

Task Switching Performance of Online Chess Players

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Abstract

The world around us is rapidly changing and we need to be able to switch between tasks more often. It would be great if we can find ways to train the ability to switch between tasks, so that we can cope with these changes. This study investigates the relation between the number of online chess games played, the time control (amount of time for the entire game) participants used the most in their online games and chess ratings on the one side and task switching performance on the other side. Individuals who have played online chess before were asked to fill in questions regarding their demographics and online chess activities. After that they performed a task switching experiment. This study didn't find an effect of the number of games and most played time control on task switching performance. For one of the ratings this study found that people who have a higher rating got higher switch costs, which was against the hypothesis. In future research it will be interesting to replicate these findings and to look at the underlying reasons for that. As previous research has shown that age can have a moderating effect regarding the impact of chess on cognitive abilities, it will be also interesting in future research to study the effects of chess on cognitive abilities of children.

Keywords: task switching, online chess, switch-costs, attention control

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The workplace has changed in the past decades. The technological advancements have brought positive changes, but also more challenges (Quelch & Knoop, 2018). We are more connected than ever before, which also results in a bigger bombardment of information. The work-life balance has changed as the boundaries between work and life have been fading. This has resulted in employers expecting a lot of flexibility from their workers. Furthermore, in the modern workplace multitasking has been made an integral part of the job design (Peterson, 2014). Yet it is also shown that oftentimes multitasking results in attention switching, which interrupts the processing of information and therefore can impair task performance (Butt & Warraich, 2022). Because of this, it is important in the modern age for workers to be able to cope with the changing work dynamics and to be able to switch quickly between tasks.

Task switching is the ability to unconsciously shift attention between one task and another. It is measured by the time you need extra when you are busy with one task, to successfully adapt to another task, which is called the switch cost. Humans are characterized by being successful at dealing with interference, but also less successful at switching to another task (Stoet & Snyder, 2003).

Some research points toward a relationship between chess and cognitive abilities. For example, it has been found that chess players are more efficient in visual perspective taking compared to non-chess players (Gao et al., 2019). A relation has also been found between chess skill and cognitive abilities, like fluid reasoning, comprehension knowledge, short-term memory and processing speed (Burgoyne et al., 2016). However age has been found to be a moderator, as younger people had a higher correlation between chess skill and cognitive abilities. These studies suggest that people who play more chess and people who are better at

chess have better cognitive abilities. Lastly the studies suggest that younger people might improve more in cognitive abilities by playing chess.

The meta-analysis of Boot et al. (2011) shows a nuanced image of the relation between video games and cognitive abilities. The study suggests that, although there seems to be a lot of evidence for a relation between improved cognitive abilities and playing video games, there are a lot of methodological shortfalls resulting in a less robust relationship. For example video game players showed less switching costs compared to non-video game players (Colzato, 2010). However, other research argues that video game players do not have improved task switching skills compared to non-video game players (Karle et al., 2010). Karle et al. (2010) suggests that the reduced task switching costs are rather because video game players are better at controlling selective attention. Research in the field of Attention-Deficit/Hyperactivity Disorder (ADHD) also suggests that training ADHD patients with chess and video games does not improve cognitive abilities, but it improves emotional control, emotion regulation and inattention (Rodrigo-Yanguas et al., 2023).

As mentioned above the effects of chess and video games on cognitive abilities has been a widely researched topic. Research to the relation between video games and cognitive abilities gave mixed results. Most research to the benefits of chess points towards an improvement of cognitive abilities in chess players. However, due to the covid pandemic and the Netflix show Queen's gambit, in the recent years chess has shifted to the online world (Majhi, 2023). Online chess has had a huge jump in popularity. For example on the biggest website for chess, chess.com, between 2020 and 2022 the number of users on the site jumped from 35 million to over a 100 million (<https://chess.com>). Furthermore, the world of competitive chess also shifted towards the online world as an Esport with multiple high profile tournaments being held online. Yet the effect of online chess has not been a widely researched topic.

When looking at online chess it is important to realize the differences between online chess and over the board (offline) chess. While playing chess online, you don't see your opponent and his/her reactions, you don't have to press your clock and you don't have to write down the moves. Interestingly, Künn et al. (2019) compared, with the help of chess engines, the quality of chess between over the board and online chess during the shift to the online world. They found a significant decrease in performance when players competed online. This can be taken as a broader sign that working in an online environment can have negative effects on a worker's performance during cognitive tasks. However, the relation between online chess and cognitive capabilities has yet to be researched. Therefore this study aims to do so.

This study also aims to investigate time control as a possible moderator for the relation between chess and task switching performance. Time control refers to the amount of time one player gets for the entire game, where sometimes you also get additional time per move. There is 'bullet' which refers to anything faster than three minutes per player, there is 'blitz' which refers to anything between three and ten minutes per player, and there are 'rapid' and 'classical' which for the sake of this thesis are combined in one category and will refer to more than ten minutes per player. They are combined because longer time controls are not very often used in online chess (lichess.org).

Research has shown that chess players spend more time thinking in positions where planning is more beneficial (Russek et al., 2022). This effect was amplified when the players were stronger. The study of Russek et al. (2022) has shown that humans can be very efficient in deciding what moments are important in a chess game to apply computation. Deciding when to use computation means that chess players can learn to sense when they need to take a moment to calculate a position, and also sense when they don't need to take an extra moment in a position to think.

However task switching doesn't require computation, a person needs to be able to adapt quickly without overthinking. Therefore, taking this into mind, it is hypothesized that people who play faster time controls are able to switch between tasks more easily as they go onto the next game quickly, while people who play longer time controls focus on just one task for a very long time.

Proposed Hypotheses

H1: It is expected that, the more online chess games a participant has played the lower the switchcosts will be during the experiment.

H2: Participants who mostly play faster time controls are expected to have lower switchcosts in the experiment than participants who mostly play longer time controls, strengthening the effect of H1. (moderation)

H3: Participants who have higher online chessratings are expected to have lower switchcosts in the experiment than participants with lower online chessratings. (replication)

As mentioned in the introduction this study aims to replicate the findings that playing chess can give cognitive advantages. It will also try to replicate the findings suggesting that people who are better at chess are better at switching between tasks. As there are differences in online chess and over the board (offline) chess it will be interesting to see if playing online chess also has cognitive advantages. The role of time control in chess games will be explored as a possible moderator. If the results indeed show a significant moderation effect of time control, it would suggest that doing short online cognitive tasks can improve a person's ability to switch between tasks. If that is the case, people can be trained to become better at task switching and therefore be able to cope better with a changing and more demanding environment

Method

Participants

To estimate the required sample size for this study a power analysis with G*Power 3.1.9.7 (Faul et al. 2009) was conducted. A small effect size of 0.3 was chosen as previous studies on task switching did not show huge differences between groups. A small effect size means that, if this study finds a significant difference, the magnitude of these differences not very large is. For a small effect size ($f = 0.3$, $\alpha \text{ err} = .05$, $1-\beta \text{ err} = .95$) a sample of 111 participants was recommended. Participants were recruited through the online chess platform lichess.org. Users on the site can make articles called “blogposts” which other people can see. This blogpost feature was used to attract as many participants as possible by explaining the study and sharing the link to the study. Next to the blogpost convenience sampling was used by spreading the link to the blogpost through popular fora and groupchats where a lot of chessplayers look.

In total 142 people participated in the study of which 93 completed the entire study. Exclusion of participants and trials from the study happened when (1) 7 participants who had an excessive failure rate (over 20%) in the task switching task, (2) 21 correct trials with a response time under 250 ms since this shouldn't be humanly possible. To detect a visual stimulus already takes 180-200 ms (Jain et al., 2015), for the stimulus to reach the brain takes another 20-40 ms and after that you need to decide which button to click and send out that signal to your hand, (3) trials with a response time over 5000 ms were automatically flagged as wrong as this wouldn't be a representative time for someone who tries to be as fast as possible, (4) 1 participant that was not at least 18 years old as this study doesn't have the needed ethical approval for that, and (5) 2 participants with negative switch costs as this was a result of performing poorly on the repeat trials. So in total 10 participants and 21 trials were

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removed from the data outside of the trials already flagged wrong by pressing the wrong key or exceeding the 5000 ms. Thus the data of 83 participants were used for analyzing the data.

Table 1

Demographic characteristics, mean reaction times (in ms) and error rates (in percent) for repeat trials, switch trials and switch costs.

Variables		Repeat trials		Switch trials		Switch costs	
	N	Reaction time (ms)	Error rates (%)	Reaction time (ms)	Error rates (%)	Reaction time (ms)	Error rates (%)
Gender							
Male	85	1005 (286)	2.5 (2.6)	1548 (383)	8.3 (5.7)	543 (251)	5.4 (3.6)
Female	8	929 (137)	2 (2.6)	1360 (172)	5.8 (5.6)	431 (195)	3.9 (4.0)
Highest degree							
Primary school or lower	1	707	2.0	1204	4.0	497	3.0
Secondary school	12	855 (177)	1.7 (2.5)	1332 (275)	9.2 (7.3)	478 (171)	5.4 (4.2)
Associate degree	4	1211 (375)	5.5 (1.9)	1649 (538)	9.5 (3.0)	438 (164)	7.5 (2.1)
Bachelor's degree	20	945 (160)	2.4 (2.9)	1527 (318)	9.0 (4.6)	582 (327)	5.7 (3.5)
Master's degree or higher	46	1045 (309)	2.5 (2.4)	1579 (393)	7.4 (5.9)	534 (234)	4.9 (3.6)
Marital status							
Single, never married	39	920 (269)	2.7 (2.6)	1439 (372)	7.7 (5.6)	519 (252)	5.2 (3.7)
Married, or living together	43	1066 (268)	2.3 (2.6)	1616 (358)	8.4 (5.9)	549 (246)	5.4 (3.6)
Widowed	1	1049	2.0	1377	10.0	328	6.0
Total	83	997 (275)	2.5 (2.6)	1530 (371)	8.1 (5.7)	532 (247)	5.3 (3.6)

Standard errors are presented in parentheses.

Significant group difference : * $p < 0.05$.

Materials and Procedure

This study was conducted online on the platform psytoolkit.org (Stoet, 2010 & Stoet, 2017).

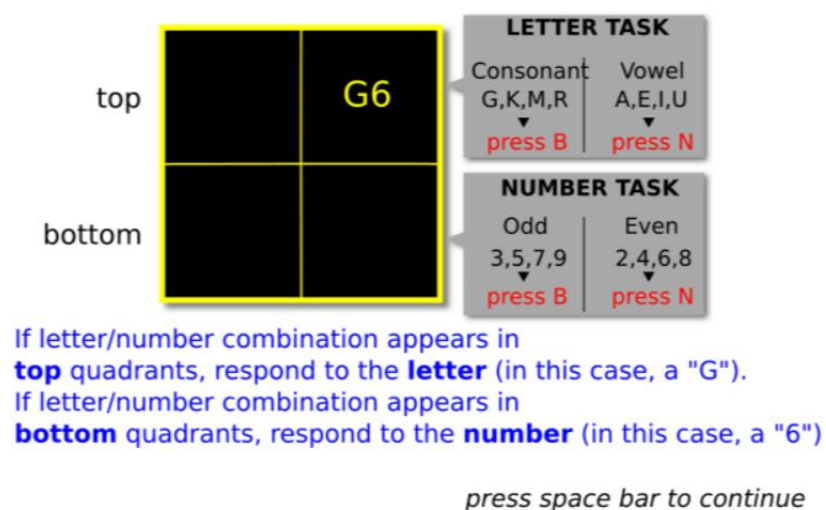
Firstly, participants were notified about the participation and confidentiality in this study and had to explicitly agree to take part in this study by clicking the 'next' button.

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After the participants agreed, they were asked to fill in the survey about their online chess activities and ratings, and their demographics like age, gender, highest educational degree and marital status (see Appendix A). After completing the survey questions they had to do an experiment to measure task switching. Before starting with the experiment they were shown an instruction page explaining the task. The experiment of my study is similar to the task of Stoet and Snyder (2007) which is based on the task of Monsell (2003). In the experiment of the present study participants had to respond to letter and number combinations by pressing a key (B or N) on the keyboard. Depending on the position of the stimulus (top or bottom), the participants knew whether to focus on the letter or the number and therefore what key to press. Detailed instructions appeared on screen before the experiment started and it also appeared on screen if a participant made an error by pressing the wrong key or exceeding the time limit (5000 ms). The instructions explained which task was required depending on the position and what button to press, depending on the task and cue. The participants started the experiment firstly with trials of just letters, and later just numbers, to practice both tasks.

Figure 1

Example trial with detailed instructions



After practicing the letter and number task with both 100 practice trials, the ‘real’ experiment started which had another 100 trials. During the real experiment the cue changed from position clockwise, so top right > bottom right > bottom left > top left etc. (see figure 1). This way people got, either “task-repeat trials” (top right and bottom left) where they had the same task as the trial before, or “task-switch trials” (top left and bottom right) where they got the other task than the trial before. To measure task switching the difference in reaction time between task-repeat trials and task-switch trials was calculated which is also called the (task) switch cost. Of course, it was also measured whether a participant made any errors by pressing the wrong key.

After participants completed the experiment, they were debriefed about the intentions of the study.

Ethical Approval and Preregistration

Going by the ethical guidelines for research, participants had to explicitly agree to take part in the study. Additionally, ethical approval for studies involving video games and cognition has been granted to the thesis supervisor Matti Vuorre by the Ethics Review Board (ERB) of the Tilburg School of Social and Behavioral Sciences of Tilburg University. The ethical approval (Code: TSB_RP1173) extends to this supervised thesis as well.

Statistical Analysis

All analysis were conducted using SPSS (IBM Corp, 2019). For evaluating statistical significance, $\alpha = .05$ was used throughout all analyses.

One-way ANOVAs were performed with gender, highest degree and marital status as the independent variable, and mean reactiontimes (RTs) and percentages of errors (ER) as the dependent variables. Furthermore, simple linear regressions were conducted with age, ratings (bullet, blitz and rapid/classical) and the number of games played (last week and in life) as dependent variables, and mean reactiontimes and error rates in repeat trials, switch trials and

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switch costs as dependent variables. Lastly a multiple regression was conducted to test a possible moderation effect of most played time control on the correlation between the number of games played and switch costs.

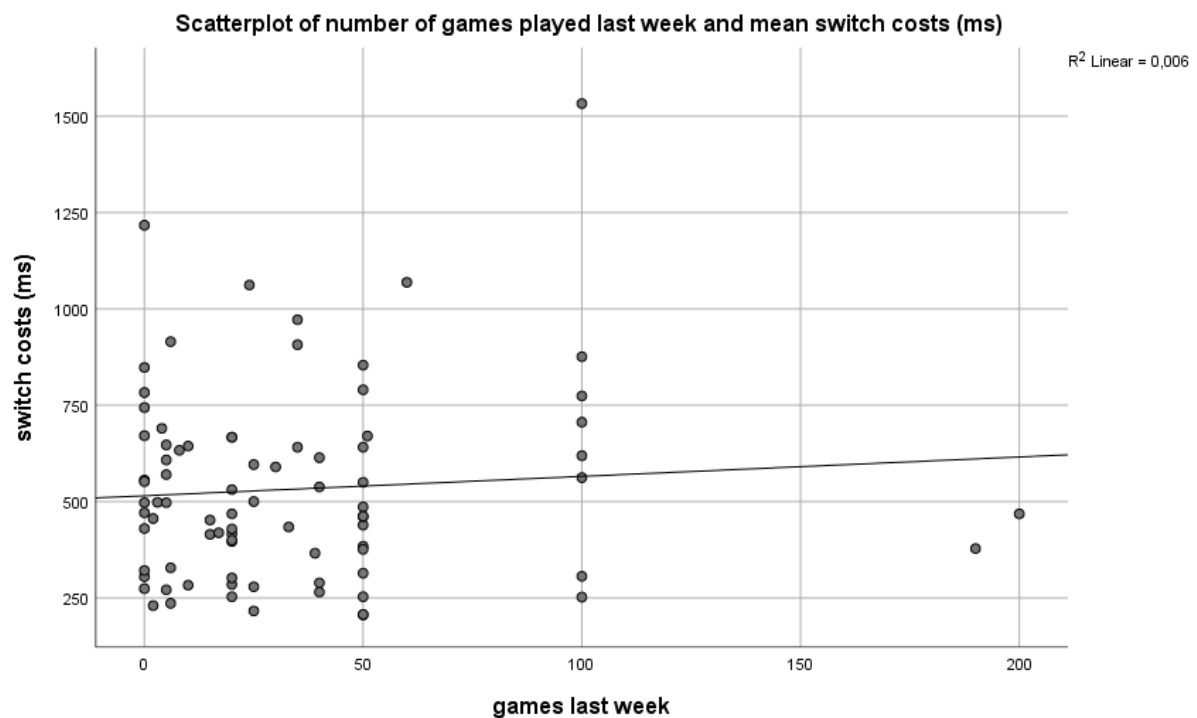
Results

As shown in table 1, the one-way ANOVAs showed there were no significant differences between groups in reaction time and error rates, in repeat trials, switch trials and switch costs.

Number of games played

To test the first hypotheses, whether the number of online chess games predict task switching performance, I regressed switch costs on the number of online chess games. Overall, the results showed that the portion of variance explained in the outcome was not significant, $F(1.81) = .51$, $R^2 = .006$, $p = .48$.

Figure 2



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The results showed that games played last week was not a significant predictor for switch costs ($\beta = .08$, $t = 0.71$, $p = .48$).

The same was tested for games played in life. Here the results also showed that the portion of variance explained in the outcome was not significant, $F(1.81) = 1.04$, $R^2 = .013$, $p = .31$. Games played in life explained 1.3% of the variance between the variables. The results showed that games played in life was not a significant predictor for switch costs ($\beta = .11$, $t = 1.02$, $p = .31$).

Therefore the first hypothesis, that people who play more online chess are faster in switching between tasks was not met.

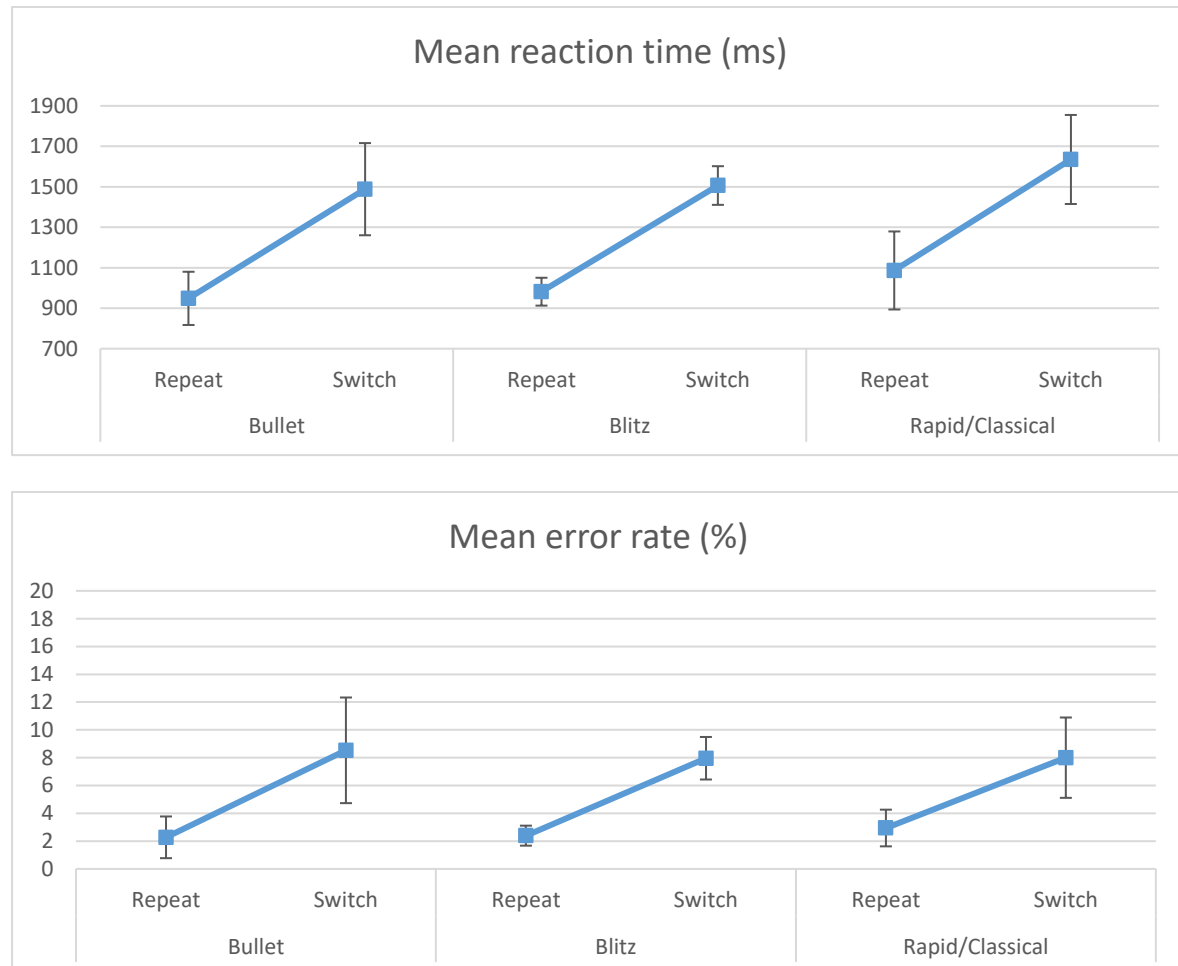
Most used time control

To test that people who play faster time controls have lower task switch costs, a one-way ANOVA was conducted. Participants were classified into three groups based on the time control they played the most: bullet ($n = 15$), blitz ($n = 51$) and rapid/classical ($n = 17$). There was not a statistically significant difference between groups as determined by one-way ANOVA, $F(2.80) = .06$, $p = .94$.

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Figure 3

Mean reaction times (in ms) and error rates (in percent), in repeat and switch trials per most used time control



Error bars show 95% confidence intervals.

To test the second hypothesis, that playing faster time controls moderates the correlation between games played last week and switch costs, a multiple regression was conducted. Games played last week and most used time control did not significantly predict task switching performance, $F(2,80) = .33$, $p = .72$, $R^2 = .008$ games played last week, $p = .42$ and most used time control, $p = .68$ did not statistically significantly add to the prediction. Therefore the second hypothesis, that most used time control could moderate the correlation between games played last week and switch costs, was not met.

Ratings

The mean ratings in this study were bullet: 1869 (SE=515), blitz: 1937 (SE=454) and rapid/classical: 1847 (SE=431).

To test the third hypothesis, that people who are better at online chess have lower switch costs, more simple linear regressions were conducted. With the rating as predictor, and switch costs as the dependent variable.

For bullet the portion of variance explained in the outcome was significant, $F(1.62) = 4.24$, $R^2 = .064$, $p = .044$. Bullet rating explained 6.4% of the variance between the variables. The results showed that bullet rating is a significant predictor for higher switch costs ($\beta = .25$, $t = 2.06$, $p = .044$).

For blitz the portion of variance explained in the outcome was not significant, $F(1.67) = 2.45$, $R^2 = .035$, $p = .122$. Blitz rating explained 3.5% of the variance between the variables. The results showed that blitz rating is not a significant predictor for higher switch costs ($\beta = .19$, $t = 1.56$, $p = .122$).

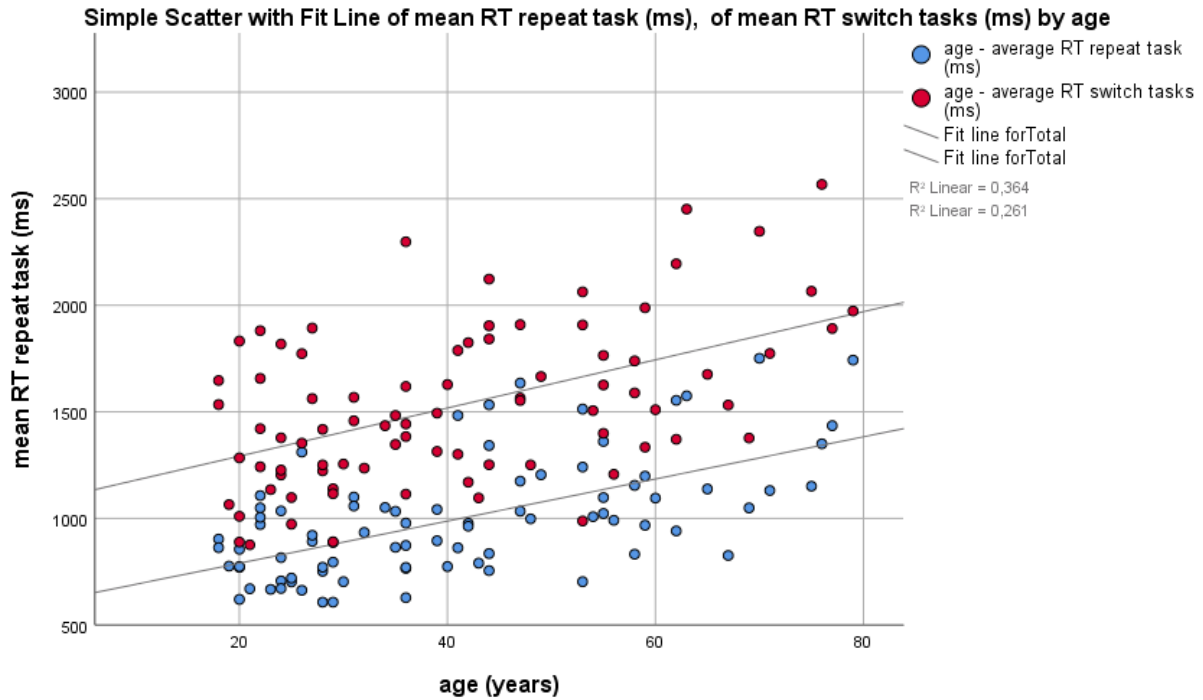
For rapid/classical the portion of variance explained in the outcome was not significant, $F(1.54) = 3.37$, $R^2 = .059$, $p = .072$. Rapid/classical rating explained 5.9% of the variance between the variables. The results showed that rapid/classical rating is not a significant predictor for higher switch costs ($\beta = .24$, $t = 1.84$, $p = .072$).

Although only bullet rating was a significant predictor, all three time controls had a correlation between online chess rating and switch costs in the same direction. The higher the rating, the higher the switch costs. This is in contrast with the third hypothesis, where chess rating was expected to correlate with lower switch costs.

Age

The effects of age was also tested in this study (see Figure 4). The mean age in the study was 41 with a standard error of 16.8.

Figure 4



In order to test the effects of age, a simple linear regression was conducted, with age as the predictor, and reaction time in repeat trials as the dependent variable. Overall, the results showed that the portion of variance explained in the outcome was significant, $F(1,81) = 46.33$, $R^2 = .36$, $p < .001$. Age explained a large amount of the variance between the variables (36%). The results showed that age was a significant predictor for a higher reaction time in repeat trials ($\beta = .60$, $t = 6.80$, $p < .001$).

The same was done for reaction time in switch trials. Overall, the results showed that the portion of variance explained in the outcome was significant, $F(1,81) = 28.61$, $R^2 = .26$, $p < .001$. Age explained a large amount of the variance between the variables (26%). The results showed that age was a significant predictor for a higher reaction time in switch trials ($\beta = .51$, $t = 5.35$, $p < .001$).

Lastly, a simple linear regressions was conducted, with age as the predictor, and switch costs as the dependent variable. However, the results showed that the portion of variance explained in the outcome was non-significant, $F(1,81) = .723$, $R^2 = .009$, $p = .40$. Age explained 0.9% of the variance between the variables. The results showed that age was not a significant predictor for switch costs ($\beta = .09$, $t = .85$, $p = .40$).

Discussion

This study aimed to investigate the relationship between playing online chess and task switching performance. It was hypothesized that the more online chess games a participant has played the lower the switchcosts would be during the experiment. Next to that it was hypothesized that participants who mostly play faster time controls would have lower switchcosts in the experiment than participants who mostly play longer time controls, strengthening the relation between the number of online chess games and the switchcosts. Lastly it was hypothesized that participants who have higher online chessratings would have lower switchcosts in the experiment than participants with lower online chessratings. To answer these questions I analyzed demographic data, the number of online chess games participants played, their most used time control and their ratings. Furthermore, I measured error rates and reaction times on repeat and switch trials from which the switch costs could be derived.

My study didn't find an effect of gender, highest degree or marital status on reaction times and error rates.

The present study also didn't find an effect of the number of games played (last week and in life) on task switching performance. So it didn't have a result in line with Gao et al. (2019) who found that people who play more chess can be more efficient in visual perspective taking.

Furthermore my study did not find a significant effect of most used time control on task switching performance, although the faster timecontrols had slightly faster reaction times.

A moderation effect of most used timecontrol on the correlation between games played and switch costs was also not found.

Although only significant for the timecontrol bullet, this study found a positive relation between chess rating and switch costs. So people who have a higher online chessrating take a longer time to switch between tasks. This is in contrast with Burgoyne et al. (2016) who suggest that chess skill is correlated with cognitive abilities like fluid reasoning, comprehension knowledge, short-term memory and processing speed. However, it's interesting to look at the research of Russek et al. (2022) that pointed out that chess players can learn to effectively decide when to use computation. This means that chess players can learn to recognize when they need to take a moment to calculate a position, and also recognize when not to. So, by getting stronger at chess you learn to deactivate your selective attention more often to save energy for critical moments (Russek et al., 2022). Karle et al. (2010) suggest that this ability to control selective attention leads to enhanced task switching capabilities for stronger chess players. However my study did not find this effect. With bullet rating my study even suggested the opposite, that chess players with a higher onlinerating performed worse on the task switching experiment as they had higher switch costs. Perhaps an explanation for this should be sought in the way strong chess players have learned to deactivate their selective attention

When looking at age my study found that, the younger the participant, the faster the reaction times in repeat and switch trials, but age did not have an effect on task switching performance.

Strengths & limitations

A strong part of this study is that it contained a task that is not similar to tasks in videogames. In the research field of videogames and cognitive abilities there are a lot of methodological shortcomings that result in mixed findings. This is because it isn't always clear that the ability to switch between tasks gets measured rather than other skills (Boot et al., 2011). Therefore, in this study, both people with and without a lot of experience in doing tasks online, had to do a completely new task, which leveled the playing field and actually measured task switching capabilities.

Next to that, a strong part of this study is that the sample contained a lot of diversity. As the chess world predominantly consists of male players (fide.com) and the online chess world consists of mostly young chess players (chess.com) it is hard to get a lot of diversity in your sample. The sample in this study consisted for 9.6% of female players and the mean age was 41 with an impressive 7.2% above the age of 70.

However, there are also shortcomings in my study. For starters the study relied on self-reports regarding demographics and online chess activities. This is a problem as the chess world is very competitive. Especially with the self-reported rating there are a lot of discrepancies in the way people portray themselves. Even though chess ratings are an objective, precise and public estimate of one's strength in chess, Heck et al., (2024) showed that chess players assess their ability higher than their observed ratings. They also showed that low-rated players tend to overestimate their ability the most, while top-rated players assess their ability the most in line with their observed rating.

Another problem of the ratings is that multiple different ratings were used. Most participants used their (online) lichess ratings, while others also used chess.com ratings, or even fide (over the board/offline) ratings. Ratings are not absolute, they are relative, so they reflect a position within a group of people. This means that chess.com, lichess.org and

ratings of the same person can differ. I couldn't find a scientific study into the differences between these ratings, but the consensus, among non-scientific experimenters, is that online ratings (especially lichess.org) tend to be higher than over the board ratings. However, with the resources this study had, the self report of a rating was the best possible estimate that could have been provided of a participant's strength in chess.

Adding to that, another shortcoming of this study is that it gave purely correlational relations rather than causal relations. Within the timeframe of this thesis it was not possible to be able to provide any causal relations. To be able to provide that, people who didn't play chess yet had to be taught and be compared to people who didn't learn chess, which can take up a lot of time. Furthermore, it would have been very difficult to find willing participants for that.

Coming back to the lack of diversity in the chess population, a limitation was that this study wasn't able to give any significant group differences regarding demographics. As the groups were very unevenly distributed, the study required a lot more participants to be able to give a significant result.

Lastly as Burgoyne et al. (2016) pointed out, age could have a moderation effect on the correlation between chess and cognitive abilities. So younger players might improve their cognitive abilities more by playing chess. This, combined with the fact that the online chess world is dominated by children, would have made a very interesting target group for the study. However this study didn't have ethical permission for people under 18 years old and therefore the study was age restricted.

Implications & further research/practice

In future research it will be interesting to replicate the findings regarding chess ratings and task switching performance. Furthermore, if there are significant differences in task switching performance, it would be great to look at the underlying mechanics of those differences. Perhaps the explanations can be found in the area of attention control and selective deattention.

As mentioned in the limitations, children are the category being the most active in online chess and they are the group that can train their cognitive abilities the most. Therefore it would be interesting in future research to test the impact of chess trainings on childrens' ability to switch between tasks. It would be great if this can also be done with children that don't have previous experience with playing chess yet. If these children are trained and compared to other children with no experience in chess, causal relations can be derived from the chesstrainings. This can also be done for over the board (offline) chess, for example in the setting of primary schools.

Next to that, it is recommended to have observations of the participants, so that you have an objective value of a players' strength. This can also be done by categorizing participants in groups regarding their strength.

Conclusion

This study aimed to investigate the relationship between online chess and task switching. It did not find a relation between the number of online chess games and task switching performance. Furthermore, it did not find a relation between the participants most used time control when playing online chess and task switching performance. For bulletrating, this study found a positive relation with switch costs, meaning that participants with a higher bulletrating had higher switch costs. Lastly this study found a relation between

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age and reaction times in repeat and switch trials. The younger the participants, the lower the reaction times on these trials. However, this study did not find a relation between age and switch costs.

More research should be conducted to replicate and look for the underlying mechanics regarding the findings of (online) chess rating and task switching performance. Lastly, research regarding online chess and task switching performance should be conducted within the group of children, as previous studies have found a moderating effect of age on the training effects of chess on cognitive abilities.

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Appendix A

Survey for Demographics and Online Chess Activities

For this survey you can open your lichess profile for more exact information.

About how many online chess games have you played in your life? (This includes games on all online chess platforms)

About how many online chess games have you played in the last week?

Please indicate what time control you play mostly when you play online chess on lichess:

- ☐ Bullet
- ☐ Blitz
- ☐ Rapid/classical

What is your current (lichess) bullet rating?

What is your current (lichess) blitz rating?

What is your current (lichess) rapid/classical rating? (you can take the average if you have both)

What is your age in years?

My gender is:

- ☐ Male
- ☐ Female
- ☐ Other

TASK SWITCHING PERFORMANCE OF ONLINE CHESS PLAYERS

What is the highest degree or level of school you have completed?

- ☐ Primary school or lower
- ☐ Secondary school
- ☐ Associate degree
- ☐ Bachelor's degree
- ☐ Master's degree or higher

What is your current marital status?

- ☐ Single, never married
- ☐ Married or living together
- ☐ Divorced/separated
- ☐ Widowed