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Realities Mar Instant Runoff Voting
18 Flaws and 4 Benefits

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Abstract

This report discusses flaws and benefits of instant runoff voting (IRV) methods and shows how IRV threatens the fairness, accuracy, timeliness, and economy of U.S. elections.

The right to vote is conferred in several places in the U.S. Constitution including in Article. 1.

> "The Times, Places and Manner of holding Elections for Senators and Representatives, shall be prescribed in each State by the Legislature thereof; but the Congress may at any time by Law make or alter such Regulations, except as to the Places of chusing Senators."

What is Instant Runoff Voting?

Instant runoff voting (IRV) is a method of counting ranked choice ballots. A ranked choice ballot is a ballot style where voters are asked to order the candidates in order of preference.

Depending on the variant, the voter can be asked for a partial ordering where voters are allowed to omit some candidates from their rankings, or a total ordering of all candidates can be required. Partial orderings are likely to be permitted in the U.S. because of the right to have all votes which are cast for eligible candidates counted, and because most optical-scan voting machines economically permit ranking only up to three candidates for each contest.

Ranked choice ballots can be counted by several methods such as:

1. the instant runoff voting (IRV) method described below, or
2. the Bucklin method which adds the lower preferences of voters to the existing totals whenever there is not a majority winner in the first choice count, or
3. the contingent method, also known as "top-two IRV", where all but the two candidates with most votes are eliminated after the first counting round[i], or
4. the Borda counting method where the voters' rankings are converted to ratings, with higher ratings used for first choice (e.g. first choice 3 pts, second choice 2 pts, third choice 1 pt),

This report focuses on the IRV method. Not all of the flaws of IRV are shared by other voting methods that use ranked choice ballots.

In instant runoff voting the counting proceeds in "rounds" where the candidate with the fewest votes is eliminated and the lower-ranked choices of voters whose candidates are eliminated are reallocated to the remaining candidates. For instance, if there are three candidates, then the two candidates with the greatest number of first-choice votes advance to a second round of counting. In a second round, the second choice candidate of all voters whose first choice candidate was eliminated in the first round is counted, along with the first-choices of other voters, and the candidate with the least number of votes is eliminated again. If there is only one candidate remaining who has not been eliminated, that candidate is the winner. If not, there is a third round.

As the number of elimination rounds increase, the IRV counting process becomes more complex. In the third round, some ballots have their first choices counted, some ballots have their second choices counted, and some have their third choices counted. Voters who do not provide total orderings of all candidates may have all their candidates eliminated and their ballots are excluded from the final counting rounds. In the round "n", voters' 1^{st} or 2^{nd} or 3^{rd},…, or n^{th} ballot choices may be counted, depending on each particular ballot. After a number of rounds equal to the total number of candidates minus one, hopefully only one candidate remains, and is declared the winner.[ii]

There are also alternative voting methods which do not employ ranked choice ballots but instead are *rating* voting schemes (i.e. voters rate each candidate with a number) including a simple method called "approval" voting; as well as the "top-two runoff" election method. Appendix E provides a brief description of some alternative voting methods.

What is "Plurality" Voting?

Plurality voting is a name given to the voting system used today in the U.S. where voters cast one vote in each contest for each elected position available and the winners are the candidates who receive the most votes.

Who Supports Instant Runoff Voting?

Support for instant runoff voting **(IRV)** has grown since the 2000 election, and it is being considered for adoption now in many U.S. locations. IRV is billed by its proponents as a solution to the "spoiler problem".[iii]

A "spoiler" is a non-winning candidate whose presence in the election contest causes a different candidate to win than would otherwise win, by splitting the vote. The "spoiler problem occurs when two candidates have overlapping support and both candidates are penalized. When a third party candidate receives an amount of votes that is more than the vote margin between the two major political party candidates, it may tip the balance of votes to the major political party candidate who is favored by fewer voters overall.[iv] The spoiler effect has elected the "wrong" U.S. president 11% of the time[v].

In recent years, a nonprofit organization named Fair Vote has led local referenda to adopt IRV which Fair Vote prefers to other ranked choice voting methods such as the Bucklin or Borda methods.

League of Women Voter groups in Minnesota and North Carolina have adopted resolutions supporting ranked choice methods, including IRV. Burlington, VT, San Francisco, CA, Minneapolis, MN, Takoma Park, MD, and Pierce County, WA have adopted IRV and Cary, NC has tested IRV. IRV has been called "rank choice voting" by some municipalities that have adopted it.

Some Fairness Principles for Voting Methods

Conditions have been proposed to judge whether or not voting and vote-counting methods result in fair or in non-fair, paradoxical election results.[vi] Such fairness criteria include:

1. **The addition of an alternative (candidate) who does not win should not affect the outcome**. This fairness principle says that if you have an election contest where candidate A wins, and you introduce a new candidate C, then either candidate A should still win, or candidate C should now win. In other words, spoilers should not be possible. The addition of a candidate that doesn't win should not affect the outcome.

This is some times called "independence of irrelevant alternatives" that says that the collective (societal) preference order of any pair of candidates x and y must depend solely on the individual voters' preferences between these candidates and not on their preferences for other irrelevant (non-winning) alternatives.

IRV does *not* meet this condition of fairness. (See appendix A.) As we've seen from prior U.S. elections where "spoilers" determined who won, plurality voting also does not meet this condition.[vii] Other alternative voting methods exist, such as approval or range voting that do seem to meet this fairness condition.

2. **Whenever all individuals prefer an alternative x to another alternative y then alternative x must be preferred to alternative y in the collective preference order**[viii] [the final election result]. This principle says that whenever all individuals prefer an alternative x to another y then x must be preferred to y in the collective preference order. It is possible to find examples of when IRV and plurality voting violate this fairness condition. (See appendix B.) Other voting methods such as approval voting, however, do seem to meet this fairness condition.

3. **The candidate who wins should have received a majority of voters' votes.** Some jurisdictions require winning candidates to have a majority (more votes than 50% of the ballots cast by voters). Some voting methods, such as plurality voting and IRV do *not* meet this condition. Actual top-two runoff elections do. A different definition of "majority"– a "majority of voters who have candidates remaining in the election contest after elimination rounds" is used by IRV proponents in order to claim that IRV "finds a majority candidate". Another way that IRV proponents finagle to claim that IRV satisfies the majority winner condition would be if voters' ballots are only counted whenever the voter has provided a complete ranking of all candidates in the contest, but this practice would probably not be legal in the U.S. and would not be practical with existing U.S. voting systems. On the other hand, top-two runoff elections that IRV is promoted to replace, virtually always finds a "majority" winner for all voters who participate by voting in the runoff election. In practice top-two runoff elections produce different results than IRV elections, because more often a runner-up in the original count wins a top-two runoff election.

4. **Any candidate who is the favorite [first] choice of a majority of voters should win**. While IRV does not always pick a majority winner out of all ballots cast, IRV proponents emphasize that *if* a majority winner exists among voters' first choices, then IRV will always select this candidate as the winner. However, existing plurality voting method also meets this condition, which IRV proponents call the "majority criterion". Range and approval voting do *not* meet this criterion. With IRV and plurality, the majority criterion candidate wins even if the candidate is the last choice or disapproved of by all other voters, and even if there is an alternative candidate who is approved of by *all* voters.

5. **The pair-wise favorite among all voters should be the winner**. In other words, the candidate preferred when compared pair-wise to other candidates by the most number of voters should win. This is called the Condorcet winner. Both IRV and plurality do *not* meet this condition. Range and approval voting meet it more often, as shown in the examples in appendix A.

IRV does *not* meet four out of the above five fairness conditions. Other alternative voting methods are available that do meet these fairness conditions.

IRV proponents often compare IRV versus plurality on the one hand or compare IRV versus "top-two runoff" on the other hand.

Against plurality voting, IRV supporters point out the spoiler effect which IRV partially solves.

Since top-two runoff elections fix the exact same special case of the spoiler problem that IRV fixes plus also finds majority winners, IRV proponents talk about expense when comparing IRV to top-two runoff elections. However, claims of the economy of IRV over top-two runoff are dubious because in practice runoff elections are rarely needed and IRV requires difficult new machine programming, additional voter education, additional training for poll workers and election administrators, increased ballot printing costs, significantly more difficult and expensive manual audits, increased staff time to count, and the purchase and maintenance of new more complex vote-reading and counting machines.

Flaws of Instant Runoff Voting

Some flaws of the instant runoff voting method for counting ranked choice ballots include:

1. **Does not solve the "spoiler" problem except in special cases**. IRV only solves the spoiler problem in cases where there are only two viable candidates and some minor candidates who receive substantially fewer votes than the two viable candidates. IRV could result in electing to office the candidate who is the second least-favored among all voters[ix] and give the major political party whose voters are less likely to vote for third party candidates a better chance of winning especially if voters incorrectly think that IRV provides an opportunity to put a third party candidate as their first choice without hurting their major party favorite.[x] Oddly enough, IRV voters could sometimes give their favorite candidate a better chance to win by giving a different candidate higher ranking.[xi] (See appendix A.)

2. **Requires centralized vote counting procedures at the state-level**: IRV requires centralized vote counting for all election contests having districts that cross county lines because in each round, IRV requires that the individual ballots choices in the entire contest are counted first to see which candidate advances to the next round to know which ballots' second or lower choices need to be counted next. In other words, non-additive in the sense that there is no such thing as simple precinct subtotals for each candidate.[xii] Counting IRV usually requires counting the second, third … choices of voters whose first, second … choices are eliminated in a prior counting round. Prior to when the state-wide tallies of each round are computed and made available, it is not possible to know which voters' second, third … choices will be counted in the next round for each contest. For all multi-county election contests, IRV thus requires either counting all ballots on a state-level or requires a procedure which involves waiting for all counties to submit first-round results, doing the state-level calculations,

notifying the counties which voters' ballots to consider second choices for round two, then waiting at the state counting center for the second round ballot numbers from the counties to arrive, and then counting again, repeating this back-and-forth process between the state and local election offices as necessary until a winner is found. Alternatively, when voters are permitted to rank from 1 to N candidates, the counting procedure requires that the jurisdictions accurately report to the state a number of subtotals *for each* precinct or ballot grouping that is equal to $\sum_{i=0}^{N-1} \frac{N!}{i!}$ where N is the number of candidates in the election contest and that the state correctly identify which of these numerous subtotals for each precinct or ballot grouping to add together in each round to obtain the overall results. For just three candidates, there are 15 possible ballot orderings or subtotals. For four candidates, there are 64 possible ballot orderings or subtotals for each precinct. When voters are permitted to rank from 1 to R candidates, as in San Francisco where voters may only rank up to R=3 candidates, then the number of permutations is equal to $\sum_{i=0}^{R-1} \frac{N!}{(i+N-R)!}$ [1]

Maine was considering IRV but had jurisdictions that would have had to give up hand counting in the polling locations. Those hand counted paper ballot counties would have had to purchase central count scanners and truck their ballots to one central office to be "tabulated". Maine abandoned IRV for that reason. Also, if any county were to submit erroneous subtotals by mistake, the process and resorting and counting would have to be restarted. IRV thus requires a sea change in election administration and possibly in state election law.[xiii]

3. **Cannot be implemented without modification to the ballots or to the optical scan machines or their software.** (See appendix D.) You can retrofit some existing optical scanners to count IRV ballots, but not the discrete-sensor machines.[xiv] If you allow ranking all candidates, then you need a number of columns of bubbles equal to the total number of candidates by each name in which you place your rating, or the ballots will quickly become pages long.

4. **Encourages the use of complex voting systems** IRV's main proponent [Rob Richie, Executive Director of Fair Vote] testified (in April 2008) to the U.S. Election Assistance Commission (EAC) that no voting systems are commercially available today to adequately handle IRV. In his testimony, Richie asked for additional technical features for optical scan voting systems, seemed to support electronic-balloting, and found fault with paper ballots.[xv]

5. **Confuses voters more than plurality voting**, and may be more confusing to voters than other alternative voting methods such as approval voting.[xvi]

6. **Confusing, complex, and time-consuming to implement and to count**. Should voters rank all candidates or only three? And, what constitutes a majority win? Is it 50% plus one vote for the total number of first column votes, or does it mean 50% plus one vote of the

[1] This paper was updated on 8/1/2008 to include this formula for when voters are restricted to ranking from one to R number of candidates. Note that when R=N, this reduces to the simpler prior formula.

accumulated votes for the candidates remaining in the contest only after many voters' ballots may have been eliminated? It took San Francisco more than two years to implement the system. In Australia it took a month in 2007 to count the difficult election contests. [xvii]

If ballots are counted prior to validating and counting all absentee and provisional ballots, the results could be wrong because incorrect candidates may have been eliminated during some rounds, causing votes to be incorrectly allocated. Thus, it is best to wait to begin the IRV counting process after all absentee and provisional ballots are available for counting.

7. **Makes post election data and exit poll analysis more difficult to perform**.[xviii] Given the lack of valid post-election audits in most states, election data analyses are often the only means available for detecting suspicious patterns caused by vote miscount.[xix] Even though Dr. Christopher Jerdonek [the Fair Vote expert on IRV] wrote a paper stating that all raw data from IRV elections should be made available to outside observers for independent analysis and verification of election results, the North Carolina State Board of Elections refuses to release the raw data, claiming privacy concerns,[xx] and some states like Utah do not even publicly post precinct-level or machine-level vote counts, let alone the detailed ballot-level data needed to analyze IRV results.

8. **Difficult and time-consuming to manually count**.[xxi] In each round, IRV requires that individual ballots cast in the entire contest are counted first to see which candidate advances to the next round to know which ballots' second or lower choices need to be counted next. For counting each election contest, for each group of ballots that must be separately maintained (say absentee, precincts …) the ballots must be sorted, stacked, and counted by voters' candidate choices on each ballot. Then the ballots corresponding to any eliminated candidate need to be sub-sorted, sub-stacked, counted and added to the appropriate sub-totals. In following rounds those sub-piles need to be further sub-divided, sub-sorted, sub-stacked, separately counted and added to previous sub-totals. In a simple Cary, North Carolina single member town council seat contest held in only 8 precincts, approximately 72 total stacks and sub-stacks were required. For any grouping of ballots it is not possible to count more than one election contest at a time because the ballots must be resorted and restacked to correctly count each contest.

9. **Difficult and inefficient to manually audit**. [xxii] To check the accuracy of voting machine results via a post-election audit of less than 100% of all ballots cast requires, as a first step, publicly publishing all separate auditable vote counts that can be used to tally the overall election results. After the unofficial auditable vote counts that can be used to tally the overall unofficial result are publicly committed then some of these auditable vote counts can be randomly selected for manual counting in order to check the accuracy of the machine tallies. The accuracy of IRV election results may be practically auditable only via a 100% manual hand count because the correctness of intermediate-stage subtotals in each auditable vote count (machine, batch of ballots, precinct, or polling location) depends on the accuracy of the state-wide subtotals. In other words, IRV is not precinct sum-able in the sense that the totals for all 2nd, 3rd, 4th,… choices for each precinct are not used to obtain the overall election result. To manually check machine counted IRV results without doing a 100% manual count of all ballots in the election contest requires:

a. publicly publishing 100% of voters' ballots prior to the manual audit and then randomly selecting individual ballots to manually count. This method requires that the voters' individual ballots have printed on them a humanly identifiable mark so that individual ballots could be randomly selected and the accuracy of the tallying could be verified. This would raise other concerns with ballot privacy and cost.

b. Alternatively, the tallies for all $\sum_{i=0}^{R-1} \frac{N!}{(i+N-R)!}$ (where N = number of candidates and R= maximum number of candidates voters are allowed to rank on a ballot) possible unique voter selections for each auditable vote count (a number of tallies usually greater than the number of voters in each precinct) could be publicly published prior to randomly selecting auditable vote counts to manually audit, and then those auditable counts manually checked. Because this is a huge number of tallies to publicly report, this method may be impractical and too confusing for auditors and election officials.

In other words, any manual audit to check the accuracy of an IRV result would require a resorting and restacking and recounting *all* the ballots for the entire election contest state-wide, or either publicly posting all voters' ballots choices for the entire election contest state-wide, along with a humanly-readable identifier marked on each ballot, or alternatively publicly reporting all of the $\sum_{i=0}^{R-1} \frac{N!}{(i+N-R)!}$ tallies for each precinct or other auditable vote count that could be used to tally the vote (the tallies for each possible unique voter ranking). Checking the accuracy of machine-counted IRV election results is more difficult than checking the accuracy of elections counted via other methods.

10. **Could necessitate counting all presidential votes in Washington D.C.** If a Constitutional Amendment or a national popular vote compact were passed in order to have a direct popular vote for the U.S. presidential election as some are pushing for, then using IRV would necessitate counting all presidential votes in Washington D.C. since there would be no such thing as individual state "subtotals". This would be a conflict of interest for the executive branch to determine the next president and could violate the U.S. Constitution.[xxiii]

11. **Entrenches the two-major-political party system**: IRV has entrenched the two-party political system wherever it has been tried.[xxiv] One reason is because if a voter puts a third party candidate as his or her first choice, it can hurt the chances of the voter's second choice major party candidate, who could potentially be eliminated in the first round, causing that voter's last choice to be selected for office.[xxv]

12. **Ranking a voter's *first-choice* candidate *LAST* could cause that candidate to WIN as opposed to ranking the *first-choice* candidate *FIRST*, which could result in that candidate LOSING!**

In mathematics, a function f is monotonic if for all x ≤ y, f(x) ≤ f(y). Instant Runoff Voting is non-monotonic because increasing a vote for a candidate does not always increase that candidate's chances of winning and in fact may decrease a candidate's chance to win. Voters should have the right to know how to rank their first-choice candidate - first or last or in-between - in order to help their first-choice candidate win. Unfortunately, this is not the case with instant runoff voting. Here is an example.

#voters	Votes 1st/2nd/3rd
6	B>A>C
5	C>B>A
4	A>C>B

Candidate C wins this contest because candidate A is eliminated in round one, giving 4 more votes to candidate C, resulting in 6 votes for B and 9 votes for C in round 2.

If **two additional new voters whose actual preferences are B > A > C** vote their real preferences:

#voters	Votes 1st/2nd/3rd
8	B>A>C
5	C>B>A
4	A>C>B

Then candidate A is eliminated first and their *least* favorite candidate C wins with 8 votes for B, and 9 votes for C.

However, if these same two voters voted A>C>B (ranked their second favorite candidate A first, their least favorite candidate second, and their favorite candidate last) then their favorite candidate B wins:

#voters	Votes 1st/2nd/3rd
6	B>A>C
5	C>B>A
6	A>C>B

This time C, their least favorite candidate loses the first round, resulting in 11 votes for B and 6 votes for candidate A, and their favorite candidate B wins.

In other words, if these two new voters want their first choice candidate B to win, they must *not* rank B as their first choice and must rank candidate B as their *last choice* instead! IRV exhibits the "non-monotonicity" property where increasing your vote for a candidate X, may cause X to *lose.*[xxvi] For some examples see http://rangevoting.org/Monotone.html or http://www.mnvoters.org/images/MVALitiBack.pdf

13. **Delivers other unreasonable outcomes**. For instance, according to Warren Smith[xxvii]
    a. IRV is more likely to lead to ties and near-ties (see appendix A.),
    b. IRV can select a winner who is the pair-wise "lose to everybody except one" loser (see appendix D), and
    c. IRV favors extremists over centrists.[xxviii]

14. **Not all voters' ballots are treated equally**: Unlike with actual runoff elections, some IRV voters are not allowed to participate in the final selection round of an IRV election because all their choices were eliminated before the last counting round. Some voters have *all* their ranked choices considered. Others do not.[xxix] Some voters' second choices are considered in a timely fashion when their second choice candidates are still in the contest. Less lucky voters' have their second choices considered only after it is too late to help that candidate to win. Some of the most unlucky voters only have their first choice considered, even though their first choice candidate loses. This unequal, unfair treatment of voters' choices, ignoring lower ranked choices on some ballots but not on others causes the IRV counting method to select winners who may be favored by fewer voters than all but one of the eliminated candidates. In other words, candidates who are favored by a majority of voters end up losing, while candidates opposed by a majority of voters may win. There is currently a lawsuit in Minnesota against the adoption of IRV on the basis of the unequal, unfair treatment of voters' ballots.

15. **Costly**: IRV is more costly than plurality voting and is more costly than some other simpler-to-count alternative voting systems. There is the cost of the new machines, software, training, and voter education. The MD legislature estimated that costs could be as high as $3.50 per registered voter in their 2006 IRV bill, and a little less in the 2008 bill which did not include the cost of software which could not be estimated. The MD legislature defeated IRV bills in 2001, 2006 and 2008.[xxx]

16. **Increases the potential for undetectable vote fraud and erroneous vote counts**. This is due to several factors:

    a. The complexity of the machine programming required for counting IRV increases the likelihood of errors.

    b. The complexity of the manual counting procedures and the requirement for a 100% manual count to check the accuracy of the results, makes valid audits less likely to occur. Any procedure lacking a routine method for detecting and correcting errors can be assumed to be inaccurate.

    c. Pre-election machine testing of IRV elections would be more complex and difficult and therefore more likely to miss innocent errors. (Pre-election testing is incapable of detecting any deliberate vote fraud.)

    d. The conflict between the requirement to make voters' ranked choices on all individual ballots available in order for the public to verify the hand count with the requirement for ballot privacy may mean that any post-election data analysis that could check for consistency with patterns caused by vote fraud and error will not be possible.

e. No one has yet been able to generalize exit poll analysis methods which can now detect vote count patterns that are consistent with vote miscount in most plurality elections, to the much more complex IRV election results. Hence it would be much more difficult, if not virtually impossible to use exit poll data to detect patterns consistent with vote miscount.

f. It could be easier to hide the effects of vote switching and incorrect failure to count votes, and vote padding within a new and more complex voting system like IRV. In other words, any vote count patterns that make vote fraud noticeable may not be easily detectable with IRV voting. IRV proponents have typically not focused attention on developing any routine policies, methods, or procedure for detecting and correcting vote count errors which would work well with IRV methods.

17. **Violates many election fairness principles**. A spoiler candidate who does not win the election contest can cause a different candidate to win than would win if the spoiler candidate were not in the election contest; IRV can fail to elect the candidate that the largest number of voters prefer to other candidates (i.e. IRV does not always elect the pair-wise favorite); IRV does not always elect a majority candidate; IRV can elect the candidate who is second to the bottom for being least favored by voters. See appendix A and the section above on fairness conditions violated by IRV.

18. **Unstable and can be delicately sensitive to noise in the rankings**. If an election is not resolved after 3 rounds of IRV then one is deep in the ranking for many people. This means noise in the rankings. Do people really study candidates they don't care much about? Thus the noise in the ranking for the most ill-informed voters is determining the outcome in deep rank run-offs.

    When an election contest is unresolved after 3 rounds of IRV, a better solution is to hold a real run off with the remaining candidates. Having winnowed the field, voters can now properly study their allowed few choices with the required care and presumably enough will to make the outcome not contingent on noise. Moreover, can you fathom how awful it would be to fill out a ballot ranking every candidate 10 deep? In Australia, voters are required by law to fill rank ever candidate running (generally 20) from 1 to 20. Do you think there is anything besides noise in the last ten? The saving grace on the Australian ballot is that generally there are only 2 questions, one with 3 to 4 rankings and one with about 20. Not like our USA ballots. Restricting the ranking depth of ranked choice ballots could improve IRV methods by reducing noise and making it easier for voters.

Benefits of Instant Runoff Voting (IRV) Over Plurality Voting

There are a few areas where IRV is an improvement over today's predominant voting method called plurality voting. The benefits of IRV include:

1. **Eliminates the spoiler scenario only in situations where the minor party candidate is behind both frontrunners** so that the spoiler candidate is eliminated before either of the two major party candidates.
2. **Will not elect a candidate who loses pair-wise to all rivals** whereas plurality voting can do so. (See appendix D.)
3. **Votes are more expressive**. It gives IRV voters a sense of being heard by giving voters an opportunity to express their preferences.
4. **An IRV** counting method called Single Transferable Vote (STV) when used in multiple-seat elections, could help minority voting groups obtain representation that is roughly proportional to their numbers in the voting population *if* sufficient candidates run for office that represent minority interests and *if* sufficient minority voters exercise the right to vote and vote for the candidates representing their interests.[2] In actual practice, IRV has not helped minorities to win representation where it has been tried.

If one ignores IRV's unequal treatment of voters' ballots, its counting difficulties, the increased potential for undetected vote fraud and error, the increased costs and complexity, the need for new high-tech voting software and equipment, and the difficulty and costs of manually auditing IRV elections, then it might be considered better than today's plurality voting method. So, if the emphasis is not on fairness, accuracy, economy, and timeliness, then IRV could be considered an improvement over plurality voting. However, IRV is not as fair as top-two runoff elections.

The IRV method, although it does not completely solve the spoiler problem, does not find majority winners, and does not solve the two-party domination problem may fit better with elections like Australia holds where there is a single contest on a single paper ballot. Australia's elections have one contest with perhaps 10-20 political parties running for election.

An "IRV-Like" Solution to Some IRV Counting Issues

While it is not strictly a ranked choice voting method, there is an "IRV-like" solution to the dilemma of the complexity of counting IRV ballots which allows the candidates who are eliminated in beginning rounds to exercise their political power, rather than being defanged by normal IRV counting methods. This is to use the current voting system we have now, where voters vote for one candidate, but then have the losing candidates' votes roll over to whomever the candidate has pre-selected prior to Election Day. That is to say the candidate not the voter determines the ranking preferences. This allows them to negotiate with the major parties to get their issues adopted in return

[2] There are other voting methods available that achieve proportional minority group representation, but do not have as many flaws as IRV methods.

for their roll-over votes. It is simple. Since the rank order is known ahead of time the votes can be counted locally not centrally. This solution solves some of the counting problems of IRV, but it does not solve IRV's fairness issues.

Two alternative methods of counting ranked choice ballots would also eliminate some of the problems of IRV. The Bucklin and Borda methods count *all* the voters' choices as compared to IRV that only counts some voters' choices, conceals the second or lower preferences of voters whose higher ranked preferences are still in the contest. The Bucklin method does not eliminate any candidates. It just counts all the votes and is similar to approval voting, but ranked. Bucklin method is more efficient at finding majorities than IRV, because IRV does *not* count all the votes. The Borda method is simpler to count and to audit than either IRV or Bucklin methods because the Borda method does not require centralized vote counting and is thus precinct-sum-able.

About the Author

Kathy Dopp has an M.S. degree in Mathematics from the University of Utah and has authored dozens of academic papers with Ph.D. computer scientists and statisticians on voting and election issues since 2003, including analyses of exit poll discrepancies and vote count patterns, and voting system recommendations. Dopp is currently executive director of the grossly under-funded non-profit, The National Election Data Archive, for which she has been doing full-time volunteer work for since 2004. Her resume is posted online at: http://electionarchive.org/ucvInfo/staff/KathyDopp.pdf

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- has a title reflecting additional flaws of instant runoff voting (IRV) suggested by experts,
- discusses how IRV does *not* select majority winners as often as real runoff elections or primary and general elections do,
- differentiates between the ballot style - "ranked choice voting" - and the counting method - "instant runoff voting" (IRV),
- gives an overview of alternative voting methods in appendix E,
- describes an "IRV-like" solution that would solve some of IRV's counting problems,
- provides a precise definition of "spoiler", and
- rebuts Fair Vote's attempt at rebutting the first version of this report in appendix F.

Thanks to Ph.D. computer scientists and voting system experts Doug Jones U of IA, Arthur Keller, U of CA, Berkeley, Charlie Strauss, and David Webber for helping with the introduction, describing some flaws of IRV, and for providing information for Appendix E, and specifically to Charlie Strauss for providing an "IRV-like solution to the counting problems of IRV, for pointing out that Sante Fe, NM has implemented IRV, and for statements used in the conclusion. After writing the initial version of this paper, responses by computer scientists motivated an immediate revision, version #2. Thanks to Joyce McCloy, Coordinator, for the N.C. Coalition for Verifiable Voting, and to Wake County, NC voting activist Chris Telesca for alerting me to the problems of IRV and for informing me in detail about the IRV counting experience in N.C. and for providing news reports and information. Thanks to the election-methods@lists.electorama.com email discussion list members including Abd ul-Rahman Lomax and Warren Smith.[xxxi] Thanks especially to Abd ul-Rahman Lomax for helping to write appendix F which rebuts the incorrect claims of IRV organization "Fair Vote". Thanks to William Poundstone, to Warren Smith who also contributed appendix D and suggested the addition of an IRV benefits section, and to Ron Baiman for reviewing and making specific helpful suggestions for this paper. Thanks to Anthony Lorenzo, chairperson of the Coalition for Instant Runoff Voting in Florida for discussing with me his reasons for supporting IRV and for opposing approval voting. (See appendix B.) Thanks to Vermont's Governor Douglas for vetoing an instant-runoff voting bill. [xxxii]

Appendix A: "Instant Runoff Voting" Examples

Example 1: This example shows that an IRV outcome may not seem fair; and that the IRV counting process is complex. The table below lists twelve voters and four candidates running for a single-winner election contest. Each row represents one voter's candidate rankings.

	Candidates' Ranks			
Voter#	**Republican**	**Libertarian**	**Green**	**Democrat**
1	4	3	2	1
2	1	4	3	2
3	1	4	3	2
4	3	1	4	2
5	4	1	3	2
6	4	3	1	2
7	4	3	1	2
8	1	2	3	4
9	2	1	4	3
10	4	2	1	3
11	4	3	2	1
12	1	4	3	2

Using the IRV method, the Democrat is eliminated in the first round and the Republican and Green candidates end up being tied, despite the fact that 7 voters, or 58%, prefer the Democrat over the Republican, and 8 voters, or 67%, prefer the Democrat over the Green candidate. Notice that overall although there are 4 voters who selected the Republican as 1st choice, more voters selected the Republican as last choice than any other candidate, and the Democrat is the candidate most frequently ranked 1st or 2nd choice among all voters.

#voters who selected candidate as	Candidates			
	Republican	**Libertarian**	**Green**	**Democrat**
1st choice	4	3	3	2
2nd choice	1	2	2	7
3rd choice	1	4	5	2
4th choice	6	3	2	1
total voters	12	12	12	12

The Democrat has the most 1st and 2nd rankings but is eliminated in the first round; the Libertarian is eliminated in the second round; and the Green and Republican candidates are tied in the third round, although the Green and Democrat are both ranked 1st, 2nd, or 3rd by 11 voters and the Republican is ranked 1st, 2nd, or 3rd among only 6 voters, the least of any candidate. A real run-off election between the Green and Republican candidates is needed for this case.

Not only is the IRV counting process complex and difficult to audit, but the result could be fundamentally unfair whenever minor party candidates become viable, as this example shows by selecting the major-party candidate favored by the least number of voters. IRV proponents claim that such scenarios "occur rarely". This claim may be true because voters learn to strategize to avoid these scenarios rather than ranking candidates honestly.

Another way to look at this set of voter preferences is:

2 voters prefer D > G > L > R
3 voters prefer R > D > G > L
1 voter prefers L > D > R >G
1 voter prefers L > D > G >R
2 voters prefer G > D > L >R
1 voter prefers R > L > G >D
1 voter prefers L > R > D >G
1 voter prefers G > L > D >R

Notice that: 6 voters rank the Republican last; 3 voters rank the Libertarian last; 2 voters rank the Green party last; and 1 voter ranks the Democrat last.

Let us count the number of voters who prefer each candidate over other candidates:

D > G and L and R for 2 voters
D > L and R or R and G or L and G for 7 additional voters
D > R or L or G for 2 additional voters
11 voters prefer the Democrat over other candidates

G > D and L and R for 3 voters
G > R and L or R and D, or D and L 2 additional voters
G > L or R or D 5 additional voters
10 voters prefer the Green over other candidates

L > D and G and R for 3 voters
L > G and D or G and R or R and D for 2 additional voters
L > R or D or G 4 voters
9 voters prefer the Libertarian over other candidates

R > D and G and R for 4 voters
R > G and D or G and R or D and R for 1 additional voters
R > L or D or G for 1 additional voters
6 voters prefer the Republican over others candidates

In sum:

11 voters prefer the Democrat over other candidates
10 voters prefer the Green over other candidates
9 voters prefer the Libertarian over other candidates
6 voters prefer the Republican over others candidates

So who do you think should win this election with 12 voters? IRV counting methods result in the R and G candidates being tied for first place. If voters approve either their first two or their first three choices then approval voting results in candidate D winning.

Example 2: This is another example where IRV eliminates the candidate preferred by most voters in the first round.

Let us examine a situation where 40% of voters prefer candidate A over candidate C, and 60% of voters prefer candidate C over candidate A:

#voters	ranking
40	A > C
60	C > A

Now allow rank order voting and introduce candidate B who is preferred first by fewer voters than candidates A. Candidate C is the Ranked Pairs winner here. But with the introduction of B, we get

#voters	ranking
40	A > B > C
35	B > C > A
25	C > A > B

With IRV candidate C, the most popular candidate whom 60% of voters prefer over A is now eliminated in the first round and now candidate A wins despite the fact that most voters (60%) prefer candidate C over candidate A. So, the introduction of candidate B, a non-winning candidate, affects the outcome in IRV, violating one fairness condition.

Let's count the same election contest using approval voting:

40 voters approve of A and B
35 voters approve of B and C
25 voters approve of C and A

A receives 40+25 = 65 votes
B receives 40+35 = 75 votes
C receives 35+25 = 60 votes

Simply add up the approval votes and candidate B, the new candidate wins. Therefore candidate B is no longer a non-winning candidate and so this example of approval voting does not violate this fairness (independence) condition. (See appendix C.)

Another way to see that candidate B is an appropriate winner in this example is to note that

35 + 25 = 60 voters prefer C over other choices. i.e. over A or over B
40 + 25 = 65 voters prefer A over other choices. i.e. over C or over B
40+35 = 75 voters prefer B over other choices. i.e. over C or over A

Example 3:

#voters	their vote
36	Left>Center>Right
34	Right>Center>Left
15	Center>Right>Left
15	Center>Left>Right

In this IRV 3-candidate 100-voter election, "Left" wins.

But "Center" is preferred over Left by a 64-to-36 landslide majority.
Also Center is preferred over Right by a 64-to-36 majority.

Appendix B: A Scenario Comparing IRV and Approval Voting

This simple approval voting scenario was provided to me by Anthony Lorenzo and demonstrates another instance of how IRV violates conditions for a fair election result, but approval voting meets the same fairness conditions.

60% of voters approve of candidate A and candidate B, and believe anybody is better than candidate C.

40% of voters approve of candidate C and candidate B and believe anybody is better than candidate A.

The outcome in approval voting is that A receives 60 votes, B receives 100 votes and C receives 40 votes. Candidate B, with 100% approval, wins.

In other words, it seems that the fairness condition (sometimes attributed to Kenneth Arrow) that

> "whenever all individuals prefer an alternative x to another y, x must be preferred to y in the collective preference order"

is met in the above example by using the approval voting method where alternative x is that candidate B wins, and alternative y is that another candidate wins.

IRV proponent, Anthony Lorenzo points out that if IRV were used instead of approval for this example, it is possible that up to 60% of the voters who voted for both A and B, may actually have preferred A over B as the best candidate and only voted for B to help ensure that C did not win. So, in that case approval voting violates the "majority favorite criterion" that states:

> "If one candidate is the favorite [first] choice of a majority of voters that candidate should always win"

Both plurality voting and IRV conform to the "majority favorite criterion" because the majority candidate in both plurality and IRV wins even if that candidate is disapproved of by all non-majority voters, and even if there is an alternative candidate that is approved of by *all* voters.

So if the "majority favorite criterion" is considered a more important fairness condition for election outcomes rather than other fairness conditions, then there is no need to abandon the current plurality voting system for the more complex IRV methods.

Approval voting, which is a simple case of range voting methods, satisfies other conditions for fair election outcomes which IRV does not, solves the "spoiler problem", and alleviates the problem of the two-party lock on our political system. Range and approval voting are much simpler to count locally, particularly for election contests whose districts cross county or township lines.

IRV proponents object to approval voting because it fails what they call the "later-no-harm" criterion which states that:

> "a voter's indicating a second or lower preference should not hurt the voter's top choice."

IRV proponent Anthony Lorenzo notes that in the above example, if all voters who voted for both A and B actually preferred candidate A over B, then, by voting for B, they can cause the defeat of their favorite candidate (A).

On the other hand, IRV voting ensures that a voter's lower preferences never hurt their first choice. However, the first choice of IRV voters often hurts their lower choices candidates by causing their early elimination.

Existing plurality voting methods used in multi-winner election contests, like municipal city council elections, where voters may vote for as many candidates as there are available positions to fill, also could hurt the chances of voters' preferred choices.

Appendix C: IRV Could Select a Winner Who Is A "Lose To Every Candidate Except One" Loser

IRV will not select a winner who loses pair-wise to all rivals (although plurality could) but could select a winner who is a "lose to every candidate except one" loser. This appendix was primarily written by Warren Stewart with some explanatory additions and editing by the author of this paper.

In IRV/RVC if the voters provide rank order votes such as "A > B > C" (meaning "I prefer A over B over C") then you can make a "pair wise matrix" showing for each candidate pair X and Y how many voters prefer X over Y and how many the reverse.

I.e. if the 3 votes are:

A > B > C (2 voters)
B > C >A (1 voter)

then

A,B: A beats B by 2 voters to 1.
B,C: B beats C pair wise 3 to 0.
A,C: A beats C by 2 to 1.

If some candidate beats every rival pair wise, then that candidate is called a "Condorcet winner" or the "beats-all winner." Here A qualifies.

If some candidate L loses to every rival pair wise, then is a "Condorcet loser" also called "lose to all loser." Here C qualifies.

Plurality voting can elect a lose-to-all loser (unfortunately). Example of Plurality voting electing "lose to all" candidate

Let the four candidates be A, B, C, and D.
#voterstheir vote

28 voters A > B > C > D
25 voters B > C > D > A
24 voters C > D > B > A
23 voters D > C > B > A

In this situation, A would lose to any opponent in a head-to-head election by a huge 72-to-28 margin, far larger than the hugest "landslide" in US presidential election history. And A is ranked dead last by 72% of the voters.

Counting the same example above using IRV method, candidate D would be eliminated in round one and "first-choice votes-for-D" would be re-allocated to candidate C. In round two, candidate B would be eliminated and "first-choice votes for B" would be reallocated to C; and C would be selected as the winner. (This example is from http://rangevoting.org/LoseAll.html)

IRV cannot elect a lose-to-all loser L because in the final round it will be L versus somebody and somebody will win. (Or L won't make it to the final round. Either way L does not win.) That's a win for IRV.

IRV can however elect a "lose to everybody except one" loser. (See example 1 in appendix A which can be adjusted slightly to show that.)

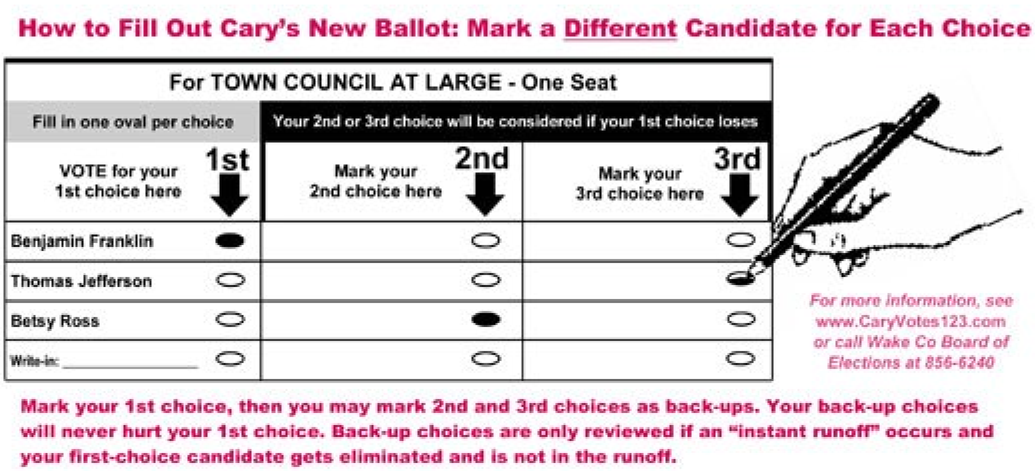
And IRV can elect as "winner" the same person IRV would also rate as the "worst" candidate, For example:

#voters	their vote
2	B > C > A
2	A > B > C
1	C > A > B

where A is (says IRV) "best" but if you use IRV to calculate the "worst" candidate by reversing all votes and using IRV to count them ("trying to choose the worst") then A "wins" also.

For another example see: http://rangevoting.org/IrvRevFail.html

Appendix D: Voter Instructions for Instant Runoff Voting, Cary, NC



Appendix E: Alternative Voting Methods Worth Considering

This appendix was built from the terse analysis of voting methods worth paying attention to by Charlie Strauss', and comments and information from U of IA, computer science professor Doug Jones and U of Berkley, computer science professor Arthur Kellner, and David Webber.

Voting methods fall into two categories, rating and ranking methods:

I. Rating Methods (Non ranked-preference)

1) Range voting. In this method voters simply rate, not rank, all the candidates on a scale (say 1-10). The candidate with highest average rating wins. Range voting has three main problems: a) tedious b) requires special machinery, and larger ballots because existing op-scans cannot be retrofitted, and c) If people were honest in their rankings, then in theory, it is Bayes optimal (an ideal voting system). But people are not honest, and will strategically exaggerate the rating differential (ten for the guy they like, zero for the guy they prefer slightly less) making for sub optimal results. Still range voting is very good.

2) Approval voting: simply mark next to any and all candidates you approve of. Works will all existing optical scanners with no changes to firmware or hardware. No changes to existing ballot designs and Easy to hand count. Key feature: this is the binary approximation to range voting (a zero to one scale). In fact, given the strategic exaggeration that occurs in range voting, Approval voting is the natural tendency of range voting results in practice. Thus this may possibly be the overall best voting system that is achievable in practice.

Approval voting is worth a serious look because it does not complicate the ballots. It can be done on the current optical ballots without modification to the ballots or to the optical scan machines or their software. Approval voting works like this: Mark the oval next to any and all candidates you approve of. The winner is the one with the most marked ovals.

Approval voting is not contingent on global outcomes like IRV, and recounting is fairly simple, and there is no difficulty with the hardware or explosion in the length of ballots. One of the benefits of Approval Voting is that by definition, there is no such thing as an overvote. Since overvotes and accessibility were the two main reasons for HAVA, eliminating the potential for overvotes significantly reduces the justification for DREs. Other advantages of Approval Voting are the ease of auditing and the fact that tallying is associative.

3) The Viking voting method. OASIS EML supports the Viking method as they still use it in Norway. In this you strike through the candidates name on the ballot that you absolutely DO NOT want! The Viking system has that nice "throw the bums out" quality. The Viking system requires a positive vote. Since it can be assumed that at least one candidate will vote for him/herself, the Viking and approval methods are essentially equivalent.

II. Ranked Choice or Ranked Preference

A. Ballot Styles: Combine one of these ballot styles with the ranked preference counting methods mentioned below.

1) candidates choose ranked preference orders of other candidates to award their votes to in case they are eliminated. No changes to current ballots. Empowers third parties and easy to hand count.

2) voter chooses ranked preference: Cedes less power to minor candidates. Ballots are tedious, physically long, easily over-voted, and hard for the voter to quickly scan for mistakes. Very inconvenient or impossible to implement in most existing op-scans. Hard to hand count. Some existing opti-scans can be retrofitted to count IRV ballots, but not the discrete-sensor ones. The big nuisance is if you allow the range 1 to N, you need N columns of bubbles by each name in which you place your rating. Diebold's older op-scan systems can do this (4 or 8 sensors per inch horizontally across the page), while the old ES&S and Sequoia scanners have only a few sensors across the page, one per column of names on the ballot. In other words, the Sequoia and ES&S opti-scans support no more than 3 bubble lanes using 3 or 4 discrete sensors (the 4rth is a position track not a bubble lane). This means that the only space-efficient way to lay out a ranked preference ballot is if the number of rankings allowed is restricted to 3. Consequently ballots will generally be 3 times longer, spill across multiple pages and increase the ways you could accidentally overvote them. The multiple page issue is slightly subtle as implementing a system that can accommodate it on existing hardware is possible but non-trivial, but I'll not dwell on this. However, limiting the depth of ranking here might not be seen a real defect. One can argue that it is what you should do, particularly if IRV is used to resolve the ranked preference.

B. Counting Methods

1) Instant run-off voting is easy to explain but a really poor idea. For example: it becomes unstable when there are three or more strong parties. In that case it will tend to elect a minor preferred fringe party over a centrist party preferred by the majority. How do you combine IRV/STV with precinct counts, especially Hand counted paper ballots (HCPB)? IRV/STV are hard to audit and are not associative. Which voting system is the overall best? We have seen so many voters get confused in voting, and poll workers that are hard to train, that any complex voting system like IRV/STV being imposed on the general voting populace increases confusion.

2) Condorcet AKA ("majority rule"). Condorcet lacks the problems with IRV and arguably the closest to fair system devised. The winner is the person who beats all others if there were just a pair-wise election contest. In the unlikely event of a circular tie, one of the better resolution methods would be to switch to a Borda count.

4) Borda count. Arguably inferior to majority-rule but with one compelling attribute. Borda up weights candidates who are closer to the top of people's rankings. Thus a majority rule winner that only emerged deep in people's rankings would lose out to an almost-majority winner that was ranked highly by most people. Main defect is the scoring scheme that achieves this balance reeks of arbitrariness. Like range voting people can vote strategically to upset the process. The Borda Count

for ranked choice voting ballots is far easier method to manually count and to manually audit than IRV, because with it, you can produce precinct totals and then aggregate the precinct totals to produce overall totals from which the winner is determined. Therefore, Borda-count precinct level audits work the same way they do with conventional ballots.

5) Top-Two Runoff election. A new and separate runoff election is held for the top two vote-getters in the first election. This has the advantage of almost always selecting a majority candidate.

Appendix F: Rebuttals to Fair Vote's "De-Bunking Kathy Dopp's 15 Flaws of Instant Runoff Voting"

This appendix relies heavily on the expertise, writing, and research of Adb ul-Rahman Lomax and his rebuttals to Fair Vote on the election-methods@lists.electorama.com with some help by other email list members, including Warren Smith. This appendix rebuts the Fair Vote organization's attempted rebuttal of the first version of this paper. (See http://www.fairvote.org/?page=2285 or http://www.fairvote.org/dopp for the full text of Fair Vote's rebuttals.) Note: The numbering of IRV flaws is slightly different in this revised version above than in the original version due to the addition of two new flaws in this addition.

1. *"Does not solve the "spoiler" problem except in special cases…."*

> Fair Vote's rebuttal:
> *"Dopp has her "special cases" reversed. In fact, IRV solves the spoiler problem in virtually all likely U.S. partisan elections. Whenever a third party or independent candidate is unlikely to be one of the top vote-getters …, IRV eliminates the spoiler problem"*

Fair Vote does not contradict the point that "IRV does not solve the spoiler problem" except in the particular case where no third candidate is among voters' top choices. In other words, using IRV counting methods means that the presence of a non-winning "spoiler" candidate can still split the votes and cause a different candidate to win than would otherwise win an election contest.

The particular spoiler problems that IRV does *not* solve are not rare whenever there are three or more major candidates. IRV is mostly being proposed at this time in the U.S. as a replacement for non-partisan elections. For instance, that is what IRV is being used for in San Francisco. Three or more major candidates occur much more commonly in nonpartisan election contests than in partisan ones in a two-party system, so that the spoiler problem is particularly likely in the same local U.S. elections where IRV is usually tested.

Notice that Fair Vote's response uses many hedging or misleading words like "virtually all", "likely", "unique", "final", and "partisan". Because simpler, more problem-free voting methods are available which do solve the spoiler problem in *all* cases, the fact that IRV solves the spoiler problem only in cases where only two major-party candidates are viable, is not a valid reason to support IRV.

2. Dopp: "Requires centralized vote counting procedures at the state-level…"

> Fair Vote's rebuttal:
> *IRV creates no need to centralize the counting or the ballots themselves, although that is one possible counting procedure … all that is required to implement IRV is central coordination of the tally. If ballot images are recorded on optical scan equipment, the data from those images can be collected centrally for an IRV ballot. If a hand-count is conducted, vote totals need to be reported to a central tallying office in order to determine what step to take next in the count. In Ireland, for example, there are 43 counting centers in the presidential election contest. Election administrators count ballots and report their totals to a national office that in turn instructs the administrators at each counting center on what to do next. The entire process takes less than a day even though more than a million ballots are cast.*

Fair Vote renames "central vote counting" to "central coordination of the tally", but does not contradict our point that IRV requires centralized vote-counting procedures at the state-level for all election contests with districts that cross county lines. What Fair Vote describes is a system where actual ballot counting takes place in regional centers, but the tallies must be transmitted to the central facility and added together and announced before the next round can be counted at the regional centers. All ballots in the entire election contest must be counted for each round and its totals computed and announced, before the next round can be counted. This web page by Warren Smith explains the need for centralized IRV vote counting: http://rangevoting.org/IrvNonAdd.html

Consider absentee ballots which frequently take some jurisdictions up to two weeks after Election Day to verify voter eligibility and count. If all the absentee voters' ballots must be counted first before proceeding to round two, then the statewide or nationwide (in the case of an IRV presidential election) would be held up for two weeks before being able to finish round one counts.

Fair Vote's response hi-lights its push for new hi-tech optical scan voting equipment needed in order to implement IRV by saying "If ballot images are recorded on optical scan equipment, the data from those images can be collected centrally for an IRV ballot". The truth is that very few of today's optical scanners create ballot images. There is a study at http://www.gregdennis.com/voting/sf_irv.pdf that describes that the San Francisco machines are programmed to "interpret" the votes in creating "ballot images" and that the alleged "ballot images" are pre-processed and do not reflect the actual patterns of votes on the paper ballots. See appendix E of this paper for a description by computer scientists of the fact that most of today's optical scanning equipment is not designed to be able to process any ranked choice ballots or to count using IRV methods. Any voting system involving transferring all individual ballot images introduces new costs and security vulnerabilities; and introduces ballot privacy issues.

The method of counting votes in Ireland is that the two lowest-ranking candidates can be eliminated in the first round as long as the sum of their votes is less than the vote total of the next highest candidate. The full counting rules for Ireland are found here: http://www.irishstatutebook.ie/1937/en/act/pub/0032/gen_6.html#gen_6 This makes sense because even if all voters were transferred to one of the other eliminated group of candidates, that candidate would still be eventually eliminated without enough votes to surpass the remaining group of candidates. While such a procedure helps shorten IRV counting, Ireland only has 1 million voters nation-wide and 43 total counting centers as opposed to the U.S. having millions of voters just in some cities and over 3300 separate election administration jurisdictions (dozens to hundreds in each state) with dozens to thousands of polling locations in each jurisdiction. The Irish Presidential election is held only once every 7 years and in 2004 it took one day to count but two days to make a decision because no candidate got a majority in the first and only round.

3. Dopp: "Encourages the use of complex voting systems and… [FairVote promotes] electronic-balloting…"

> Fair Vote's rebuttal:
> *Most government IRV elections are in fact conducted with hand-count paper ballots, including national elections in Australia, Ireland and Papua New Guinea….* FairVote advocates that all such machines store a redundant electronic record of each ballot, as well as a paper ballot to allow for better fraud detection, and to simplify ranked ballot tabulations.

Fair Vote reinforces our point that "Fair Vote promotes electronic balloting" when its attempt at rebuttal asks for an "electronic record of each ballot… to simplify ranked ballot tabulations.

Consider trying to manually audit an IRV election. It is not enough to look at the totals for each rank. One has to look at each round, and the ranks on ballots transferred in that round. Suppose A is eliminated. On some ballots A might be in the first position, on some in second position, and so forth. On each of these ballots where A is eliminated, there is the candidate in the second position. The exact sequence of eliminations that took place in the original election must be followed. Compare this with just counting the marks on the ballot and adding them up. How can Fair Vote IRV activists deny the complexity of IRV counting with a straight face? IRV is far more complex to count than any other alternative voting system being considered.

Elections in Australia, Ireland, and Papua New Guinea are held under very different circumstances than U.S. elections. Please refer to response #2 above for a discussion of Ireland's IRV election. Australia …

4. Dopp: "Confuses voters…"

> Fair Vote's rebuttal:
> *All the evidence shows that voters are not confused by IRV. The rate of spoiled ballots did not increase in any of the U.S. cities when they switched to IRV.*

All the evidence? Well then, let us look at the evidence. Fair Vote implies that the most confused voters in Burlington, VT would, of course, be in the "ward in town with the highest number of low-income voters". However Burlington is a college town and college students are known to be low-income. When I called the Burlington election office, I was told by the person answering the phone that IRV "confused voters". Fair Vote's claims about San Francisco are unfounded because there is no real ballot spoilage data from which to make their statistics. There is an analysis of over-vote rates available at http://rangevoting.org/SPRates.html that found a 0.082% overvote rate in plurality contests compared to a 0.60% overvote rate in the IRV election contests, a difference that is statistically significant. More information here: http://rangevoting.org/Irvtalk.html#nospoilageincrease . There is also a study that goes into more detail at http://www.gregdennis.com/voting/sf_irv.pdf that is also inconsistent with Fair Vote's conclusion that "All the evidence shows that voters are not confused by IRV." According to the study, 14% of Latinos and 27% of Asian voters, in exit polls conducted by the Chinese-American Voter Education Committee found IRV difficult to use. Also, some patterns of overvotes do not show up in the San Francisco ballot images used to determine the statistics because the software pre-processed and interpreted the voters' ballots, rather than simply reporting them.

The author(s) of Fair Vote's rebuttal attempt should read all the news articles on voter confusion that are provided in the endnotes of this paper. It is hard to imagine how anyone could deny that IRV causes some voter confusion.

5. Dopp: "Confusing, complex and time-consuming to implement and to count…"

> Fair Vote's rebuttal:
> *IRV certainly is simpler for election officials and voters than conducting a whole separate runoff election to find a majority winner. ... Note that the winning threshold for an IRV election, as with any election, must be specified in the law.*

Computer scientists who are voting system experts generally disagree with Fair Vote's unsupported assertion that IRV is "simpler" than an election plus a separate runoff election. If the required winning threshold for an IRV election is a majority of voters, then an IRV election could end by requiring a separate top-two runoff election afterwards. It took two years to implement IRV in San Francisco, and some jurisdictions have passed IRV but are still waiting to implement it whenever new voting equipment that can handle IRV elections can be purchased.

6. Dopp: "Makes post election data and exit poll analysis much more difficult to perform…"

> Fair Vote's rebuttal:
> *To date, IRV election can make it easier to do post-election and exit poll analysis. Because optical scan counts with IRV require capturing of ballot images, San Francisco (CA) and Burlington (VT) were able to release the data files showing every single ballot's set of rankings – thereby allowing any voter to do a recount and full analysis on their own.*
>
> *Exit polls can be done just as well under IRV rules as vote-for-one rules. California requires a manual audit in its elections, which has been done without difficulty in San Francisco's IRV elections. Manual audits should be required for all elections, regardless of whether IRV is used or not.*

Fair Vote continues to make the unsupported assertion that election and exit polls analysis can "be done just as well under IRV". However, the fact is that no researcher or mathematician has yet been able to generalize exit poll analyses methods that could detect patterns consistent with vote miscount or with exit poll response bias in contests with two viable candidates, to any ranked choice voting methods. Imagine exit pollsters trying to accurately obtain all the ranked ballot choices of all voters for all election contests at the precinct-level and then trying to compare their sums statistically with the number of subtotals of votes equal to $\sum_{i=0}^{N-1} \frac{N!}{i!}$ for each precinct! Imagine the sample size exit pollsters would need to reduce the error due to random chance for such statistical comparisons! For instance, I have repeatedly challenged IRV proponents to generalize the methods explained in this exit poll analysis paper to IRV and none have been able to do so yet: http://electionarchive.org/ucvAnalysis/US/exit-polls/Exit-Poll-Analysis.pdf

As pointed out above, the optical scan machines in San Francisco (and probably in Burlington) do not provide images of the ballots. The ballot data they provide are preprocessed and modified into abstracted vote data which is what San Francisco calls "images" that do not show all the rankings on the ballot. Data is processed out that is considered irrelevant for election administration purposes although it is relevant for determining voter error rates and for analyzing election data. There are also legal, financial, administrative, and ballot privacy impediments to publicly releasing the images of all ballots.

Fair Vote's response suggests, without supporting evidence, that if ballot images showing all voters' ranked choice votes were available, then election data analysis would be easy to perform, This study explains the lack of accurate, un-interpreted ballot images in San Francisco: http://www.gregdennis.com/voting/sf_irv.pdf

Fair Vote claims that San Francisco manually audited its IRV machine count accuracy "*without difficulty*". How could San Francisco manually audit 1% of its IRV election precincts according to California statutes in a publicly verifiable way? I ask Fair Vote to demonstrate that San Francisco did a publicly verifiable valid manual audit of its precinct machine counts which checked the accuracy of its IRV election results by providing the URL where San Francisco, prior to beginning its audit, publicly released all of the thousands of vote counts, $\sum_{i=0}^{N-1} \frac{N!}{i!}$ vote counts per precinct, along with each vote count's unique candidate ranking order, or alternatively, where San Francisco publicly posted all of its individual ballots' IRV rankings with humanly readable identifiers that are needed to manually audit an IRV election by randomly selecting ballots.

More discussion on post-election audits of IRV elections is below in the audit section.

7. Dopp: "Difficult and time-consuming to manually count…"

Fair Vote's rebuttal:
Manual counts can take slightly longer than vote-for-one elections, but aren't difficult, unless many different races on a ballot need to go to a runoff count. As cited earlier, Irish election administrators

> *can count more than a million ballots by hand in hotly contested presidential elections in one standard workday.*

See the response to Fair Vote's "Irish" story above which counts only one election contest using only 43 counting centers for only 1 million total ballots for only one IRV round because the election was not close, and actually took two days to decide. What does Fair Vote mean by "need to go to a runoff count"? Is Fair Vote is honestly admitting that if many different election contests on a ballot are counted using IRV, manually counting is difficult? Fair Vote fails to mention San Francisco where election workers put in 16 hour days and the counting took about a month to count their IRV election.

A number of vote counts equal to $\sum_{i=0}^{N-1} \frac{N!}{i!}$, where N is the number of candidates in the election contest, could possibly be used to tally IRV rounds in *each* precinct or voting machine. Errors in counting IRV ripple through the rounds. IRV machine programming errors are easier to make and more difficult to detect. An error in counting the first round can require the entire election to be recounted in all the precincts and in all the rounds. Absentee and provisional ballots that sometimes take weeks after Election Day to process could change the entire IRV election results, necessitating waiting until all absentee and provisional ballots have been counted to begin IRV counts. For all contests whose districts reside in more than one jurisdiction, unless all ballots are centrally tallied by the state, every local jurisdiction must wait until all jurisdictions have reported the prior round's tallies to the central office to tally and the central office reports back who won the prior round, before knowing how to tally the next round.

8. Dopp: "Difficult and inefficient to manually audit…"

> Fair Vote's rebuttal:
> *IRV can be manually audited just as well as vote-for-one elections, although it does take more effort (since voters must be allowed to express more information on their ballot). A manual audit can either be done using a random sample of ballots from all jurisdictions, or a random sample of ballots from a random sample of voting machines, or by a complete re-tally from a random sample of voting machines. A complete re-tally of all ballots (a recount) is, of course, possible but unnecessary unless a court recount is ordered.*

Notice this paper said audits are "difficult and inefficient" and Fair Vote says "can be manually audited". This is true. However, ordinarily with an audit, one can pick a sample precinct and count it. Period. But with IRV, the number of possible vote counts that could be used to tally any IRV election in each precinct or other auditable vote count is equal to $\sum_{i=0}^{N-1} \frac{N!}{i!}$ if N is the number of candidates. With just three candidates, there are 15 possible ballot orderings or subtotals in *each* precinct. One cannot know if the overall IRV results are correct by randomly selecting and counting all the ballots from 1% of precincts, unless all those $\sum_{i=0}^{N-1} \frac{N!}{i!}$ counts for *each* and every precinct, including the unique candidate ranking associated with each of the

$\sum_{i=0}^{N-1} \frac{N!}{i!}$ counts within every precinct or other auditable vote count, are publicly released prior to the audit, in order that auditors could:

1. check the accuracy of all the tallies for all those counts in all precincts for each IRV round, and then that

2. randomly select from all those counts (equal to the number of total precincts times $\sum_{i=0}^{N-1} \frac{N!}{i!}$ which had been previously publicly reported.

Alternatively, Fair Vote is proposing a ballot-selection method to audit an IRV election that (to be publicly verifiable) would necessitate first publicly releasing the ranked vote choices on each and every individual ballot, along with printing a humanly readable identifier on each ballot that could be used to randomly select identifiable ballots. To avoid ballot privacy issues the humanly readable identifiers for each ballot would have to be printed on the ballots after voters cast them. With IRV's more than N! unique ballot preference orders for each precinct, if there were a lot of candidates, then individual voters' ballots could become easier to identify. Then ballots would have to be randomly selected from the entire election contest, including all precincts, so this might not meet California's requirement to manually audit 1% of precincts. See http://www.sos.ca.gov/elections/voting_systems/pearson_rcv_letter_091407_07_0586.pdf

The only other possible way to validly audit an IRV election that takes more than one round to count would be to manually recount 100% of the ballots involved in the election contest. Perhaps since it took San Francisco about a month to count its IRV election, it simply manually counted all the ballots and called it an audit.

9. Dopp: "Could necessitate counting all presidential votes in Washington, D.C.…"

> Fair Vote's rebuttal:
> *If the Electoral College were abolished and IRV were then adopted for future national popular vote elections for president, there would need to be national coordination of the tally in order to know which candidates got the fewest votes nationwide and needed to be eliminated –… Note that voters certainly would be pleased to have a majority winner in elections for our highest office.*

Fair Vote has renamed "counting votes in Washington D.C." to "national coordination of the tally" and our two statements are in agreement. All 3300+ jurisdictions which count votes in a U.S. presidential election would first have to completely count the first choices on all ballots, including absentee and provisional ballots before transmitting first round numbers to Washington DC where these votes would be tallied and the winner of the first round announced, prior to any of the 3300+ jurisdictions being able to count round #2, and so forth. Of course each of these 3300+ jurisdictions have dozens to thousands of precincts in each of them. Alternatively, all the ballots could be sent to Washington DC for counting.

Fair Vote's misleading assertion that "*voters certainly would be pleased to have a majority winner in elections for our highest office"* is probably true. However, IRV does not find majority winners with any reliability. A majority winner occurs when a majority of those who voted in an election cast a vote for the winner. In Australia's IRV system, they find majority winners because Australia requires that all voters fully rank all the candidates, or the ballot is not counted. That a ballot containing a vote for an eligible candidate is eliminated is a violation of a basic principle of democracy and would never be adopted in the U.S. As the Australians know, once you have ranking optional, you can get majority failure. The only method being used that guarantees a majority winner is real top-two runoff voting.

If the same definition that Fair Vote uses for "majority" is used for "unanimous", why not, for the cost of a very complicated counting process, have "unanimous" elections by using IRV and continuing the elimination for one more round, until all the votes are for one candidate?

10. Dopp: "IRV entrenches the two-major-political party system …"

Fair Vote's rebuttal:
IRV neither "entrenches" nor "overthrows" the two-party system. It simply ensures no candidate wins over majority opposition. If a minor party has the support to earn a majority of vote, it can win in an IRV election. If not, it will not win.

IRV makes the continuation of a two-party system highly likely, and IRV has no record of assisting in the overturning of a two-party system, and IRV has several obvious ways in which it helps maintain a two-party system by eliminating minor political parties in the first round, with less risk to the major party candidates, so that major parties can safely ignore minor parties. Observant voters also notice immediately that ranking a minor party candidate first, could cause the early elimination of their major-party favorite, causing their least favorite candidate to win, and so voters quickly learn to rank a major party candidate first. Some information on how IRV entrenches the two-party system in Australia is in this article: http://www.abc.net.au/elections/federal/2004/items/200407/s1162263.htm On the other hand, with an actual top-two runoff, a third party has only to muscle its way to second place to make it into the runoff, giving it a better chance of winning, as opposed to IRV which provides less chance for a minor party to convince voters that it is viable. Fair Votes' response does not say that the Green party won any seats, only that it ran candidates. Could it be that the Green party supports IRV against its own interests? With IRV they are defanged. Political scientist Maurice Duverger observed (See http://rangevoting.org/DuvTrans.html note #3) that the top-2-runoff (2 round) election method is a single winner system which does not lead to 2-party domination, as is shown by historical experience.

Fair Vote's statement that IRV "ensures no candidate wins over majority opposition*"* is misleading because a candidate with more opposition than any other candidate could win an IRV election. In a simple 12 voter example in appendix A above, 11 voters prefer the Democrat over other candidates; 10 voters prefer the Green over other candidates; 9 voters prefer the Libertarian over other candidates; and only 6 voters prefer the Republican over others candidates; 6 voters rank the Republican dead last; 3 voters rank the Libertarian dead last; 2 voters rank the Green party dead last; and 1 voter ranks the Democrat dead last. Yet the Republican and Green party candidate tie for first place!

In Australia, it appears there were 9 Green "pair-wise majority winners" but IRV forced every single one of them to lose. Yet Richie considers it a "success" that the Green party "contested" and "won 8% of the vote" but did not win a single seat? The Greens are strong in Australia because of other elections in their senate which are not held using IRV.

11. Dopp: "Could deliver unreasonable outcomes…."

Fair Vote's rebuttal:
Unreasonable outcomes are less likely with IRV than with any other single-seat voting method in use today. Every single voting method ever proposed can deliver "unreasonable outcomes" in some scenarios, but real-world experience has shown IRV to be one of the best methods. The overwhelming number of election method experts agree that IRV is fairer and more democratic than plurality voting even if some might prefer other theoretical voting methods.

Fair Vote says "IRV is fairer and more democratic than plurality voting…" Sure, fairer than plurality voting, better than diving into a swimming pool with no water in it. Better than dictatorship. But is IRV fairer and more democratic than other methods in use today, such as "top-two runoff"? Absolutely not. Is IRV fairer and more democratic than other available voting methods including approval, Borda count, Condorcet, or range methods? Absolutely not.

Fair Vote's rebuttal:
The American Political Science Association (the national association of political science professors) has incorporated IRV into their own constitution for electing their own national president. Robert's Rules of Order recommends IRV over plurality voting.

Look at the APSA constitution and, sure enough, you will find a provision that if there are three or more candidates for the office of President-Elect, the "standard method of the alternative vote" is to be used, and the method is described. The method is loosely IRV. However, how does the APSA actually elect its Presidents? The President, with the advice and consent of the elected Council, appoints a Nominating Committee which names a single nominee. If there is no other nominee, this candidate is elected at the Annual Meeting. However, it is possible to nominate other candidates by petition. The last time there was a petition candidate was about 40 years ago. In order for the APSA to use IRV, there would have to be a second petition candidate. The chances of that can be estimated at once in every 1600 years.

Wait, what about the elected APSA Council? They are elected by plurality-at-large. Voters vote for as many seats as are open and the candidates with the most votes win. So the APSA is actually not using IRV. They are using plurality. Period.

Next, Robert's Rules of Order do not actually recommend IRV. It says that "preferential voting" gives fairer results than plurality voting if it is considered impractical to used repeated balloting, which is what Roberts Rules actually recommend. Robert's Rules states that "there are many forms of preferential voting" and describes the Single Transfer Vote (STV) "IRV-like" method "by way of illustration". Robert's Rules require repeat balloting when no candidate gains a majority of all ballots cast. Then Robert's Rules discusses some of the problems of this specific method: it "deprives" voters of the opportunity to base later choices on the results of earlier rounds (which is provided with top-two runoff) and can fail to find a "compromise winner".

12. Dopp: "Not all ballots are treated equally…"

> Fair Vote's rebuttal:
> *This charge reveals a lack of understanding of how IRV works. All ballots are treated equally. Every one has one and only one vote in each round of counting. Just as in a traditional runoff, your ballot counts first for your favorite candidate and continues to count for that candidate as long as he or she has a chance to win.*

In an IRV "instant runoff" voters who sincerely rank their preferred candidates cannot participate in the instant runoff unless one of their candidates is still in the last runoff. So in the U.S., IRV does not treat all voters equally because voters are likely to only get to participate in the IRV final runoff if the top two leading candidates are among their top three preferences. In addition, some voters' ballots have all their choices counted, other voters' ballots have only their top preference counted. In other words, IRV conceals votes because some votes are never counted in determining the winner. Clearly Fair Vote has a different perspective on the meaning of when voters' ballots are "treated equally". On the other hand, the top two runoff method that IRV often replaces treats all voters' ballots equally by anyone's definition of "equal".

13. Dopp: "Costly. …"

> Fair Vote's rebuttal:
> *The two main expenses associated with the transition to IRV are voting equipment upgrades and voter education. Both of these are one-time costs that will be quickly balanced out by the savings coming from eliminating a runoff election in each election cycle.*

The increased voting equipment maintenance, programming, testing, and upgrade costs of IRV are on-going, not "one-time". If IRV saves so much money, then why did jurisdictions like Oakland adopted IRV "pending implementation"? And why did the Maryland legislature estimate that costs could be as high as an additional $3.50 per registered voter in their 2006 IRV bill, and a little less in the 2008 bill which did not include the cost of software, as cited earlier in this paper? While IRV supporters in North Carolina are claiming that the pilot was a success, why did no NC counties decided to participate in the 2008 county-elections IRV pilot?

IRV is being promoted by Fair Vote to replace plurality voting, not just to replace top-two runoff elections. Not every election requiring a majority candidate necessitates a runoff election. And because IRV does not always find a majority candidate, another runoff could be necessary after the IRV election anyway.

In nonpartisan elections, IRV tends to simply ratify the results of the first round because the vote transfers tend to happen in the same ratio as the already existing votes. In other words, if candidate C is eliminated, the C votes will be split in about the same ratio as A and B have already. There are simpler methods to count ranked choice ballots which find majority candidates more often than IRV, such as the Bucklin method. Top-two runoff elections more often cause the original second-place candidate to win the final runoff. Often top-two runoff elections are held during the next general election and are therefore relatively cheap.

Fair Vote neglects to mention the increased costs of manually counting and manually auditing IRV rounds over any other voting method being recommended by voting system experts or in use today.

14. Dopp: "Increases the potential for undetectable vote fraud and erroneous vote counts…"

> Fair Vote's rebuttal:
> *Actually, just the opposite is true, so long as paper ballots (such as optical scan) are used. The reason that any attempts at fraud are easier to detect with IRV is that there is a redundant electronic record (called a ballot image) of each ballot that can be matched one-to-one with the corresponding paper ballot. Cities such as San Francisco (CA) and Burlington (VT) release these ballot files so that any voter can do their own count. Without such redundant ballot records (which are not typical with vote-for-one elections) there is no way to know for certain if the paper ballots have been altered prior to a recount.*

Fair Vote's claim that "there is a redundant electronic record (called a ballot image) of each ballot" is:

1. False, as discussed amply above the alleged "ballot images" are interpreted ballot data,
2. prohibitively costly,
3. would open up new security issues and new avenues for electronic ballot box stuffing, vote tampering and fraud,
4. would require a humanly readable identifier printed on each paper ballot after the voter casts them to "match up" with electronic records,
5. would necessitate extra post-election auditing steps and expense, and
6. certainly does not make fraud "easier to detect" in the absence of post-election manual audits, that are absent in most states, and which IRV makes much more difficult to conduct.

In addition, the complexity of IRV counts makes any patterns caused by vote miscount much more difficult to detect by data analysis methods.

15. Dopp: "Violates some election fairness principles…."

> Fair Vote's rebuttal:
> *This charge reveals either a general lack of understanding, or intentional miss-representation. Every single voting method ever devised must violate some "fairness principles" as some of these criteria are mutually exclusive. …. When the field narrows to the two finalists in the final instant runoff count, the candidate with more support (ranked more favorably on more ballots) will always win.*

> *Some theoretical voting methods may satisfy some "fairness' criteria, such as monotonicity, but then violate other more important criteria such as the majority criterion, or the later-no-harm criterion.*

After making unsubstantiated claims, the rest of Fair Vote's paragraph substantiates the original statement that IRV "violates some election fairness principles". In fact, this second version shows how IRV violates an additional fairness condition, the majority candidate condition that was not shown in the first version.

Sure, it is possible that "all voting methods violate some election fairness principles," but many alternative voting systems, including top-two runoff, range and approval and Condorcet voting methods satisfy many fairness principles that IRV does not satisfy. For instance, some voting systems always find majority winners, pick the pair-wise favorite among all voters, or eliminate the spoiler problem completely, whereas IRV does not do any of these except in particular cases. These same voting systems, besides being fairer in many respects than IRV and plurality voting, are easier to count and to administer and to audit than IRV.

"Later-no-harm", that a voter's lower preference cannot harm the voter's higher preference, is Fair Vote's favorite election criterion. Later-no-harm, however, is incompatible with the basic principles of majority rule, which requires compromise if decisions are to be made. That is because the IRV sequential elimination guarantees that a lower preference cannot harm a higher preference because the lower preferences are only considered if a voter's higher preference candidate is eliminated. Later-no-harm is undesirable because it interferes with the process of equitable compromise that is essential to the social cooperation that voting is supposed to facilitate. If I am negotiating with my neighbor, and his preferred option differs from mine, if I reveal that some compromise option is acceptable to me, before I am certain that my favorite will not be chosen, then I may harm the chance of my favorite being chosen. If the method my neighbor and I use to help us make the decision *requires* later-no-harm, it will interfere with the negotiation process and make it more difficult to find mutually acceptable solutions. On the other hand, the Bucklin method of counting ranked choice ballots causes "later-harm" only if your favorite candidate does not win by a majority in the first round.

For a more detailed rebuttal of Fair Vote's claims, see the full email responses by Abd ul-Rahman Lomax to the election-methods discussion list which will be posted here http://uscountvotes.org/ucvAnalysis/US/RCV-IRV/

[i] Note that "top-two IRV" is not equivalent to "top-two runoff" elections because top-two IRV does not allow all voters to participate in the "top-two IRV" runoff because there may be some voters whose ranked ballot choices do not include either of the top two candidates, and "top-two runoff" elections always find a majority candidate and "top-two IRV" may not.
[ii] There is some debate about the exact definition of IRV. This definition of Instant Runoff Voting is borrowed from http://www.ncvoter.net/irv.html and from Warren Smith.
[iii] "Boxed In" by Peter C. Baker in The Nation magazine discusses Fair Vote's promotion of IRV and discusses some of the flaws of IRV. (June 2, 2008) See https://thenation.com/ or http://rangevoting.org/Baker2BookRev.html IRV was recently promoted in "An Elections Revolution" by Tony Marrero in the Hernando Today, May 27, 2008 http://www2.hernandotoday.com/content/2008/may/27/elections-revolution/
Voters Want Choices. And They Want to Be Heard. That's why Ranked Choice Voting makes so much sense. http://seattleweekly.com/2008-06-04/music/voters-want-choices-and-they-want-to-be-heard/ IRV is being promoted for local elections. See http://www.ncga.state.nc.us/gascripts/BillLookUp/BillLookUp.pl?Session=2007&BillID=S1692 and http://www.ncga.state.nc.us/gascripts/BillLookUp/BillLookUp.pl?Session=2007&BillID=H2413
[iv] According to Warren Smith, spoilers can exist in Plurality, IRV, Borda, and Condorcet voting methods but do not exist in Approval and Range voting methods.
[v] See "A Test Drive of Voting Methods" by William Poundstone http://www.mathaware.org/mam/08/PoundstoneMAMessay.pdf
[vi] Fairness conditions #1 and #2 have been attributed to Kenneth Arrow. Arrow's theorem requires a ranked order voting system that allows two candidates to be ranked equally that does not apply to all voting methods. See http://www.encyclopedia.com/doc/1O87-Arrowsimpossibilitytheorm.html Fair Vote's web site incorrectly states that "In 1952, Kenneth Arrow, a professor emeritus of economics at Stanford University in Palo Alto, Calif., proved that *no* voting system is completely free from counterintuitive outcomes. " See http://www.fairvote.org/op_eds/science110202.htm According to William Poundstone, "If you make a separate-but-parallel assumption, that voters are willing and able to rate the candidates on a numerical scale, as is done in range and approval voting, there is no problem in devising a fair system. This result can be demonstrated much more simply and is hardly Nobel-worthy (though it's been acknowledged by Nobel laureates such as Amartya Sen)."
See Arrow's theorem http://en.wikipedia.org/wiki/Arrow's_impossibility_theorem#Statement_of_the_theorem or this discussion of it http://rangevoting.org/ArrowThm.html Plurality is a special case of IRV. William Poundstone says "Imagine we have a voting system where everyone is instructed to rank all the candidates, from first to nth choice, but the tallying rule says that we ignore all the rankings except first-place choices. The rule is, whichever candidate has the greatest number of first-place choices wins. This system is covered by Arrow's theorem, and it's easy to see that, for all practical purposes, it is equivalent to plurality voting. (With plurality, we don't bother to ask people for their lower choices because they're irrelevant to determining the winner.) Arrow's theorem applies to every system that uses ranking information and nothing but ranking information. This includes systems that discard some of the ranking information, as plurality does. But range and approval use fundamentally different types of information (absolute judgments on how acceptable a candidate is) and thus are not covered [by Arrow's theorem]." See http://rangevoting.org/Lorenzo.html Arrow defines a social welfare function which aggregates voters' preferences into a single preference order from the set of individual voter preference orders. See http://www.encyclopedia.com/doc/1O87-Arrowsimpossibilitytheorm.html
[vii] This fairness condition is attributed to Kenneth Arrow. See http://condorcet.org/rp/arrow.shtml
[viii] Ibid note vi
[ix] To be precise: IRV can select the candidate as the winner whom the largest number of voters would choose as the "worst" candidate. This is easy to test by anyone using a paper and pencil or a spreadsheet to try out various situations counted by IRV.
[x] As Warren Smith explains "In fact when you have two-party domination, IRV works fine since all the minors get eliminated first and then the most popular major wins. The problem arises when the third-party candidate actually has a chance. In THAT case, "IRV spoiler" scenarios happen. If voters try to avoid them then we return to two-party domination. (If they do not avoid, then we get "wrong winner" spoiler scenarios.) So the IRV two-party-domination trap is more subtle than the 2PD trap in plurality voting, but history indicates it is still effective."
[xi] See "A Test Drive of Voting Methods" by William Poundstone http://www.mathaware.org/mam/08/PoundstoneMAMessay.pdf
[xii] Instead if there were 4 candidates, there would be 3 rounds and 4 raised to the 3rd power or 64 possible subtotals for each precinct which might be used to count the votes during the rounds, depending on the results of prior rounds. This complexity makes plenty of opportunity for counting mistakes.
[xiii] Warren Smith has created a web page explaining the need for centralized counting procedures here: http://rangevoting.org/IrvNonAdd.html
[xiv] According to Ph.D. computer scientist/voting system expert Doug Jones of the U. of Iowa, "Diebold's older op-scan systems can do this (4 or 8 sensors per inch horizontally across the page), while the old ES&S and Sequoia scanners can't (only a few sensors across the page, one per column of names on the ballot)."

[xv] Rob Richie of Fair Vote said: “what we … run into, is the basic problem of a jurisdiction deciding to go that direction [use IRV] and then its voting equipment not being able to handle it [IRV]” and “For an instant runoff election, a rank choice ballot for an optical scan counting system, the essential thing it needs to do, is capture the ballot image of each voter’s ballot, ... And what we found was, actually a lot of optical scan systems don’t capture ballot images.” And “I guess the point I wanted to highlight is that, there is an issue of how to create procedures that anticipate risk, like the risk of paper ballots being destroyed or, either accidentally or maliciously, how it would change.” See “United States Election Assistance Commission Public Meeting Voting Integrity Advocates Roundtable Discussion” April 24, 2008 http://www.eac.gov/News/meetings/News/meetings/EAC%20Roundtable%20042408.pdf
[xvi] “Voter finds new system frustrating” Oct 19, 2007, Harrison Metzger Times-News, Hendersonville: Bill Modlin wasn't happy with his first experience with the new "instant runoff" voting when he cast his ballot for Hendersonville City Council on Thursday. ..."It doesn't make any sense to me, and I can guarantee you because of the way they have it set up there are people in this town that are going to lose their vote," he said. ..."I call it instant confusion," he said. http://www.blueridgenow.com/article/20071019/NEWS/710190361 (Cached at http://www.ncvoter.net/downloads/IRV_Oct_19_Voter_finds_new_system_frustrating.pdf). Also "To stem runoff votes, new ballots have voters rank top 3" Oct 17, 2007 by Jordan Schrader, USA TODAY. CARY, N.C. - Winning candidate Frantz said he heard from many confused voters on the campaign trail.” I found myself, when I was at some places, that's all I was doing … explaining the new voting system," he said. http://www.usatoday.com/news/politics/2007-10-17-Runoff_N.htm (Cached at http://www.ncvoter.net/downloads/IRV_Oct_17_USAToday_To_stem_runoffs_new_ballots.pdf) A sample ballot shows how instant runoff voting will affect the way voters choose Hendersonville City Council members this year. (105 KB) Asheville Citizen Times http://www.ncvoter.net/downloads/IRV_Touchscreen_Ballot_NC.pdf
Also see http://rangevoting.org/SPRates.html When San Francisco adopted top-3-IRV ("as simple as 1-2-3") their ballot spoilage rate in IRV election contests went up significantly versus plurality contests held at the same time and place.
[xvii] The winner of the Cary IRV election contest won with 1401 votes when there were 3022 first-column votes cast for three candidates and a few write-in candidates. See http://msweb03.co.wake.nc.us/bordelec/downloads/cary_irv_results.xls or http://msweb03.co.wake.nc.us/bordelec/downloads/cary_irv_results.htm and the results for Council Member C-B 1 Cary Municipal District B at http://msweb03.co.wake.nc.us/bordelec/downloads/2007OCT_summary-official.htm
It took San Francisco about a month, necessitating an extended canvass period after Election Day to count its IRV votes: “Preferential voting software breaks down in San Francisco: Thu, 4 Nov 2004 10:07:12 PST. In the election of 2 Nov 2004, San Francisco's district supervisor election used ranked-choice voting for the first time. It went just fine on Tuesday during the election. Preliminary results showed candidates in three districts had won by a clear majority (so no re-ranking-rounds were needed), whereas the other four seats remained to be determined by the preferential ballot counting process. The computer processing broke down completely on Wednesday afternoon when election workers began to merge the first, second, and third choices into the program that is supposed to sequentially eliminate low-vote candidates and redistribute voters' second and third choices accordingly.” See http://rangevoting.org/rangeVirv.html It took San Francisco more than two years to implement the system, a process that included making changes to its optical-scan voting machines that required the approval of the secretary of state. In the 1970's, Ann Arbor, Mich., abandoned it [IRV] after one election. See http://www.nytimes.com/2004/09/30/national/30runoff.html San Francisco officials missed a deadline Tuesday to certify the outcome of the local Nov. 6 election after a partial check found too many errors in the tally of absentee ballots run through the city's electronic voting machines. See “Instant Runoff Voting Facts Verses Fiction” http://www.instantrunoffvoting.us/ In Australia it took a month in 2007 to count the difficult election contests.
[xviii] I have asked several alternative voting methods proponents who claim otherwise to generalize the exit poll analysis methods shown in “New Mathematical Function for Analyzing Exit Poll Discrepancy” http://electionarchive.org/ucvAnalysis/US/Exit-Poll-Analysis.pdf and none have yet been able to do so.
[xix] See exit poll analysis methodology described at http://electionarchive.org
[xx] Cary, NC did release some aggregated data which was not useful for analysis because whether or not and when the second, third … choices of voters are relevant for counting or not depends on exactly in what round voters’ first, and second choices were eliminated. See http://msweb03.co.wake.nc.us/bordelec/downloads/cary_irv_results.htm
[xxi] "Critics Take Runoff Concerns To Elections Board" Tuesday, Oct 30, 2007 NBC 17..."What IRV does is violate one of the basic principals of election integrity, which is simplicity," said Perry Woods, a political consultant in Cary. He says a small glitch threw everything into turmoil. Basically, someone counted the same group of votes twice; the error was caught, and corrected after an audit. Wood says his problem is with how they conducted that audit. "In this case, they ended up recounting all the ballots again and calling it an audit," said Woods. "I felt like if they were doing that, the public should have been involved, so no doubt is there." See http://www.nbc17.com/midatlantic/ncn/search.apx.-content-articles-NCN-2007-10-30-0028.html. According to Chris Telesca who observed the IRV counting in Wake County, NC, to hand-process a little over 3000 paper ballots (after the first choice votes were counted on the op-scan machines) when there were only 3 candidates plus a few write-ins for the Cary district B, single member town council seat, and the counting went only two rounds it took 6 sorting stacks for each of 12 ballot groupings or precincts (8 precincts plus absentee by mail in Cary, board of elections one-stop site, the Cary one-stop site, provisional ballots- Cary, and possibly some transfer votes from another

county which were eligible to vote in the Cary IRV contest) or 12 times 6 stacks = 72 stacks. Wake County officials decided to put each stack in a separate plastic bag to keep track. This would not be possible if there were more than one IRV contest because each contest requires independent sorting and stacking to count. The procedure was very complicated, but it was there in print. Even so, the Wake Board of Elections (BOE) didn't follow it. There was no overhead projector so that observers could follow the process. Non Board members were sorting the ballots into stacks which was hard to follow. Nonetheless, observers and the Board came up with different totals at the end of the day. The next day, the different totals were determined to be caused by a calculator error that was discovered in an "audit" – that also discovered a few missing votes. The "audit" – which had to have included going back into the previously sorted/stacked and counted ballots – was not done in public. It took 3.5 hours minimum to do the first expedited processing of the 3000 ballots, not including the non-public "audit". If you proceeded at the same pace for a county commissioner election in 2008, it could take three teams of counters 350 hours to sort/stack and count 300,000 ballots for just one election contest. That is just ten hours short of nine weeks – more time than it would take to hold a runoff election 4 to 6 weeks later. See http://www.carynews.com/front/story/7368.html and http://www.newsobserver.com/630/story/735578.html and http://www.newsobserver.com/630/story/739547.html

See also the "Instructions on counting optical scan IRV ballots" on pages 1- 3, and sample ballots on page 5 (provided by the Rocky Mount Telegram) http://www.ncvoter.net/downloads/IRV_Optical_Scan_Ballot.pdf and "2007 PILOT PROGRAM iVOTRONIC *TOUCH SCREEN) METHODOLOGY" (an illegal work around that was not used but was devised for Hendersonville, NC) http://www.ncvoter.net/downloads/Henderson_County_IRV%20Tabulation.pdf

It took San Francisco about a month, necessitating an extended canvass period after Election Day to count its IRV votes: "Preferential voting software breaks down in San Francisco: Thu, 4 Nov 2004 10:07:12 PST. In the election of 2 Nov 2004, San Francisco's district supervisor election used ranked-choice voting for the first time. It went just fine on Tuesday during the election. Preliminary results showed candidates in three districts had won by a clear majority (so no re-ranking-rounds were needed), whereas the other four seats remained to be determined by the preferential ballot counting process. The computer processing broke down completely on Wednesday afternoon when election workers began to merge the first, second, and third choices into the program that is supposed to sequentially eliminate low-vote candidates and redistribute voters' second and third choices accordingly." See "Ranked-Choice Voting and Flawed Ballots Tax San Francisco's Election" Kat Zambon, 11/9/2007 http://www.votetrustusa.org/index.php?option=com_content&task=view&id=2639&Itemid=113 See http://rangevoting.org/rangeVirv.html It took San Francisco more than two years to implement the system, a process that included making changes to its optical-scan voting machines that required the approval of the secretary of state. See http://www.nytimes.com/2004/09/30/national/30runoff.html San Francisco officials missed a deadline to certify the outcome of the local Nov. 6 election after a partial check found too many errors in the tally of absentee ballots run through the city's electronic voting machines. See "Instant Runoff Voting Facts Verses Fiction" http://www.instantrunoffvoting.us/ In Australia it took a month in 2007 to count the difficult election contests. In the 1970's, Ann Arbor, Mich., abandoned it [IRV] after one election.

[xxii] Wake County, North Carolina claims to have audited the Cary IRV vote count the day after the official public count, but that audit was not performed in public and no one on the Board of Elections staff kept track of the time and manpower required.

[xxiii] A similar problem occurs today in that all county election officials count the votes in their own re-elections or for their replacement. Also see http://rangevoting.org/NPVtrainwreck.html

[xxiv] Examples include Australia (IRV seats are two-party dominated, zero third party members currently in the federal house; even though other NON-IRV seats NOT 2-party dominated, so this makes it quite clear) ditto Ireland and Fiji (but Fiji's democracy recently ended)

[xxv] Another reason is here http://rangevoting.org/KISSirv.html

[xxvi] See "Boxed In" by Peter C. Baker. The Nation's article concludes that "IRV has many flaws". Baker provides an interesting example of another vagary of the IRV method by illustrating how a winning candidate could lose by **gaining more votes** from a losing candidate, thus causing a different candidate to be eliminated in the first round. See https://thenation.com/ or http://rangevoting.org/Baker2BookRev.html

[xxvii] See http://rangevoting.org/TieRisk.html http://rangevoting.org/Monotone.html and http://rangevoting.org/IrvExtreme.html and see also http://zesty.ca/voting/sim

[xxviii] This is shown by the graphical analysis of Ka-Ping Yee http://zesty.ca/voting/sim/

[xxix] Two example elections to illustrate this are http://rangevoting.org/CoreSupp.html and http://rangevoting.org/rangeVirv.html#nasty

[xxx] These costs came from an e-mail from Scott Kennedy that referred to the 2008 bill cost study: Revision of documentation - $3 million, Agency IT systems - $4.5 million (assuming extensive revisions to much of the State Board's election management system, including considerable expansion of data sets and the reporting of data), Judge training development - $50,000, Voting system – undeterminable at this time, Voter education - $2.1 million. Chris Telesca of North Carolina notes that the first year costs in MD for the 2006 bill were $11,050,000 and $1,500,000 each year after that but the cost of the software was not included in the estimates. MD has approximately 3,135,773 registered voters. See

http://mlis.state.md.us/2006rs/fnotes/bil_0002/sb0292.pdf Most voting systems do not have IRV compatible software. For instance, North Carolina's voting equipment does not have IRV compatible software and none is available according to Keith Long, the Voting Systems Project Manager for the NC State Board of Elections. See http://www.ncvoter.net/downloads/Keith_Long_Machines_Not_IRV_Compatible.pdf IRV advocates often claim "IRV is cheaper than (non-instant) runoffs". That claim can be true, but also can be false because the multi-round runoffs involve simpler (plurality-style) voting for which the old machines suffice. The main reason their claim is misleading is that we usually in the USA have only one round so the comparison with multi-round elections is with a spurious straw man. For the MD Legislature fiscal notes for SB0233 in 2001, see http://mlis.state.md.us/PDF-Documents/2001rs/fnotes/bil_0003/sb0233.PDF or http://mlis.state.md.us/2001rs/fnotes/bil_0003/sb0233.doc. For fiscal notes for SB 292 in 2006, see http://mlis.state.md.us/2006rs/fnotes/bil_0002/sb0292.pdf. And for HB 1502 in 2008, see http://mlis.state.md.us/2008rs/fnotes/bil_0002/hb1502.pdf

Although a single IRV election could be cheaper than two elections (original plus runoff) runoff elections may only be needed rarely depending on the requirements of the jurisdiction, so the expense ratio on average is not anywhere near 2-to-1, and hence the expense of switching to IRV would usually exceed any savings in jurisdictions which conduct runoffs, for a long time (and perhaps forever considering the need to replace and update voting machines and the extra cost of manual audits). See http://rangevoting.org/Irvtalk.html

[xxxi] election-methods@lists.electorama.com See http://rangevoting.org/

[xxxii] http://www.burlingtonfreepress.com/apps/pbcs.dll/article?AID=/20080404/NEWS/80404029/-1/NEWS05