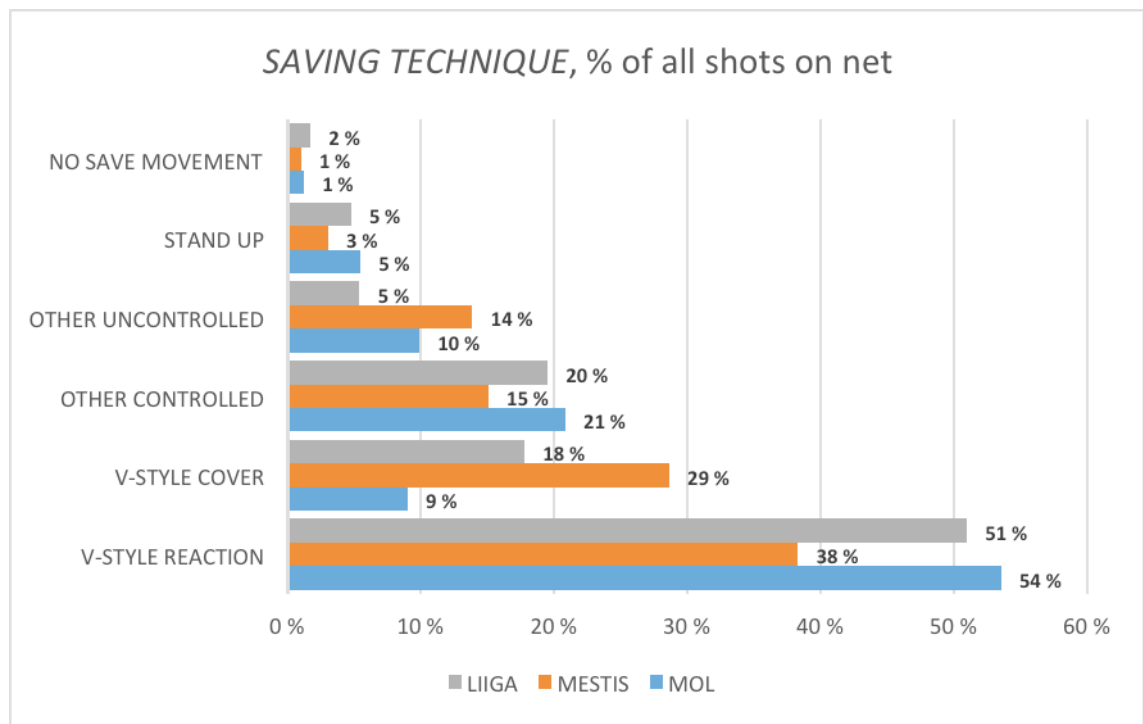


Figure 17. Used saving techniques in different leagues. Goaltenders in Liiga are able to find balance between the use of V-style cover (butterfly cover) and V-style reaction (butterfly reaction) techniques. Liiga goalies had least percentage of uncontrolled saving techniques.

There are some clear differences between the leagues in what saving techniques goalies are mostly using. In MOL goalies try to react to most of the shots, which can be seen in high percentage of butterfly style reaction and other controlled saves. In contrary, MOL has the lowest percentages in butterfly style cover saves. Mestis on the other hand has lowest percentages in controlled reaction saves but clearly highest numbers for cover and uncontrolled saves which indicates to more blocking style of playing. Results from Liiga set between MOL and Mestis but one clear difference is the lowest percentages in use of uncontrolled saves.

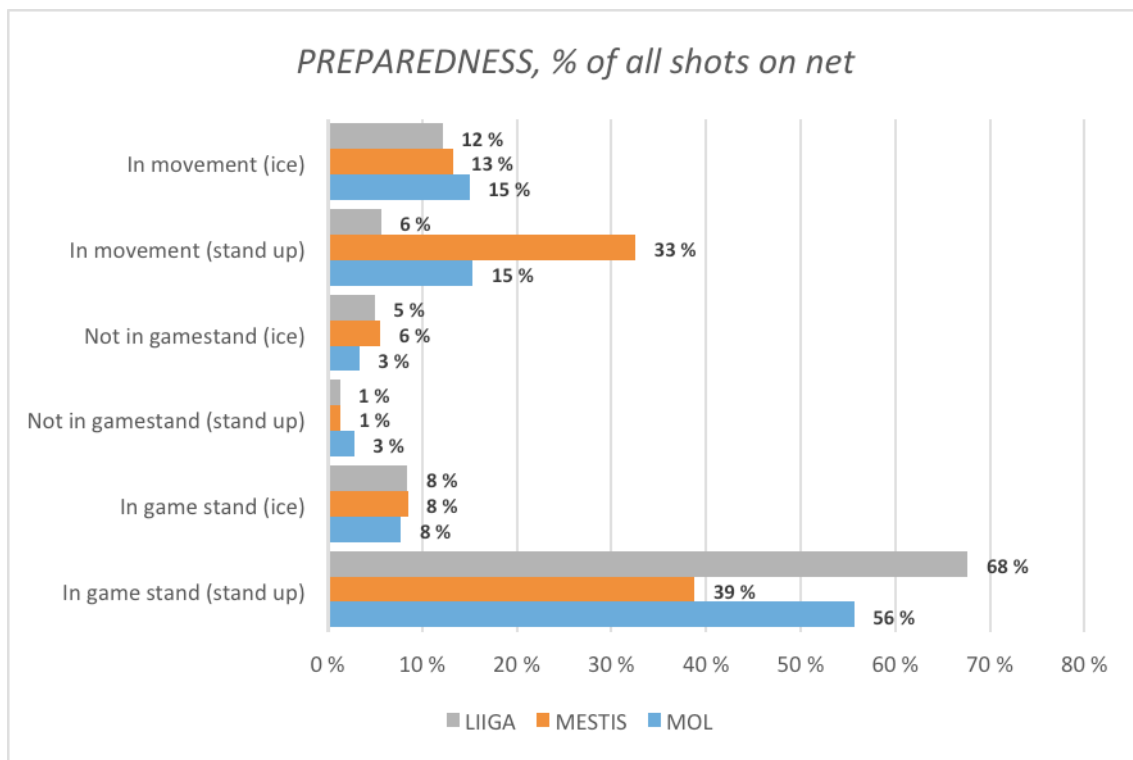


Figure 18. Goaltenders preparedness when shot is released in different leagues. Liiga goalies are able to make save much more often while being in game stance on feet.

Most significant differences between leagues are seen in goalies preparedness. Goalies in Liiga are able to make save from game stance standing still much more often versus Mestis and MOL goalies, who have high percentage of making the save while still in movement on feet.

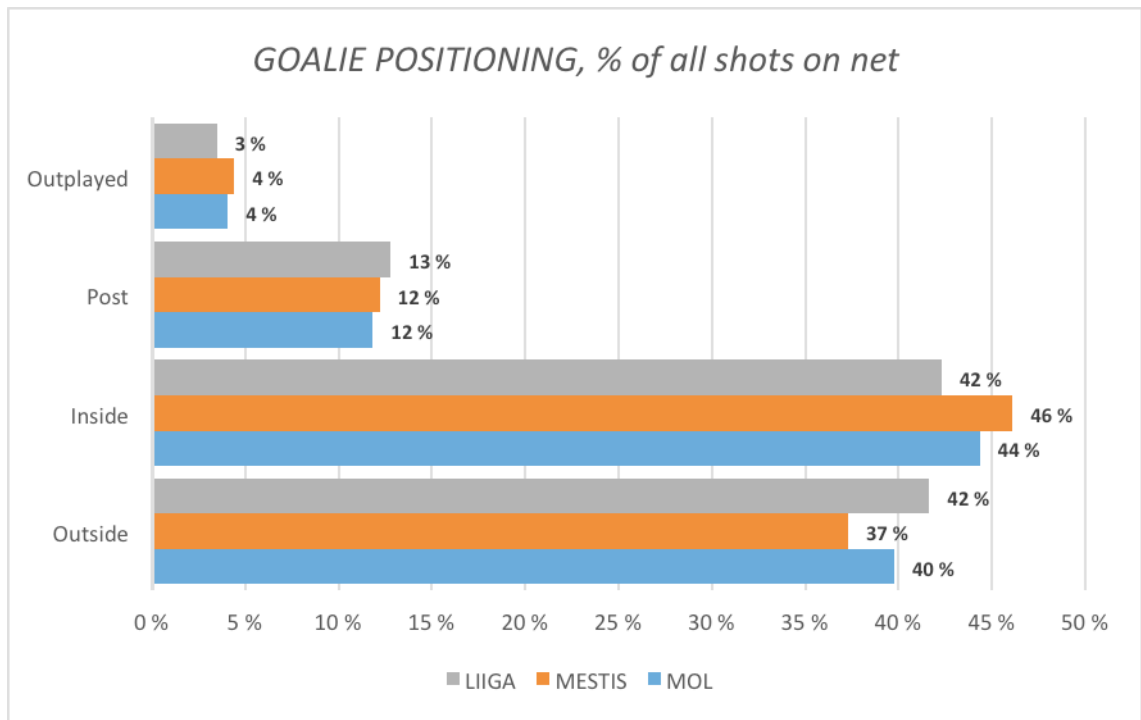


Figure 19. Goalie positioning when shot was released in different leagues. Liiga goalies are able to play more situations outside of on top of the goalie crease.

Even there are no major differences in goalie positioning between the leagues, a little difference in goalie positioning percentages gives us an idea of goaltenders ability to move and read the play.

6.2 Scoring situation variables

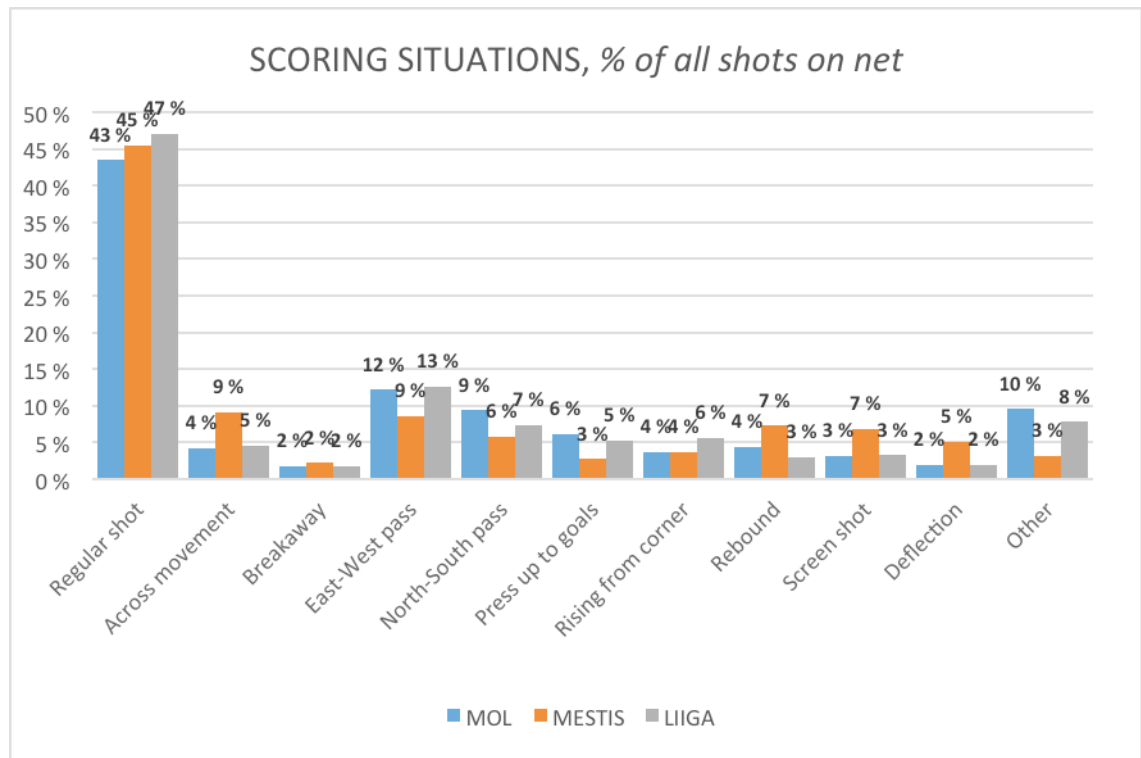


Figure 20. Distribution of scoring situations that occurred in different leagues. Liiga goalies face most regular shots but least number of rebound situations. Liiga goaltender faced high number of situations from lateral or vertical pass.

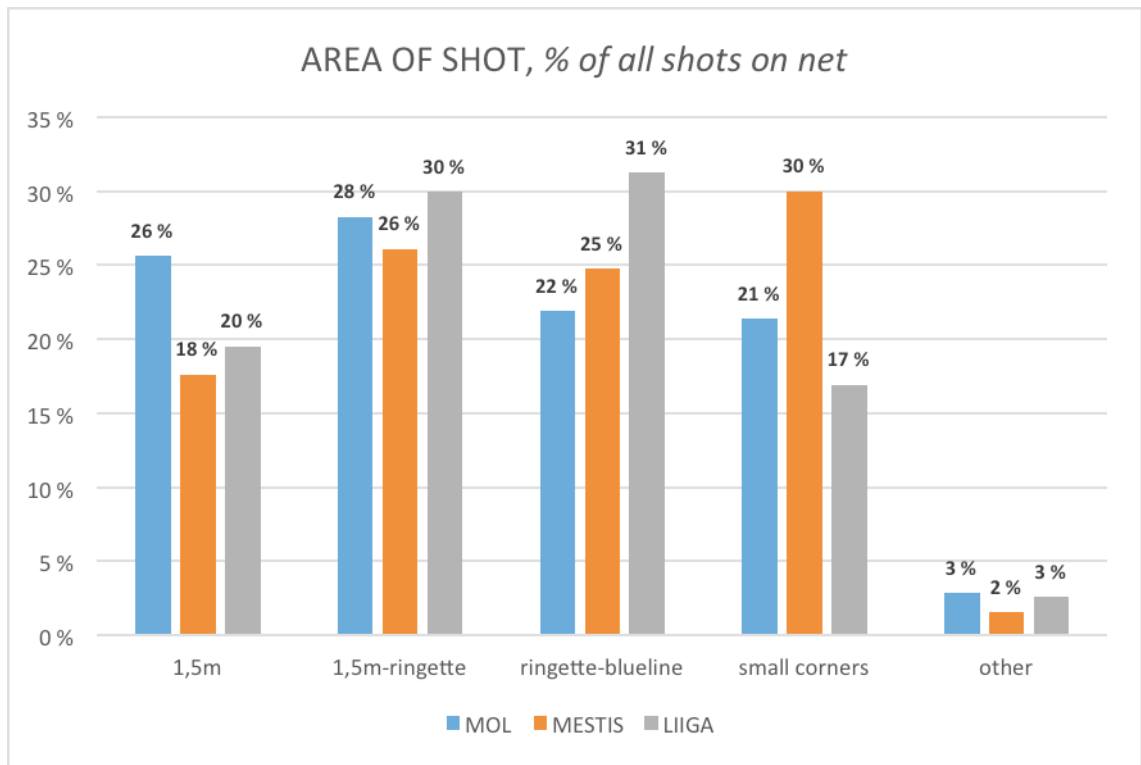


Figure 21. Area of shots in different leagues. In Liiga players tend to get in prime scoring areas instead of shooting from small angles

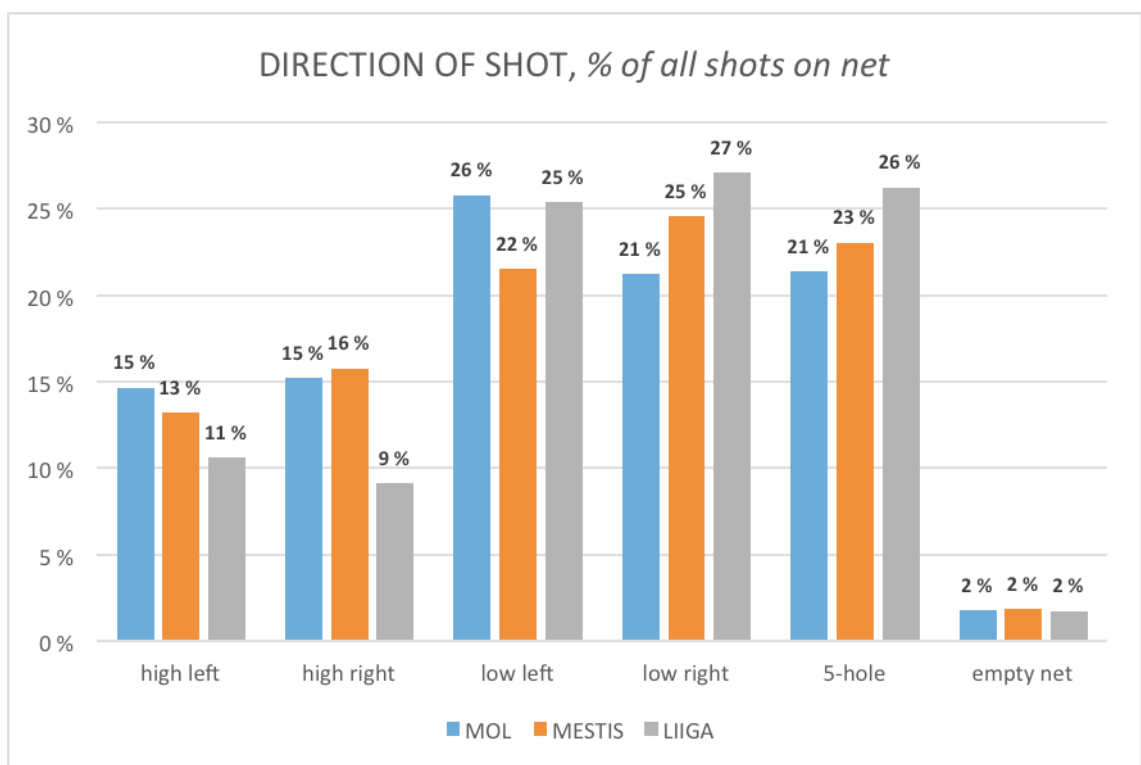


Figure 22. Direction of shots in researched leagues. Liiga goalies face more shots directed low. When shot is directed low, possibility for a rebound off a goaltender increases.

Discussion

According to Brierly (2010, 103-014) the wrist shot is a silent killer of goalies and that a wrist shot is the best goal scoring shot of them all. Most of the goals are scored from 1st scoring area that locates close to the net. Player attempting a slap shot in areas close to the net are usually blocked by defending players and saved by a goaltender since slap shot takes much more time to take than a quick wrist shot release. As several top players listed attributes of a good scorer listed according to Miller (2003, 134-135): shoot quickly and try to catch goalie moving. Martikainen (2011, 28) added the ability to shoot quickly from movement to be effective against goaltenders. To support Miller and Martikainen, we admit that while goaltender is moving when player releases his shot, making a controlled save becomes way harder for a goalie, and increases the chance for rebounds and goals. That's one reason why the use of a wrist shot is considered being a good scoring shot.

According to Daccord (1998, 123) supported by Koho & Luukkanen (2012, 79) when goaltender plays too deep, close to goal line, one needs solely trust on his reflexes and shows a lot of net for the shooter. Although playing too far from the goal line may cause troubles because from there it is much longer distance to move laterally to get behind the puck. Both also consider that the best place for a goalie is to position himself depth wise is at the top of goalie crease. We don't see this depth part as solely as Daccord, Koho & Luukkanen. We think goaltenders positioning depth-wise has a lot to do with the position of the puck and especially if the possible threat is located somewhere else. To make more justice to this depth conversation and according to SJL (2008) how far the goalie should come out from the net is always dependable on the game situation.

Half butterfly save is used to shots which direction can be read well by a goalkeeper, according to Nordman (2013, 32). Motion with hands is strongly established and this technique gives a little more reach than a normal butterfly. This saving motion leaves some holes on ice level, Nordman continues. Half butterfly saves should, in our view, not be used to low shots on the ice. The most effective saving technique for shots on the ice is reactive butterfly save. According to Nordman (2013, 32) this saving tech-

nique is used when direction of the shot can be read well by the goaltender. For this reason, we believe that goaltender, when having time to read the direction of the shot well, is able to find out whether shot is low or high, and pick his saving technique according to that. In other words not to use half butterfly when shot is on the ice, coming towards the holes that half butterfly technique leaves on the ice, but use full butterfly save not worrying of any holes.

According to Näckel (2013) shots from behind the top of the face-off circle are fairly easy to save unless there is a screen, non-puck-carriers are offering a passing option, or deflection is possible. Näckel (2013) also stated that it is important that goalie doesn't anticipate, but reads the pucks trajectory, then making the reaction save. If player shoots the puck from that scoring area with no screening player in front of the goaltender, and no deflection occurring, in our point of view, goaltender should always make controlled save. This is one of the things that separate high-level goaltenders from ones playing in lower level.

For scoring situations close to the net (goal mouth) according to Koho & Luukkainen (2012, 84-85) it is important for a goalie to find the most efficient way to block as much net as he can, still maintaining readiness for possible continuous play, and that these situations should mostly be played by using butterfly cover -, or paddle down saves. In order to use those saving techniques, it is really important that goaltender can position himself well. According to SJL (2008) the purpose for good positioning is that at the moment of shot goalie is at the line of puck and middle of the net (puck line). We think that if a goaltender cannot move well and fast enough, is not balanced, loses control easily, and gives loads rebounds, he will be in trouble positioning himself for shots coming close to the net.

Shots coming from small angle area, are ones taken from board side of the face-off-dot-line and basic rule is to stop this type of shot by staying on feet, according to (Koho & Luukkainen 2012, 83-84). As the goaltending has changed and new styles have been invented, these small angle shots are nowadays mostly saved by using either 1-knee-down, or post knee down save. Not too many shots are saved staying on the post on feet when shot is released below the wide hash mark line and the scoring angle not

being big. It's hard to set any basic rules of what goaltender should do as (Koho & Luukkainen 2012, 83-84) suggested. It is better to allow goaltender read the play, angle, and pucks trajectory. If puck is close to the net, still in small angle, and goaltender stays up on his feet, it's almost impossible to fast enough to move laterally when feet are close together. If goalie stays up on his feet but stance being wide, it allows shooter to find holes down low. To these close to net mouth situations the most effective saving stance is to go down to butterfly and position inside the post, or to go to one-knee-down position. Both of these saving techniques, if done correctly, allow goaltender to block the shot from small angle, and if pass lateral pass is given, also able to laterally push by using the help from short side post.

According to (Koho & Luukkainen 2012, 84) scoring efforts from a player occurring in "scoring circle" (Area 2) are not always stopped by goaltender with reaction save, but also by blocking. We can not agree more on this. When seeing many goalies from different level of ice hockey leagues, something that separates world's best goaltenders from weaker ones are in these situations. As the puck gets closer to the net, goaltender has less time to react to make saves and has to rely on blocking when shot is taken. Best goaltenders in the game have amazing reaction skills and still can make a reaction save even when there's less reaction time. Also reading and anticipating the pucks trajectory from players stick blade angle, and also from shooters body position, even before the shot is released, are done extremely well by goaltenders playing at high level.

6.3 Results analysis

First hypothesis was that lower level goalies play scoring situations differently compared to goalies at higher level. Second hypothesis was that the type of scoring situations occurring at high level league differ from low level. Our results indicate that both of these hypotheses are correct statements. Following analyse of results show the differences in goalie play and scoring situations between the leagues.

6.3.1 Goaltending variables

There are clear trends in goalies trying to save the puck between the leagues. Goalies in MOL try to make reaction save for most of the shots despite the situation and have

highest percentages for using reaction Butterfly-technique (54%) and other controlled reaction saves (21%). They have also the lowest percentage for using the Butterfly-cover technique (9%). This indicates that goalies in MOL can't read the situations well enough to understand scoring angles and reaction time to make decision when the best option is just to try cover as much as possible of the net.

Mestis goalies play clearly more of a blocking style game as they used Butterfly-style cover technique almost twice more often (29%). This technique gives poor puck control what is then seen in high percentage of other uncontrolled saves (14%) as the goalie needs to scramble for rebounds.

It is interesting to compare results from Liiga to lower levels in this category as the results in cover and reaction save categories set between the MOL and Mestis. This can be explained with Liiga goalies ability to read situations better and choose the correct technique for each situation. Choosing the right technique combined with better control and technique shows also that Liiga goalies had to use far less uncontrolled save techniques (5%) compared to MOL (10%) and Mestis (14%).

In situations when there was no save movement or goalie made stand up save there was no significant difference between the researched leagues.

Great difference between researched leagues was seen in goaltenders preparedness to stop the shot. Goalies in Liiga have significantly higher percentage (68%) of "In game stand (stand up)" preparedness's of all shots faced, compared to MOL (56%) and Mestis (39%). Goaltenders in Liiga can set (standing still in goalie stance) to make saves. When talking about percentages of all shots, we need to remember that it includes all onetime shots from lateral and North to South passes, lateral moves by skaters, and deflections. Setting up is the best way to stop shots, and that can be seen in Liiga goaltenders. Goalies in Finnish first league make much more saves setting their feet for the shot, which tells about their more efficient movement skills on feet compared to lower level league goaltenders. Preparedness "In movement (stand up)" is seen lot more compared to setting position (in game stand (stand up)) in MOL- and Mestis leagues. Technical skill-, and mobility- differences between leagues are probably the difference

maker between these researched leagues. Efficiently moving goaltender can get behind lateral passes and deflections on feet, and stopping to make saves.

As goalie position figure 19 shows, goaltenders in Liiga play courageously on top of the goalie crease or even outside. In Liiga, 42% of all shots in our research, goaltender positioned himself on top of the goalie crease. Even the numbers are close to each other when compared between leagues, this small difference makes a big difference in game situation. Least percentage shots when goaltender positioned inside the crease in Liiga (42%) compared to MOL (46%) and Mestis (44%). Even when Liiga goaltender faced percentage wise most shots positioning on outside the goalie crease, they made most saves positioning on the post also. This tells about the skill of reading the play. We also need to remember the skill difference in skaters when comparing these leagues. One reason allowing goaltenders to play more out far from the net in higher level is that skaters as team are more organized defensively. Better game reading and moving techniques allow goalie to have patience and challenge puck carrier more.

6.3.2 Scoring situation variables

Scoring situations occurring in hockey game are divided between leagues in figure 20. One interesting notice can be made on looking at the percentages between “regular shot”, “across movement”, and “rebound”. As in all leagues, regular shot is the most occurring scoring situation, with over 40% of all situations. Liiga goaltender faces the most regular shots but less rebounds. That tells us about Finnish league goaltenders better puck control when making saves, but also the defensive understanding of the more skilled players compared to MOL, and Mestis. Shots from across movement (9%) and rebounds (7%) can be considered high compared to MOL and Liiga. That can be a result of a less skilled defense, also that rebound control of goaltenders in Mestis is also not as good as in Liiga. When comparing scoring chances created by either passing the puck or skating the puck to the net (East-West pass, North-South pass, press up to goal, rising from corner) the percentage is fairly low in Mestis. It seems a Mestis goaltender can focus more on a shot coming from a player whose passing options, and chance to drive to the net are taken away by defending team. Goalies in high level need to be able to control puck better and to move well – be prepared for

shots. Goaltender in high level needs to use stick, glove and blocker to control low shots.

Number of rebound, screen shot, and deflection scoring situation percentages in Mestis (7%, 7%, and 5%), compared to Liiga (3%, 3%, and 2%) are much associated with where the shot is released from. 30% of the shots in Mestis are taken from small angles. Those type of shots are harder to control for goaltenders. Shot taken from a small angle and goaltender partly screened, or shot is deflected, it's almost impossible to control the puck when making a save. Even then MOL league goaltender gave most rebounds, according to our research, with the percentage being 38% (of all shots). Scoring situation ending to a rebound in Mestis was 36%, in Liiga 31% of all shots. MOL league goaltender faces the most shots near the goalmouth, 26% of all shots from 1,5m from the net, while Mestis goalie 18%, and league net minder 20%. Liiga skater doesn't want to shoot from small angles according to our research. Only 17% of all the shots Liiga player shoots are taken from small angle. We can then say, while MOL league defense allows forwards to take shots close to their goaltender, Liiga defenders are more skilled, not letting players getting to the best scoring area. When goaltender from MOL or Mestis enters to more skilled league like Liiga, he faces more shots from 1,5m-ringette-blue line.

In order to be successful puck stopper, shots coming from scoring areas 2, and 3 (1,5m-ringette and ringette-blue line) goaltender needs to prepare well for the shot. As said before goaltender should move well on feet, get on top of the crease, react to the shot, to make controlled saving move and especially not giving rebounds, to be successful in higher level leagues. These three factors can be seen as difference between lower and higher levels in our study. As seen in figures 17, 18, 19, and 23, goalies in Liiga are able to make much more saves from game stance with feet set, having good gap at the top of the crease and control puck better using controlled saving techniques. These factors result in covering more net, being able to get behind the puck line and controlling puck better as not giving up so many rebounds to 1st, 2nd or 3rd scoring areas compared to MOL and Mestis goalies. Goalies in high level need to be able to read game and possible threats away from the puck also. Ability to read situations and be prepared allows goalies to have better patience and to anticipate for moving faster.

Stronger legs and better moving techniques allow goalies to move faster and stop before shot.

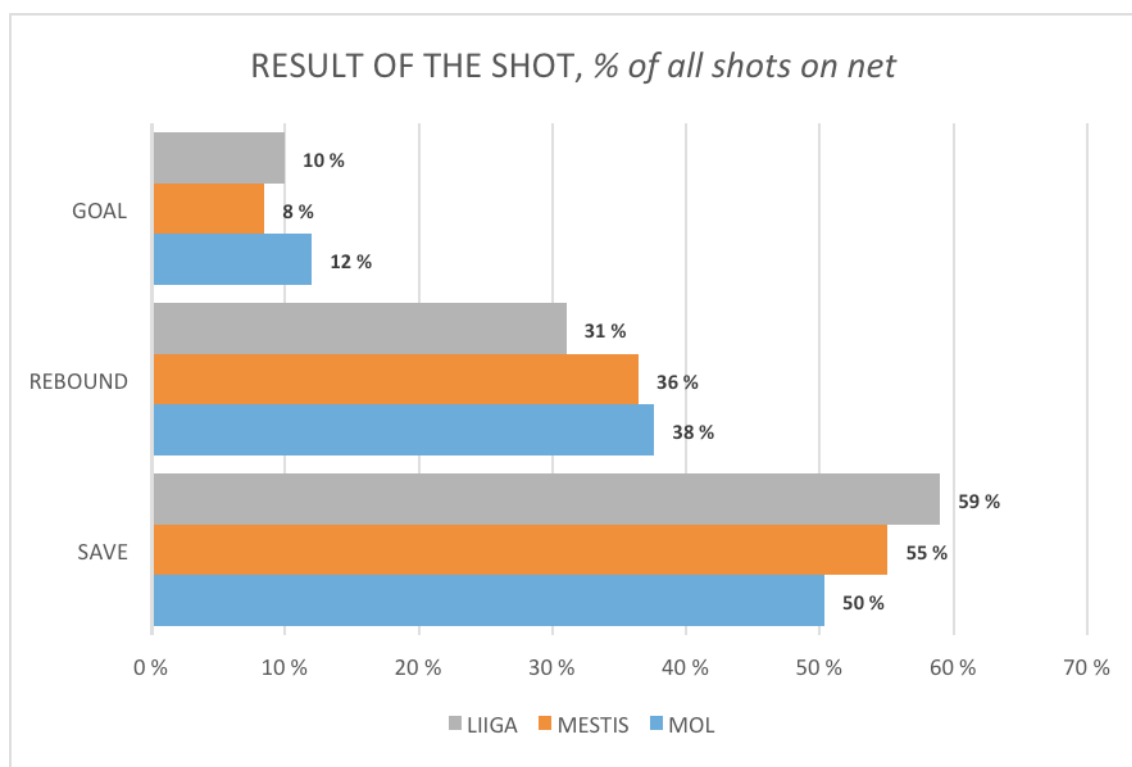


Figure 23. Results of shots - in three researched leagues. Liiga goalies control puck better and produce least percentage of rebounds.

To be successful in higher level, better reading of the shot and situation, and use of proper saving technique allows goaltender to control puck better.

6.4 Study problems, validity and future implications

Problem with this kind of study is that even the analysed variables were categorized clearly; it was sometimes difficult to decide which category some situation belongs to. Because almost every situation differs at least slightly from another, there is room for some error when collecting the data. To better compare some quantities there would be need for more data. For example situations that occurred rarely in our study, like breakaways, there should be more data collected in order to get more accurate comparison between the leagues. Another factor in data validity is the inconsistency of goal-tenders, especially in lower levels. Higher level goalies are able to be more consistent

playing each type of situation. This produces more valid data. Lower level goalies are more inconsistent playing the same type of situation differently every time.

We think anyhow that collected data is valid to present results in analysed categories. This is supported by goal per game averages. In our study MOL average was 6,8 G/G and number for the regular season was 6,6 G/G. In Mestis following numbers were 5,0 G/G in study and 5,6 G/G regular season, and for Liiga 4,6 G/G from study versus 5,0 for regular season. So in each league there was less than one goal per game difference in averages.

There are couple implications that could be extended from this study. Small angle situations played by goaltenders are played differently nowadays. For extending this research, we think that one should include category for 1-knee-down or post knee down to goalie preparedness. We marked all those to “In game stance – on ice” and saving technique to “other – controlled” –saving technique. It would be interesting to know the scoring efficiency in different scoring situations when comparing goaltender staying up on his feet compared to different knee-down positions on the post.

Goaltenders puck handling could be included to extended study also. Goaltender stopping opponent’s dump-ins, and then being able to pass the puck to his teammate is one factor considered when comparing goalies in different level.

Shots that were blocked are not included into this research. By following goaltenders actions, even when shot gets blocked, can give interesting information of the goaltenders skill level, and tell more about defensive game as a team in different levels.

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