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Election Results in Ranked Choice Voting and Voter Confidence

Transparent presentation of the results of any election is necessary to maintain voter confidence in Utah. This is especially true for ranked choice voting (RCV) elections where the selection of the winner from ranked voting ballots is more involved than in plurality voting. State election policy should be amended to ensure that results of RCV elections are released in a staggered or round-by-round manner. Moreover, anonymized ranked vote tallies, including how many voters ranked the candidates in any given order, should be made available in an easily accessible format that citizens can use to verify the results of the election.

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EXECUTIVE SUMMARY

Because elections employing ranked choice voting (RCV) via instant run-off voting (IRV) are more complicated than elections employing plurality voting (aka single-choice voting), greater care must be taken when presenting the results of such an election to maintain transparency and verifiability of results. As in plurality elections, the calculation of the winner should be repeatable by any voter and the results and method should be presented in a manner that is understandable.

Many current methods of presenting RCV via IRV election results make it impossible to recreate and verify the calculation of the winner. Such presentation practices can encourage the growing distrust in election administration and provide an incomplete picture of the effectiveness of RCV. As such, these practices should be modified.

The Herbert Institute recommends that election administration offices adopt the following principles of best practice in presenting election results for RCV via IRV elections:

- Anonymized raw voter provided ranked preference profiles (such as those in Table 1 below) should be easily obtainable in a format that is widely accessible like a spreadsheet.
- Results should be provided in a way that allows for both macroscopic and microscopic inspection. This includes:
    - Releasing results in a staggered or animated round-by-round manner so that they can be easily and rapidly understood by a casual observer.
    - Releasing a detailed table (like those currently used) detailing the round-by-round results and including sufficiently detailed explanation of each column and row so that it can be well understood by an observer that wants to take a closer look at the results.

INTRODUCTION

In recent years, whether engendered by legitimate security concerns or misinformation, election security and validity has become an important topic nationally. While most of the attention has been on potential voter fraud, this anxiety about elections has spread to practically every aspect of election administration, even driving many of the election campaigns for election officials and other offices.

During this same period, ranked choice voting (RCV) has been gaining traction in the United States and being used in an increasing number of cities, county, and states for elections at nearly every level. Though this method is not novel, with some locations around the world using it for over 100 years, it is new to the United States. Many new ideas can be met with apprehension because of misunderstandings about it and RCV is not immune to this. However, coupled to the typical apprehension and skepticism that inherently comes with any new idea, hesitancy about RCV seems compounded by the current climate of general election security skepticism.

The best remedy to this apprehension is education about the topic and, most especially, sufficient transparency by governing officials in all election procedures. To build trust in a system, it is critical that the public be able to "check the work" of election procedures. That is, any citizen should be able to recreate the computation used in any election method.

For plurality (aka single-choice or first past the post) voting, this is simple. Since in a plurality election, only information about the first-choice candidate of each voter is collected, the only computation necessary for that election is to compare the number of votes from each candidate and select the largest number.

However, the scenario is not quite so simple with RCV. In an RCV election, an entire ranked preference profile of the candidates, that is, information about how a voter ranks all the candidates, is collected from each voter. This is a richer source of data about voter opinion than what is collected in a plurality election. As such, methods used to parse and interpret those data are commensurately more complicated than a single simple comparison. While many methods exist to interpret the public's collective opinion from the collection of voter-provided ranked profile data, the most commonly employed in the United States, and certainly within Utah, is instant run-off voting (IRV).

In an RCV via IRV election, the collection of ranked profiles is interpreted as follows. First, all first-place votes are tallied. If any candidate has a majority of votes, then that candidate is declared the winner and is elected. If no candidate has a majority of votes, then the candidate with the least first-place votes is eliminated from the election. For all the ranked profiles that listed that candidate in first place, the second-place vote now becomes the first-place vote, and the vote is retallied. Then the process repeats iteratively until a candidate has a majority of votes in that round (this is guaranteed to happen once there are only two candidates remaining).

Because of this more complicated way of selecting a winner, more detailed voter opinion data is required to recreate that calculation. Unfortunately, many places that employ RCV in their elections provide far too little information to allow the electorate to recreate the calculations themselves. This leaves the electorate having to trust that the officials did it correctly, which may or may not be a very good assumption to make depending on the competency of the official or their understanding of how this process works. What is worse is that these calculations are often delegated to

third party entities who often do not provide sufficient data back to the city, county, or state government to recreate and check the calculations either. In a tenuous political environment where trust for the government is waning, having such an opaque method of election is not only harmful to the discussion of plurality vs. RCV, but it contributes to the already eroding faith in government that many in our public are already experiencing.

In this paper, we first provide an example of how and RCV via IRV election selects a winner and then discuss the issue of presenting such RCV results and how that presentation can affect voter confidence in the election method and elections in general. We also provide recommendations for how best to present elections results from an RCV election. Because the most common method of interpreting voter-provided ranked profile data is IRV, we will restrict our attention how best to present results from an RCV via IRV election. But the principles discussed should be generalizable to other methods as well.

A HYPOTHETICAL EXAMPLE OF AN RCV VIA IRV ELECTION

Before we discuss how best to present election results in an RCV via IRV election, it would be useful to discuss in detail how an RCV via IRV election calculates a winner. Perhaps the best way to do this is via a hypothetical example. For this example, suppose that we had four candidates in an election for a city mayor: Sally (S), Warren (W), Pat (P), and Gordon (G).

For simplicity, we will represent the population of this city by 100 units of votes (one could think of them as percentage points of the total votes cast). Suppose that this city employs RCV using the IRV method and the population casts ballots in the following amounts indicated in Table 1.

Table 1. Hypothetical Example of Voter Provided Ranked Preference Profiles

5	18	9	12	3	10	3	22	9	9
S	S	S	W	W	P	P	P	G	G
W	P	G	S	G	S	W	W	S	P
P	W	W	P	S	W	S	G	P	W
G	G	P	G	P	G	G	S	W	S

Looking at just first-place votes yields Table 1a.

Table 1a. Round One of Hypothetical Example

32	15	35	18
S	W	P	G

This is referred to as Round 1 in an RCV via IRV election. Note that no candidate has a majority of votes. So, we eliminate the candidate with the fewest first place votes, which is Warren.

But we do this elimination in the full preference profile from Table 1 above. This yields Table 1b.

Table 1b. Hypothetical Example after Warren is Eliminated

5	18	9	12	3	10	3	22	9	9
S	S	S	S	G	P	P	P	G	G
P	P	G	P	S	S	S	G	S	P
G	G	P	G	P	G	G	S	P	S

Note that every column that listed W first represented voters who voted for Warren as their first choice. Those columns now have a new first candidate listed. These now look like first-place votes and are thus tallied that way. But note also that several columns are now identical. This is because with Warren no longer in the running, more people agree on how to rank the remaining candidates. We can combine these columns, adding their amount of support together to get the following consolidated Table 1c.

Table 1c. Consolidated Hypothetical Example After Warren is Eliminated

35	9	22	13	22	9
S	S	G	P	P	G
P	G	S	S	G	P
G	P	P	G	S	S

We again tally the new list of first place votes and obtain Table 1d, which is referred to as Round 2. Again, no candidate has a majority of votes, so we eliminate the candidate with the least first-place votes. Thus, in this round, Gordon is eliminated. Eliminating Gordon form Table 1c. produces Table 1e. Note again that those that voted first for Gordon, now have a different candidate listed first. We also have several repeated columns, so we can consolidate the table again to Table 1f. This quickly translates into the new tally of first-place votes in Table 1g, which would be referred to as Round 3 and is the final round for this IRV election. In this final round, we have a candidate who has a majority of votes. In this case, Sally has 56% of the votes to Pat's 44% and Sally is elected.

Table 1d. Round Two of Hypothetical Example

44	35	21
S	P	G

Table 1e. Hypothetical Example After Gordon is Eliminated

35	9	12	13	22	9
S	S	S	P	P	P
P	P	P	S	S	S

Table 1f. Consolidated After Gordon is Eliminated

56	44
S	P
P	S

Table 1g. Round Three of Hypothetical Example

56	44
S	P

There are several observations to be made from this example, but the most notable is perhaps the fact that in the initial tally of first place votes (See Table 1a), which is all the information that plurality voting collects, the person with the most first place votes was Pat, and Pat would have won under a plurality election. However, the electorate collectively prefers Sally to Pat. This is a data point that a plurality election with single choice voting in this case would have failed to collect. The main advantage to RCV is the fact that it collects far more information about voter opinion than a single-choice vote does. And this is true regardless of the method used to interpret that rank preference profile data.

Next, some opponents of RCV would look at the above example and argue that RCV is bad because it turned a winner into a loser (Pat would have won under plurality but lost under RCV via IRV). The problem with this criticism is that it assumes that there is nothing wrong with plurality voting. If nothing was wrong with it, then indeed there would be no need to change it. But as we pointed out above, something is potentially wrong with plurality voting. In the example above, it did not collect information about the fact that the electorate preferred Sally to Pat. Should Pat really win the election if the electorate prefers another candidate to them? That is a more complicated question

than it may seem, but it certainly should be apparent that simply ignoring the fact that the electorate strongly preferred another candidate is not necessarily a good thing. This suggests that something is potentially wrong with plurality voting. If someone notices that and suggests an alternative, that alternative should produce different results in some circumstances, or it has no chance of solving the problem.

Thus, the fact that RCV via IRV turned a plurality "winner" into a "loser" is, in fact, the intended feature, because the "winner" that plurality elects may not actually be who the electorate chose and hence should not actually be the winner. RCV via IRV is an attempt to correct the perceived mistake that plurality already made by making "winners" out of "losers".

The most important observation here though is how much information was required to correctly carry out this computation. Indeed, all the computations follow from the information contained in Table 1. Without this complete ranked preference profile, it is impossible to accurately reproduce the computation made to determine the winner in an RCV election. Unfortunately, we have found that many places that employ RCV in their elections do not publish anywhere near this amount of information. In the next section, we describe the presentation of results in the recent 2021 Sandy, UT mayoral election. This election employed RCV via IRV and its presentation of results seems typical to most elections.

PRESENTATION OF RCV VIA IRV ELECTION RESULTS IN THE 2021 SANDY, UT MAYORAL ELECTION

In the 2021 Sandy, UT mayoral general election, a total of 8 candidates ran. It took 7 rounds to complete the IRV process on the 21,165 ranked choice ballots that were cast. The results of this election were presented as follows.

Table 2. 2021 Sandy, UT Mayoral Election Results[1]

Round 1

Candidate	Zoltanski	Bennet	Nicholl	Applegarth	Saville	Jones	Christensen	Houseman
Votes	4382	4139	2601	2041	2503	1440	2338	1730
Percentage	20.70%	19.51%	12.29%	9.64%	11.83%	6.80%	11.05%	8.17%
Transfer	208	223	125	294	63	-1440	208	75

Round 2

Candidate	Zoltanski	Bennet	Nicholl	Applegarth	Saville	Jones	Christensen	Houseman
Votes	4590	4353	2760	2335	2566	0	2546	1805
Percentage	21.94%	20.81%	13.03%	11.16%	12.27%	0.00%	12.17%	8.63%
Transfer	213	275	404	232	172	0	329	-1805

Round 3

Candidate	Zoltanski	Bennet	Nicholl	Applegarth	Saville	Jones	Christensen	Houseman
Votes	4803	4628	3130	2567	2738	0	2875	0
Percentage	23.16%	22.31%	15.09%	12.38%	13.20%	0.00%	13.86%	0.00%
Transfer	376	536	566	-2567	254	0	438	0

Round 4

Candidate	Zoltanski	Bennet	Nicholl	Applegarth	Saville	Jones	Christensen	Houseman
Votes	5179	5164	3696	0	2992	0	3313	0
Percentage	25.46%	25.38%	18.17%	0.00%	14.71%	0.00%	16.28%	0.00%
Transfer	529	632	588	0	-2992	0	489	0

Round 5

Candidate	Zoltanski	Bennet	Nicholl	Applegarth	Saville	Jones	Christensen	Houseman
Votes	5708	5796	4284	0	0	0	3802	0
Percentage	29.14%	29.59%	21.87%	0.00%	0.00%	0.00%	19.41%	0.00%
Transfer	973	799	1015	0	0	0	-3802	0

Round 6

Candidate	Zoltanski	Bennet	Nicholl	Applegarth	Saville	Jones	Christensen	Houseman
Votes	6681	6595	5299	0	0	0	0	0
Percentage	35.97%	35.50%	28.53%	0.00%	0.00%	0.00%	0.00%	0.00%
Transfer	1939	2004	-5299	0	0	0	0	0

Round 7

Candidate	Zoltanski	Bennet	Nicholl	Applegarth	Saville	Jones	Christensen	Housemanv
Votes	8620	8599	0	0	0	0	0	0
Percentage	50.06%	49.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Transfer	0	0	0	0	0	0	0	0

Note that the last row in each round refers to how many votes are to be added to that candidate in the next round. The number is negative when a candidate is eliminated, and these votes are redistributed to the candidates according to the ballots next choice. However, one might notice that the sum of the amounts positively added to remaining candidates is not equal to magnitude of the amount lost by the eliminated candidates. The additional votes that do not advance to the next round are due to ballots that failed to list any additional candidates. Since all the candidates on those ballots are eliminated, those ballots no longer impact the results and are removed from consideration.
These are sometimes called inactive ballots and are a subject for another paper. A few things to note about the above results. First, the election was remarkably close, with every candidate in play in each round maintaining a respectable amount of the vote. This likely indicates that much of the public felt comfortable voting their mind as the front runners did not have commanding leads. Had this been a single-vote election, we would expect more people to identify the front runners prior to election day and hedge their support there instead. Thus, using RCV here seemed to improve the willingness of the public to vote their mind, a key advantage to RCV indicates that much of the public felt comfortable voting their mind as the front runners did not have commanding leads. Had this been a single-vote election, we would expect more people to identify the front runners prior to election day and hedge their support there instead. Thus, using RCV here seemed to improve the willingness of the public to vote their mind, a key advantage to RCV.

It is also interesting how close each round remains with lead changes even occurring in both Rounds 5 and 6. Even the final round of the election was decided by just 21 votes. This indicates that in Sandy, there was a very wide array of voter preferences, which this RCV via IRV method seems to have portrayed. Another feature that the closeness of this race suggests is that the candidates can observe how each round went and realize that what their opponents were bringing to the table resonated with a large portion of the electorate. This might encourage them to take positions that appeal to more people as they recognize more accurately the weakness of their own positions.

All the above observations are positives of presenting the data this way. However, the largest drawback of presenting these data this way is that it is impossible to reconstruct the original data set of voter-submitted ranked preference profiles. That is, we cannot reconstruct a table like Table 1. Instead, the only information we are given by these results is essentially the equivalent of the information in Tables 1a, 1d, and 1g, as well as how many of the eliminated group is moved to each remaining candidate. This allows us to determine how many of the number of ballots cast for the eliminated candidate ordered the eliminated candidate against each remaining, but that is not enough information to reconstruct the entire voter preference chart. As such, the voters in Sandy, UT must take the city/county election office's word that this is indeed how the votes should be distributed. This lack of transparency is bad practice as it makes it difficult to be confident in the calculation of the results, which only adds a layer of distrust to an institution that is already strained. The Herbert Institute attempted to obtain information via a GRAMA request regarding this election, specifically data such as depicted in Table 1, but it was not available. Instead, we were provided the above round by round data, which is also available on Sandy City's website.

The Herbert Institute discussed this issue and the possibility of obtaining data like that in Table 1 with former Utah County Clerk Josh Daniels who remarked that obtaining that data is "easier said than done." He explained that the city would not have the data, but the county might. However, the county likely would not be willing to share it (1) because that data might be considered "ballots" or "election returns" and hence "sealed" after the election, and (2) because Salt Lake County uses Dominion voting systems, the data is contained in a file often referred to as a "Cast Vote Record" (CVR) and comes in the form of dozens of .json files (a data structure in JavaScript Object Notation (JSON)) which would be difficult to convert into a useable format.[2]

Both issues cited above are valid issues. The first listed above is especially important as it is certainly borne out of honest and secure election handling, which the people of Salt Lake County should find encouraging. However, anonymized voter preference data like that in Table 1 should not be considered a private and sealed portion of a vote tally. Indeed, it is at the very heart of transparently reporting the results. If the electorate cannot be privy to the raw election data, there is no way for them to be certain that they were tabulated correctly, which contributes to the growing distrust in election security.

There is a secondary problem with reporting RCV via IRV election results as Sandy did. Those results are difficult to parse for a casual observer of the election. A typical person might struggle to understand what is going on in the tables above. This issue might improve as people become more familiar with RCV via IRV, but it is nonetheless an important issue when RCV via IRV is being used the first time. We believe that the main issue here is the fact that the above tables sort of deluge someone in information. Fortunately, this is probably an easier problem to solve than the one concerning a lack of raw data.

In the next section, we make recommendations for best practices in reporting RCV via IRV results that will address both problems described above.

PROPERLY PRESENTING RCV VIA IRV RESULTS

The two main points that must be addressed when presenting RCV results is (1) the calculation of the winner must be completely repeatable from the results presented, and (2) the results must be provided in ways that are digestible to any viewer of the results no matter how macroscopic or microscopic they may wish to understand them. Keeping these principles in mind, the Herbert Institute recommends the following best practices.
First, anonymized raw voter provided ranked preference profiles must be easily accessible, that is, data like that in Table 1 must be available. One thing to note here is that depending on the number of candidates a table such as Table 1 may be exceedingly large. For example, while an election with four candidates (such as in the hypothetical example) is not too bad, having only 24 possible ways to order the candidates, an election with 8 candidates (such as in the Sandy, UT example) has 40,320 distinct ways of ordering the candidates. In fact, there are almost twice as many ways to order the 8 candidates in the Sandy election than there were voters who participated in the election. This would make for a remarkably complicated table to present on paper. But this could be done on a website with either a large downloadable spreadsheet or even with some kind of mechanism to look up how many voters voted for a particular ranking.
However, this is done, these raw data should be easily obtainable in a format that is widely accessible such as a spreadsheet. This helps with the second principle above too as this allows for a voter who wishes to understand the election at its most microscopic level to do so. Moreover, it would allow other parties to analyze ranked voting data and compare other methods to IRV, which would invite more robust and more critical discussion about RCV and voting methods in general.

However, this is done, these raw data should be easily obtainable in a format that is widely accessible such as a spreadsheet. This helps with the second principle above too as this allows for a voter who wishes to understand the election at its most microscopic level to do so. Moreover, it would allow other parties to analyze ranked voting data and compare other methods to IRV, which would invite more robust and more critical discussion about RCV and voting methods in general.

Please note that no information identifying voters should be obtainable this way, just the numbers.

Second, we recommend a multi-faceted approach to presenting the results in a more advertised way, such as the general announcement of results on election night. This includes the following:

Releasing the results in a staggered or animated manner: Instead of releasing all rounds simultaneously, the release of the data could reflect how it was calculated. One way to do this is to release the first round initially. Wait some amount of time (could be as short as 5 minutes or something similar on election night), then release the next round of data. Do this for each additional round. This will provide those that are paying close attention to election night information with a slower rate of information dumps. Rather than being deluged with all rounds at once, the results flow in at regular intervals with enough time in between to digest the results of the round. If possible, a similar experience should be imitated on web pages for each municipality, where the election results can be experienced one round at a time to digest what is happening with each round's computation. As an alternative to releasing the results in a staggered manner, an animation could be used instead that transforms each round into the next by showing the dispersal of votes for eliminated candidates. This could be done in a similar manner to Tables 1-1g or in a more engaging graphical way. However, the animation is created, that animation should be preserved on the respective government web page.

A presentation like this would allow for a casual viewer of these results to understand them in a nutshell, without getting too bogged down in the details while remaining detailed enough to understand the process. This is what we meant by a macroscopic view of the results.

Releasing a table of results such as those currently used, but with more explanation: Tables such as the one that Sandy City released are good tables to combine the results in a readable format. There are great advantages to having the data represented in tables like those used for Sandy City. But with those tables, an explanation for what data is displayed in each field should also be included. Right now, a casual viewer would have to read the table and try to figure out on their own what each column refers to. This makes the table seem ominous and hard to understand, an immediate turn-off to someone trying to figure out what happened on election night.

This table and the recommended explanation would allow for a closer inspection of the results and offers a nice midway between the more macroscopic view of the staggered or animated results and the denser raw voter data.

To summarize, the Herbert Institute recommends the following principles of best practice for presenting RCV results, especially RCV via IRV results.

1. Anonymized raw voter provided ranked preference profiles (such as those in Table 1) should be easily obtainable in a format that is widely accessible like a spreadsheet.
2. Results should be provided in a way that allows for both macroscopic and microscopic inspection. This includes
    - Releasing results in a staggered or animated round-by-round manner so that they can be easily and rapidly understood by a casual observer.
    - Releasing a detailed table (like those currently used) detailing the round-by-round results and including sufficiently detailed explanation of each column and row so that it can be well understood by an observer that wants to take a closer look at the results.

CONCLUSION

One advantage that plurality voting has over RCV is that it is simple and easy to understand and verify. However, plurality voting has potential drawbacks and encourages campaigning and voter strategies that might not be conducive to honest and accurate elections. RCV is an attempt to combat those potential drawbacks. However, to do so, any method of RCV is naturally more complicated. This makes understanding how it works more challenging. This process can be helped or hindered by how the results of RCV elections are presented. Poor presentation of results can add fuel to the already growing distrust not of just RCV, but of election in general. By the same token, clear and transparent presentation of results lead to better education of how RCV works and more accurate analyses of the advantages and disadvantages of RCV.

In this paper, we have discussed some of the limitations of the current method of presenting RCV via IRV results. We also made recommendations for how these presentations might be improved. We encourage all election organizations to adopt the principles of best practice described in this paper as they will likely lead to improved understanding and acceptance of RCV results.

ENDNOTES

[1] General Elections Final Ranked Choice Results, sandy.utah.gov/485/Results, obtained 25 Aug 2023.

[2] Correspondence with former Utah County Clerk Josh Daniels with the Herbert Institute.

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