If Peltola had more votes, she would have lost

Alaska (& Utah & Vermont)'s Instant Runoff Election Pathologies:
A warning to all other States to prefer Score Voting

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ABSTRACT. Alaska's August 2022 special election, won by Mary Peltola, was its first statewide instant runoff (IRV) election. We demonstrate a large number of horrific paradoxes, pathologies, problems, and widely publicized lies and misconceptions about this election. For example the election was "non monotonic" in the sense that if 6000 Palin votes had switched to Peltola, that would have made Peltola lose.

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Instant Runoff Voting (IRV)'s severe mathematical defects were brought into focus by Alaska's first statewide IRV election, which elected Mary Peltola to Congress and attracted nationwide attention. Virtually all top figures on all sides lied about and/or failed to notice that. We'll explain the defects and refute the lies. The **lesson** of this for all other states: a better and simpler system is score voting.

The election. Let **B** denote Nick Begich, **S** Sarah Palin, and **M** Mary Peltola; disregard "write-ins." Alaska's IRV election was the lefthand table (M won after IRV eliminated B). If Alaska had stayed with old-style plurality voting ("name one candidate then shut up"), then we'd have the middle election. If Alaska instead had used 5- or 3-level score voting, then (from Alaska Survey Research's July polls) the election would have resembled the righthand tables.

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Instant Runoff

#voters	their vote
26829	B>S>M
15114	B>M>S
11560	B
33761	S>B>M
. 3437	S>M>B
21526	S
46808	M>B>S
4525	M>S>B
24356	M
2970	write-ins

Plurality voting

#voters	their vote
75761	M
58945	S
53756	B

Score Voting

Canddt	4	3	2	1	0	unscored	average score
M	223	215	207	109	79	368	2.47
B	158	360	147	275	224	37	1.96
S	167	275	30	196	525	8	1.47

Canddt	2	1	0	unscored	avg
M	303	200	113	384	1.31
B	310	214	333	143	0.97
S	314	63	613	10	0.70

Winner: In this election, **M won** in all 4 voting systems.
Sources: Alaska Divn of Elections; Alaska Survey Research Corp.
Slight **Discrepancies** between IRV & Plurality data: Alaska's fault not ours.

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(i) Non-monotonicity pathology: "More is less." Suppose 4068 S>B>M voters and 1154 S>M>B voters (i.e. the former regarded S as best, B second, and M worst) change their minds: they now love M and want to help her win. So they raise their ranking of her to "best": their new ranked-choice votes are M>S>B. Paradoxically, that does *not* help M win. Instead, now M

loses and B wins! (In the final IRV round, B defeats M by 2 votes.) A simpler dramatic related paradox pointed out by A.G.Squire & D.McCune is: if 6000 "S" voters change their vote to "M>S," that stops M winning and makes B win.

Whenever this sort of self-contradiction happens, we know IRV was undemocratic in either the pre- or post-modification election (or both). E.g. Begich could justifiably complain: "Wait a minute. I lost to Peltola because she had too *few* votes?!"

(ii) Lying is better than voting honestly: Those 5222 (or Squire's 6000) voters were foolish to provide honest rank-orderings as their votes – they would have gotten the better-for-them IRV winner M by *lying* in their votes to pretend their favorite M was "worst." (And they did.)
   Also, the original election's S>B>M voters were motivated to lie by pretending they preferred their second-choice B over their true-favorite S – e.g. 23000 such lies would have elected the improved-for-them winner B. This latter (but not the former) type of lie also would have worked in the plurality-voting election.

(iii) Staying home is better than voting honestly: The S>B>M voters also would have gotten a better-for-them IRV winner B if 5300 of them had *stayed home*, refusing to reveal their preference for B over the hated M in their votes! I.e. "if there were fewer anti-M voters, M would have lost." A prerequisite for "democracy" to work is that everyone should *want* to vote, hopefully honestly. So it's bad if voting honestly is *worse* for voters than doing nothing.

(iv) The "Utah 2-seat problem": In 2021 Utah held 38 IRV elections in counties and towns, but in many wanted to elect *two* seats. To do so, Utah first elected the IRV winner, then removed him from all rank-order ballots, then re-ran the IRV process to elect the second.   We found 9 such bi-elections. The problem: in 6 of those 9, the second placer in Utah's first IRV count, **disagreed** with the winner of their second IRV count! That paradox recurred here: Palin (S) finished second behind M. She might, therefore, have hoped that if this had been a 2-seat election, she would have won the second seat. Wrong! In fact, the IRV re-run would have made her lose *again*! In that sense Palin was correct that IRV was "rigged against her."

(v) Majority winners? Not with IRV. In Alaska's final IRV "round," M obtained support from 91206 (48.4%) out of the 188462 valid IRV ballots. Note, this fell short of a majority. The IRV ballots show B **beat all rivals** pairwise: he would have won by 87264-79126
if pitted against M in a 2-candidate race, and similarly beat S by 100311-63249.
So if anybody could be branded a "majority winner," it's B. But IRV elected M.

(vi) Un-transparency. Alaska (and hence news media) were unable to determine the winner until 31 August, 15 days after election day. That's much slower than any of Alaska's prior 5 non-IRV elections. And when Alaska finally issued its "OFFICIAL REPORT" on the election, it was pathetically poorly detailed versus priors. For example, in this IRV election there were exactly **9 legal vote-types: B>S>M, B>M>S, B, S>B>M, S>M>B, S,, M>B>S, M>S>B, and M.** So Alaska could tell us the 9 counts of these 9 ballot types, thus specifying the election. Right? Wrong! – their OFFICIAL REPORT refused to say the 9 counts (only 3 were deducible).

The compares with all 5 prior elections, whose reports *did* give counts *fully determining* those elections, then went further by breaking the counts down into district and precinct subtotals, then recounted random precincts manually to detect/protect against possibly-hacked computers. *Finally* on 8 Sept (23 days after election) Alaska released a huge datafile still not telling us the 9 counts directly, but they were deducible from it (except for discrepancies presumably mostly due to a certain relatively small subset of problematic ballots that were counted manually). For IRV, there remained no geographic breakdown and no random-precinct recounting. We were simply asked to take the entire statewide result-claim on trust.

(v) Extreme counting difficulties. We were not the only team trying to use Alaska's datafile to count this election to find the "9 magic counts." There were at least 3 others (plus the State of Alaska itself): E.Pacuit & W.Holliday (Univ.Maryland & U.C.Berkeley), Robbie Robinette (Austin TX), and A.G.Squire & D.McCune (High Pt.Univ. NC & Wm.Jewell College, Liberty MO). Astonishingly, **all 5 teams found disagreeing results!!** Fortunately all these disagreements were only around ±500 votes, small enough not to damage any of our conclusions. But there will be some future election in which they will not be so harmless.

We are not sure which team (if any) were "right" – that question is difficult to answer, and most of us eventually abandoned the effort to obtain a consensus. Subjectively it looked as though Robinette seemed to be doing the best, trying the hardest to carefully read/interpret the details of Alaska election law as well as asking questions of Alaska's voting machine manufacturer Dominion Systems. But others also unveiled various issues, with supporting documentation. The full story is far too complicated to describe here. The closest we came to a consensus was these 9 revised values by Navratil: 27070, 15477, 11263, 34073, 3659, 21240, 47419, 4647, 23733 which note differ slightly from the counts we have used in this paper. Furthermore we are almost certain Alaska almost certainly **dIsobeyed its own laws** about the details of how to count, e.g. Alaska's software probably would not transfer "A>A>A>B" to B after A is eliminated.

Robinette indeed argued that it was **impossible** to determine the 9 counts!! The difficulty arises from the combined effects of (I) voters who cast illegal IRV ballots, possibly including (II) "write in" candidates, (III) how Alaska law says to handle them, and (IV) the fact that Alaska's laws in some circumstances seem to be self-contradictory and/or dead-end into impossible demands. For example, under Alaska law, what any particular IRV ballot says does *not* depend solely on what is written on that ballot(!) – it also depends on the progress of the IRV process itself, i.e. also depends on all the *other* ballots. (If the same ballot were involved in a different election, its meaning would change.) For example, a ballot of form A>B=C>D which note is *not* a valid pure-ordering of {A,B,C,D} would be truncated by Alaska to just "A" – unless, at the moment the "B=C" mattered inside the IRV algorithm, one of {B,C} had already been eliminated. Then Alaska would interpret that same ballot as saying, e.g, "A>B>D." And a ballot ranking "A 1st, B 3rd, C 4th" (note *skipping* rank 2) would be interpreted by Alaska as "A>B>C" because only one rank was skipped, whereas "A 1st, B 4th" would be interpreted as "A" and *not* "A>B" because two ranks were skipped, which is enough for Alaska to change its mind and demand truncation. But if B has already been eliminated by the IRV process, does that mean the "A 1st, B 3rd, C 4th" ballot should now be re-interpreted as "A" *not* "A>C" because effectively two ranks

really are being skipped? And if so, then what precisely does "already" mean? This all really brings a whole new level of nightmarishness that makes the Bush-Gore Florida 2000 supreme-court battle look trivial by comparison.

A fundamental previously-known [problem](#) with IRV C-candidate elections with moderate to large C is they *inherently* are not countable in precincts, and must be counted centrally. With IRV there is *no such thing* as a concise "precinct subtotal" such that central can determine the total election result purely from those subtotals. These Alaska laws can explode that problem to a whole new level of craziness.

Furthermore, they can make it strategic to intentionally cast an "illegal" IRV ballot (which actually *is* legal, albeit only the most educated people would realize that), thus achieving a better winner (from that voter's perspective) than obtainable via any "legal" ballot. That effectively means that Alaska's IRV voting process is *not* IRV, but rather something else, involving new kinds of votes not permitted under old-style IRV rules, which have new effects. These new extra votes and their advantages and properties likely will not be known to 99.9% of the public, leaving the other 0.1% effectively in possession of "cheat codes" for the voting system.

We'll give two **simple example elections** as food for thought. Of course these examples only scratch the surface of an insanely complicated topic.

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WEST		EAST			#voters	their vote
#voters	their vote	#voters	their vote		7	A>B>C>D
6	A	6	C		6	B>A>C>D
4	B	4	B		5	C>B>A>D
3	C>B>A	3	A>B>C		3	D>C=E>B>A
					x	E

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In the election at left the country (pop.26) is divided into two equipopulous districts, the "WEST" and "EAST." In each of those districts by itself, B wins the final IRV round by 7:6. But In the country as a whole, the result is exactly the opposite: B is eliminated and A and C are tied winners. That illustrates the impossibility of "district subtotals" with IRV, and the consequent necessity of central, not precinct-based, counting.

In the $(21+x)$-voter 5-candidate IRV election at right, if $x≤4$, or maybe only if $x≤2$, then E is eliminated before the IRV process needs to worry about the 3 voters who ranked C=E. (Depends on what "needs to worry" means exactly.) Hence the 3 voters' ballots are interpreted as "D>C>B>A." IRV proceeds to eliminate D, then B, whereupon **A wins** by defeating C in the final IRV round by 13:8. If however $x≥9$, then the C=E is treated as an illegal "IRV overvote" so those 3 voters' ballots are truncated to just "D". If x=9 IRV eliminates D, then C, then A, whereupon **B wins** over E in the final IRV round by 21:9. Because our 3 sneaky voters honestly *preferred* B>A, they are happy they included that "illegal" C=E inside their rankings. If they'd "legally" (and honestly) voted D>C>E>B>A, then the hated A would have won. "Illegal" voting paid off. This illegal vote could also pay off in a different manner if $x≥15$.

(Keep in mind, these 3 voters do not know the value of x ahead of time; they want to devise a strategy that works well for many different x.) If x=15 IRV eliminates D, then C, then A, leaving a perfect 18:18 tie between E and B *provided* the IRV rules, noting C is now eliminated, then regard the 3 ballots as "D>E>B>A." And if x>15 then **E wins**, which our 3 sneaky voters again prefer over B.

False public statements about this election and IRV generally.
1. Sen. Tom **Cotton** (R-Ark) tweeted that IRV in Alaska "is a scam to rig elections," complaining "60% of Alaska voters voted for a Republican, but thanks to a convoluted process and ballot exhaustion – which disenfranchises voters – a Democrat 'won'," while **InsideElections.com** falsely [claimed](#) that if merely "half of Begich's 'bullet voters' had instead selected Palin as their second preference, she would have won." In fact, a half-half split by definition would have had exactly zero effect on the M:S margin; and the actual 36:64 split shows M still would have won (95303-93159 over S) even if there had been zero ballot "exhaustion." Plus, M still would have won even if Cotton had somehow [made](#) Alaska use old-style plurality instead of IRV. So S's problem here was not the IRV system. It was that too many voters, even Republican ones, simply disliked her.   (Also, IRV "ballot exhaustion" does not "disenfranchise" anybody who did not intentionally ask to be disenfranchised in that respect.)
2.   Rob **Richie**, head of FairVote (pro-IRV group), in his [only](#) scientific [publication](#), falsely stated "A[n IRV] voter's best strategy is to sincerely rank the candidates" – see (ii) above for three disproofs.
3.   **Palin** [said](#) she was not going to rank any candidates besides herself, and [urged](#) her supporters to do the same. Palin was [correct](#) that refusing to rank further candidates can be advantageous in IRV elections with 4 or more candidates, *but* it's never strategic in a *three*-candidate election. Hence this voting advice was astronomically stupid. And since most S voters preferred B over M, Palin's advice simply hurt her fellow Republican B's election chances without affecting her own. Palin then (what gall!) demanded Begich "do the honorable thing and withdraw before the November election" whereas actually *Palin* was the "spoiler" whose non-withdrawal stopped Begich's win.
4.   Steven **Hill** from the New America Foundation & Richie titled their 26 January 2005 piece in the *San Jose Mercury News* "Instant runoff would end spoiler effect in elections." Since S *was* a "spoiler" in this IRV election (also called a "kingmaker"; by dropping out of the race S would have made B win, but by running she made both B and herself lose) that claim was a lie.
5.   **FairVote**, the pro-IRV advocacy group, claims "IRV ensures a majority winner." False -- see (v). A related [paradox](#) is IRV electing some unique winner, but then after we *reverse* all rankings (e.g. A>B>C ballots become C>B>A), *still* elects him – i.e. the "best" candidate according to IRV, is the same as the "worst" according to IRV! (Evidently FairVote maintains that the "majority winner" is the "majority loser.") Although that particular "**reversal paradox**" did not happen in the present election, it did occur if we define "reversals" as leaving singleton votes ("S") unaltered. (But more correctly, the "reverse" of "S" should be "M=B>S", which unfortunately would be an illegal ballot in Utah & Alaska's IRV systems and hence discarded.)
6. **Peltola** [appeared](#) on MSNBC's *Alex Wagner Tonight* (Sept.1) to say she thought IRV was good since it encouraged election of "middle of the road" candidates rather than "extremists." **Wagner** duly agreed, saying IRV tended to elect "less partisan" candidates. Exactly wrong!

Indeed, Peltola, the first Native Alaskan to hold federal office, and Alaska's first Democratic congressman in 50 years (indeed Alaska had not elected any Democrat to any statewide office since 2008) *was* extreme – for Alaska. And Wagner herself complained within 1 minute (apparently noticing no contradiction) that the other top IRV finisher Palin was "extreme" to the point where Wagner questioned whether Palin could even hope to be a Republican anymore. Meanwhile Steve Schmidt, the senior campaign strategist/advisor to the McCain/Palin 2008 presidential campaign, branded Palin a "serial liar" and the "first of a generation of politicians who live in a post-truth environment"; McCain's family told Palin to stay away from McCain's funeral; her ex-husband endorsed Begich; and the score-voting polls above gave Palin a huge number of bottom-ratings.

| 1 IRV | 2 IRV | 3 score voting |
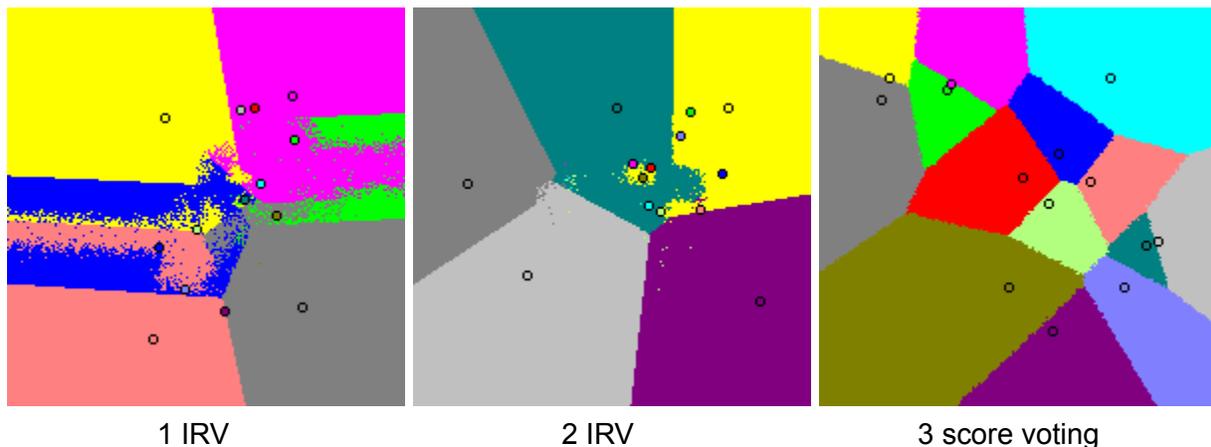
IRV favors extremists and disfavors centrists: Alaska's election was merely one instance. Each "Yee diagram" above depicts 22500 elections, one per pixel. Each pixel's color tells you that election's winner. There are 14 candidates (small colored circles) which are random points in the square. The voters are sampled randomly from bell-shaped ("normal") distributions centered at each pixel. Voters prefer nearer candidates. Pictures 1 and 2 use IRV . As you can see, at most 7 of the 14 candidates ever win, and these winners are always "extremists" (candidates located toward the edges of the square) and not "centrists." No centrist wins even a single one of these 45000 IRV elections, not even with the most-centered voter distributions. In contrast, picture 3 uses score voting. Score exhibits little or no evident bias for either centrists or extremists; all 14 candidates can win, and the shapes of their win-regions make a lot more sense than in the IRV pictures. The fact that the IRV win-regions often are *disconnected* sets – and you can walk upward starting in an orange win-region, then it goes blue, then back to orange, then yellow, then back to blue, then yellow again – seems crazy, and is a symptom of IRV elections often being "non-monotonic," see (i).

These illogical pathologies are common and not unique to this Alaska election. For example the Burlington VT 2009 mayor election exhibited an almost identical set of pathologies, including nonmonotonicity. Burlington repealed IRV one year later. Ireland's 1990 presidential IRV election also appears nonmonotone. The IRV propaganda group FairVote solved this problem

by simply lying: "In terms of the frequency of non-monotonicity in real-world elections: there is no evidence that this has ever played a role in any IRV election -- not the IRV presidential elections in Ireland, nor the literally thousands of hotly contested IRV federal elections that have taken place for generations in Australia, nor in any of the IRV elections in the United States."

Fairvote also calls IRV "**simple as 1-2-3**." As we have shown, FairVote, its alleged IRV-experts Richie and Hill, Cotton, "InsideElections.com," and the top two finishers Peltola & Palin in Alaska's IRV election, all publicly blared falsities about IRV. If even they vastly misunderstand IRV's behavior – even with benefit of hindsight – then what hope is there for Joe Schmoe Voter? And there were only 3 candidates in Alaska (simplest possible). For *really* crazy complex IRV behavior, try more candidates. I'd bet 90% of Alaskan voters had no idea that upranking M from worst to best could actually make M lose – and if they did that and it did make M lose (which might well happen in November's re-election) they should be *angry*.
7 of the 17 Utah IRV races examined by the Navratil-Smith study were so un-simple for voters in 2021 that over 10% of their votes had to be discarded as invalid or altered to become legal. In the 3 worst, the bad-ballot fractions were 38%, 58%, and an unbelievably horrible 75%.

There is, however, a **simple solution:** instead enact **score voting**. As your vote, you provide a numerical score within a fixed range (for example 0-to-9) for each candidate you want to score. Highest average wins.

Score voting is never nonmonotonic. It never has a reversal paradox. Your honest vote always moves all candidate's averages toward your scorings so no part of your vote is ever "wasted." If a loser such as Palin suddenly drops out of the race, then the same ballots, if used for the remaining candidates, will always deliver the same winner (unlike this IRV race, where Palin was a "spoiler"). Anybody finishing second with score, will finish first if the election is redone with the same ballots but with the old winner removed. Score *always* elects a winner who "beats all rivals" pairwise, provided "beats" is reckoned from the same score-set. Isn't it nicer to vote with a system that doesn't contradict itself?

People are used to rating alternatives with 0-9 scores. There is no problem breaking down a score election into dIstrict subtotals. Scoring experimentally is three times faster than ranking, and delivers lower invalid-ballot rates than either IRV or (surprise!) plurality voting. That proves people find scoring simpler. Despite that, score ballots provide *more information* than rankings – you indicate not only your preference order, but also how strong each preference is. Unlike with IRV, you now are allowed to score two candidates equal. Score also allows you (if you want) to express ignorance about a candidate by leaving them unscored. IRV doesn't – if you leave a candidate unranked, IRV interprets that as you ranking him worst, the extreme opposite of expressing ignorance / no opinion. (No pollster would ever be that incompetent – so why should our voting system?)

Honeybees have used score voting for millions of years. I wish human democracies could at least enter the same ballpark as insects.