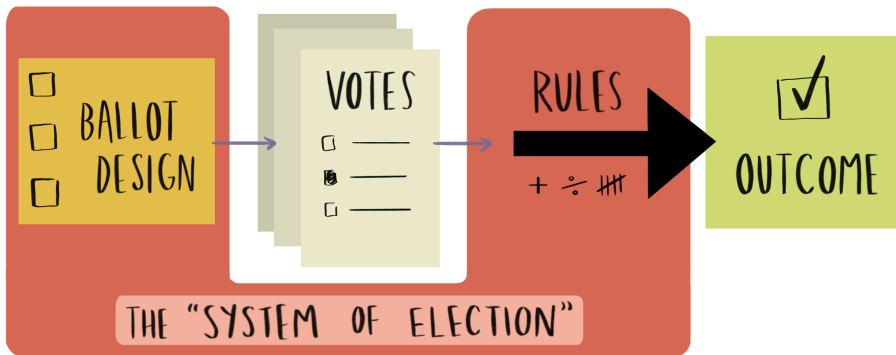


## 20 *Explainer: Ranked choice voting*

THOMAS WEIGHILL AND MOON DUCHIN

In the subject called *social choice theory*, we regard electoral systems (like plurality voting in districts) as sets of rules that convert ballots from voters into a choice of winners or outcomes. The rules matter—the exact same ballots can be subjected to a different set of rules and produce a different outcome, as we’ll see below.

But even before we get to the rules for aggregating the votes, a important element of an electoral system is the form of ballots that voters can cast. On a standard plurality ballot, you have a number of choices and you select just one candidate. On an approval ballot, you can decide whether you approve or disapprove of each candidate, so you can select more than one. On a limited approval ballot, you can select up to a certain maximum number of candidates.



Systems matter.

In this explainer, we’ll explore *ranked choice voting* (RCV), which is the name for all the electoral systems that use a ranked ballot. In other words, voters see a number of choices and they indicate their first choice, their second choice, and so on—though typically they are allowed to stop early and don’t have to include every candidate in the rankings.

Even given ballots of this form, there are still (infinitely) many ways to devise rules to combine the ballots of a group of voters into a choice of winners. In the United States today, the two most common forms of RCV under discussion for practical use are *instant runoff voting* (IRV) and *single transferable vote* (STV). We’ll explain

those below—they are essentially the same system, but used to elect one person or several.<sup>1</sup>

Supporters of RCV tout it as a way to make democracy work better by giving voters more say in their representation, by allowing ballots that better describe their preferences and policy views. The voters are not required to know anything about the algorithm to participate fully in the process. Detractors say that more complicated ballots are nevertheless a barrier to participation.

We'll look at some simple examples of the IRV and STV forms of ranked choice voting and then discuss some other properties of the systems.

## SINGLE-WINNER (IRV)

Why is it so hard for a third party to gain traction in the United States? There are likely many reasons, but one of the most frequently cited is the problem of third-party “spoilers.” Generally, a (weak) spoiler is a candidate who didn't have a chance of winning but nonetheless impacted the outcome among the stronger candidates. This can happen when a newly formed political party ends up hurting the party it most closely aligns with by siphoning enough votes to tilt the election. Let's look at a toy example to see how this works. It's a mayoral election, so there can only be one winner, and there are three candidates: two dogs (the St. Bernard and the Shih Tzu) and one cat. Each animal runs on its own unique platform, but there is a lot of agreement between the dog candidates. Both dogs, for example, are in favor of more fire hydrants for convenient public relief, while the cat would prefer that infrastructure dollars go to scratching posts.

The election takes place, each voter selects just one candidate, and nine ballots are cast (see Figure 1). Clearly the dogs' general platform gained a lot of traction because most voters selected a dog. And yet, it's a cat who won with the most votes overall. The Shih Tzu is branded a “spoiler” because their presence in the race diverted votes away from an ally, the St. Bernard.

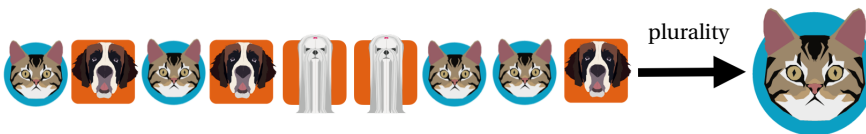


Figure 1: Electing a mayor through “first past the post”: the animal with the most votes wins, namely the tabby cat. The Shih Tzu was accused of being a spoiler.

Ranked choice voting provides a fix for this predicament. Let's run the election again, this time with rankings. The ballots are shown in Figure 2. We first look at only the first place votes: 4 for the tabby cat, 3 for the St. Bernard, and 2 for the

<sup>1</sup>There are many other forms of combining ranked ballots, like Borda count and Schulze beatpath and on and on, each with passionate aficionados.

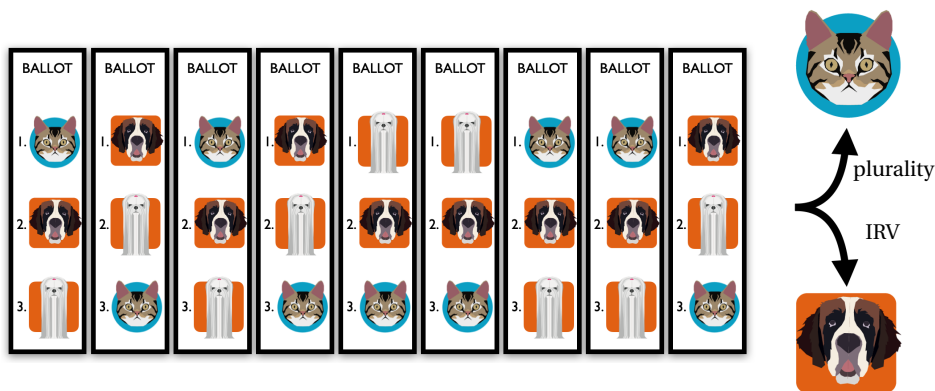


Figure 2: The same plurality votes we saw above might look like this if voters ranked the candidates. If we electing a mayor through ranked choice voting, we get a different outcome: once the Shih Tzu is eliminated, their support *transfers* to the voters' next preference and ultimately identifies a majority coalition for the St. Bernard.

Shih Tzu (just like last time). We check to see if any candidate has a majority of these votes (in this case, five or more); if they do, then they win. In our election, no candidate passes that threshold, so we eliminate the candidate with the fewest first place votes, namely, the Shih Tzu. The votes of those who put the Shih Tzu first are not wasted, though, as we now redirect their votes to their second-choice candidate. New totals: 4 for the tabby cat and 5 for the St. Bernard. We check again for a majority and see that the St. Bernard does indeed have a majority of votes. The St. Bernard wins! Note that even though everyone's first-choice votes remained the same, the fact that voters were able to indicate their other preferences secured victory for St. Bernard.

## MULTI-WINNER (STV)

In the previous example, we were electing a mayor. Ranked choice voting can easily be extended to elections for a larger number of winners, like for a city council or simply for sending several members to a large governing body using multi-member districts. The number of representatives to be elected from one voting geography is called the *magnitude* of the district. Electing more than one winner opens up a new question: to what extent does the makeup of the representatives reflect voter preferences? Will a city where 30% of voters are deeply concerned with affordable housing policy elect a city council where that reform stance has 30% share? This is a form of *proportionality* that we might ask of our systems of election, and supporters of STV frequently argue that this is the key strength of this system.

To see this play out, we'll go back to the example of a town electing cats and dogs, and we'll suppose a high degree of bloc voting: most voters can be classified as dog-lovers or cat-lovers, and they vote accordingly. Let's say three-eighths (37.5%) of the town's residents are dog-lovers, and the rest are cat-lovers. The town wants

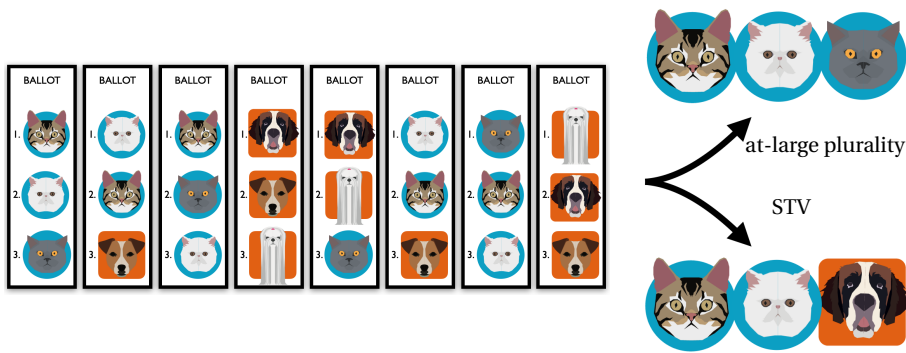


Figure 3: Electing a three-animal council. If we just count who has the most first-place support, we get a cat sweep. But single transferable vote (STV) lets the dog-lovers' votes consolidate on the St. Bernard, and we get a more proportional outcome.

to elect a three-animal town council. In this case, the most proportional outcome would be two cats and one dog. But whether that occurs depends heavily on the system.

Initially, the town used an at-large plurality system, where every voter selects three candidates (to seat the full town council), and the animals with the most overall votes cast for them are elected to the council. Eight ballots were cast, shown in Figure 3, and indeed, cat-lovers showed a lot of cohesion in support of cats. Three cats received four or more votes, and no dogs did, so the three cats are elected. (Here, we're not paying attention to the rankings, but just to who appears on voter ballots at all.) In other words, bloc-voting by cat-lovers secures a complete sweep of the town council seats.

The dog-lovers might reasonably feel unfairly excluded. What if the exact same voter preferences were taken into account in a ranked way? Let's step through the STV algorithm for tabulating the rankings. We begin with first-place votes and check to see if anyone is over the threshold of election. The threshold is the smallest whole number  $T$  of first-place votes that couldn't have too many people clear that level. In this case, four candidates could have two votes each, but you couldn't have four candidates with three first-place votes each, so we set  $T = 3$ . Initially, no animal hits the threshold, but three animals have two votes each. So we eliminate the little Jack Russell terrier, who has no first-place vote support. Next, the Shih Tzu and the gray cat with spooky eyes are eliminated, because they only have a single first-place vote each. Now the voters that ranked those candidates first see their support transfer to the next eligible candidate on the ballot, which gives an extra vote to the tabby cat and the St. Bernard, putting them at the threshold, so they are elected. The method continues in this way: you check who's over the threshold, and if anyone is over, you mark them as being elected and distribute their excess votes.<sup>2</sup> If nobody is over the threshold, you eliminate those with the least support,

<sup>2</sup>To be precise, there are several different ways to manage the redistribution of excess votes. The Wikipedia page on STV [en.wikipedia.org/wiki/Single\\_transferable\\_vote](https://en.wikipedia.org/wiki/Single_transferable_vote) is a good place to start if you want full details.

and redistribute their votes. Continue until you've elected your full complement of representatives!

## PROS AND CONS

There's a lot to like about RCV. In our single-winner example, we saw that RCV can reduce the barriers for additional parties to enter into an election, which many Americans view as favorable, at least at the national level.<sup>3</sup>

In our multi-winner example, we saw that RCV can promote proportional representation in governing bodies. This phenomenon generalizes beyond the very simple example shown here. If you have a sizeable bloc that gives cohesive support to a slate of candidates, they are likely to secure representation roughly proportional to their share of the electorate.<sup>4</sup> Note that this is proportionality promoted by the structural properties of the system, rather than the arranged party proportionality that is popular in other countries through *party list* voting (see Sidebar 2.3 in Chapter 2). This observation is fueling renewed interest in using RCV to promote minority representation across the nation.

It has long been known that at-large plurality voting has a strong tendency to exclude minorities from representation. Localities that decide to move away from at-large plurality (or who are being forced to do so by a Voting Rights Act lawsuit) have traditionally looked to single-member districts as the leading alternative. However, RCV is increasingly being considered as another remedy, as we will see in Chapter 21.

The most frequent criticism of ranked choice voting is that it increases the burden on voters by requiring them to make more choices and to absorb more information. To fully complete a City Council ballot in Cambridge, MA, in 2019, a voter had to assess twenty-two candidates (Figure 4), a daunting task for all but the most avid followers of local politics. Some researchers have argued that this increased cognitive load can cause voters to rely on nonpolicy cues such as race and gender, putting women and people of color at a disadvantage.

A second point against STV is that it can allow for all the representation to come from a small area or neighborhood, so it lacks the geographic distribution that is promoted by the use of a larger number of districts.

There are quite a few other questions around RCV that are hotly debated, like whether the shift to a new form of voting causes changes in voter behavior. See for example the seething polemic—by academic standards—between Donald Horowitz (who argues that RCV reduces racial polarization) and Jon Fraenkel and Bernie Grofman (arguing that this reduction isn't universal). As is the case with a lot of questions about RCV, there are very few good data available to address this question, partly because so few places have adopted RCV.

<sup>3</sup>[news.gallup.com/poll/244094/majority-say-third-party-needed.aspx](https://news.gallup.com/poll/244094/majority-say-third-party-needed.aspx)

<sup>4</sup>This is a well-known “folklore” fact about STV. It is proved as a lemma in Benade et al. [2], and we also demonstrated it in several vote models for approximately realistic voting conditions.

Only one vote per candidate. Only one vote per column.		DO NOT USE RED TO MARK BALLOT														
SUKIA AKIBA, 343 Walden Street		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BURHAN AZEEM, 91 Sidney Street		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DENNIS J. CARLONE, 9 Washington Avenue	Candidate for Re-election	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CHARLES J. FRANKLIN, 162 Hampshire Street		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CRAIG A. KELLEY, 6 Saint Gerard Terrace	Candidate for Re-election	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DEREK ANDREW KOPON, 8 Wright Street		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ILAN LEVY, 148 Spring Street		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ALANNA M. MALLON, 3 Maple Avenue	Candidate for Re-election	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MARC C. MCGOVERN, 17 Pleasant Street	Candidate for Re-election	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
JEFFERY MCNARY, 116 Norfolk Street		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RISA MEDNICK, 20 Maple Avenue		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
GREGG J. MOREE, 25 Fairfield Street		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ADRIANE MUSGRAVE, 48 Haskell Street		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PATRICIA M. NOLAN, 184 Huron Avenue		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
JOHN PITKIN, 18 Fayette Street		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SUMBUL SIDDIQUI, 283 Sidney Street	Candidate for Re-election	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
E. DENISE SIMMONS, 188 Harvard Street	Candidate for Re-election	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BEN SIMON, 67 Bishop Allen Drive		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
JIVAN SOBRINHO-WHEELER, 19 Trowbridge Street		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
TIMOTHY J. TOOMEY, JR., 88 6th Street	Candidate for Re-election	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NICOLA A. WILLIAMS, 8 Brewer Street		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
QUINTON Y. ZONDERVAN, 235 Cardinal Medeiros Avenue	Candidate for Re-election	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
WRITE-IN		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Figure 4: Sample ballot from Cambridge City Council election, 2019. Obtained from [cambridgema.gov/Departments/electioncommission](https://cambridgema.gov/Departments/electioncommission)

The MGGG Redistricting Lab has modeled the effect of RCV on minority representation in Chicago, Lowell, Santa Clara, and Yakima County, and in each case found positive impacts for the representation of people of color.<sup>5</sup>

Research around RCV currently has far more questions than answers, partly because the data sources have been so limited. But as more jurisdictions adopt ranked choice, we'll have more and richer data to go on.

PAST, PRESENT, AND FUTURE

Outside of the U.S., ranked choice voting is used in national elections in Australia, Fiji, Malta, Papua New Guinea, Northern Ireland, and Republic of Ireland.

Within the United States, ranked choice voting has a very interesting history. Single transferable vote used to be quite popular across the country in the early 20th century, but it got stamped out in mid-century—some have argued that its successes getting Black and Communist candidates elected led to backlash during the Red Scare [1]. The only holdout has been Cambridge, Massachusetts, a city of about 100,000 that has used ranked choice continuously since initial adoption in 1941.

Today, ranked choice is a reform on the upswing.<sup>6</sup> About twenty U.S. cities adopted some form of ranked choice between 2000 and 2020, most commonly to elect the mayor by instant runoff. The most prominent recent addition is New York City,

<sup>5</sup>You can check out the collection of case studies on ranked choice here: [mggg.org/RCV](https://mggg.org/RCV).  
<sup>6</sup>The Ranked Choice Voting Resource Center maintains a list of RCV localities, past and present, here: [rcvresources.org/where-its-used](https://rcvresources.org/where-its-used).

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which is now phasing in IRV in primaries and special elections for mayor, city council, and other offices.

In 2018, Maine voters adopted ranked choice for all their statewide elections, but only in IRV form. In 2020, Alaska voters narrowly moved to ranked choice: primary elections will now be nonpartisan, and the top four vote-getters will advance to the general election, where IRV will be used to identify the winner.

Multi-winner ranked choice, though it is the form with proportionality benefits, is still lagging badly behind. Besides Cambridge, only one city council is elected by ranked choice: Eastpointe, Michigan, adopted STV in 2019. But several new state-level Voting Rights Acts leave room for ranked-choice remedies, and as civil rights advocates get more comfortable with the idea, it may become an indispensable new tool, avoiding both the fence-out effects of plurality systems and the gerrymanderable pathologies of districts.

## REFERENCES

- [1] Douglas J. Amy, *The forgotten history of the single transferable vote in the United States*, *Representation*, 34(1): 13–20 (1996).
- [2] Gerdus Benade, Ruth Buck, Moon Duchin, Dara Gold, and Thomas Weighill, *Ranked choice voting and minority representation*, preprint.