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The Impact of Free Guard Zone Rule Modification on the Game of Curling[1]

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ORIGINAL RESEARCH

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Abstract

Curling, which was first played on frozen lakes in Scotland in the 16th century, has become one of the most watched Olympic sports, especially on TV, as a result of the increasing interest of people. Curling is the only target sport where the trajectory of the projectile can be effected after the rock has been released by the athlete and is called 'chess on ice'. To add more excitement to the game of curling the WCF updated the FGZ as the five rock rule in 2018. With the modification of the FGZ rule it is expected that the games will be played more competitively. The aim of this research is to examine the changes in various parameters such as the points generated per game, number of blank ends, total ends played, big ends and the extra end situation after the revised FGZ rule. Within the scope of the study elite level international competitions (Olympic Games, World and European Curling Championships) played for 3 years before (844 games) and after (908 games) the FGZ rule in the womens and mens category were evaluated. The data was taken from the Historical Results section of the World Curling Federation web page. Independent Sample t test was run in JASP 0.15.0.0 statistical analysis program. The level of significance was taken as $p<.05$ for statistical analysis. It can be interpreted from the research that, with the revised FGZ rule's impact, the number of blank ends has decreased and the score produced has increased. Considering the obtained results, it can be stated that curling has become more enjoyable for both players and spectators following the modification of the FGZ.

Keywords: Moncton Rule, Effect, Ice Sports, Chess On Ice, Rule Change.

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Serbest Koruma Bölgesi Kuralı Değişikliğinin Curling Oyununa Etkisi

Öz

İlk olarak 16. yüzyılda İskoçya'da donan göller üzerinde oynanan ve popularitesi giderek artan curling oyunu, en çok izlenen olimpik sporlardan biridir. Materyalin sporcu tarafından atıldıktan sonra güzergâhının değiştirilebildiği tek hedef sporu olan curling "buz üzerinde oynanan satranç" olarak tanımlanmaktadır. Curling sporunda son 30 yıldır uygulanan ve önemli kurallardan biri olan Serbest Koruma Bölgesi Kuralı (SKB) oyuna daha fazla heyecan katmak amacıyla 2018'de Dünya Curling Federasyonu tarafından modifiye edilmiştir. SKB kuralındaki değişiklikle birlikte müsabakaların daha çekişmeli oynanacağı beklenmektedir. Bu araştırmanın amacı revize edilen SKB kuralı sonrasında maç başına üretilen sayı, kazanan/kaybeden takımı aldığı sayı, blank end, toplam end, big end sayısı ve maçın uzatmaya gitme durumu gibi çeşitli parametrelerdeki değişimlerin incelenmesidir. Çalışma kapsamında kadınlar ve erkekler kategorisinde SKB kuralı öncesi (844 maç) ve sonrasındaki (908 maç) 3 yıl boyunca oynanan üst düzey uluslararası müsabakalar (Olimpiyat Oyunları, Dünya ve Avrupa Şampiyonaları) değerlendirmeye alınmıştır. Veriler Dünya Curling Federasyonu web sayfasındaki Tarihsel Sonuçlar kısmından alınarak MATLAB yazılımında ön işleme yapıldıktan sonra JASP 0.15.0.0 istatistiksel analiz programında hipotez testlerinden Bağımsız Örneklem t testi uygulanmıştır. İstatistiksel analizlerde anlamlılık düzeyi $p<.05$ olarak alınmıştır. Araştırma sonucunda müsabakalarda üretilen toplam sayı artışı, kazanan takımların maç başına aldığı sayı artışı ve blank end sayısında azalmanın istatistiksel olarak anlamlı düzeyde olduğu görülmüştür ($p<.05$). Araştırmada revize edilen SKB kuralı etkisiyle blank end sayısının düştüğü ve üretilen sayının arttığı şeklinde yorumlanabilir. Elde edilen sonuçlar değerlendirildiğinde curling sporunun SKB modifikasyonundan sonra hem sporcular hem de izleyiciler için daha keyifli hale geldiği ifade edilebilir.

Anahtar kelimeler: Moncton Kuralı, Etki, Buz Sporları, Buz Üzerinde Satranç Kural Değişikliği.

[1]This study was presented at the 7th International Academic Sports Research Congress.

Introduction

Curling, which was first played on frozen lakes in Scotland in the 16th century (Wieting and Lamoureux, 2019), has become one of the most watched Olympic sports, especially on TV, as a result of the increasing interest of people (Turriff, 2016). Curling is one of the most popular sports of the Winter Olympic Games, which has been followed with admiration by all fans around the world in recent years, with the inclusion of the Mixed Doubles discipline in the PyeongChang Olympic Games in 2018 (Mouhtaropoulos, 2018). Most of the curling arenas in the world hosted a record number of people after the 2022 Beijing Winter Olympics (Judd, 2022). It is obvious that the game of curling is spreading rapidly and has a very bright future.

Curling is the only target sport where the trajectory of the projectile can be effected after the rock has been released by the athlete (Buckingham et al., 2006) and is called 'chess on ice' (Haggerty, 2013). In the sport of curling strategy is extremely important as players have to constantly think a few moves ahead (Westlund Stewart and Hall, 2017). In the championships organized by the World Curling Federation the teams are given 38 minutes of thinking time for a 10 end game (Association, 2018). The games are played on an ice surface of 5m x 45m called sheets (Kostuk and Willoughby, 2006). The most important feature that makes curling ice different from other ice is that water droplets called 'pebble' are sprinkled on the ice before the games (Weeks, 2020).

In the game of curling played by two teams of four each curling shoes, stones and brooms are used (Lee et al., 2019). There are houses with a diameter of 3.66 meters consisting of intertwined rings at both ends of the sheet. The four intertwined circles are called the 12-foot, eight-foot, four-foot circle and button respectively (Kostuk and Willoughby, 2006). The aim of the teams in the game of curling is to position their stones, weighing approximately 20 kg, closer to the button than the opponent's stones (Reeser and Berg, 2004). The two teams throw eight stones each towards the target called the house with sequential moves (as in chess) during each end. Since the teams consist of four athletes all players make eight moves belonging to their teams by throwing two stones at each end in the order determined by the coach before the game. In this case each player must have a fixed throwing order. Provided that each end is thrown in the same order leads throw first and second, seconds throw third and fourth, thirds throw fifth and sixth, and fourth players throw seventh and eighth stones to the house (Tamminen and Crocker, 2013).

When an athlete delivers the stone two teammates sweep in front of it while the other athlete, called the skip, directs his teammates about the area where the stone should be placed and when to sweep. When it is the skip's turn to throw the vice-skip moves to the house and directs the game (Willoughby and Kostuk, 2005). According to the strategy determined before the end, or the current

position of the rocks, the teams can throw their stones into the house, remove the opponent's rocks from the game, move them away from the house or place their own rocks as guards for the next moves (Neyedly, 2012). At the conclusion of the end (when 16 stone have been delivered) the object is to count as many stones as possible closer to the center of the house than the opponent's stone nearest to the center of the house (Otani et al., 2016). The hammer shot is an extremely important factor as scoring is made after the hammer which is the final shot of the end (Ahmad et al., 2016).

In order to decide which team will throw the last stone in the first end teams throw two stones to the center of the house after a nine minute pre game practice provided that they have to rotate stones one clockwise and the other counter clockwise. The purpose of these shots is to be able to place the stone closest to the center of the house. The distance of both stones delivered by the teams to the center of the house is measured and recorded with special measurement tools. The average distance of the stones to the center of the house is measured and calculated by the umpires and the team with the lesser average distance is given the right to throw hammer in the first end of the game. In the next end the hammer right passes to the team that lost in the previous end (Willoughby and Kostuk, 2004). When the end score is 0 – 0 (Blank) the team with the hammer carries this right to the next end.

In the defensive strategy applied by the teams that want to keep the score difference low in the game, the shots are usually made to draw into the house or take the opponent's rock out of the game (Weeks, 2020). The games played by teams with a defensive strategy are considered boring by the audience (Cousins, 2021). In order to increase the pleasure of watching the game and make it more attractive the Free Guard Zone rule has been developed. This forces teams to play more offensively. This rule completely changed the sport of curling (Mielke, 2018). The FGZ rule, which is also called the ‘Moncton Rule’, was put into practice in 1991 (Brazeau, 2019). With the implementation of the rule boring games with take out shots were left behind and the athletes had more opportunities to show their skills. As the games are played more offensively players and spectators quickly adopted this rule (Neyedly, 2012).

According to the rule the first four rocks thrown into the FGZ at each end (rocks thrown by the leads of both teams) cannot be removed from the field of play by the opponent team (Federation, 2015). When the player who throws one of the first four rocks removes the opponent's rock that is in the FGZ the opponent's rock is replaced and his own rock is taken out of the game (Turriff, 2016). The area determined as the FGZ is the area between the hog line and the T line excluding the house (see Figure 1) (Howard, 2010).

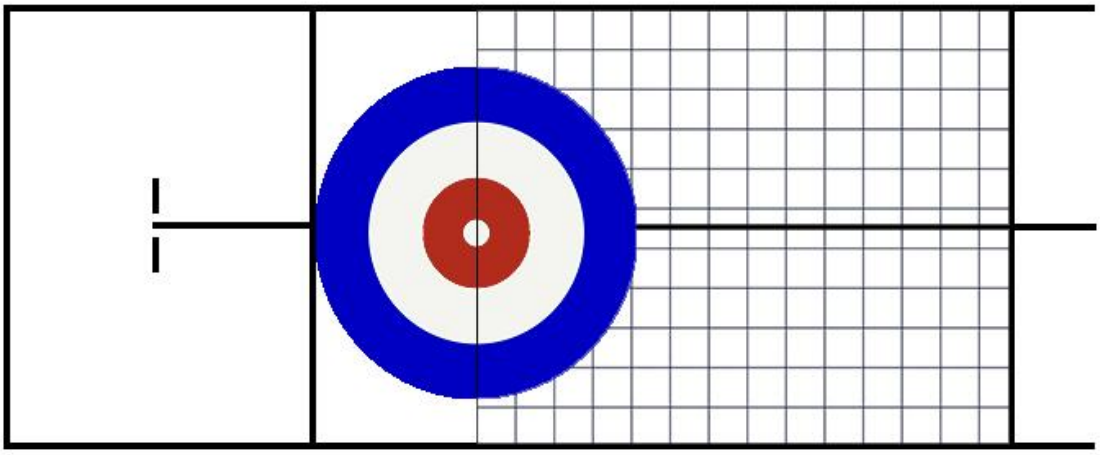

Figure 1. Free guard zone shown in shaded area

To add more excitement to the game of curling the WCF updated the FGZ as the five rock rule in October 2018 (Brazeau, 2019). Previously, the FGZ rule was applied for the first four rocks of each end but with this change the number of rocks increased to five. The main purpose of the application of the five rock FGZ rule is to have more offensive games, more rocks remaining in play and less blank ends (Mielke, 2018). It is thought that this effect will occur in championships played at the elite level rather than at the club level (McCormick, 2018). Thanks to the five rock rule, it is aimed that the teams who have the hammer will have more of an advantage and the teams that prefer the defensive game will be forced to play offensively.

When the literature is reviewed, it is seen that research on curling are related to sports psychology (Westlund Stewart and Hall, 2017; Tamminen and Crocker, 2013; Collins and Durand-Bush, 2010, 2014, 2019; Paquette and Sullivan, 2012; Shank and Yves, 2013; Stewart and Hall, 2016), engineering (Buckingham et al., 2006; Lee et al., 2019; Gwon et al., 2020; Heo and Kim, 2013; Ito and Kitasei, 2015; Kawamura et al., 2015; Masui et al., 2016), sweeping (Bradley, 2009; Kim et al., 2021; Yanagi et al., 2008; B. Marmo et al., 2006; Marmo et al., 2006), hammer (Kostuk and Willoughby, 2006; Ahmad et al., 2016; David, 2012) and strategy (Willoughby and Kostuk, 2005; Otani et al., 2016; Willoughby and Kostuk, 2004). However, no study has been found on the revised FGZ rule in order to increase the excitement in curling and attract more people's attention. The aim of this research is to examine the effect of the modified FGZ rule which was put into practice in 2018 on various parameters such as the total points generated, the number of ends played and blank ends occuring per game.

Methodology

Data Collection

The study employed a quantitative research method. In terms of its design, the research was structured as a survey model. The data used in this study were taken from the WCF Historical Results database. Since the five rock FGZ rule was applied in October 2018, 844 matches played in mens and womens categoy in the last three years before the implementation of the 5 Rock FGZ rule (2015 – 2016 – 2017 European Curling Championships, 2016 – 2017 – 2018 World Curling Championships and 2018 Olympic Games) and 908 matches played after the implementation of the 5 Rock FGZ rule (2018 – 2019 – 2021 European Curling Championships, 2019 – 2021 – 2022 World Curling Championships and 2022 Olympic Games) were evaluated. The championships in 2020 could not be assessed as they were canceled due to the COVID – 19 pandemic. The competitions played in Pacific Asia, America and Europe B – C groups were excluded as they were open to all countries and there was an excessive difference between the participating teams in the World rankings. 14 games with Win – Loss record due to insufficent time and COVID-19 cases were not included in the analysis.

Preprocessing

After the data was transferred to the MS Excel software as in Table.1 preprocessing steps were applied through the MathWorks MATLAB software to calculate the parameters. Calculation of the parameters related to the total points generated per game, the points of the winning team, the points of the losing team, the number of ends played, the number of blank ends and big ends per game, games finished at sixth – seventh – eighth – ninth – tenth ends and extra end.

Table 1
Sample of the Data Preprocessed in MATLAB

Game No	**Teams**	**H**	**Ends**											**Score**	**Total Points**	**Blank Ends**	**Ends Played**	**Big Ends**	**Extra End**
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**					
1	NOR	*	2	1	0	2	0	5	0	1	X			11	15	1	8	1	0
	SCO		0	0	0	0	1	0	3	0	X			4					
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**					
16	CZE		0	2	0	0	2	0	1	1	1	0	1	8	15	0	11	0	1
	NED	*	2	0	2	1	0	1	0	0	0	1	0	7					

Statistical Analysis

In order to answer if there is a difference on various parameters between the four rock and the five rock FGZ rule applied in curling, the normal distribution of the data was tested and it was found to have a normal distribution. Independent Samples t test was applied with JASP 0.15.0.0 software to compare the situation before and after the five rock FGZ rule. In the tests performed, the statistical significance level was taken as $p < .05$.

Ethics Committee Permission

During the current research, the "Regulation on Scientific Research and Publication Ethics of Higher Education Institutions" has been followed. For this research, ethical approval was obtained from Atatürk University Faculty of Sport Sciences Ethics Committee on 22.08.2022 with reference number 97.

Findings

The analysis of the data of the study, in which we examined the difference between the four and five rock FGZ rule applications, is shown in Table.2.

Table 2
Analysis of Parameters Between Four and Five Rock FGZ Rule

Variable	Rule	n	X	SD	t	p
Total Point	4 Rock FGZ	844	12,36	2,66	-2,869	**0,004***
	5 Rock FGZ	908	12,73	2,68		
Winning Team's Point	4 Rock FGZ	844	7,91	1,67	-2,723	**0,007***
	5 Rock FGZ	908	8,13	1,69		
Losing Team's Point	4 Rock FGZ	844	4,46	1,79	-1,630	0,103
	5 Rock FGZ	908	4,60	1,76		
Blank Ends	4 Rock FGZ	844	1,29	1,13	3,401	**0,001***
	5 Rock FGZ	908	1,11	1,06		
Big Ends	4 Rock FGZ	844	0,23	0,46	-0,503	0,615
	5 Rock FGZ	908	0,24	0,47		
Ends Played	4 Rock FGZ	844	9,00	1,20	-0,445	0,656
	5 Rock FGZ	908	9,03	1,13		
6 End Game	4 Rock FGZ	844	0,06	0,24	0,788	0,431
	5 Rock FGZ	908	0,05	0,22		
7 End Game	4 Rock FGZ	844	0,08	0,27	1,537	0,125
	5 Rock FGZ	908	0,06	0,24		
8 End Game	4 Rock FGZ	844	0,11	0,31	-0,777	0,437
	5 Rock FGZ	908	0,12	0,33		
9 End Game	4 Rock FGZ	844	0,28	0,45	-1,945	0,052
	5 Rock FGZ	908	0,33	0,47		
10 End Game	4 Rock FGZ	844	0,36	0,48	0,580	0,562
	5 Rock FGZ	908	0,35	0,48		
Extra Ends	4 Rock FGZ	844	0,11	0,31	0,985	0,325
	5 Rock FGZ	908	0,09	0,29		

*p<0.01

The total number of points generated in a game when the four rock FGZ rule applied was 12.36 ± 2.66, while the five rock FGZ rule was 12.73 ± 2.68. In the application of the five rock FGZ rule, the total number of points generated in a game increased statistically significantly ($p<.05$). When the numbers generated per game by the winning and losing teams in both rule applications are compared, the winning teams produced 7.91 ± 1.67 points in the four rock FGZ rule and 8.13 ± 1.69 points in the five rock FGZ rule. The amount of points the winning teams produced per game in the five rock FGZ rule showed a statistically significant ($p<.05$) increase compared to the four rock FGZ rule. Although the number of points produced by the losing teams increased (four rock FGZ rule 4.46 ± 1.79, five rock FGZ rule 4.60 ± 1.76), this increase was not statistically significant ($p>.05$).

While the average number of blank ends per game is 1.29 ± 1.13 in four rock FGZ, it is 1.11 ± 1.06 in five rock FGZ rule. It is seen that the amount of blank ends occurring per game in five rock FGZ rule decreased statistically significantly ($p<.05$). In the four rock FGZ rule application, the number of big ends in a game is 0.23 ± 0.46 and the total end played is 9.00 ± 1.20. In the five rock FGZ rule application the number of big ends in a game is 0.24 ± 0.47 and the total end played is 9.03 ± 1.13, increasing in both parameters. However, these increases are not statistically significant ($p>.05$)

When the number of ends played per game in both rule applications is compared, it is seen that while the five rock FGZ rule is applied, fewer games are finished at the 6, 7, 10 and 11 ends. The number of ends played in the games is for six ends 0.06 ± 0.24, 7 ends 0.08 ± 0.27, 10 ends 0.36 ± 0.48 and 11 ends 0.11 ± 0.31 with four rock FGZ rule. When the games played with the five rock FGZ rule, these values are 0.05 ± 0.22 for 6 ends, 0.06 ± 0.24 for 7 ends, 0.35 ± 0.48 for 10 ends and 0.09 ± 0.29 for 11 ends. Although there was a difference in the number of ends played between the two FGZ rule applications as stated above, no statistically significant difference was observed ($p>.05$).

In the number of ends per game that were played, the situation was exactly the opposite for the 8th and 9th ends. While the number of games ending in the 8th and 9th ends were 0.11 ± 0.31 and 0.28 ± 0.45 in the four rock FGZ rule, respectively, these values were 0.12 ± 0.33 and 0.33 ± 0.47 in the five rock FGZ rule. Although more games were finished at the 8th and 9th ends in the five rock FGZ rule application, it is seen that there is no statistically significant difference between four and five rock FGZ rule applications ($p>.05$).

Discussion and Conclusion

In the study examining the effect of the revised FGZ rule on various parameters, it is seen that the total number of ends produced per game increased statistically with the new rule. Teams that

wanted to apply a defensive strategy with take out shots had to make these shots later because of the rule or abandon the defensive strategy. Therefore, the fact that the increased number of stones in play with the five rock FGZ rule means more offensive games (Mielke, 2018). The fact that both teams play more offensively can be interpreted as increasing the generated points per game. This is also the expectation of the world's leading curling athletes and trainers before the rule modification (Spencer, 2018). The results of the research prove the accuracy of the estimates.

Another result of the research is the increase in the average number of points produced per game by both winning and losing teams. The average number of points produced per game by winning teams increased more than losing teams. This has led to a larger gap between winning and losing team. The fact that the games ended with more point difference after the five rock FGZ rule can be explained by more skilled, more experienced and teams with better ice-reading abilities produced more points, especially in the ends where they had the hammer.

In the research, after the FGZ rule modification it is seen that the number of blank ends per game significantly decreased statistically. It is thought that this result occurs because the five rock FGZ rule limits the take out shots. Since the five rock FGZ rule affects teams that do not have hammer (Miskew, 2015), teams without hammer had to apply different strategies and take out shots were replaced by guard or draw shots. As a natural consequence of this situation games that result in fewer blank ends have emerged. In recent years it has been suggested that there should be rule changes for the team making the blank end to give the hammer to the other team in order to create less blank ends (Reimer, 2019). WCF temporarily applied the ‘no-tick’ rule at the 2022 World Championship which makes the stones on the centreline untouchable during FGZ rule for fewer blank ends.

According to the results of the research, the number of ends played per game increased slightly due to the five rock FGZ rule, but it is seen that this increase is not statistically significant ($p>.05$). It is thought that the new rule provides more opportunities for teams to come back during the game (Brazeau, 2019). For this reason, the teams act with the motivation to win until the last stone by keeping their hopes fresh instead of giving up. The increase in the number of ends played per game can be interpreted in this way. In addition, the average of the occurance of big ends (end in which a team generates four or more points) in the games has also increased. As the probability of a team to score more points in offensive games increases, the risk of giving more points to the opponent also increases (Howard, 2010). It can be stated that the reason for the increase in the number of big ends is the risky game format originating from the five rock FGZ rule.

No statistically significant difference was found between the two rule applications related to the number of ends played in the games analyzed within the scope of the research. When the results

are examined in detail, it is seen that fewer games finished in the 6th and 7th ends with the rule modification. This is an indication that the games are played longer than in the past. Especially the increase in the number of games with 8 and 9 ends for this research confirms this claim. Since 10 ends are played in all championships except mixed, which is not an Olympic discipline, the curling games last approximately 3 hours. This situation both tires the athletes more and makes it difficult to market the TV broadcasting rights of sport of curling (Heroux, 2021). For this reason proposals of playing 8 end games are being put forward for all world championships. The various stakeholders' suggestions about not playing extra ends in matches support this situation (Burns, 2021).

In the study examining the differences between the four and five rock FGZ rules in some parameters in the sport of curling, it was concluded that there are fewer blank ends and more points are being generated in the games after the five rock FGZ rule modification. With the five rock FGZ rule implementation games last more ends. More people are interested in curling which is more enjoyable to watch than before the FGZ revision. Variables which were not evaluated in this research such as the winning status of the teams with the hammer down by one or two points in the last end, and the average points produced per end by the teams with and without the hammer, can also be examined within the scope of future studies.

Ethics Committee Permission Information

Ethics evaluation committee: Atatürk University, Faculty of Sport Science

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Statement of Researchers' Contribution Rates

Both authors contributed equally to all stages of the study

Conflict Statement

The author have no declarations of conflict regarding the study.

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