Analyzing Regional Voting Patterns for the 2023 Toronto Mayoral By-Election*

How Regional Demographics Can Shape Elections

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The 2023 Toronto Mayoral By-Election, prompted by the resignation of Mayor John Tory, witnessed a field of 102 candidates with Olivia Chow, Ana Bailão, and Mark Saunders emerging as the front-runners. Aggregated voter data is released to the public in order to provide transparency, trust, and accountability in the electoral process. This analysis examines the voting data, focusing on the distribution of votes across Toronto's 25 wards. This allowed us to find that different geographical regions favor different candidates at varying intensities, likely because of varying regional demographic profiles.

1 Introduction

The 2023 Toronto Mayoral By-Election occurred after the resignation of Mayor John Tory, who was re-elected in 2022. The city of Toronto is home to almost 3 million people and the Mayor plays a large role in overseeing the success of the city. There was significant public interest in this election with a 38.5% voter turnout, which is 9% higher than that of the 2022 election (Hune-Brown, Roy, and Huynh (2023)). 102 people ran for the Mayor of Toronto, but voter polling indicated three front-running candidates: Olivia Chow, Ana Bailãlo, and Mark Saunders (Hune-Brown, Roy, and Huynh (2023)). These candidates represent diverse political interests and backgrounds, and understanding the distribution of votes by ward and subdivision helps to better understand Toronto's geopolitical landscape and general regional political dynamics.

Granular analysis of the number of votes each candidate received by ward and subdivision allows us to identify variations in voting patterns and determine which areas contribute the most to the success of the winning candidate, and which areas are more highly contested.

*Code and data are available at: https://github.com/sophiabrothers1/2023mayoralelection.

Every area of Toronto has a different background, whether it be variations in socioeconomic status, race, gender, etc (Toronto (2021)). Knowing and collecting this data is imperative to determining what issues and policies are important to different demographic backgrounds.

As mayoral elections only occur every 4 years and societal priorities and community interests evolve overtime, it is important that this data is consistently released in order to make sure new literature is accurate. This allows policymakers and people involved in research to learn about the shifting voting demographics and any potential implications that may arise from that. Releasing the voting numbers also builds trust in the electoral process, keeps policy makers accountable (dissuades election fraud), and ensures that electoral districts are drawn fairly.

In Section 2, we will discuss the background and context of the data used and collected, analysis of the data that is visualized through various graphs and tables, and a discussion of the results and their implications.

2 Data

This data originates from the 2023 Toronto Mayoral By-Election. Residents of Toronto are eligible to cast one vote for who they believe should be the Mayor of Toronto. These votes are cast officially at one of many voting locations before being anonymized and aggregated by the City Clerk's Office, where the data is then published. It includes the number of votes cast for each candidate in all 25 wards, which were then further broken down by polling subdivision (City Clerk's Office (2023)). This is the official form of data for the 2023 Toronto Mayoral By-Election and therefore the most accurate dataset available.

There were 4 different variables included in this dataset.
Ward Number: Represents each of Toronto's 25 wards (geographical areas of Toronto).
Subdivision: Geographical areas within a ward.
Candidate Names: All of the official candidates who ran for Mayor.
Vote Count: The number of votes a candidate received.

Using R (R Core Team (2023)), I was able to generate the following tables and figures to reflect the data provided. As data was provided in separate sheets per ward, the data was cleaned by transforming it into a long format and combined into one data frame.

Although the Mayor of Toronto is elected by popular vote, each ward and subdivision may have varying demographic profiles that influence their voting patterns. Each ward also has their own representative. As shown in Figure 1, Olivia Chow won the popular vote to become Toronto's Mayor, defeating Ana Bailão. This figure focuses on candidates who received more than 1,000 overall votes, reducing the pool from 102 to 19 candidates, thereby highlighting the most competitive races.

Aggregated data containing the total amount of votes each candidate received by ward can be found in Table 2 in the Appendix.

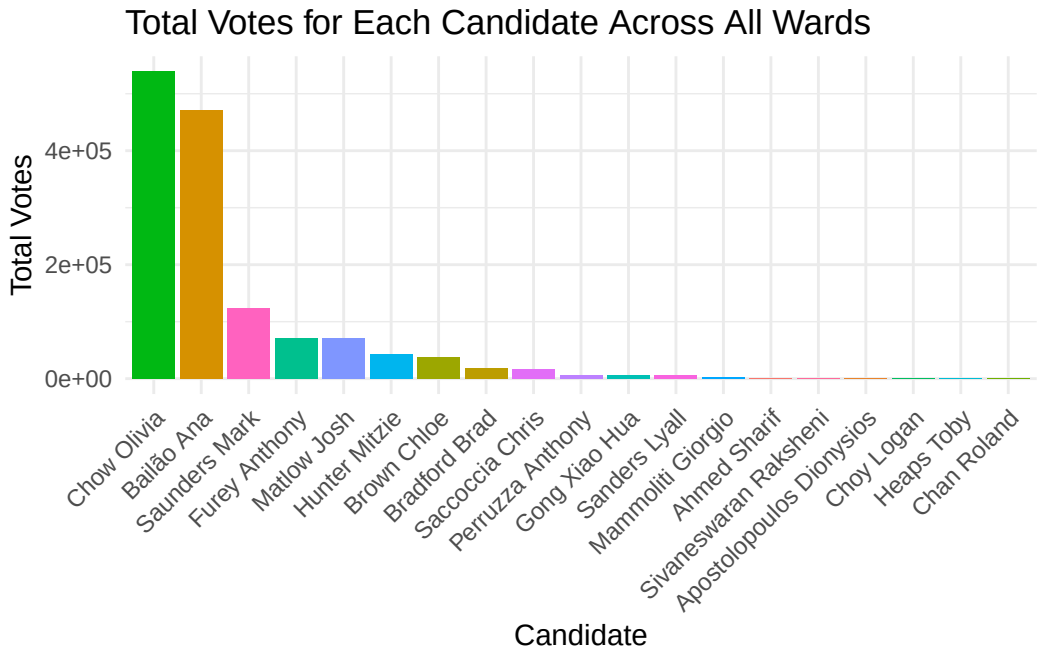

Figure 1: The number of votes candidates received across all wards, filtered only to candidates with more than 1000 total votes.

Table 1 helps to show regional preferences for each candidate. Wards 4, 14, and 13, which represent Parkdale - High Park, Toronto - Danforth, and Toronto Centre respectively, were all carried heavily by Olivia Chow. Meanwhile Wards 2, 8, and 15, which represent Etobicoke Centre, Eglington Lawrence, and Don Valley West respectively, were all carried heavily by Ana Bailão (Toronto (2021)).

Looking at the median household income of each of these wards, we see a pattern. The wards carried by Chow had median household incomes of 89k, 131k, and 127k. Meanwhile, the wards carried by Bailão had median household incomes of 147k, 176k, and 225k. Similarly the wards heavily carried by Bailão had a higher median age than those carried by Chow (Toronto (2021)).

On the flip side, there are a number of wards that were more tightly contested (although since the election is by popular vote, this doesn't speak to the winner of the election but rather the demographic of the ward itself). Bailão had only 4 more votes than Chow in Ward 7. Wards 16, 25, and 18 also had differences of less than 100 votes between either of the two candidates (City Clerk's Office (2023)).

Figure 2 shows the distribution of votes in each ward among Chow, Bailão, and Saunders. As wards have different population sizes and densities, this view allows you to see how wards vote

Table 1: The number of votes between the candidate with the most votes and the candidate with the second most votes in each ward.

Table: Wards with Smallest Difference Between Winner and RunnerUp

Ward	Winner	Runner_Up	Vote_Difference
Ward 7	Bailão Ana	Chow Olivia	4
Ward 16	Bailão Ana	Chow Olivia	30
Ward 25	Bailão Ana	Chow Olivia	78
Ward 18	Chow Olivia	Bailão Ana	98
Ward 17	Bailão Ana	Chow Olivia	488
Ward 24	Chow Olivia	Bailão Ana	902
Ward 1	Bailão Ana	Chow Olivia	1552
Ward 21	Chow Olivia	Bailão Ana	1816
Ward 12	Chow Olivia	Bailão Ana	2606
Ward 20	Chow Olivia	Bailão Ana	2844
Ward 5	Bailão Ana	Chow Olivia	4854
Ward 22	Chow Olivia	Bailão Ana	4940
Ward 6	Bailão Ana	Chow Olivia	7934
Ward 23	Chow Olivia	Bailão Ana	8916
Ward 3	Bailão Ana	Chow Olivia	9086
Ward 15	Bailão Ana	Chow Olivia	10464
Ward 19	Chow Olivia	Bailão Ana	10962
Ward 11	Chow Olivia	Bailão Ana	12238
Ward 9	Chow Olivia	Bailão Ana	13438
Ward 8	Bailão Ana	Chow Olivia	15876
Ward 10	Chow Olivia	Bailão Ana	16964
Ward 2	Bailão Ana	Chow Olivia	17788
Ward 4	Chow Olivia	Bailão Ana	18776
Ward 14	Chow Olivia	Bailão Ana	20760
Ward 13	Chow Olivia	Bailão Ana	21288

relative to its population and in comparison to other wards.

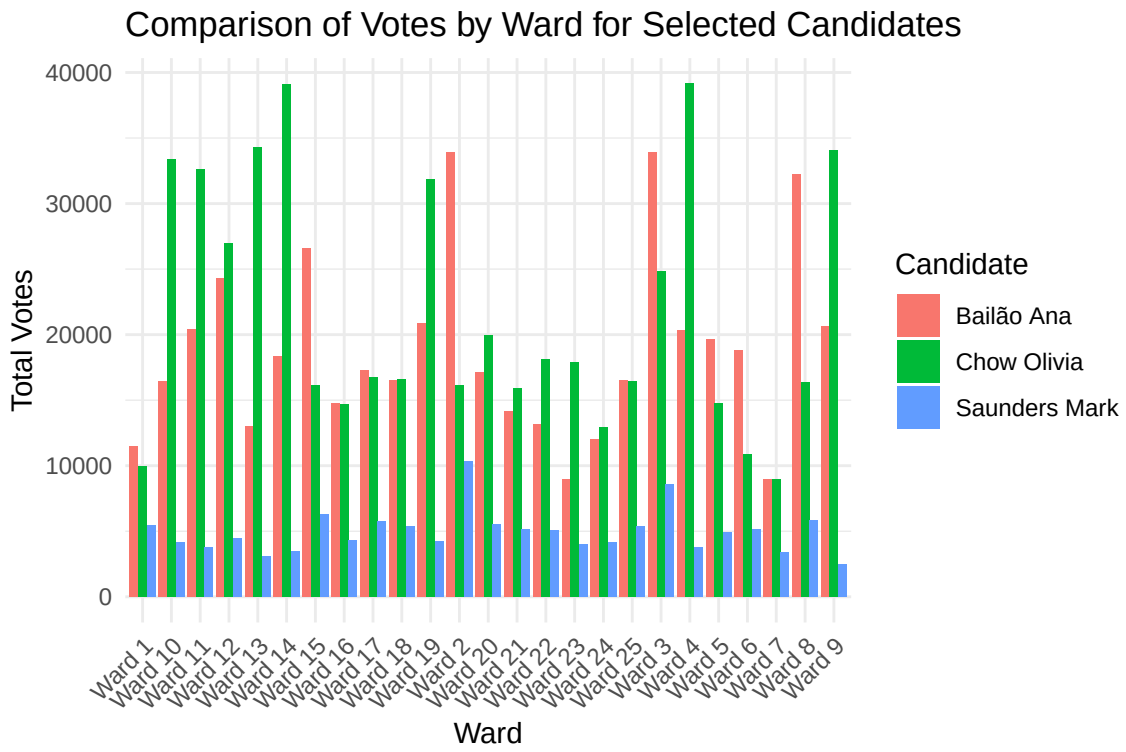

Figure 2: The number of votes the top 3 candidates, Olivia Chow, Ana Bailão, and Mark Saunders received, broken down by ward.

Releasing and tracking this data is incredibly important towards understanding why Torontonians vote the way they vote. It shows what issues are important to voters and what policies and values resonate with the people and we can determine that through regional demographic information. It is through understanding this information that we can work towards building a better Toronto that represents the wellbeing and wishes of its people

Appendix

To prepare the data for analysis, I filtered the data to exclude any non-candidate-related votes and removing any unnecessary columns. Several R packages were used to process, clean, and visualize the data in this paper: ggplot2 (Wickham et al. (2019)), dplyr (Wickham et al. (2019)), knitr (Xie (2015)), readxl (Wickham et al. (2019)), and tidyverse (Wickham et al. (2019)).

Below, Table 2 contains the vote breakdown for all 102 candidates by ward.

Table 2: The number of votes cast in each ward for each candidate.

Candidate	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Acquaye Emmanuel	46	20	16	14	22	16	54	6	14	10	14	10	20	8	8	16	26	12	18	26	22	16	26	12	20
Acton Blake	22	22	42	20	18	20	22	10	8	16	18	6	28	32	12	26	18	14	20	30	20	44	18	20	22
Ahmed Sharif	108	60	32	26	86	44	36	24	18	14	10	12	50	40	84	98	36	16	90	252	162	44	68	128	90
Alam Asadul	20	18	10	10	42	6	24	26	12	12	10	10	20	14	8	8	10	8	24	46	60	32	28	24	32
Allan Gru Jesse	34	24	38	24	34	36	24	12	12	8	20	28	52	20	16	30	14	18	16	44	56	42	28	40	34
Aly Atef	14	14	12	14	10	14	20	8	12	8	2	0	10	10	8	26	10	14	4	18	10	16	14	12	14
Apostolopoulos Dionysios	30	38	38	38	34	26	26	34	44	22	22	88	18	232	40	78	54	32	58	94	142	122	46	64	32
Atkinson Darren	18	16	20	22	14	34	14	8	10	8	8	10	18	26	16	6	16	20	8	6	12	24	14	24	12
Atkinson Jamie	38	46	44	36	40	34	24	32	30	18	10	22	14	20	24	26	44	38	26	20	32	34	8	28	34
Bailão Ana	11496	33886	33934	20362	19652	18822	8974	32242	20624	16412	20376	24330	12996	18360	26598	14746	17250	16488	20858	17118	14124	13190	8964	11994	16554
Baking Jose	32	32	20	14	48	28	28	30	28	14	8	18	12	16	20	14	22	14	22	32	34	6	24	20	32
Bankas Ben	18	12	34	26	20	20	12	18	18	18	18	14	34	16	16	10	18	8	10	10	12	8	14	12	10
Beals Claudette	8	10	18	8	14	16	16	12	14	4	22	14	18	10	12	16	8	4	8	18	12	20	12	2	6
Benway Glen	14	8	10	12	12	16	16	10	14	8	0	12	16	4	6	2	2	4	2	6	8	16	12	12	14
Bonilla Elizazar	34	34	24	8	46	26	40	18	16	14	18	12	16	34	18	20	18	26	12	24	40	34	32	30	26
Bradford Brad	434	850	1024	712	480	500	246	706	322	994	660	646	742	1104	678	678	546	580	3446	1002	594	366	240	434	524
Brown Chloe	1136	1070	1732	2660	1436	930	986	1078	2876	3278	2462	1858	2840	2034	884	976	888	686	1772	1192	1050	762	856	928	1292
Buffey Brian	18	12	14	8	8	10	6	4	8	4	8	10	8	8	4	4	10	4	12	20	12	14	8	6	6
Caesar-Chavannes Celina	38	14	18	20	28	32	24	6	20	18	6	10	30	22	10	6	8	14	20	36	20	16	28	18	46
Carrie Mason	14	2	12	10	28	16	10	18	4	0	10	2	2	14	4	10	6	6	4	14	34	10	28	20	22
Chan Roland	40	32	40	16	54	18	36	30	22	30	24	24	44	52	36	28	52	54	32	42	44	108	92	46	34
Charlton Matti	18	10	8	4	12	12	20	10	4	8	8	6	28	14	2	4	12	6	10	12	14	18	2	10	16
Chevalier Romero Danny	44	24	12	32	28	18	38	18	18	24	24	16	22	20	18	16	20	28	8	14	16	30	22	36	16
Chow Olivia	9944	16098	24848	39138	14798	10888	8970	16366	34062	33376	32614	26936	34284	39120	16134	14716	16762	16586	31820	19962	15940	18130	17880	12896	16476
Choy Logan	42	68	78	58	68	28	64	48	68	56	50	54	64	62	32	68	36	50	62	42	68	58	46	74	46
Clarke Kevin	18	16	20	28	10	16	24	20	14	12	10	16	22	32	6	22	12	12	38	38	18	24	20	56	26
Climenhaga Sarah	14	20	16	26	10	14	18	10	24	18	18	48	18	6	10	16	6	6	24	14	6	24	2	18	4
Cohen Gordon	18	14	2	14	10	56	8	50	6	18	4	16	8	10	20	18	44	42	10	16	6	12	8	14	4
Collins Paul	14	20	10	16	10	12	14	30	12	12	4	8	10	8	8	14	8	14	12	8	26	10	10	36	10
D'Amico Frank	30	50	34	6	66	62	48	60	188	20	8	32	14	6	8	4	8	10	4	10	6	16	12	4	8
D'Angelo Frank	26	56	50	12	66	42	52	32	36	16	20	14	14	18	6	16	22	26	14	34	32	22	8	36	16
D'Cruze Phillip	12	4	10	2	12	4	0	6	2	4	2	2	2	4	2	14	4	2	2	6	6	8	10	10	6
Davis Rob	54	46	66	30	34	40	20	30	14	28	24	38	32	18	28	18	28	34	24	32	32	18	32	16	20
Deb Samson	6	10	6	10	14	12	26	10	14	0	4	4	14	4	2	10	12	12	6	28	8	16	8	14	8

Candidate	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Desai Habiba	16	10	6	6	16	6	18	0	8	10	0	2	10	20	28	42	12	6	8	14	42	8	16	64	24
Deville Cory	18	10	8	6	12	0	6	12	2	8	8	14	4	8	6	10	8	2	10	4	8	8	8	6	6
Fenby Simryn	8	4	6	8	4	14	12	8	2	6	4	16	0	6	12	10	6	10	26	6	8	8	2	4	4
Forrester Monica	22	38	32	28	36	22	20	22	16	8	14	24	36	24	6	38	8	22	20	36	28	16	8	16	16
Furey Anthony	2062	6278	5992	3390	2326	2816	1326	3656	1870	2502	2382	3228	1900	2530	2992	2680	2914	2834	3748	3644	2522	2026	1058	2488	2634
Furnival Scott	8	8	24	6	2	16	10	8	6	6	6	6	4	8	8	12	8	6	4	16	10	8	4	12	14
Gamk Isabella	6	8	10	10	10	6	6	4	8	4	10	6	12	2	4	18	2	0	4	8	4	12	10	8	4
Gao Feng	12	12	4	16	20	26	52	8	8	10	10	4	16	12	18	12	20	28	6	20	12	24	30	8	8
Gong Xiao Hua	324	210	196	118	268	310	298	188	110	128	96	120	124	198	146	224	480	212	110	290	288	502	446	238	342
Goraya Adil	18	6	10	4	12	10	22	0	12	2	4	10	6	4	0	12	2	4	16	0	8	4	16	16	10
Graff Brian	6	4	10	10	2	6	6	6	8	6	8	8	8	6	6	8	8	14	4	8	16	6	2	6	6
Grosman Ari	12	14	16	16	14	44	18	48	2	10	8	24	10	8	4	14	28	22	4	6	12	10	6	0	4
Guglielmin James	10	14	10	2	6	10	14	12	2	2	4	4	2	8	0	12	10	6	0	16	14	20	8	8	8
Gulyas David	14	12	12	12	6	16	4	10	10	12	6	16	10	12	10	4	12	8	4	6	8	6	4	12	14
Hall Thomas	40	42	8	8	36	42	20	14	6	8	8	12	12	20	2	26	24	18	10	28	42	34	12	24	20
Handjis Peter	10	8	10	6	8	2	12	2	4	2	8	8	4	64	8	16	4	6	8	10	18	8	6	18	4
He Heather	8	2	6	10	12	8	12	4	8	18	10	4	2	6	14	16	86	54	4	12	20	166	94	10	8
Heaps Toby	18	54	100	102	44	22	22	50	50	80	46	48	58	70	50	42	20	44	66	46	26	44	28	28	28
Hossain Monowar	20	12	4	10	44	10	8	6	2	10	4	8	24	8	12	6	12	2	10	22	28	10	6	26	24
Hunter Mitzie	956	1408	1872	1960	1314	836	818	1086	1224	1776	1372	1408	1562	2180	1094	1204	1204	946	2322	2228	1794	1334	1380	5526	3654
Igodan Sheila	16	6	6	0	2	0	12	4	0	6	0	0	2	2	0	2	2	6	4	0	4	2	4	4	0
Irmya Daniel	2	2	2	6	2	0	4	6	4	2	0	0	10	0	0	0	0	2	2	4	2	0	0	2	2
Jaffery Syed	16	2	10	4	6	0	10	0	8	2	2	2	16	4	62	12	4	8	12	20	24	12	12	20	26
Jensen Michael	16	8	10	6	8	6	8	4	6	6	0	4	8	4	8	16	6	10	2	20	10	12	16	18	18
Johnston Patricia	34	12	14	12	22	24	22	6	22	8	12	12	18	20	18	24	18	10	14	16	20	12	12	34	18
Khan Walayat	10	10	0	6	6	4	20	6	6	4	0	6	12	8	6	10	6	4	6	10	14	8	22	16	18
Korovitsyn Serge	6	8	16	16	0	32	4	12	0	14	2	2	10	4	4	6	4	28	2	0	8	4	2	6	2
Lamoureux Michael	12	6	4	6	10	10	12	10	10	4	4	6	12	22	2	14	16	6	14	8	6	22	10	10	4
Langenfeld Kris	12	6	22	12	6	14	6	10	12	10	2	6	16	2	4	4	2	14	20	14	16	6	8	28	22
LeLiever Mark	32	20	34	18	24	10	26	10	16	22	4	8	18	26	22	28	28	24	14	18	12	44	28	18	14
Lee Rick	12	14	10	12	10	28	22	8	8	24	16	6	14	24	16	8	40	46	10	14	22	52	44	12	10
Letonja John	8	6	4	6	6	0	4	0	4	2	4	2	4	4	2	4	2	2	2	0	2	6	4	12	0
MacLeod Norman	12	12	12	12	6	12	10	14	8	4	6	16	18	16	8	12	12	14	10	6	22	30	12	22	20
Mammoliti Giorgio	134	134	104	62	168	174	476	154	46	34	32	34	38	82	20	36	52	40	32	72	98	68	40	42	38
Mann Steve	20	6	16	2	12	14	16	4	10	10	6	10	4	14	4	12	8	6	12	10	6	10	22	10	10
Marshall Cleveland	12	8	24	26	32	8	12	24	16	6	10	54	56	20	18	28	24	8	18	24	20	14	16	26	36

Candidate	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Matlow Josh	626	2126	2774	4112	1234	1810	478	5336	2762	2812	4486	15476	3180	3944	5056	1876	1570	1920	3474	1612	1008	1196	588	678	1010
Mohee Faizul	18	14	34	10	22	2	14	12	6	6	8	14	4	2	10	12	18	12	36	94	26	28	20	34	54
Murphy Bob	20	22	18	18	32	18	12	14	14	8	6	24	14	10	14	18	14	14	10	36	8	14	10	28	10
Nicula Michael	10	18	6	8	10	12	12	2	2	0	0	8	10	8	0	8	6	8	2	6	6	10	6	10	8
Nowwarah Jamil	4	2	0	2	8	6	8	0	4	4	0	0	2	2	2	0	4	2	2	2	4	4	4	2	8
Perruzza Anthony	286	204	140	60	266	640	3410	122	62	38	32	52	32	52	36	44	56	106	32	50	56	70	76	52	76
Ransome John	18	10	2	4	10	10	24	2	2	4	0	0	6	4	0	8	4	0	2	6	10	2	10	6	6
Renée D!ONNE	20	18	16	18	34	14	16	14	32	14	10	16	12	14	10	16	8	6	12	14	18	12	6	10	16
Reodica Willie	20	8	20	14	20	16	12	10	6	2	2	0	6	8	10	14	8	8	4	40	68	20	48	54	32
Rubino Walter	8	4	4	4	6	20	6	2	4	2	2	2	4	2	2	12	2	6	4	4	4	6	12	4	8
Saccoccia Chris	668	1336	1228	558	1100	756	606	598	694	500	380	428	418	586	370	652	488	380	644	826	880	452	306	540	608
Sanders Lyall	252	454	356	166	324	304	220	248	110	136	116	180	158	156	194	242	156	192	200	310	276	226	142	160	272
Saunders Mark	5488	10332	8612	3784	4940	5114	3420	5864	2480	4172	3766	4464	3090	3500	6310	4310	5756	5360	4198	5524	5152	5088	4026	4176	5408
Schipano Rocco	18	14	14	2	18	8	4	6	6	4	6	0	8	6	4	8	6	6	6	18	10	2	6	4	4
Shusterman Robert	2	6	4	6	8	48	10	32	6	6	4	10	2	6	10	0	6	12	2	6	6	6	10	10	10
Singh Knia	42	14	22	14	18	6	22	14	12	26	10	0	22	20	10	8	14	8	18	22	24	20	50	18	58
Singh Partap Dua	44	8	10	8	8	10	22	10	8	6	2	10	6	4	2	6	8	6	8	16	8	8	12	12	22
Sivaneswaran Raksheni	52	10	10	16	18	16	38	4	2	2	0	4	26	0	2	20	32	6	14	86	266	90	264	236	344
Sniedzins Erwin	0	0	8	2	0	0	2	10	2	6	2	0	2	8	0	8	2	4	6	2	0	6	2	4	0
Srivastava Sandeep	56	6	6	8	2	8	6	4	6	10	0	0	10	8	4	18	18	6	0	20	28	16	32	40	20
Straus Meir	4	22	10	8	2	30	8	38	4	2	8	14	4	8	10	4	6	18	14	12	4	6	10	6	6
Tang Weizhen	2	4	2	6	14	2	26	10	2	10	10	10	6	10	0	8	16	8	10	12	10	30	22	12	8
Toye Mitchell	14	10	6	6	4	8	8	0	0	4	8	4	6	2	4	0	8	2	2	10	12	2	4	14	6
Tull Reginald	14	30	38	22	44	12	8	32	12	12	8	20	20	68	8	46	90	10	44	60	108	38	66	84	70
Tunney Jeffery	2	6	14	6	6	2	4	12	4	8	0	10	14	10	8	10	2	4	8	16	6	4	4	0	6
Vadivelu Kiri	18	8	12	28	8	2	14	0	10	8	26	20	38	12	2	14	18	6	8	42	86	22	36	62	80
Weenen Jack	0	0	2	0	2	0	2	4	0	0	8	4	0	0	6	0	4	0	6	8	0	4	2	8	0
Wei Yuanqian	8	4	4	2	2	4	10	4	0	2	6	10	0	2	4	6	10	12	0	10	4	20	14	8	10
Williams Jody	10	6	10	14	16	20	48	8	8	6	6	12	22	6	18	16	6	14	2	8	16	16	6	18	8
Winter John	8	10	14	8	14	12	16	10	2	4	6	10	8	10	8	8	10	8	6	10	14	4	12	12	12
Yan Nathalie Xian Yi	6	12	16	8	16	22	20	6	4	12	16	8	14	16	10	6	26	18	8	18	22	38	16	8	14

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