

Subjective Influences on the Objectivity of Chess

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Abstract

Chess is aptly stereotyped as a male-dominated activity in much of the world. In this paper I use longitudinal data from 2001 onwards in order to understand trends and differences between countries concerning age, gender, and nationality. With these findings I then seek to understand what about the culture and history of the game has shaped it into its current state. I use my findings and statistical literature to deduce the importance of participation in generating results and explore what often stands in the way of equitable distributions. Broadly, for most countries with a history with the game, chess is seen as either a part of culture or an activity for leisure. Those that do not subscribe to this dichotomy often have the relatively fairest participation ratios.

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Introduction

Chess is one of the oldest continuing games known to humankind, surviving over a millennium and a half. In the last 33 years, a paradigm shift occurred, which has and will continue to differentiate its future from its preceding forms. Ever since 1997, when Garry Kasparov was defeated by IBM's Deep Blue chess computer in their second meeting, technology has come to dictate the game's pace. The improvements on play are often subtle, such as a preference for one move in an opening over another almost equally valid move. But with the increased computing power of the best engines, very slight advantages can spiral into huge opportunities at the highest levels of play.

The implication of this shift is that chess has become a function that can be optimized. It has technically always been this way, due to its definite rules and clear strategic goal in trapping the opponent's king; however, only now do we have the tools to attempt to bring human play towards this higher level. Algorithms have demonstrated that the game's infinitesimal variations demand a problem-solving approach but there is no clear answer to why there are large disparities in those who choose to attempt the puzzles found over the board.

Females only make up 14.7% of the total FIDE (an international chess membership required to compete internationally) registered playerbase. Yet this gap is not for a lack of skill. Players like Hungarian Grand Master Judit Polgar have reached the top 10, with wins over the best players of both genders. She beat Bobby Fischer's record in achieving the Grand Master title at only 15 years and four months, the youngest at the time.¹ Today the record has been broken by

¹ Contributors to Wikimedia projects, "Chess Prodigy."

younger male prodigies many times over. Five years after her retirement, the only female player in the top 100 is China's Hou Yifan. If women can succeed and have succeeded, what is stopping others from following suit?

Chess has been transformed into a paradox due to our increased foresight given by computers. Take any game and you can receive precise calculations of the best move at any given moment, often with reasons lying within variations dozens of moves away. Yet, sit down to play chess and all of this objectivity goes out the window. If we were to consider any player, human or not, as a computer attempting to parse their way through the amount of variations larger than atoms in the universe to find the next best move, the human brain would appear riddled with viruses. Beyond limited capacities for attention and foresight, bugs arise due to a rich life surrounding the chess board: one with intimidation, stereotype threat, and overcompensation. For example, when a young man plays a female opponent, they typically opt for riskier and more aggressive play in the opening even as it only stands to hinder their chances of winning later in the game.² To play excellent chess is simply first-level maximization of success: enough on its own but not all there is to it. Even if your game has a definite best move, as it would be calculated by a hypothetical supercomputer, many exogenous factors can stand in the way of finding it.

There are a myriad of conditions that players must consider in addition to their moves. For example, in the last game of the 2018 World Chess Championships, Magnus Carlsen was in a winning position, using his pawns and knight to nullify the two bishops of Caruana while also having a greater ability to attack his opponent's king. Yet, on move 32, Carlsen opted for a draw,

² Fine, *Players and Pawns: How Chess Builds Community and Culture*, 167.

choosing to not risk a loss by not trying for a win and the disadvantaged Caruana knew it was in his best interest to accept. In this case, the world champion understood that a draw now would pay off later, as all 11 games preceding this one were also drawn and making it 12 straight ensured a tiebreak. This tiebreak consisted of a best of 4, with only 25 minutes for each player compared to the marathon classical games which reached as long as 7 hours total.³ Carlsen was a definite favorite in the shorter time format. Considering the players' Elo, a Chess ranking system, the gap between the two players was 91 points in the rapid time format, a very significant amount on the highest level of play when compared to their difference of only 3 points in the classical format.⁴ From aggregating their past matchups, it was clear Carlsen had better odds in the tiebreak, boasting more wins to losses along with less draws in the shorter time formats.⁵ A common maxim in chess is to "think X moves ahead of your opponent." Here it's clear that Carlsen was thinking 4 games ahead of Caruana by deciding to draw on game 12 and subsequently beating him 3-0 in the rapid games, all while a computer would have just been calculating the next best move.

³ Ingle, "Clash of Chess Stars Ends in Dramatic Draw after Seven Gruelling Hours."

⁴ Pereira, "Magnus Carlsen Keeps the Crown."

⁵ Pereira; "CHESSGAMES.COM * Chess Game Search Engine."

Caruana, F. vs Carlsen, M.
WCC 2018 | London | 27 Nov 2018 | 1/2-1/2



The position in question. Carlsen is black. Note the advanced a4 pawn, nullified e3 bishop, and impotent f2 knight.

On a larger scale, among the lower echelons of players, studies and experiments have found deviations in the assumed logic of first-order play when conceptions like gender enter the minds of players, sometimes causing dampened performance by the player or the opponent depending on the context.⁷ While each chess player has a set of skills and knowledge that should allow them to play at a hypothesized max level, there are a multitude of factors that can hold them back and push them forward. As current world chess champion Magnus Carlsen puts it, “There are plenty of players in history who have been immensely talented, but they were just too pessimistic, they see too many dangers that are not there and they cannot perform at the highest level.”⁸ It's this gift for powerful internal computing which allows the best players to excel in this game. But, if this were all that mattered then we would find chess to be almost a true

⁶ “World Chess Championship 2018 – Game 12.”

⁷ Fine, *Players and Pawns: How Chess Builds Community and Culture*, 167.

⁸ *Magnus Carlsen - Charlie Rose*.

meritocracy, which Carlsen argues against, where the only two things that mattered would be talent and preparation.

If this were true, that there were no barriers to equal competition, deciding to stick with the game in a tournament setting would be a simple choice based on skill and one's rate of improvement. Yet, we see vast disparities in terms of participation and in those who stick to the game. These phenomena imply that there are girls who are never brought to play or, for some reason, quit when there is a good chance they would have become top performers. This drastic under representation also varies heavily on a national level. China, Vietnam and Sri Lanka are all above the 25% participation mark while Norway, Germany and the USA are all below 10%.

What is most interesting about Judit's case is that her two older sisters also are high-level chess players (one Grand Master, one International Master - a step lower). This familial skill is attributed to the hypothesis of their parents, which posited that any child can become a genius: success is simply a manner of getting the proper attention and resources needed to bring that genius out of someone. Seemingly in spirit of that belief, Judit refused to play in any female-only tournaments, which often have fewer participants and lower average ratings in addition to fractional prize funds.⁹ Judit's father fought the idea of playing in these tournaments first, claiming "Women are able to achieve results similar, in fields of intellectual activities, to that of men," he wrote. "Chess is a form of intellectual activity, so this applies to chess. Accordingly, we reject any kind of discrimination in this respect."¹⁰ Judit echoes the same sentiment, "I always say that women should have the self-confidence that they are as good as male players, but only if they are willing to work and take it seriously as much as male players."¹¹ The 2020 World Chess

⁹ Shahade, *Chess Bitch: Women in the Ultimate Intellectual Sport*, 83.

¹⁰ Radeska, "Judit Polgár Is the Woman Who Defeated Kasparov, Karpov and Spassky ."

¹¹ "A Gender Divide In The Ultimate Sport Of The Mind."

Championship has a minimum payout of 2,000,000 Euros while the Women's World Chess Championship had a purse of only 500,000 Euros.¹²¹³ Tournaments have just been one area of segregated classification in official chess. The titles awarded to expert players also have twin versions exclusively for women, with lower rating requirements, almost as if FIDE expects women to play worse than men, putting their ceiling markedly lower than those of the non-restricted titles.

The first major form of chess was demarcated by a weak queen who could only move one square diagonally at a time until, simultaneous with the power of female monarchs like Queen Isabella, her power grew.¹⁴ As the game grew to be more competitive, it simultaneously began to shun women from playing due to the perceived unbecoming nature of the competition allegorical to war.¹⁵ This helped fuel its reputation as male-dominated, an association that eventually was ingrained as culture within the community. Bobby Fischer, the only champion the United States has had in the last century, stated in a 1961 interview, “They're all weak, all women. They're stupid compared to men. They shouldn't play chess, you know. They're like beginners. They lose every single game against a man. There isn't a woman player in the world I can't give knight-odds to and still beat.”¹⁶ The more stable Russian champion Garry Kasparov answered in a 1989 interview that, “I think this is very simple logic. It’s the logic of a fighter, a professional fighter. Women are weaker fighters.”¹⁷ 28 years later, Kasparov changed his stance but numerous Grand Masters continue to hold and voice similar opinions.

¹² Doggers, “2020 World Chess Championship: 14 Games, Double The Prize Fund.”

¹³ “[No Title],” 3.

¹⁴ Shahade, “How a Royal Changed the Game - Los Angeles Times.”

¹⁵ Shahade, *Chess Bitch: Women in the Ultimate Intellectual Sport*, 9–12.

¹⁶ “Chess Variants,” 43.

¹⁷ “Garry Kasparov: I Was Wrong about Women Playing Chess.”

Still, deviations are clear in attitudes of different nations. Former Soviet states like Georgia have maintained their chess-playing legacy throughout political and economic strife, continuing to boast some of the most equitable participation rates in the world. Further, the youngest players entering the world of chess today have been playing in tournaments at the highest rates ever, with the proportion of female players growing quickly in younger age groups. There is no question that this ancient game will have a future but it is unclear the path the community will take it, with the ability to favor tradition or inclusion.

Chess represents more than just a game. Top players are worth millions of dollars, just like any other sport. A successful career as a Grand Master, the highest title awarded to players, can lead to a lifetime of coaching, book writing, and competition in addition to being a great signal of general aptitude to employers in other fields. But to get to this level, it takes hours of intense study and immense resources. There are players who can get far on talent alone. Though, at the highest level of competition, there is a lush foundation of coaching, software, and, most importantly, time that allows champions to flourish. If potential pros are not being afforded these necessary components, they suffer large opportunity costs in monetary gains as well as achievement. By researching the effects of identity in an otherwise “objective” realm, we can isolate the role of social stigmas and internal filters in the pursuit of casual and professional opportunities.

Data and Methods

The main source of data comes from the FIDE website and their archive of player rating data from January 2001 onwards. FIDE stands for “Fédération Internationale des Échecs” and is

considered to be the premier chess authority for international competition. Players who wish to play in tournaments may be able to play with no registration, a local or national membership, or with a FIDE registration, depending on the event. FIDE events are considered to be the most prestigious and competitive since it is an international ladder and garners the most and best competition. As such, being in this database represents players who at once chose to pay a membership fee to be able to register for a tournament. After competing in the tournament players have ratings calculated based on an Elo system, basing their quantified level of skill on the strength of their opponents and game outcomes. The rating is an indication of skill relative to all other players in a given population. If two players of the same Elo play, they are expected to win an even number of games each. Thus, differences represent skill as well as implied odds.

FIDE publishes updated ratings in a text format every month. I collected 143 months of data, which began on a quarterly schedule and around 2008 switched to being updated every month. The range of dates is January 2001 to February 2020. Rather than looking at snapshots, I amalgamated all of the months to be able to track a full history of the chess community to be able to study rating progression amongst individual players cohorted by age, nationality, and gender. Another advantage over using snapshot data is that this tracks players who drop out of the system, such that they were entered in January but by February they leave the system. Important to note is the distinction made between active and inactive players within the analysis. FIDE has their own classification system for inactivity based on one year without a player playing any rated games.¹⁸ Players can shed the designation by playing one game. For some of the analyses I will explore only active players, which means that every time period in which they

¹⁸ "B. Permanent Commissions / 02. FIDE Rating Regulations (Qualification Commission) / FIDE Rating Regulations Effective from 1 July 2017 / FIDE Handbook."

are not inactive is considered. For example, if a player is active from 2005-2010 but goes inactive then on, the 2005-2010 period is included even though they later are inactive. This is key for using rating data while the full dataset, active and not, are generally useful for looking at demographic descriptions. One other intricacy of note is that FIDE also implements a hard cutoff at 1000 Elo, considering those below to be unranked and therein unincluded in the captured data. For the earliest data from 2000 it seems that the cutoff was 2000 Elo but it is a small fraction of the total set. As such, this dataset is a sample of a population of players where the left tail is largely missing since the worst players aren't included by and large. Further, for recent snapshot analysis of rating strength and proportions of players I default to November 2019 data due to the possible impact of COVID-19 on tournaments December onwards.

In addition to the dataset which I forged from the available monthly FIDE data, I also supplement the analysis by using data from the World Bank (<https://data.worldbank.org/>). They ammmoglomate different data sets used in past research projects alongside official figures codified by country. By matching up the country codes used by FIDE and the World Bank, I can invoke collected measures of population to compliment the chess data.

Following the quantitative analysis using ratings data, I had planned to interview female chess players and coaches to understand, through their experience, why these patterns appear in the data but due to social distancing measures in early 2020 was unable to attend the gatherings I had planned to attend.

Literature Review

Past works focused on the game of chess have honed in on a variety of different aspects, from the neurological phenomena while playing the game to the players themselves and what goes into their preparation for the game at all levels of skill. As a subject of psychology, the first studies go back to the 19th century, with published articles in *Nature* surrounding the attributes of talented chess players.¹⁹ Interests and uses for the game have only evolved since then. A 2007 study on the Big 5 personality traits of young chess players found “Children who are less sensitive towards others, more prone to arguing and less to avoiding conflicts (Agreeableness), more energetic (Energy/extraversion) and more open to new experience (Intellect/openness) are more likely to be attracted to the game of chess.”²⁰ Studying what brings players to the game is an important predecessor to understanding the current shape of the game. Another study found that among German pro players, the lower average rating of females is explained 96% by higher participation rates of males.²¹ This idea is the main explanation given as to why disparities in performance exist at large. This has been reaffirmed by a 1996 study focused on statistically assessing the expected and observed ratings among the top players based on nationality (here only American vs Soviet) and gender, finding that both categories simply represent what is to be expected based on the amount of participants.²² Furthering the idea of external factors leading to rating differences, studies have also indicated the presence of stereotype threat in experimental

¹⁹ Galton, “Psychology of Mental Arithmeticians and Blindfold Chess-Players.”

²⁰ “Personality Profiles of Young Chess Players.”

²¹ Bilalić et al., “Why Are (the Best) Women so Good at Chess? Participation Rates and Gender Differences in Intellectual Domains.”

²² Charness and Gerchak, “Participation Rates and Maximal Performance: A Log-Linear Explanation for Group Differences, Such as Russian and Male Dominance in Chess,” 48–49.

settings.²³ Further work has also pointed to the presence of stereotype threat in children's scholastic tournaments, where girls perform significantly worse playing boys than other girls, especially when their opponent is older and favored based on skill.²⁴ In essence, when girls are at a natural disadvantage based on Elo differentials their performance becomes even worse than what is expected when their opponent is older and male. A consequence found in the study was that those with greater subjectivity to stereotype threat are less likely to continue playing chess.²⁵

The above implications contrast a group of studies which demonstrate the opposite, finding a lack of stereotype threat in the analysis of thousands of chess games internationally, only looking at game outcomes, gender and rating.²⁶ Of note is the fact that stereotype threat both requires activation and a specific cultural context for the stereotype.²⁷ Here only game metadata is used and from all countries represented by FIDE, a flawed methodology considering that in some countries women perform better than men on average. Further proponents of the idea of innate differences in chess skill on the axis of gender come from Robert W. Howard of The University of New South Wales. One study finds that, through longitudinal data, among active players women demonstrate lower skill (more games to get GM, even in countries where there is greater representation) and suggests that males have innate "...advantages in developing and exercising chess skill."²⁸ A second example looks at current disparities in career length, games played, and performance and finds that, while gaps between genders have lessened over time in

²³ Maass, D'Ettola, and Cadinu, "Checkmate? The Role of Gender Stereotypes in the Ultimate Intellectual Sport."

²⁴ Rothgerber and Wolsiefer, "A Naturalistic Study of Stereotype Threat in Young Female Chess Players."

²⁵ Rothgerber and Wolsiefer.

²⁶ Stafford, "No Stereotype Threat Effect in International Chess."

²⁷ https://diversity.arizona.edu/sites/default/files/stereotype_threat_overview.pdf

²⁸ pubmeddev and Howard, "Gender Differences in Intellectual Performance Persist at the Limits of Individual Capabilities. - PubMed - NCBI."

other domains, differences seem to have persisted in chess.²⁹ This last study was replied to, citing more literature that points to the fact that chess skill doesn't rely on intelligence, as measured by IQ, which is claimed by Howard.³⁰ Another large cohort study takes a more involved view by matching boys and girls of similar skill levels and finds equal rates of improvement and drop-outs, but as a whole that boys start chess rated higher and in greater numbers.³¹ In contrast, the study also finds that in locales where there are roughly equal rates of participation between genders, there is no difference in starting rating, pointing to their stated conclusion that, as a whole, rating differences are due to participation differences more than anything else, echoing the 2009 Bilalić et al. study.³²

When we also consider the pursuit of chess as a labor opportunity, there are a plethora of different factors which come into play when gender is the prevailing identity. Akerlof and Kranton discuss the implicit associations of jobs, in which some roles are deemed women's or men's jobs - cyclically promoting lopsided participation along those roles by the laborer and in promotion by the employer.³³ At large, a woman will have many choices in what type of work she will pursue. If professional chess is typically thought of as a role for men, women are likely to be less interested just as those in charge of recruiting players would be less likely to introduce chess or encourage it further, be it parents, coaches, or other figures in a player's life. A 1989 dissertation mapped out a lot of these questions using data from the United States Chess

²⁹ pubmeddev and Howard, "Are Gender Differences in High Achievement Disappearing? A Test in One Intellectual Domain. - PubMed - NCBI."

³⁰ pubmeddev and Bilalic M And Mcleod, "How Intellectual Is Chess? -- a Reply to Howard. - PubMed - NCBI."

³¹ Chabris and Glickman, "Sex Differences in Intellectual Performance: Analysis of a Large Cohort of Competitive Chess Players."

³² Chabris and Glickman.

³³ Akerlof and Kranton, "Economics and Identity*", 733.

Federation, a body identical in functionality to FIDE, but exclusive to the US. At the time, Linda Carol Gilbert found dramatic rating improvements in female players year on year - positing the idea that male players have hit a ceiling that female players have yet to find but does not find any evidence of a “Roger Bannister Effect” where the top rated female players lift the ratings of other female players by demonstrating possibilities.³⁴ Gilbert also matches many of these findings with survey data, indicating that, at the time, women learned chess, eventually took it seriously, and joined the USCF all at older average ages than those of male respondents who had their earlier participation and interest correlate with significant gains in ratings.³⁵

“A ‘chess historian’ is a recognized and honorific title, and the library of chess is large.”³⁶ I am not the first to contextualize the rich history of chess against the course it has taken today. Though, many of the past attempts have been confined to specific domains and I aim to provide a marriage of different fields, combining the history of the game with social context and sociological perspectives to understand the statistical aberrations found in the expansive dataset.

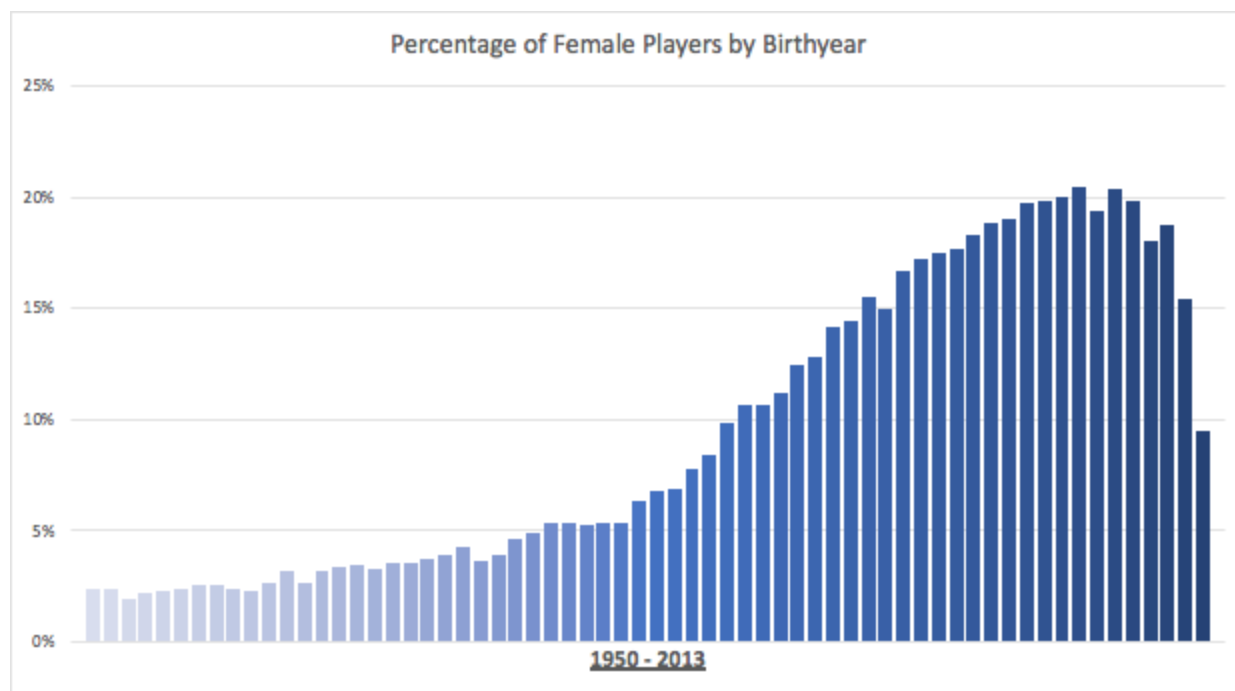
The Game Today

The defining characteristic of chess in the 21st century is that of attracting and including more players. The total player count has increased consistently over time, with a greater, albeit still significantly smaller, proportion of female players entering the game, particularly at young ages.

³⁴ Gilbert, *Chessplayers: Gender Expectations and Self-Fulfilling Prophecy*.

³⁵ Gilbert, 123–124.

³⁶ Fine, “Sticky Cultures: Memory Publics and Communal Pasts in Competitive Chess,” 399.

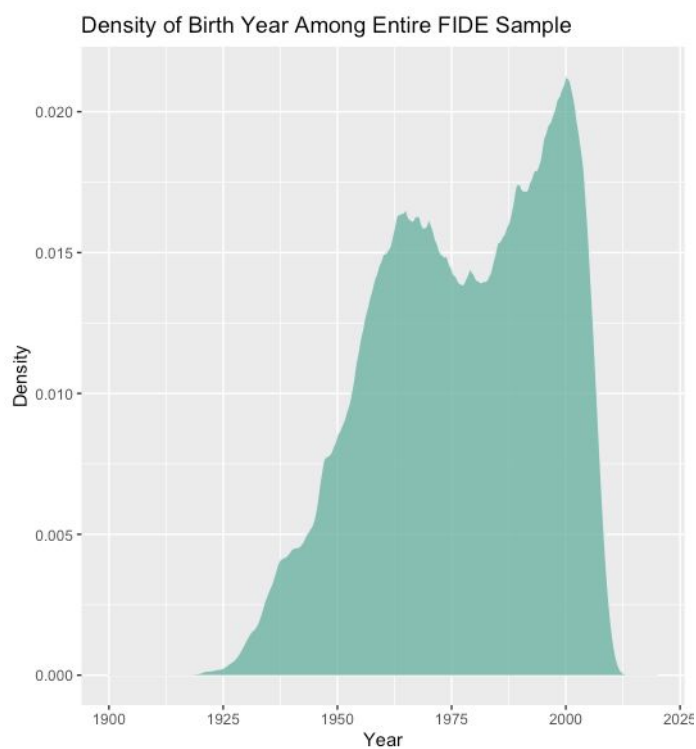


The % of registered female FIDE players by birth year

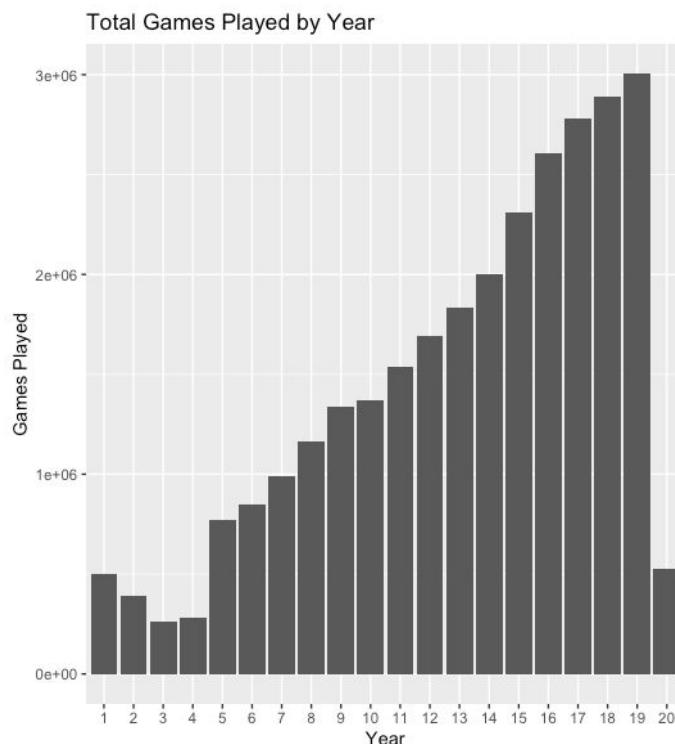
This snapshot shows that of players 7-10 years old, about 20% are female, an all time high for the game. Chess has become welcoming to new, younger, players by promoting tournaments that are only open to players of a specific age or rating. Each player begins unrated, and based on one's first few games they are then assigned a rating based on their performance against opponents who have been rated based on their performance against other players. This system, known as an Elo ranking, allows for easy comparisons between players who may have never played each other before. In a sense, the formula assigns a probabilistic outcome to a game, and based on one's chances of winning they gain points. For example, a player who is ranked at 1600 would only gain 3.2 points for defeating an opponent ranked at 1200 but would gain 36.8 points for upsetting a 2000 player as the system "expects" the former victory but not the latter.³⁷ This system has helped welcome in the largest number of players in the history of

³⁷ Assuming a K value of 40. See https://ratings.fide.com/calculator_rtd.phtml and https://en.wikipedia.org/wiki/Elo_rating_system for more on how ranking works.

this dataset, with the largest fraction being born in the year 2000, also increasing the yearly total of games played to about 1.5 million, triple the amount played 12 years ago.



Share of birth years among every registered FIDE player in the database (even those who are now inactive)



Here, since there are two players to each game, $3,000,000/2$ shows there were 1.5 million unique games played in 2019.

Age is one example of how, in order to see what is achievable, a greater sample of players is needed to find those who are exceptional. It's like trying to grow the largest watermelon. In order to better the chances of doing so it makes more sense to have a thousand plants compared to just one. As such, when it comes to gender, there is a huge disparity in recruitment, possibly leading to why we see such an achievement gap in performance today. Even on a national scale, there are no examples of any true equal distributions of players. The country which comes closest is Seychelles, where there are only 1.57 males for each of the 42 active female players. But if we filter out countries with small playerbases, we can see how far even the top nations are from equality.

Country	Ratio (M:F)
Vietnam	1.6353211
United Arab Emirates	1.82255846
Mongolia	1.83407672
Georgia	2.31722222
China	2.33830645

Top 5 countries with the lowest M:F active player ratios and over 1000 registered players

This implies that women are outnumbered far more than 2:1 in most countries, meaning that at clubs and tournaments they are always the minority unless they opt for gender-exclusive events with poorer prizes and competition. The catch 22 created forces them to either feel like an outsider or like an inferior player. If we consider the inverse of the above table we find that there are 25 nations with active male players but no registered female players.

Country	Active Players
Libya	2665
Saudi Arabia	771
Mauritania	377
Afghanistan	363
Cape Verde	306

The most active player bases among countries with no women participating

Beyond absolute figures, we can also measure participation as a percent of total population, segmented by gender, by using 2018 data from the World Bank compared with 2018

FIDE data. Here we see that Iceland is the country in which chess is the most popular as a % of population, % of males, and as a % of females.

	Top Total Participation		Top Male Participation		Top Female Participation	
1	Iceland	1.44%	Iceland	2.76%	Iceland	0.12%
2	Slovak Republic	0.61%	Slovak Republic	1.19%	Slovenia	0.10%
3	Czech Republic	0.59%	Croatia	1.14%	Greece	0.10%
4	Croatia	0.59%	Czech Republic	1.13%	Georgia	0.09%
5	Denmark	0.56%	Denmark	1.12%	Estonia	0.08%
6	Serbia	0.48%	Serbia	0.91%	Barbados	0.08%
7	Norway	0.46%	Norway	0.88%	Croatia	0.08%
8	Hungary	0.45%	Hungary	0.88%	Latvia	0.07%
9	Montenegro	0.42%	Luxembourg	0.79%	Montenegro	0.07%
10	Luxembourg	0.42%	Montenegro	0.78%	Lithuania	0.07%
11	Slovenia	0.42%	Slovenia	0.75%	Slovak Republic	0.07%
12	Spain	0.37%	Spain	0.72%	Mongolia	0.06%
13	Greece	0.34%	Greece	0.60%	Serbia	0.06%
14	Austria	0.31%	Austria	0.59%	Hungary	0.06%
15	Sweden	0.30%	Sweden	0.58%	Czech Republic	0.06%

16	France	0.24%	France	0.45%	Armenia	0.06%
17	Barbados	0.23%	Belgium	0.44%	Suriname	0.05%
18	Belgium	0.23%	Aruba	0.43%	Luxembourg	0.04%
19	Aruba	0.22%	Barbados	0.39%	Botswana	0.04%
20	Armenia	0.21%	Armenia	0.39%	Sri Lanka	0.04%

Highest participation as a % of population by gender

Looking back at Iceland, they have almost 3% of all males registered as FIDE players but only 1.44% of the total population, weighed down by the much lower, but still the highest in the world, female participation rate. This disparity demonstrates a norm of chess being a national pastime, but really only for men. By refiguring the ratios to only include countries where 0.05% of their population is registered with FIDE, we find that all of the previous countries with 0 women playing have left the list, indicating that the game, or atleast official tournament competition, is not as serious as it is in other nations. In the below list we find a new set of countries which take the game relatively seriously on a national level but drastically overrepresent males as their players.

Highest ratios with at least 0.05% participation		
Country	Ratio	Participation
Denmark	61.4780115	0.56%
Sweden	35.4357743	0.30%
Ireland	25.0995025	0.11%
Switzerland	24.4359756	0.20%
Norway	24.3128205	0.46%

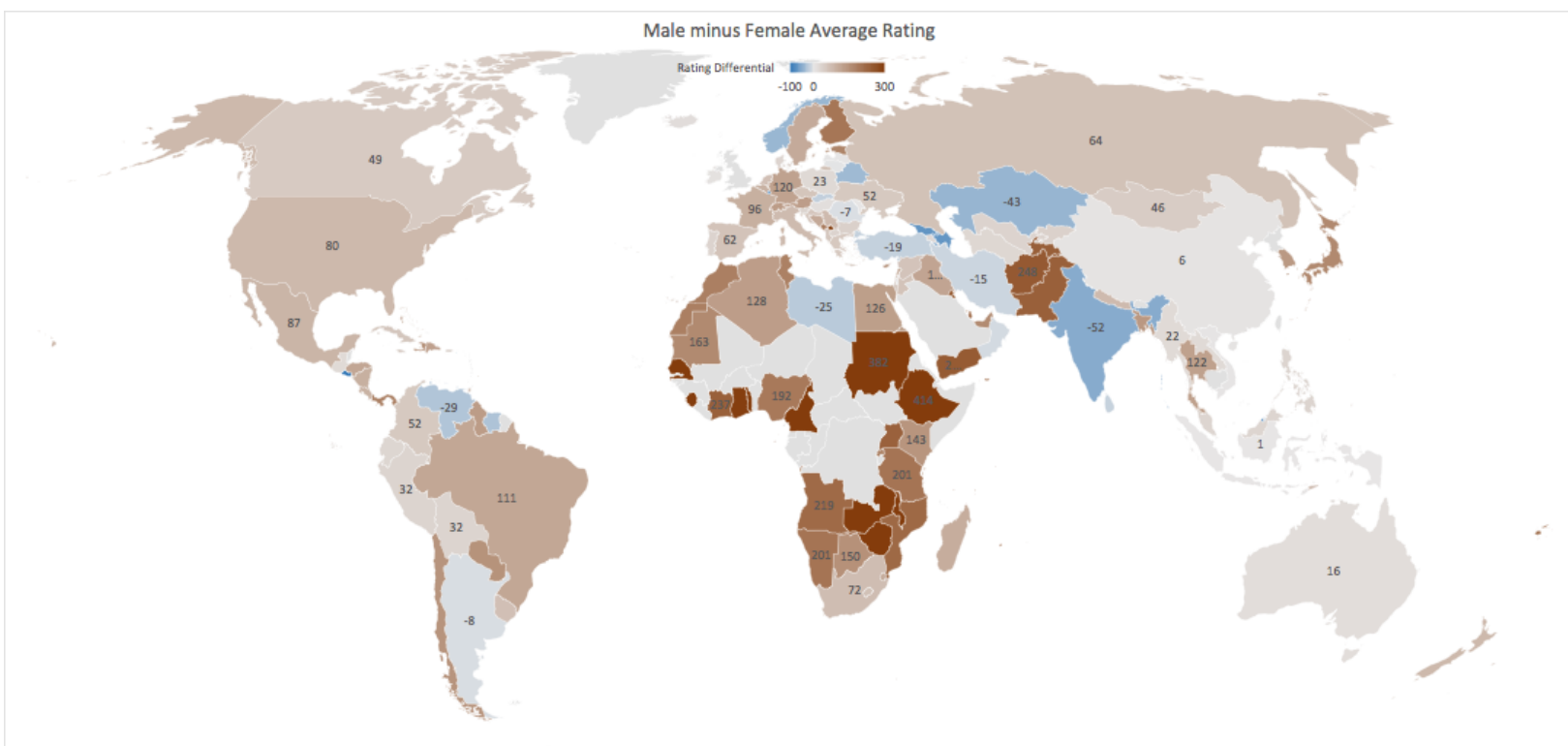
Iceland	24.0245098	1.44%
Finland	22.5930233	0.15%
Netherlands	21.1365854	0.18%
Argentina	20.5117371	0.06%
Spain	19.4982935	0.37%
Belgium	18.9445727	0.23%
Luxembourg	18.4242424	0.42%
Czech Republic	18.3030303	0.59%
Slovak Republic	17.2474114	0.61%
Austria	16.9986755	0.31%
Italy	16.5670659	0.10%
Portugal	16.3731118	0.11%
Israel	15.787234	0.20%
Uruguay	15.6261261	0.11%
Bosnia and Herzegovina	15.0616883	0.15%

Top 20 M:F ratios and % participation in countries with at least 0.05% of their population playing

While the former list with no filter was largely Islamic Middle Eastern and North African nations in which a fraction of their population played to begin with, here we find a largely European basket of nations in which there are at least 15, and up to 61, men for each woman competing. Nations like Georgia share many features with the above list but demonstrate that it doesn't have to be like this. If greater equality is possible there must be something else standing in the way from achieving it.

When it comes to average ratings, the results are similarly unbalanced. In the vast majority of countries around the world, males can expect to be rated up to 400 points higher than females. Looking at the map below, we can identify a large hotspot in Africa. Many of these nations have small player bases so these are likely the consequences of an unrepresentative sample of the chess playing community within these countries. For example, Senegal has one of the highest differentials at 402, but only had 13 registered players in 2019. Looking past similar cases, the real striking trend is the zero-to-negative rating differentials seen in the east from countries like India, China, and Iran. Here, the women registered with FIDE are expected to do as well as, or better than their male counterparts. The country with the largest participation among the bunch is India, followed by Iran and then China. Here the mass adoption by India, the second most participating country after Russia, demonstrates that we are likely witnessing representative results. The same can be argued of Iran, with over 10,000 registered members - the sixth most participating nation. China, on the other hand, only has 1,700 players registered. This likely demonstrates the consequence of their strong national chess league with 300,000 registered players as of 2008 compared to the 350,000 FIDE players in November 2019.³⁸ FIDE is an organization for players geared more towards serious competition and likely doesn't capture the complete prowess of any nation. Still, as a percentage of population for a country actively competing at the highest levels, China's true abilities remain a mystery.

³⁸ "Nanjing: Bu Draws First Blood in Super-GM."



Taking the difference between average male and female ratings based on the average birth year of 1982 from the 2019 sample

With national leagues in mind, comparing the above map to the below distribution of average ratings by nation demonstrates the inherent filtering process that comes with a FIDE membership. The USA finds itself in the top 10 rated countries with an associated Elo of 1901, a rating associated with the strongest amateur players, one level below expert.³⁹ Yet, as a percentage of the participating population, the US is in 128th place. Here we see again the effect a robust national league has on total participation, with 93,000 members registered with the USCF.⁴⁰ Countries in a similar position within the top 10 are South Korea and Nigeria who both owe their prominence to players that seek out competition on an international level while countries like Serbia and Montenegro to be deserving of their excellent average ratings given

³⁹ Till, "About Chess Ratings."

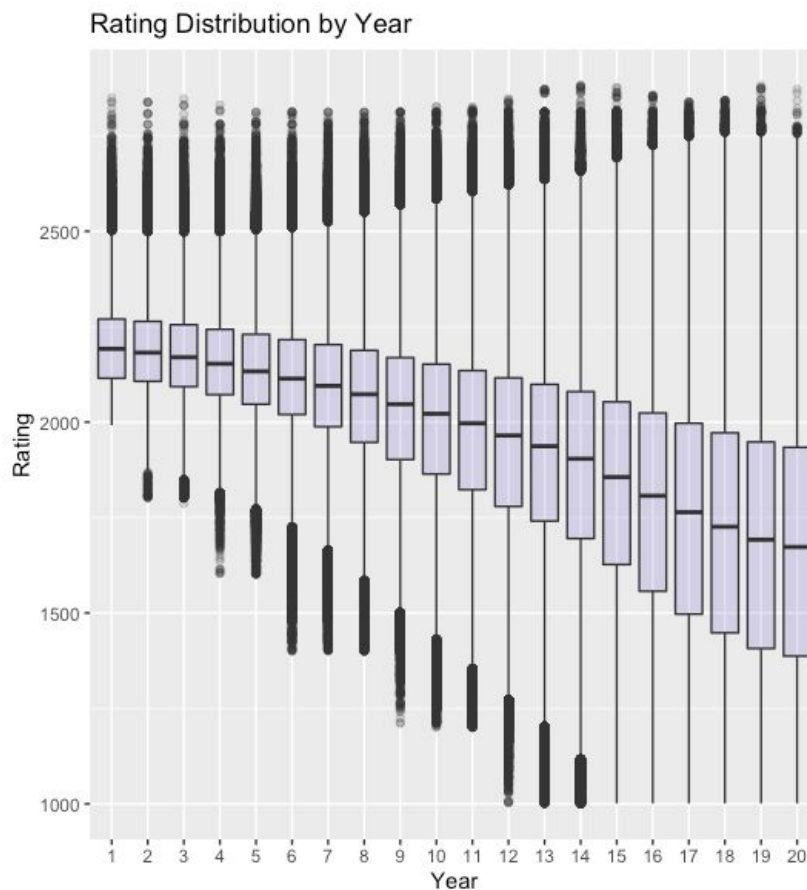
⁴⁰ "US Chess."

either lacking the means or the support to do so as a nation. India is a prime example of this, with their high absolute participation and low average rating. This combination indicates the presence of children representing the nation at tournaments since there is no substantive mediating organization. Overall, India has the 26th youngest player base, but this is largely driven by the disparate average female birth year of 2000 and male birth year of 1991.

Country	Average Birth Year
Sri Lanka	1998
Chinese Taipei	1998
Chile	1998
United Arab Emirates	1997
Antigua and Barbuda	1997
Lesotho	1996
Azerbaijan	1996
Botswana	1996
Namibia	1996
Suriname	1996

Top 10 youngest overall countries

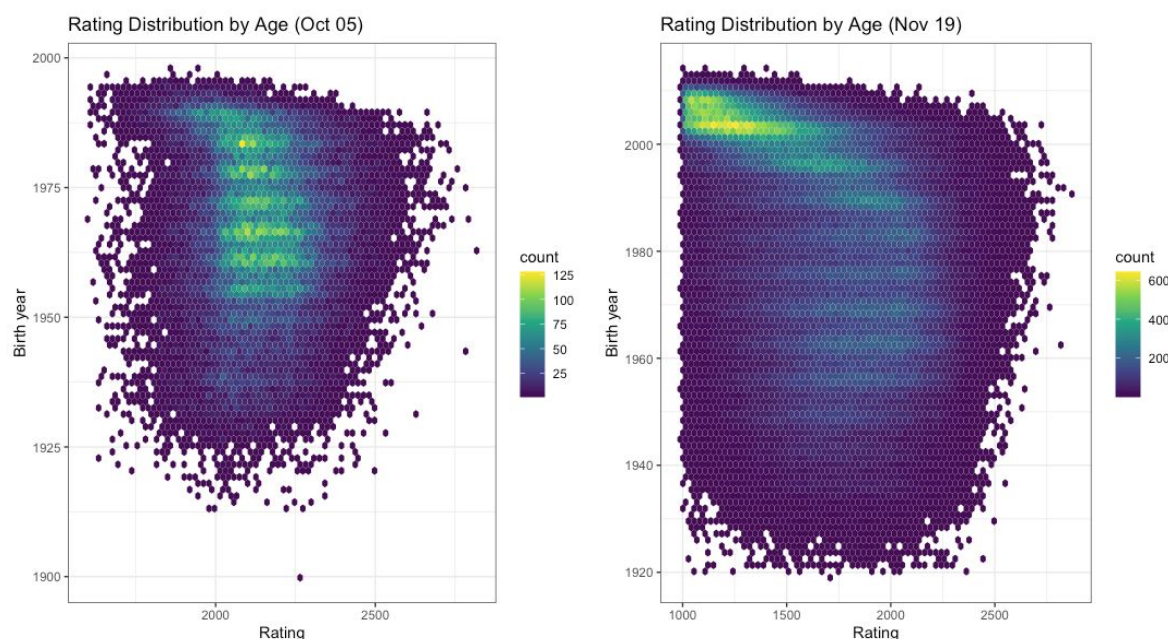
One reality of the younger players at the gate is the gradual decline in average ratings over time. Age is a proxy for time spent accruing skill, along with its important implications for cognitive development. Therein it is no surprise that younger players bring down the entire average as they join the game in larger numbers.



Rating distribution by over time

One corollary to this observation of a negative relation between age and performance has been the absolute increase in players. We may expect less from younger age groups, similar to how our expected payout for lottery tickets decreases with price, but given enough chances we are sure to find exceptions to the expectation. The best technique to discover a prodigee could not be to put up flyers, as many would not have experience with the game. It would not be to pick a random child and focus an immense amount of time and resources on their improvement (although it seemed to work for the Polgar sisters). The most effective way to find one talented player would be to find a thousand other less talented ones. The graphs below demonstrates that each age corresponds with a common rating on the heat map, gradually increasing but hitting

some ceiling. Examining the 2005 graph, we see that ratings were more consolidated, while in 2019 there is a much broader spectrum of ratings and only at the youngest ages do we see major clumping. Visually it is clear that increasing the number of players, 65,797 vs 349,781, increases the range of play expected. While some children may only play because their parents force them to, others are breaking records - two styles to be expected given the growth in the playerbase.



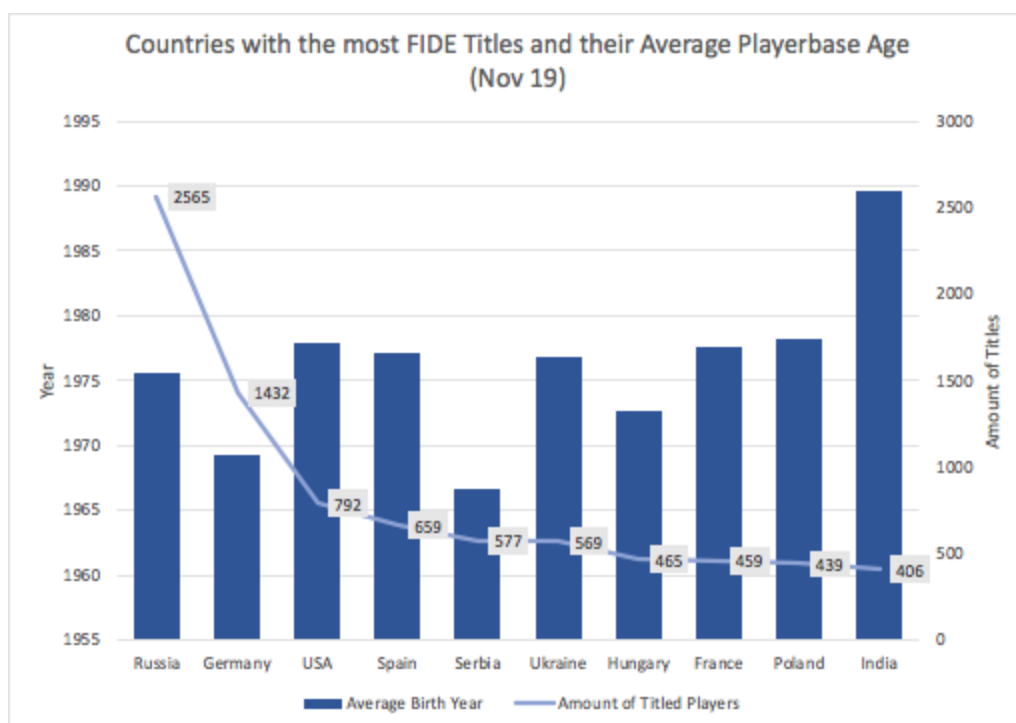
Heatmap of years of birth in different ratings

Chess has become a young person's game. Magnus Carlsen holds the record for being the youngest number one rated player but is only the second youngest champion, winning at 22, a few months behind Garry Kasparov.⁴¹ For the women's championship, Hou Yifan achieved the feat at just 16 years old.⁴² One additional casualty to the inflow of talented children has been the aforementioned record of youngest grandmaster. To achieve it, players need exceptional performances at international tournaments and must defeat already-crowned grandmasters. In a

⁴¹ Deutsche Welle ([www. dw.com](http://www.dw.com)), "Magnus Carlsen Wins Chess World Championships Aged 22 | DW | 22.11.2013."

⁴² McClain, "Record Set for World's Youngest Chess Champion."

sense, as the level of play has increased, due to general knowledge and skill accretion as well as new technology, there are players who are able to demonstrate their capabilities at younger and younger ages as the bar only rises. Judit Polgar, for example, beat Bobby Fischer's record at 15 years and 4 months. Today, she isn't even in the top 25. The record holder today is Sergey Karjakin of Ukraine, achieving the title at just 12 years old and 7 months.⁴³



At large, the old guard still maintains their supremacy in the amount of titles held by recent players but younger nations are creeping up

The newest cohort of players find themselves in a community with a rich history, but join it during a time of great upheaval - not just with the surge in computers, but the re-evaluation of the foundational culture of the theoretically egalitarian but practically discriminatory game.

⁴³ Contributors to Wikimedia projects, "Chess Prodigy."

Culture and Tradition

To learn chess today is a social activity. Players in the US are typically taught by male (91% of the time) parents, friends or relatives 83% and 89% of the time for males and females respectively, and only otherwise are self-taught.⁴⁴ Because the game subscribes to a meta in which there are commonplace openings and responses, human play is different from that of computers at lower skill levels, making human interaction an important feature to improving early. Typically players will be expected to memorize a set of opening moves which have been repeated in a number of other games, and only when a deviation is made does the game become unique when compared to all other games ever played. These openings are generally well-studied and help usher in positions many moves away which is why they are a large advantage over opponents who do not know how to respond to them properly, human or not. For instance, if a player at 1300 Elo and a computer meant to mimic that skill level played, the human following the first 15 moves of an opening would have exhibited perfect play before defaulting to their nominal skill level when the game became unique or their memory of the line failed - still giving them a leg up over the opponent which played at a 1300 level from move one. This is why, as the head of Boston's Boylston Chess Club claimed "A tournament player is a chess player. Someone who plays with the family or on long vacation trips is not a chess player."⁴⁵

The hierarchical structure in which knowledge is passed down has created a sticky culture, a phrase coined by sociologist Gary Fine, in the chess community. As he puts it, "Chess

⁴⁴ Gilbert, *Chessplayers: Gender Expectations and Self-Fulfilling Prophecy*, 130–131.

⁴⁵ Fine, *Players and Pawns: How Chess Builds Community and Culture*, 2.

is a bounded community with a knowledge base to which participants can gain access should they make the effort and in which exit has costs in light of the investment that led to participation.”⁴⁶ The millions of players in each country all help shape a series of memories that are commonplace to other members of the chess community. Many of these concepts are global, like the great games played at the world championship, interesting puzzles, or anecdotes about players and some of their best games, such as the famous Opera Game of 1858 in which Paul Morphy, the American master, defeated two nobles working together in a beautiful manor when he had been hoping to enjoy the opera they were attending.⁴⁷ The game is so ubiquitous to the knowledge repertoire of chess players and the memory of Morphy that his biopic is simply set to be named “The Opera Game.”⁴⁸ Morphy is just one example of the heros created within these communities. He stands second only to Bobby Fischer as the most well-known player within the United States, which is to be expected given the immense publicity given to Fischer’s games and temperament. The apex of this publicity was Fischer’s 1972 championship match versus Boris Spassky which demonstrated a clash of two sub-communities within this global game, as his win ended 24 years of Soviet domination at the highest level.⁴⁹

National identities are important fixtures within the community. These create more specialized communal memories and define heros who can be unheard of by other players of different locales. Russia and the former Soviet states stand out one of the most definitive bastions of a lasting interest in chess. The game began as an early communist party tool to shape character in military recruits but quickly blossomed out into an example of attainable culture for the

⁴⁶ Fine, “Sticky Cultures: Memory Publics and Communal Pasts in Competitive Chess,” 441.

⁴⁷ Contributors to Wikimedia projects, “Opera Game.”

⁴⁸ Marsalis and Mask, *The Opera Game*.

⁴⁹ History.com Staff, “Bobby Fischer Becomes the First American to Win the World Chess Championship.”

masses; a reservoir of elite players was a happy consequence.⁵⁰ The war on the board grew to such importance that tournaments went on in spite of World War II reaching Russia, with some being held 3 months into the siege of Leningrad at hospitals around the city, even as games were frequently being interrupted by “...the air raid sirens, the thunder of anti-aircraft batteries, and the thumping of bombs.”⁵¹

After the war ended, the country opened itself up to international competition, quickly demonstrating the honed skills of the Soviet players versus the rest of the world. Witnessing the results, England challenged the Soviet Union to a women’s match with little knowledge of the skill of the female Soviet players and quickly lost all of their matches.⁵² The British believed they had the upper hand given their legacy in Vera Menchik, who held the women’s title for 17 years but passed during the war.⁵³ Though Menchik lived the majority of her life playing for England, she was born in, and posthumously claimed to be a patriot of, Russia and the Soviet Union.⁵⁴ The 1957 biography of Menchik, with its uncited pro-soviet quotes gathered after her death, followed a 1953 memo that found the state of women’s chess “unsatisfactory” due to the insignificant number of participants.⁵⁵ Despite this thought, the Soviet Union dominated the women’s chess space after the war, holding the title from 1950-1991, before losing the streak to China following the dissolution of the state.⁵⁶ In large, this can be traced to the fact that in Eastern Europe chess was deemed proletariat culture rather than a “bourgeois diversion”, with its

⁵⁰ Hudson, “STORMING FORTRESSES: A POLITICAL HISTORY OF CHESS IN THE SOVIET UNION, 1917-1948,” 4–9.

⁵¹ Hudson, 305–306.

⁵² Hudson, 350.

⁵³ Kavalek, “Women in Chess: A Few Tales.”

⁵⁴ Shahade, *Chess Bitch: Women in the Ultimate Intellectual Sport*, 41.

⁵⁵ Shahade, 41–42.

⁵⁶ Contributors to Wikimedia projects, “Women’s World Chess Championship.”

roots in a state decree.⁵⁷ The mandate was well-supported, with chess players typically earning three times as much as doctors and engineers.⁵⁸

Mass appeal was what set the Soviet Union apart from its peers, as it had its own heroes, both male and female. Before there was Garry Kasparov there was Nona Gaprindashvili. During the 41 year block of Soviet Women's Chess Champions, Nona held the title the longest, from 1962-1978.⁵⁹ Nona was born in a small town in Georgia, but her immediate affinity for chess brought her to her aunt's house in the capital to better be able to train with coaches.⁶⁰ Her first championship created an "instant celebrity" out of her by the Georgian public who was fixated on the game, especially due to regional rivalry against the prejudiced Russians. Her ultimate downfall came at the hands of another Georgian woman, Maia Chiburdanidze, who carried the torch until 1991, bringing Georgia an uninterrupted 29 years of domination in the space.⁶¹ Before the economic collapse of Georgia following the dissolution of the Soviet Union and subsequent mass emigration, the country was a prime example of a region where chess was truly accepted nationwide, with women often receiving sets as a part of dowries, encouraged to pick up the game as a hobby, and where boys and girls both learned the game in school.^{62,63} This egalitarian perspective sees its effects today in the fact that the country has a ratio of male to female FIDE players of 2.3, the fourth most progressive country in this regard while England touts a ratio of 16.1, appearing to see chess more as the "bourgeois diversion". Note that this female dominance by Eastern Europe came alongside 24 years of male champions.

⁵⁷ Fine, *Players and Pawns: How Chess Builds Community and Culture*, 3.

⁵⁸ Spanier, *Total Chess*, 57.

⁵⁹ Contributors to Wikimedia projects, "Women's World Chess Championship."

⁶⁰ Shahade, *Chess Bitch: Women in the Ultimate Intellectual Sport*, 44.

⁶¹ Contributors to Wikimedia projects, "Women's World Chess Championship."

⁶² Shahade, *Chess Bitch: Women in the Ultimate Intellectual Sport*, 44.

⁶³ Spanier, *Total Chess*, 114.

Jews specifically also have a lengthy history of achievement in chess. The Soviet champions Garry Kasparov, Mikhail Botvinnik, and Mikhail Tal as well as Bobby Fischer all were Jewish by birth. It's been said that there is an innate talent that comes from Talmudic Study.⁶⁴ H.G. Wells posited that it could have been an "...innate sense of values – a capacity for judging between relative gains and losses with the utmost subtlety."⁶⁵ It's also been said that it is "...a wonderful outlet for Jewish aggression."⁶⁶ Or, beyond the game itself, "...there are too many Jews in chess. They seem to have taken away the class of the game. They don't seem to dress so nicely." said Bobby Fischer.⁶⁷ In actuality, these players simply had the opportunity to pursue chess and grasped it. Many came from regions where the game was revered and found support in making a career out of it. Similar associations to temperament have been made on a variety of other avenues, from age to race to gender.

The position of women in the community stands as an example of this effect, in largely the opposite direction of Jews. While excellence by some Jewish players created these conclusions about the group at large, poor empirical performance by women helped forge negative conceptions of their ability to compete. British grandmaster Nigel Short concluded based on his experience that "Girls just don't have the brains to play chess," echoing Kasparov's claim that "...they are not great fighters."⁶⁸⁶⁹ While chess rankings are not about one game, but rather the performance of a player among their many games, the defeat of Garry Kasparov, who was the best player in the world, by Judit Polgar proves a fallibility to ideas of impediments

⁶⁴ Spanier, 62–63.

⁶⁵ "Chess and Jews by Edward Winter."

⁶⁶ Spanier, *Total Chess*, 65.

⁶⁷ Chun, "The Atlantic."

⁶⁸ Watson, "Nigel Short: 'Girls Just Don't Have the Brains to Play Chess'."

⁶⁹ "Garry Kasparov: I Was Wrong about Women Playing Chess."

preventing women from ever reaching the very top of leaderboards - not to mention her 6 to 3 record against Nigel Short in classical games, with 5 draws.⁷⁰ For a game where hierarchy is implicitly based on rating, assumptions flow freely based on outcome with no consideration to nuance. For Jews, the obvious source of success is better traced to their locale and the historical context rather than ethnic or biological factors. All in all, what this proves is that opportunity is of foremost importance to the performance of players, even more important than talent. It's only when they meet that generational players like Judit are allowed to excel.

To bank on one player as representing the future of a group to which half of all humans belong is less so a cop out but rather a statistical feature of the amount of women participating. The Bilalić et al. and the Charness and Gerchak papers demonstrate that, taking the amount of women participating in chess as given, what is observed both in general play as well as the highest echelons of rankings are to be expected.⁷¹⁷² This is because the very best (and the absolute worst) players have very small probabilities of reaching that position among the total population. Not to say that they got lucky, but the spots they hold in the distribution of all players are unlikely to be filled by your average player. Another way of thinking of it is like drawing straws among the general population and having them learn chess. There is a very small chance the person you get will be Magnus Carlsen or Fabiano Caruana rather than some third grader in Asia who is average for their age. As such, it can be said that the chess community is lucky that the far right tail was even discovered, providing some of the most invigorating games to be remembered for centuries to come. This can be largely credited to the high levels of participation

⁷⁰ "CHESSGAMES.COM * Chess Game Search Engine."

⁷¹ Bilalić et al., "Why Are (the Best) Women so Good at Chess? Participation Rates and Gender Differences in Intellectual Domains."

⁷² Charness and Gerchak, "Participation Rates and Maximal Performance: A Log-Linear Explanation for Group Differences, Such as Russian and Male Dominance in Chess."

in the game, only rising over time. Drawing Carlsen is rare, but chances only go up if you can draw enough times, reducing the amount of undiscovered players with each subsequent pick. Following this logic, it only makes sense that males dominate chess ratings as they also dominate chess participation.

Consequently, while males and females differ substantially on some specific areas of cognition, such as a one standard deviation upper hand in mental-rotation tasks which are meant to test the bandwidth for storing and using spatial information, these advantages fail to demonstrate superior performance but may help contribute to the ease at which players pick up and stick with the game.⁷³ We have our trophy examples at the Grandmaster level, but we would expect biological differences to flow through en masse more than anything. Yet, when Chabris and Glickman matched similarly rated pairs of boys and girls, they found that in locales where there was an equal amount of each gender playing chess, there were no actual differences in initial ratings or drop out rates.⁷⁴ Their results also indicated that the variance in rating for each gender did not differ.⁷⁵ This latter finding is important as a high variance implies longer tails in a distribution. In other words, a high variance means that ratings would be more spread out, pushing the ceiling higher for the best and worst players. If males had a higher variance they would be expected to produce the very best and very worst players more so than women. The lack of evidence for a difference in variance is the simplest and strongest clue that proponents of a theory of biological difference in ability are misled.

⁷³ Gobet, "The Psychology of Chess," 59.

⁷⁴ Chabris and Glickman, "Sex Differences in Intellectual Performance: Analysis of a Large Cohort of Competitive Chess Players," 1040.

⁷⁵ Chabris and Glickman, 1040.

Charness and Gerchak categorize the choice faced by facilitators of competition to produce results in three categories.⁷⁶ First being able to allocate lots of resources to a limited population (think Nobel Prize contenders). Second, there is the possibility of training the entire population a little bit each, distributing resources equally (public education, for instance). Lastly, simply increasing the number of total participants to discover people with a natural affinity for the activity (I argue chess). Each technique has its ideal applications. It would not make sense to assign the population of the US time in an astrophysics lab since almost no one would know what they're doing with the specialized equipment. But with chess, the rules are simple and the game is easy to pick up, fitting it to the third approach. People will quickly be able to recognise if they enjoy the game and if they have talent before choosing to continue. This can be, in part, why the historic leading countries of the game have all had strong state support for the game, most notably Russia and China.⁷⁷

While the Polgar sisters may be the best examples of excellence in chess by women, they also serve to remind us why so many women do not reach the same level. It was decided that the three sisters would have everything they would need in order to succeed before they were born as part of an experiment by their parents, two PhDs in education, to prove that there is ability in all.⁷⁸ They were given hours of lessons a day in chess, complemented by further education in math and foreign languages.⁷⁹ Here they lacked nothing in their training but are compared to so many others who do not have the same luxury. In this seemingly objective game, rankings are

⁷⁶ Charness and Gerchak, "Participation Rates and Maximal Performance: A Log-Linear Explanation for Group Differences, Such as Russian and Male Dominance in Chess," 50.

⁷⁷ Shahade, *Chess Bitch: Women in the Ultimate Intellectual Sport*, 145.

⁷⁸ Gobet, "The Psychology of Chess," 57.

⁷⁹ Gobet, 56.

sometimes deemed to represent a meritocracy.⁸⁰ This, in practice, considers what players have done to reach their spot, but not what they were able to use to get there.⁸¹ In this sense, it is still entirely possible that Judit Polgar was the best female player in chess history but calls into question the idea of comparing on the basis of gender, especially in countries with demonstrable inequality in participation, such as the iniquitous Western European bloc illuminated in the previous section. The lag in ratings could simply be a consequence of an inequitable distribution of resources. This does not necessarily mean that women are purposely neglected - it could even be their own choice to take a step back.

The sticky culture associated with chess has created a moat associated with joining the community since there is an expectation of knowledge in lingo, history, and etiquette to be expected from serious players.⁸² These facets can also act as barriers to entry for those who have been historically excluded and lack a means to gain the knowledge. Ability in chess is a form of cultural capital, particularly among children due to the studied and assumed links to intelligence which comes from play.⁸³ Within families, this cultural capital is only correlated to better performance of girls if the mother is educated, while boys benefit if the father and/or the mother is educated (and to a greater degree).⁸⁴ This indicated that boys are allocated more resources in their in-home training to help their rating in all possible family configurations. We can see this play out by looking at the first graph demonstrating the proportion of female players by birth year. It is at a historic high, but the percentage takes a sharp decline for the youngest players in

⁸⁰ pubmeddev and Howard, "Are Gender Differences in High Achievement Disappearing? A Test in One Intellectual Domain. - PubMed - NCBI."

⁸¹ Segall, "Equality and Opportunity," 87.

⁸² Fine, *Players and Pawns: How Chess Builds Community and Culture*, 87.

⁸³ Fine, 5, 221.

⁸⁴ Gilbert, *Chessplayers: Gender Expectations and Self-Fulfilling Prophecy*, 122.

the snapshot, indicating that males are still entering the game earlier which only improves their accumulated skill over time, a finding demonstrated by Gilbert.⁸⁵ In scholastic competition in the USA, 1/3 of 1st graders are girls but only 1/10 of 6th graders pointing to the desire for many girls to exit the community.⁸⁶ With this in mind, simply joining the chess community seems to be an uphill battle for many women, giving light to anthropologist Margaret Mead's assertion that "Women could be just as good at chess, but why would they want to be?"⁸⁷

Comparing the most and least equitable nations, it seems as though those countries with long histories of participation are the same ones who perpetuate a gender divide, while those who are relatively new to the game, or lacking the same associations of the West, promote a split closer to a balance. China, for example, had board games banned during their Cultural Revolution under Mao and even had their own version of chess called xiangqi that was preferred until trailblazers like Xie Jun claimed the Women's World Chess Championship and furthered state encouragement of the global game.⁸⁸ Today they are the 5th most equitable participating country.

The sticky culture associated with chess has been a stalwart in maintaining the popularity of the game for centuries but also serves as a gatekeeper, preserving traditions from older times, sometimes for better and sometimes for worse. Historically, it took inventive players who probably have an opening named after them to raise the level of play in the game. The chess community helped attract, teach, and absorb the knowledge of these players, a cycle that keeps the game alive and fresh, but ironically this same community has shut its doors to the possibility

⁸⁵ Gilbert, 117.

⁸⁶ Fine, *Players and Pawns: How Chess Builds Community and Culture*, 164.

⁸⁷ Shahade, *Chess Bitch: Women in the Ultimate Intellectual Sport*, 156.

⁸⁸ Shahade, 126.

of finding more of these greats-to-be so long as they are not male. Addressing this problem globally, we see that it does not have to be this way, with women being rated, on average, higher in some countries untouched by largely western prejudice, therein better being able to reach the top ranks of competition due to more equitable competition.

Conclusion

Here I sought to understand the makeup, mechanisms, and direction of competitive chess. Its rich history and enthusiastic player base has insulated the game from recent social changes, particularly when considering gendered participation. The state of the game's disproportionate player base is demonstrated in the parsing of FIDE's official rating database in conjunction with World Bank data. Inequities en masse were not always seen in between-country differences, highlighting the role culture has in shaping the competitive landscape of the game.

By analysing current trends we actually see changes taking shape. Given that the majority of players learn from another person, it is understandable that there is a generational lag in progressivity. The reliance on mentors and community to learn the game and its associated habitus means that there must be an overtaking by a newer generation from within the community in order to change commonplace ideas. With the gradual increase in female participation among younger generations during a general upswing in membership, it seems as though change is slowly taking shape.

Social change is but one model for garnering equitable participation. States like Russia and Georgia have long histories with the game and share those traditions with their entire

population, compared to countries in Western Europe who have equally long histories but equate different meanings to the game, therein segmenting and sheltering the community from change.

The final model for countries those who have entered the scene with conceptions that are *tabula rasa*, demonstrated in their higher-than-average gender equity ratios. Although they differ in terms of adoption of the FIDE membership, both China and India have shown aptitude and interest in competing for the top spots. Both countries have had world champions, and their young average ages of competitors indicate good odds of more in training.

The goal of this paper was to marry the literature on the statistics of participation, along with my own contributions to describing the data, with the way in which the game functions as an activity rife culture. This middle ground gives more scope to sociological perspectives and more clarity to disparities in rating and participation. The generality limits the ability to make conclusions based on the data and forces us to rely on trends. Further research should use similar data to statistically explore differences between similar countries with vastly different outcomes, such as Georgia versus other former-Soviet countries. Additionally there is also room to bring in more data sources, such as literacy rates or freedom indexes, to map out more relations in participation along the proletariat culture/bourgeois diversion divide. All in all, it is clear that inequities are not the fault of game design but rather our attitudes towards the game. The goal of the chess community ought to be more like that of the computer that is always looking for the next best move, only instead finding the players most capable to figure out that move.

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