

Predicting the 2023 Canadian Cubing Championship

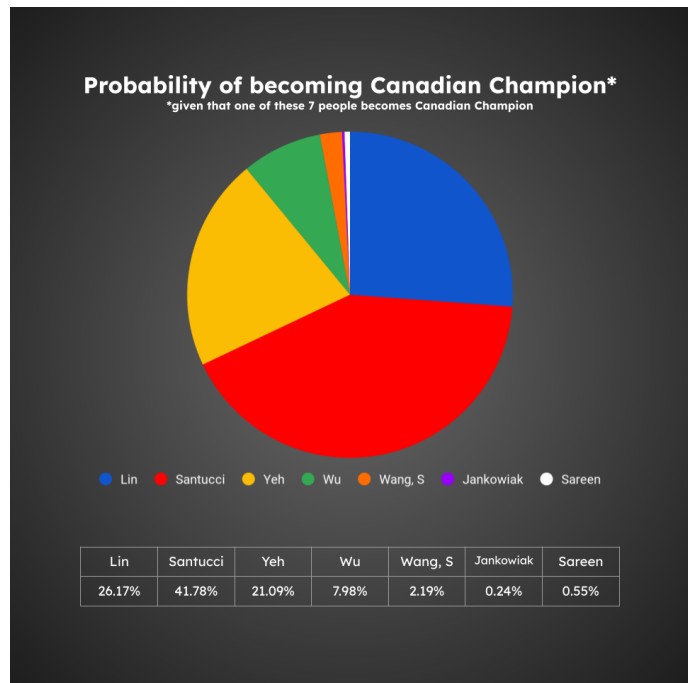
Matthew Liu / July 16, 2023

The 2023 Rubik's Cube Canadian Championship is well underway. Defending Champion Bill Wang elected not to participate this year, meaning that we will crown a new national champion in a few hours. The results of the semifinal round of the Canadian Championship have just been released. With just four hours before the final round, I have compiled my predictions to who will succeed Mr. Wang for the coveted title.

Overview

As shown in this chart, I believe that Kyle Santucci will win the competition and become Canadian Champion. I also see Brennen Lin and Morgan Yeh as serious contenders for the championship title as well. No competitor reached a probability above 50%, so even though Mr. Santucci is the favorite to win, it is still more likely that he will lose. However, each of his potential opponents has an even lower probability of winning.

In this article, I will discuss the entire process that led me to this prediction, such as choosing the competitors in my prediction, discussing various statistics of each competitor, and explain how I use this information to determine these final probabilities.



The competitors chosen for the prediction

I have chosen the Top 7 Canadian Competitors from the seeding list published before the competition. Those competitors are as follows:

1. Brennen Lin
2. Kyle Santucci
3. Morgan Yeh
4. Ryan Wu
5. Stanley Wang
6. Luke Jankowiak
7. Arhaan Sareen

The reason behind choosing 7 competitors was largely arbitrary, and I don't have a very good explanation as to why. My rationale was that I would stop at the point where I believed that the competitor had virtually no chance of being champion. Of course, all competitors technically have a chance of being champion, but I picked the ones who I thought had a non-trivial chance of being Canadian Champion. A more concrete study would have compared all competitors, but that would have made things much more complicated, something that would be unfeasible given the tight time constraints for these predictions.

Best Ever Result.

The World Cube Association's (WCA) seeding list is based on their best average of 5 result. which is shown to the left. At the time of writing this article, there are two Canadian #1s: Brennen Lin and Kyle Santucci. However, there is much more to a cuber's overall strength than their best result.

For this reason, I have also ranked them according to their performance over the past year:

PR averages of the top 7 Canadian Competitors at Canadian Championship 2023

	Name	PR ao5
1	Lin, Brennen	5.93
=	Santucci, Kyle	5.93
3	Yeh, Morgan	6.03
4	Wu, Ryan	6.34
5	Wang, Stanley	6.61
6	Jankowiak, Luke	7.00
7	Sareen, Arhaan	7.01

Best Average Performance

Mean of all non-DNF averages done in the past year

	Name	Mean
1	Santucci, Kyle	6.74
2	Lin, Brennen	6.91
3	Yeh, Morgan	7.12
4	Wu, Ryan	7.50
5	Wang, Stanley	7.78
6	Jankowiak, Luke	7.98
7	Sareen, Arhaan	8.39

As you can see, the ranking list remained the exact same, except now there is a clear #1 and #2. Although Brennen Lin has achieved the fastest average of 5 solves done in competition, and worthy of the Canada #1 position alongside Kyle Santucci, it was Mr. Santucci who had a slightly better competition performance over the past year. An important note is that DNF (Did Not Finish) results are not included, because those are difficult to quantify. However, even this doesn't tell the full story. Because of how short the 3×3 event is (as you can see, all competitors in this prediction have achieved averages of seven seconds or less at some point in their career), another important factor is how consistent each competitor has been over the past year.

Most Consistent

Without going into unnecessary detail, the standard deviation is a method to measure the "spread" of a dataset.

Once again, Kyle Santucci emerges on top, this time as the most consistent. This means that he is the most "solid" competitors, his times tend to vary the least.

An interesting note is that sixth seed Luke Jankowiak has actually been the second most consistent of the seven competitors. Although this won't mean much, because his performance over the past year is a full second slower than the likes of Mr. Santucci or Mr. Lin, it is still a very positive aspect about his solving.

Standard Deviation of results of the top 7 Canadian Competitors at Canadian Championship 2023 from the past year		
	Name	stdev
1	Santucci, Kyle	0.42
2	Jankowiak, Luke	0.44
3	Lin, Brennen	0.45
4	Wang, Stanley	0.57
5	Wu, Ryan	0.65
6	Yeh, Morgan	0.66
7	Sareen, Arhaan	0.69

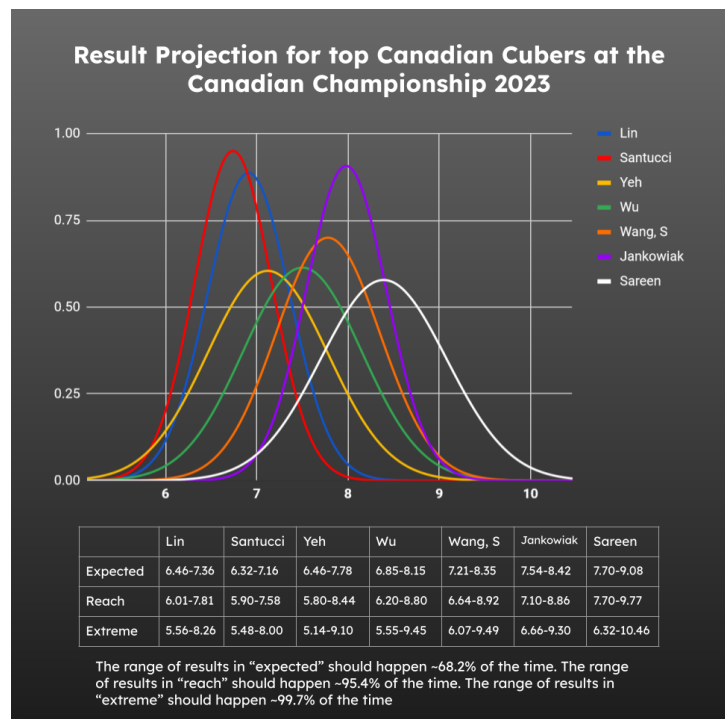
Putting it all together

In order to make this prediction as well-rounded as possible, I have compiled the average performance and standard deviation of each competitor, and plotted them onto a graph.

It is not an unreasonable assumption to say that cubing results behave "normally" (the actual word to describe a "bell-curve" distribution, to put it simply). This is the basis of how I made my predictions.

It is a well-known fact that in a perfectly normal distribution, approximately 68.2% of the results will fall within one standard deviation from the mean, approximately 95.4% of the results will fall within two standard deviations of the mean, and 99.7% of the results will fall within three standard deviations of the mean.

From this, I have shown three ranges of results for each competitors: the "expected range" (± 1 standard deviation), the "reach range" (± 2 standard deviations) and the "extreme range" (± 3 standard deviations).



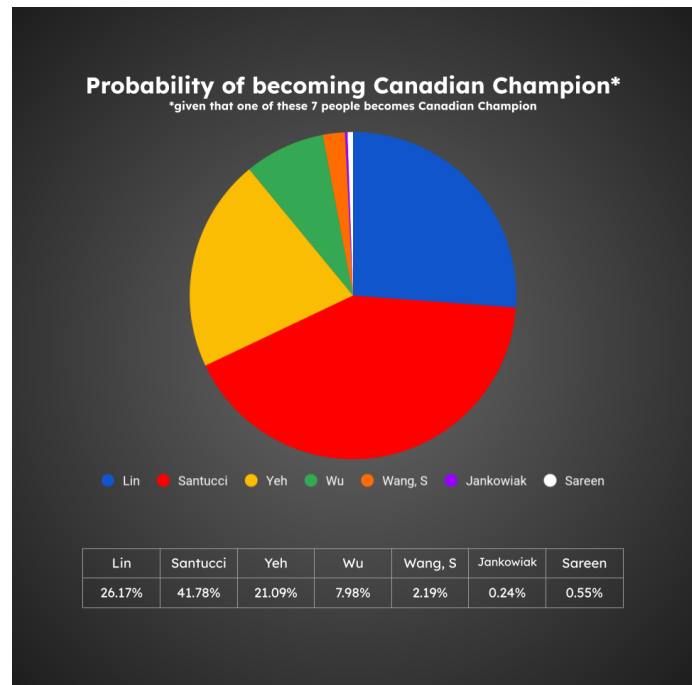
In order to compute the probability of any competitor winning, I have taken every possible result in the extreme range (i.e. 5.14 seconds, 5.15, 5.16, 5.17, ... all the way up to 10.46 seconds, anything outside of this range will be virtually impossible), and determine who would win in each scenario. Then, add all the probabilities up to create a total probability.

The Official Prediction

The moment everyone has been waiting for. (Well, I guess not because you saw this at the start of the article)

According to my model that I described above, I am predicting that Kyle Santucci, as the fastest yet most consistent cuber, will be the favourite to become the new Champion, with a 42% probability. The second favourite (does not imply second place, simply the second most likely to win) is Brennen Lin, with a 26% probability of winning. The third favourite is Morgan Yeh, with a 21% chance of winning.

No competitor reached a probability above 50%, so even though Mr. Santucci is the favorite to win, it is still more likely that he will lose. However, each of his potential opponents has an even lower probability of winning.



The actual contenders

Official competitions organized by the World Cube Association all follow a similar format: Competitors are slowly eliminated from the competition through multiple rounds. In the 2023 Canadian Championship, there are four such rounds:

Round 1: All competitors can participate

Round 2: The top 75% competitors from Round 1 can participate

Round 3: The top 56 competitors from Round 2 can participate

Round 4: The top 16 competitors from Round 3 can participate

Due to this, it is only reasonable to make a prediction for Canadian Champion once the results of Round 3 have been published, as all other competitors have been eliminated, and therefore have a 0% chance of winning. Unfortunately, I was unable to do this.

The 16 competitors are as follows:

Matty Hiroto Inaba (USA)

Max Siau (USA)

Ryan Wu (CAN)

Kyle Santucci (CAN)

Morgan Yeh (CAN)

Luke Jankowiak (CAN)

Luke Tycksen (USA)

Carter Kucala (USA)

Sameer Aggarwal (USA)

Brennen Lin (CAN)

Michele Cavezza (CAN)

Li Chak Kwan (HKG)

Arhaan Sareen (CAN)

Brian Sun (CAN)

Stanley Chapel (USA)

Jonathan Esparaz (CAN)

You may have noticed that not all competitors participating are Canadian. While competitors from all nations are allowed to participate, only Canadian participants are eligible for the title. For this reason, only the Canadian competitors are compared.

Out of the Canadians in my prediction, only one was unsuccessful in their attempt to make it to the finals: fifth seed Stanley Wang. This means that as of right now, his probability of becoming Canadian Champion has fallen to zero. Additionally, three other Canadians (Michele Cavezza, Brian Sun, and Jonathan Esparaz) made it to the finals, so they have non-zero chances of winning it at this stage. If I ever do this in the future, I will try and make an updated prediction just before the finals.

Update: The Actual Results

It's the next day, and the 2023 Canadian Championship has concluded. The final standings are as follows:

6.27 - Brennen Lin (CAN)
6.39 - Matty Hiroto Inaba (USA)
6.47 - Kyle Santucci (CAN)
6.87 - Morgan Yeh (CAN)
6.94 - Sameer Aggarwal (USA)
7.04 - Stanley Chapel (USA)
7.44 - Max Siau (USA)
7.78 - Ryan Wu (CAN)
7.93 - Li Chak Kwan (HKG)
8.03 - Carter Kucala (USA)
8.06 - Michele Cavezza (CAN)
8.28 - Luke Tycksen (USA)
8.36 - Luke Jankowiak (CAN) [Tiebreak: 6.67 Single]
8.36 - Arhaan Sareen (CAN) [Tiebreak: 6.70 Single]
8.72 - Jonathan Esparaz (CAN)
9.54 - Brian Sun (CAN)

Brennen Lin succeeds Bill Wang as the Canadian Champion.

I will say, I was very happy to see that not only did Brennen become the Canadian Champion, he also placed first among all competitors, including the international competitors. I guess this shows to the world that Canada, even if it has fewer top speedcubers than the current "powerhouses" (the United States and China), we still have completely reasonable chances of winning big competitions.

As you can see, the model (which favoured Kyle Santucci) did not correctly predict the winner of the competition. However, the winner was the model's #2 prediction.

Furthermore, Mr. Lin was still predicted to have a 26% chance of winning, which is essentially one-in-four, and such a result is completely reasonable. Additionally, if you look closer at the results, six of the seven competitors, everyone except Mr. Lin, obtained a result in the "expected" range that I described earlier, while Mr. Lin did better than the model's expected range, and hence, became champion.