

Volume 5, Issue 6 December 2000

Math Against Tyranny

Will Hively

The following article is taken from the 1996 November issue of Discover Magazine. We would like to thank Discover for the great research and writing that went into this article. To read more great articles from Discover, visit them on the web at www.discover.com.

MATH AGAINST TYRANNY By Will Hively From Discover Nov '96 When you cast your vote this month, you're not directly electing the president - you're electing members of the electoral college. They elect the president. An archaic, unnecessary system? Mathematics shows, say one concerned American, that by giving your vote to another, you're ensuring the future of our democracy.

"One morning at two o'clock," Alan Natapoff recalls, "I realized that I was the only person willing to see this problem through to the end." The morning in question was back in the late 1970s. Then as now, Natapoff, a physicist, was spending his days doing research at MIT's Man-Vehicle Laboratory, investigating how the human brain responds to acceleration, weightless floating, and other vexations of contemporary transport. But the problem he was working on so late involved larger and grander issues. He was contemplating the survival of our nation as we know it.

Not long before Natapoff's epiphany, Congress had teetered on the verge of wrecking the electoral college, an institution that has no equal anywhere in the world. This group of ordinary citizens, elected by all who vote, elects, in turn, the nation's president and vice president. Though the college still stood, Natapoff worried that sometime soon, well-meaning reformers might try again to destroy it. The only way to prevent such a tragedy, he thought would be to get people to understand the real but hidden value of our peculiar, roundabout voting procedure. He'd have to dig down to basic principles. He'd have to give them a mathematical explanation of why we need the electoral college.

Natapoff's self-chosen labor has taken him more than two decades. But now that the journal Public Choice is about to publish his groundbreaking article, he can finally relax a bit; he might even take a vacation. In addition to this non-technical article, which skimps on the math, he's worked out a formal theorem that demonstrates, he claims, why our complex electoral system is "provably" better than a simple, direct election. Furthermore, he adds, without this quirky glitch in the system, our democracy might well have fallen apart long ago into warring factions.

This month many of us are playing our allotted role in the drama that's haunted Natapoff for so long. Ostensibly, by voting on November 5, we are choosing the next president of the United States. Nine weeks after the apparent winner celebrates victory, however, Congress will count not our votes but those of 538 "electors," distributed proportionally among the states. Each state gets as many electoral votes as it has seats in Congress- California has 54, New York has 33, the seven least populated states have 3 each; the

District of Columbia also has 3. These 538 votes actually elect the president. And the electors who cast them don't always choose the popular-vote winner. In 1888, the classic example, Grover Cleveland got 48.6 percent of the popular vote versus Benjamin Harrison's 47.9 percent. Cleveland won by 100,456 votes. But the electors chose Harrison, overwhelmingly (233 to 168). They were not acting perversely. According to the rules laid out in the Constitution, Harrison was the winner.

Some reversals have been more complicated. In 1824, Andrew Jackson beat his rival, John Quincy Adams, by more popular and then more electoral votes-99 versus 84-but still lost the election because he didn't win a majority of electoral votes (78 went to other candidates). When that happens, the House of Representatives picks the winner. In 1876, Samuel J. Tilden lost to Rutherford B. Hayes by one electoral vote, though he received 50.9 percent of the popular vote to Hayes's 47.9 percent; an extraordinary commission awarded 20 disputed electoral votes to Hayes. We've also had some famous close calls. In 1960, John F. Kennedy narrowly beat Richard Nixon in the popular voting, 49.7 percent to 49.5 percent, a smaller margin than Cleveland had over Harrison. But wait: Nixon won more states (Nixon 26, Kennedy and others 24). But no: Kennedy, who won bigger states, went on to win the electoral balloting, 303 to 219. This time we, the people, did not strike out. The popular-vote winner became president.

Clearly, in U.S. presidential elections, it ain't over till it's over. A popular-vote loser in the big national contest can still win by scoring more points in the smaller electoral college. But isn't this undemocratic? Isn't it somehow wrong that a few hundred obscure electors, foisted on a new republic by men of property in powdered wigs, should be allowed to reverse the people's choice?

By 1969, Congress was beginning to think so. After Nixon defeated Hubert Humphrey with a popular margin, again, of less than 1 percent, the possibility of a modern-day winner's being denied the presidency had become so obnoxious to the House of Representatives that it approved a constitutional amendment to abolish the electoral college. The American Bar Association supported the move, calling our current electoral system "archaic, undemocratic, complex, ambiguous, indirect, and dangerous." In the Senate, too, the amendment had broad support. What could be simpler or fairer than electing the president by direct popular vote? Over the next few years the issue lost momentum, but Jimmy Carter's narrow victory over Gerald Ford in 1976 brought it back to life. The League of Women Voters, a host of political scientists, and a large majority of American citizens, according to various polls, all agreed that the electoral college should be abolished. In 1977, though, among those testifying against the amendment was a self-described political nobody from Massachusetts: Alan Natapoff.

Leafing now through the Congressional Record, Natapoff laughs. "The impact of my testimony," he says, "was negligible." He hadn't yet proved his theorem, and the mathematical argument he did present was edited to a "blunted" paraphrase, leaving out some of his most important arguments. The electoral college survived, of course, but not because of anything Natapoff said. After a decade of sporadic debate and 4,395 pages of testimony, the bill died in the Senate. It had majority support, but not the two-thirds

majority required to pass it.

The issue will likely catch fire again, though, the moment another popular winner fails to muster the 270 electoral votes needed to clinch victory. “Raw voting, having the president elected by a popular vote, is deep in the American psyche,” Natapoff says. It’s been around since Andrew Jackson finally won the presidency-four years later than he should have, according to 153,544 raw, frustrated voters. “My theorem,” Natapoff admits, “contradicts the common wisdom of our time. Everybody gets this wrong. Everybody. Because we were taught incorrectly.”

Natapoff included. How could a boy who grew up in the Bronx, played ball in the streets, and attended public schools in New York City not have absorbed the common wisdom? Natapoff went on to study particle physics at Berkley. Later, at MIT, he changed his field of research but not his belief in raw, popular democracy. Then one day in the 1960s, he saw an article in *Life* that changed his mind. It quoted political experts who said the electoral college robs voters of their power. But the mathematics these experts were using seemed too simple to support their conclusion. Natapoff looked into the math, and pretty soon he reached the opposite conclusion. Almost always, he convinced himself, our electoral system increases voters’ power. The experts had not considered enough cases; they looked only at unbelievably close elections with two candidates running neck and neck everywhere in the country. Real elections are almost never that closely contested. Some states tilt sharply toward one candidate or another, and the voting power of individuals in each state changes in ways the reformers’ arguments ignored.

The more Natapoff looked into the nitty-gritty of real elections, the more parallels he found with another American institution that stirs up wild passions in the populace. The same logic that governs our electoral system, he saw, also applies to many sports-which Americans do, intuitively, understand. In baseball’s World Series, for example, the team that scores the most runs overall is like a candidate who gets the most votes. But to become champion, that team must win the most games. In 1960, during a World Series as nail-bitingly close as that year’s presidential battle between Kennedy and Nixon, the New York Yankees, with the awesome slugging combination of Mickey Mantle, Roger Maris, and Bill “Moose” Skowron, scored more than twice as many total runs as the Pittsburgh Pirates, 55 to 27. Yet the Yankees lost the series, four games to three. Even Natapoff, who grew up in the shadow of Yankee Stadium, conceded that Pittsburgh deserved to win. “Nobody walked away saying it was unfair,” he says.

Runs must be grouped in a way that wins games, just as popular votes must be grouped in a way that wins states. The Yankees won three blowouts (16-3, 10-0, 12-0), but they couldn’t come up with the runs they needed in the other four games, which were close. “And that’s exactly how Cleveland lost the series of 1888,” Natapoff continues. “Grover Cleveland. He lost the five largest states by a close margin, though he carried Texas, which was a thinly populated state then, by a large margin. So he scored more runs, but he lost the five biggies.” And that was fair, too. In sports, we accept that a true champion should be more consistent than the 1960 Yankees. A champion should be able to win at least some of the tough, close contests by every means available-bunting, stealing,

brilliant pitching, dazzling plays in the field-and not just smack home runs against second-best pitchers. A presidential candidate worthy of office, by the same logic, should have broad appeal across the whole nation, and not just play strongly on a single issue to isolated blocs of voters.

“Experts, scholars, deep thinkers could make errors on electoral reform,” Natapoff decided, “but nine-year-olds could explain to a Martian why the Yankees lost in 1960, and why it was right. And both have the same underlying abstract principle.”

These insights came quickly, but it was many years before Natapoff devised his formal mathematical proof. His starting point was the concept of voting power. In a fair election, he saw, each voter’s power boils down to this: What is the probability that one person’s vote will be able to turn a national election? The higher the probability, the more power each voter commands. To figure out these probabilities, Natapoff devised his own model of a national electorate—a more realistic model, he thought, than the ones the quoted experts were always using. Almost always, he found, individual voting power is higher when funneled through districts—such as states—than when pooled in one large, direct election. It is more likely, in other words, that your one vote will determine the outcome in your state and your state will then turn the outcome of the electoral college, than that your vote will turn the outcome of a direct national election. A voter therefore, Natapoff found, has more power under the current electoral system.

Why worry how easily one vote can turn an election, so long as each voter has equal power? One person, one vote—that’s all the math anyone needs to know in a simple, direct election. Natapoff agrees that voters should have equal power. “The idea,” he says, “is to give every voter the largest equal share of national voting power possible.” Here’s a classic example of equal voting power: under a tyranny, everyone’s power is equal to zero. Clearly, equality alone is not enough. In a democracy, individuals become less vulnerable to tyranny as their voting power increases.

James Madison, chief architect of our nation’s electoral college, wanted to protect each citizen against the most insidious tyranny that arises in democracies: the massed power of fellow citizens banded together in a dominant bloc. As Madison explained in *The Federalist Papers* (Number X), “a well-constructed Union” must, above all else, “break and control the violence of faction,” especially “the superior force of an . . . overbearing majority.” In any democracy, a majority’s power threatens minorities. It threatens their rights, their property, and sometimes their lives.

A well-designed electoral system might include obstacles to thwart an overbearing majority. But direct, national voting has none. Under raw voting, a candidate has every incentive to woo only the largest bloc—say, Serbs in Yugoslavia. If a Serb party wins national power, minorities have no prospect of throwing them out; 49 percent will never beat 51 percent. Knowing this, the majority can do as it pleases (lacking other effective checks and balances). But in a districted election, no one becomes president without winning a large number of districts, or “states”—say, two of the following three: Serbia, Bosnia, and Croatia. Candidates thus have an incentive to campaign for non-Serb votes in

at least some of those states and to tone down extreme positions-in short, to make elections less risky events for the losers. The result, as George Wallace used to say, may often be a race without “a dime’s worth of difference” between two main candidates, which he viewed as a weakness but others view as a strength of our system.

The founding fathers were not experts on voting power. Many wanted an electoral college simply because they distrusted the mob. A large electorate, they believed, falls prey to passions, rumors, and “tumult.” Electors were supposed to consider each candidate’s merits more judiciously, not blindly follow the popular will. Nowadays, of course, whoever wins the popular vote in any state wins all the electoral votes in that state automatically (except in Maine, which divides its electoral votes). We no longer need human bodies to cast electoral ballots, Natapoff says. That part of the system is indeed archaic. But it has worked beautifully, he insists, as a formula for converting one large national contest into 51 smaller elections in which individual voters have more clout. The Madisonian system, by requiring candidates to win states on the way to winning the nation, has forced majorities to win the consent of minorities, checked the violence of factions, and held the country together. “We have stumbled onto something that not everyone appreciates,” Natapoff says. “People should understand it before they decided to change it.”

Which is why, late one night a couple of decades back, with a minimum of fanfare, Natapoff appointed himself unofficial mathematician for one of the least popular institutions in America.

Two variables, Natapoff realized, profoundly affect each citizen’s voting power. One is the size of the electorate, a factor that political scientists already recognized. The other is the closeness of the contest, which most experts hadn’t taken into account.

It’s easy to see the effect of size. Your vote matters less in a larger pool of votes: it’s the same drop in a bigger bucket and less likely to change the outcome of an election. However, in a ridiculously small nation of, say, three voters, your vote would carry immense power. An election would turn on your ballot 50 percent of the time. For a simple example, let’s assume that only two candidates are running, A versus B, and each vote is like a random coin toss, with a 50 percent chance of going either way. In your nation of three, there’s a 50 percent chance that the other two voters will split, one for A and the other for B, and thus a 50 percent chance that your single vote will determine the election. There’s also, of course, a 25 percent chance both will vote for A and a 25 percent chance both will vote for B, making your vote unimportant. But that potential tie-splitting power puts all voters in a powerful position; candidates will give each of you a lot of respect.

As a nation gets larger, each citizen’s voting power shrinks. When Natapoff computes voting power-the probability that one vote will turn the election-he is really computing the probability that the rest of the nation will deadlock. If you are part of a five-voter nation, the other four voters would have to split-two for A and two for B-for your vote to turn the election. The probability of that happening is 3 in 8, or 37.5 percent. (The other

possibilities are three votes for A and one vote for B, a 25 percent probability; three for B and one for A, also 25 percent; four for A, 6.25 percent; and four for B, 6.25 percent.) As the nation's size goes up, individual voting power continues to drop, roughly as the square root of size. Among 135 citizens, for instance, there are so many ways the others can divide and make your vote meaningless-say, 66 for A and 68 for B-that the probability of deadlock drops to 6.9 percent. In the 1960 presidential race, one of the closest ever, more than 68 million voters went to the polls. A deadlock would have been 34,167,371 votes for Kennedy and the same for Nixon (also-rans not included). Instead, Kennedy squeaked past Nixon 34,227,096 to 34,107,646. You might as well try to balance a pencil on its point as try to swing a modern U.S. election with one vote. In a typical large election, individuals or small groups of voters have little chance of being critical to a raw-vote victory, and they therefore have little bargaining power with a prospective president.

So, does this historic example demonstrate how the electoral college compensates for our individual insignificance? Wasn't each vote for Kennedy or Nixon actually more important than the raw vote count suggests, being funneled through the electoral college? If a couple thousand votes had changed in a key state or two . . . ? Actually, no-if the experts' assumptions are true. If each vote really is like a toss of those perfectly balanced coins so beloved by theorists, then districting never boosts voting power. It's actually a useless complication; it slightly reduces individual power. You can see this in a small electorate. If you district a nation of nine into three states with three voters each, with each vote a perfect toss-up, the probability of a deadlock in your state is 50 percent. Your vote would then decide the outcome in your state. Beyond that, the other two states must also deadlock, one going for A and one for B, to make your state's outcome decisive for the nation. The probability of that is also 50 percent. So the compound probability of the whole election hinging on your vote is 25 percent. In a simple, direct election, on the other hand, the national pool of eight other voters would have to split four against four to make your vote decisive. The probability of that happening is 27.3 percent (35/128), giving you more power in a direct election. Districting doesn't help this nation of nine, and it doesn't help any electorate of any size when the contest is perfectly even.

Thus the experts who wanted to reform our system were right, but only if you grant them one large assumption. An electoral college does rob voters of power if everyone, in effect, walks into a voting booth and flips a coin to decide between two equally appealing candidates, Tweedledee and Tweedledum. "But this is an inaccurate model," Natapoff counters. "They were going to change the Constitution based on a narrow finding."

Natapoff decided to push the analysis further, even though the math got harder as he shed convenient, simplifying assumptions. He wanted to know what happens when voters stop acting like ideal, perfect coins and begin to favor one candidate over the other. He could see right away that everyone's voting power shrinks, because the probability goes down that the electorate will deadlock. The national tally is more likely to be lopsided, just as a tail-heavy coin is more likely to come up, say, 60 heads and 40 tails than 50-50.

A general preference for one candidate over the other is like a house advantage in

gambling. “If candidate A has a 1 percent edge on every vote,” Natapoff says, “in 100,000 votes he’s almost sure to win. And that’s bad for the individual voter, whose vote then doesn’t make any difference in the outcome. The leading candidate becomes the house.”

Of course, you might object, voters aren’t really roulette wheels. When you walk into the voting booth, you’ve probably already made up your mind which candidate you’ll vote for. If it’s A, the probability that you’ll pull the lever for B instead isn’t 45 percent, it’s more like 0 percent. Similarly, if your brother-in-law is a strong supporter of B, the probability that he’ll actually vote for B is close to 100 percent, not 45 percent. Although many people get hung up on this part of Natapoff’s argument, it’s not really that hard to understand. Imagine for a moment that you’re not a person at all, but a voting booth. When someone steps in to cast a vote, you have no idea whether that vote will be for A or for B. The voter may have made up her mind long ago, but until she actually pulls the lever, you won’t know whom she’s chosen. All you know is that of the people whose votes you count today, about 55 percent will vote for A and about 45 percent for B. Similarly, a spin of the roulette wheel isn’t really random. The laws of physics, the shape of the ball, the currents in the air, and other factors will all determine where the ball lands. But a gambler can’t calculate those factors any more than a voting booth can know which candidate an individual voter will choose.

In a nation of 135 citizens, says Natapoff, one person’s probability of turning an election is 6.9 percent in a dead-even contest. But if voter preference for candidate A jumps to, say, 55 percent, the probability of deadlock, and of your one vote turning the election, falls below .4 percent, a huge drop. If candidate A goes out in front by 61 percent, the probability that one vote will matter whooshes down to .024 percent. And it keeps on dropping, faster and faster, as candidate A keeps pulling ahead.

The next step is the kicker. The effect of lopsided preferences, Natapoff discovered, is far more important than the size effect. In a dead-even contest, remember, voting power shrinks as the electorate becomes larger. But a 1 or 2 percent change in electorate size, by itself, doesn’t matter much to the individual voter. When one candidate gains an edge over another, however, a 1 or 2 percent change can make a huge difference to everyone’s voting power, giving candidates less of a motive to keep the losers happy. And the larger the electorate, the more telling a candidate’s lead becomes, like a house advantage.

Some people know this from ordinary experience. If you’re gambling in a casino, for instance, you had better keep your session as short as possible; the longer you play, the less likely you are to beat the house odds and break even (let alone win). By the same principle, if you’re flipping a lopsided coin yet looking for an equal number of heads and tails (a deadlock), you had better keep the number of coin flips low; the longer you try with lopsided coins, the more the law of averages works against a 50-50 outcome. And if you’re voting in an uneven election, you had better keep the electorate’s size as small as possible. “If the law of averages has got an edge,” Natapoff says, “it’s going to tell in the long run. And so the idea is not to allow any very large elections if you are a voter. Unless the contest is perfectly even, you want to keep the size of elections small.” The

founding fathers unwittingly did this when they divided the national election into smaller, state-size contests.

So even though districting doesn't help in an ideal, dead-even contest, with voters acting the same all over the country, it does help, Natapoff saw, in a realistic, uneven contest. Sports fans, again, vaguely understand the underlying principle. In a championship series, the contest becomes more equal, and the underdog has a better chance, when a team has to win more games, not just score more points. Similarly, when contesting 50 states, the leading candidate has more ways to lose than when running in a large, raw national election—there are more ways for votes to cluster in harmless blowouts, just as there are more ways for runs or goals to cluster in the seven games of the World Series or the Stanley Cup play-offs. In a big, raw national contest, those clusters wouldn't matter.

The degree to which districting helps, Natapoff found, depends on just how close a contest is. Take as an illustration our model nation of 135, divided into, say, three states of 45 citizens each. When the race is dead even, of course, no districting scheme helps: voting power starts off at 6.9 percent in a direct election versus 6.0 percent in a districted election. But when candidate A jumps ahead with a lead of 54.5 percent, individual voting power is roughly the same whether the nation uses districts or not. And as the contest becomes more lopsided, voting power shrinks faster in the direct-voting nation than it does in the districted nation. If candidate A grabs a 61.1 percent share of voter preference, voters in the districted nation have twice as much power as those in the direct-voting nation. If A's share reaches 64.8 percent, voters in the districted nation have four times as much power, and so on. The advantage of districting over direct voting keeps growing quickly as the contest becomes more lopsided.

Natapoff now had a two-part result. A districted voting scheme can either decrease individual voting power or boost it, depending on how lopsided the coin being tossed for each voter becomes. He found the crossover point interesting. For a nation of 135, that point is right around a 55-45 percent split in voter preference between two candidates. In any contest closer than this, voters would have more power in a simple, direct election. In any contest more lopsided than this, they would be better off voting by districts. How does that crossover point shift, Natapoff wondered, as electorate size changes?

For very small electorates—nine people, say—he found that the gap between candidates must be very large, at least 66.6 to 33.3 percent, before districting will help. That's why raw voting works well at town meetings, where electorates are so small. As the number of voters gets larger, the crossover point moves closer to 50-50. For a nation of 135, voters are better off with districting in any race more lopsided than 55-45. For a nation with millions of voters, the gap between candidates must be razor-thin for districting not to help. In the real world of large nations and uneven contests, voters get more bang for their ballot when they set up a districted, Madisonian electoral system—usually a lot more.

Now, try to imagine a bleary-eyed Natapoff working through the math for case after case. He finds out what happens as the size of the electorate changes, as the contest gets more or less lopsided, or as the method of districting changes (in his most favored nation of

135, you could have 3 states of 45 citizens each, 45 states of 3 citizens each-even 5 states of 20 and 7 states of 5). All these things affect voting power. Natapoff's theorem now covers all cases. "The theorem," he sums up, "essentially says that you're better off districted in any large election, unless every voter in the country is alike and very closely balanced between candidates A and B. In that very extraordinary case, which rarely if ever occurs in our elections, it would be better to have a simple national election."

Natapoff had finally answered, to his satisfaction, the question that had nagged him for decades. But what size, shape, and composition should our districts have? Like everyone else who delves into electoral politics, Natapoff could see that the actual, historic United States is not a perfectly districted nation. For one thing, states vary enormously in size. Natapoff can solve his equations to find an ideal district size for the purpose of national elections, assuming that each vote, like a coin toss, is statistically independent-but the answer depends on an election's closeness. The districts could all be the same size, but only if the preference for one candidate over another is the same everywhere in the country. In general, the more lopsided the contest, the smaller each district, or state, needs to be to give individual voters the best chance of local deadlock. So in close elections, voters in larger states would have more power; in lopsided election, voters in smaller states would. Since some campaigns run neck and neck to the wire while others become blowouts, we will probably never have an ideally districted nation for any particular election, even with equal-size states.

Ideally, too, no bloc should dominate any district. This consideration, by itself, probably makes the 50 states a grid that's closer to ideal for electoral voting than, say, the 435 congressional districts. For example, in heavily black districts, no single white or black person's vote would be likely to change the outcome, if blacks in that district tend to vote as a bloc. Each of those voters, black and white, would have more national power in a districting scheme more closely balanced between black and white. For this reason, Natapoff says, gerrymandering can be counterproductive even when undertaken with the intention of boosting some national minority's power. The gerrymandered district might guarantee one seat in Congress to this minority, but those voters might actually wield more national bargaining power with no seat in Congress if representatives from, say, three separate districts viewed their votes as potentially swinging an election. Anyway, Natapoff says, the point of districting is to reduce the death grip of blocs on the outcome. "This is a nonpartisan proposition," he says. "The idea is to be sure all votes in a district have power." Ideally no single party, race, ethnic group, or other bloc, nationally large or nationally small, will dominate any of the districts-which for now happen to be the 50 states plus Washington, D.C.

Natapoff concedes that the Madisonian system does contain within it one small, unavoidable paradox. Every once in a while, if we use districting to jack up individual voting power, we'll have an electoral "anomaly"-a loser like Harrison will nudge out a slightly more popular Cleveland. He sees those anomalies, as well as the more frequent close calls, not as defects but as signs that the system is working. It is protecting individual voting power by preserving the threat that small numbers of votes in this or that district can turn the election. "We were blinded by its minor vices," he says. "All that

happens is someone with fewer votes gets elected,” temporarily. What doesn’t happen may be far more important. In 1888, victorious Republicans didn’t celebrate by jailing or killing Democrats, and Democrats didn’t find Harrison so intolerable that they took up arms. Cleveland came back to win four years later, beating Harrison under the same rules as before. The republic survived.

One other benefit attributed by Natapoff to our electoral college seems almost aesthetic. As usual, it’s easier to appreciate in sports. In 1960, under simpler rules, the Yankees might have been champions. They might have won, for instance, if there were no World Series but only the scheduled 154-game season, with one large baseball nation of 16 teams instead of two separate leagues. The team winning what most games all year long would simply pick up its prize in October. Instead, here is what happened. By the ninth inning in game seven of the series, the Yankees and Pirates had fought to a standstill—the ultimate deadlock. Each team had won three games. The Yankees had led throughout much of game seven, but Pittsburgh astonished everyone by scoring five runs in the eighth inning, after a Yankee fielding error, to go ahead 9-7. They couldn’t, of course, hold their lead. The Yankees answered with two more runs in the top of the ninth to tie the score at 9-9.

Then, in the bottom of the ninth, Bill Mazeroski, an average hitter without much power, stepped to the plate for Pittsburgh. He seemed a mere placeholder—until his long fly ball just cleared the left-field wall. Rounding second base, halfway home, Mazeroski was leaping for joy, and Pittsburgh fans were pouring from their seats, racing to meet him at the plate. The Yankees had finally toppled. There they were, ahead in the polls, piling up votes like nobody’s business, until one last swing of one player’s bat turned the whole season around. “Everybody regarded it as one of the most glorious World Series ever,” Natapoff says. “To do it any other way would totally destroy the degree of competition and excitement that’s essential to all sports.”