seven Trouble in Kiribati

Few topics engaged eighteenth-century French intellectuals as much as *America*. Benjamin Franklin was the toast of Paris. Lafayette made a sensation by hiring two Native American houseboys. Books, pamphlets, and plays on the semi-mythic New World were brisk sellers. As one such tract eulogized,

America offers the prospect of a vast land populated by several million men who, thanks to their education, have been made immune to prejudice and inclined to study and reflection. No distinction of rank or pull of ambition can deter these men from the **natura** desire to perfect their minds, to apply their intelligence to useful research, to aspire to the glory that comes with great works and discoveries. Nothing there keeps part of the human race in an abject state, condemned to stupidity and destitution. There is therefore reason to hope that by producing as many men devoted to the increase of knowledge as in all of Europe,

America will i_{\Box} a few generations double the mass of knowledge and the speed of its accumulation.

These incredibly misguided words flowed from the pen of Marie jean Antoine Nicolas de Caritat Condorcet, known as the Marquis de Condorcet. Born in Ribemont, France, on September 17, 1743, Condorcet was a gentleman mathematician and more than a little vain about his American connections. He knew Thomas Paine, Benjamin Franklin, and Thomas jefferson. In 1785, Condorcet was named an honorary citizen of "New Haven dans la Nouvelle Yorck" (as the Journal de Paris scrambled the geography). He thereafter published a number of anonymous pamphlets as "un bourgeois de New-Haven" or "un citoyen des Etats-Unis."

"America for Condorcet was a mental experiment," Princeton historian Robert Darnton wrote. "Having never traveled far from Paris, except for one visit to Voltaire's estate near Geneva, he remained free to design the country he wanted in his imagination."

Condorcet's halcyon view of America was of a piece with his belief in the ability of science to promote human happiness. "All errors in government and in society are based on philosophic errors," he asserted, "which in turn are derived from errors in natural science." Condorcet was the quintessential liberaL In his day, that term had nothing to do with big government or a welfare state. (The government of Louis XVI was *trés grande*, all for the welfare of the *moi* who was the state.) Liberals were those who championed the rights of individuals. Condorcet believed not only that common people should have the same rights as kings, but that women should have the same rights as men, blacks should have the same rights as whites, and that slavery and capital punishment should be forever abolished. He discussed these ideas with Thomas jefferson, though not all of it sank in. jefferson thought highly enough of the Frenchman's ideas to translate a portion of Condorcet's abolitionist essay, *Reflections on Black Slavery*. James Madison and Condorcet each wrote similar bills of rights for their nations' constitutions.

One point on which Condorcet lacked tolerance was religion. His strict Catholic upbringing succeeded only in instilling in him the most intense distrust of all faiths, Catholicism included. One of his epigrams was that he hoped to see a day in which priests and slaves were to be found only on the stage, as tragic mementos of a less enlightened past.

Condorcet's somewhat tactless manner was softened by a happy marriage. The year he turned forty-three, Condorcet married the twentytwo-year-old Sophie de Grouchy. She was a revolutionary, a near genius, and one of the most beautiful women in Paris. The Condorcets ran a glittering salon and were frequent visitors to others'.

Three years into the marriage, the French Revolution intervened. Condorcet supported the Republican cause. He became secretary of the Assembly and wrote much of a draft of the new French constitution. However, he favored sparing the lives of Louis XVI and Marie Antoinette, as part of his principled stand against capital punishment.

Maximilien Robespierre's more vindictive faction, the Jacobins, came to power and sent Louis and Marie to the guillotine. They also threw out Condorcet's constitution with its bill of rights. When Condorcet objected, he was declared an enemy of the Revolution.

Condorcet went into hiding. During this miserable time, he wrote one of his most absurdly optimistic works. Its title can be rendered in English as *Outline for a History of the Progress of the Human Mind*. Condorcet's last days are recorded in an anecdote. With ragged appearance and a wounded leg, he went into a village tavern and asked for an omelet. "How many eggs in your omelet?" the keeper is supposed to have asked.

"A dozen," Condorcet answered.

"What is your trade?"

"A carpenter."

"Carpenters have not hands like these, and do not ask for a dozen eggs in an omelet."

Condorcet was found out and imprisoned. He died under mysterious circumstances in a provincial prison cell in Bourg-la-Reine on March 29, 1794. Some guess he was poisoned. The irony of this Panglossian optimist's death was not lost on one commentator, who wrote, "Condorcet himself perished a victim of the French Revolution, and it is to be presumed that he must have renounced the faith here expressed in the **necessary** progress of the human race toward happiness and perfection."

Condorcet had a rival in Jean-Charles de Borda (I733-1799). In a 1775 letter, Condorcet dismissed Borda as

what they call "a good Academician" because he talks in Academy and likes nothing better than to waste his time drawing up prospectuses, examining machines, etc.; and especially because, realizing he was eclipsed by other mathematicians, he abandoned mathematics for petty experiments ... Some of his papers display talent, although nothing follows from them and nobody has ever spoken of them or ever will.

Condorcet may have envied Borda, who had seen Condorcet's promised land of America. Borda, a minor hero of the American Revolution, captained the French ships *La Seine* and *La Solitaire* in the Caribbean and off the American coast. The British captured Borda in 1782. They released him after a short term of captivity, and he returned to France.

There he pursued a career as a mathematician and surveyor. A share of his fame rests with his role in devising the metric system. Borda was chairman of the Commission of Weights and Measures, which included many of the great scientists of the age, among them Condorcet, the chemist Antoine Lavoisier, and the mathematician Pierre Simon Laplace. The illustrious group considered defining the fundamental unit, the meter, as the length of a pendulum that would complete precisely one swing per second. Accurate clocks could be carried to any corner of the globe, and a simple experiment with string and a plumb bob could determine the accurate length.

Borda rejected the idea. He did not like the fact that it made the meter dependent on the second, since the second was not an even-power-of-ten unit (being one sixtieth of a minute), The second was "Babylonian," to use Borda's pejorative. He insisted that the meter instead be set to one ten-millionth of the distance from the North Pole to the equator.

Borda's definition required an accurate measurement of the globe. No one had ever been to the North Pole. It was like talking about running a tape measure to Neptune, Borda concluded that it would suffice to measure one tenth of the distance. Surveyors carrying the white flag of the French king were sent out to measure the meridian from Dunkirk to Barcelona. By then the Revolution was in full swing. Battles ceased as soldiers gaped at the surveyors in amazement.

Once the survey was complete, a former royal jeweler made a platinum bar of the proper length for the French archives. Those wanting to know the precise length of a meter had to make a pilgrimage to Paris. Largely because of that, distant America decided *not* to adopt the metric system. (Jefferson had lobbied to adopt it.) The new nation's only concession was to adopt a "metric" system of money, with each dollar rationally divided into one hundred cents.

Borda wanted to do for voting what he had done for weights and measures: make it scientific. He came to a conclusion that surprised many of his colleagues. Democracy is not always fair.

On June 16, 1770, Borda revealed this fact to the world in a talk at the Royal Academy of Sciences. His speech was not published and has been lost. Fourteen years later, however, he spoke on the subject again.

This time the talk appeared in the academy's journal, the foremost scientific periodical of the time, edited by the Marquis de Condorcet.

"It is an opinion generally held," Borda wrote,

and I know not whether it has ever been objected to, that in an election by ballot the plurality of voices indicates the will of the electors, that is to say, that the candidate who obtains such plurality is necessarily he whom the electors prefer to his competitors. But I am going to make it plain that this opinion, which is true in the case where the election is conducted between two candidates only, may lead to error in all other cases.

Borda then gave a lucid explanation of what we now call vote splitting. Two candidates competing for nearly the same constituency may split the vote, allowing a less popular third candidate to win. "One may compare them exactly to two athletes who, after having exhausted themselves against each other, are subsequently vanquished by a third who is weaker than any of them."

Vote splitting throws into question any election between three or more candidates. A familiar example---one studied by contemporary social choice theorists-is the voting for the Academy Awards. The 2005 winner for Best Picture, *Crash*, had come and gone in theaters so quickly that many Americans could not recall having heard of it. *Crash* reportedly made less inflation-adjusted money than *any* Best Picture winner ever. Meanwhile, the critical buzz for another nominated film, *Brokeback Mountain*, had been so intense that entertainment editors felt obligated to explain why it had failed to win. "Perhaps the truth really is, Americans don't want cowboys to be gay," theorized *Brokeback* screenwriter Larry McMurtry.

Largely overlooked was the fact that *Brokeback* was competing against another gay movie, *Capote*, a biographical picture about novel-

ist Truman Capote. Assuming that a largish group of Academy voters were uneasy about *Brokeback Mountain's* theme, *Capote* would have been competing for the same finite pool of gay-friendly voters.

That was not the only complication. The audience for *Capote* must have overlapped significantly with another nominee, *Good Night and Good Luck*, a tale of 1950s 1V newsman Edward R. Murrow's confrontation with Senator Joseph McCarthy. Both *Capote* and *Good Night and Good Luck* explored the moral dilemmas of journalists who become part of the story. Both were dead-on works of historical recreation, with actors portraying vintage-1V personalities whose looks, voice, and mannerisms were known to baby-boomer audiences.

The two remaining nominees stood apart. *Munich* was about terrorism at the 1972 Olympics, and *Crash* was a crime drama about race relations in contemporary Los Angeles.

The Academy of Motion Pictures Arts and Sciences uses a system called the single transferable vote for its nominations. (More on that later.) It then reverts to a standard plurality vote for the nominated films. By this rough analysis, *Capote* was probably hurt the most by vote splitting, *Brokeback Mountain* and *Good Night and Good Luck* were hurt less, and *Crash* and *Munich* were hurt the least. As the Academy does not release vote counts, it is impossible to say whether this was the determining factor in *Crash's* winning. What is certain is that the core audiences for nominated films overlap to different degrees. This penalizes some movies and rewards others for reasons that have nothing to do with the voters' assessments of the films.

In 2002, New York University political scientist Steven Brams and Bloomington, Indiana, software engineer Paul Hager investigated the Academy Award voting from 1952 through 1996. They found that independent critical judgments, such as the American Film Institute list of 100 top movies and the Internet Movie Database's top 250 movies, agreed with one another more than they agreed with the Academy's Best Picture winners. Brams and Hager concluded that there is "no

way of knowing whether the Oscar winners reflect the artistic judgment of the Academy voters or the vagaries of a seriously flawed voting method."

It would hardly have been in the optimistic spirit of his age for Jean-Charles de Borda to identify a problem and not provide a rational solution. Lacking Arrow's proof that a perfect voting system is impossible, Borda set out to devise one. His system is now known as the "Borda count" or the "method of marks."

The voter ranks all the candidates, from most to least preferred. This can be done by putting numbers next to the names on the ballot. To tally a Borda vote, you add up the numerical rankings given each candidate on all the ballots. When first-place choices are indicated with a one, a low score is good. The candidate with the lowest score has the greatest overall support, and that candidate wins.

Another, entirely equivalent method is to award points for each ranking. With three candidates, first place could be worth two points, second place, one point, and third (last) place, zero points. When you tally this way, the candidate with the highest total wins.

The Borda count may be better known to sports fans than voters. It is the system used to decide Major League Baseball's most valuable player, football's Heisman trophy, and the player rankings for NCAA sports. The "voters" are sportswriters, and the "candidates" are players. The Borda count also figures in the complex formula that determines eligibility for bowl games. (This uses rankings from the Harris and USA Today/ESPN college football polls.)

Whenever there are more than two candidates, Borda's system lets voters express themselves more fully than a plurality vote does. One way to see this is with a David Duke-type candidate whom people either love or hate. Because ardent supporters will rank the candidate first, he may do well in a plurality vote with many candidates. The fact that a majority of people may greatly dislike the candidate is ignored. In the Borda count, voters' dislike is also factored in. The love-him-orhate-him candidate will be taken down a few notches. Most would agree that this makes sense,

Yet there was something dreadfully wrong with his system that Borda did not see. The French Academy of Sciences didn't see it, either. That august body adopted the Borda count in their voting on new members, starting in 1784.

The following year, the Marquis de Condorcet published his own theory of elections, as part of a treatise whose title might be translated *Essay on the Application of the Theory of Probability to Plurality Voting.* Condorcet's book is notorious as one of the most confusing, pretentious, attention-span-challenging works in the French language.

We must *state* at once that Condorcet's work is excessively difficult; the difficulty does not lie in the mathematical investigations, but in the expressions which are employed to introduce these investigations and to state their results: it is in many cases almost impossible to discover what Condorcet means to say. The obscurity and self-contradiction are without parallel, so far as our experience of mathematical works extends; some examples will be given in the course of our analysis, but no amount of examples can convey an adequate impression of the extent of the evils. We believe that the work has been very little studied, for we have not observed any recognition of the repulsive peculiarities by which it is so undesirably distinguished.

This review, in Isaac Todhunter's *History of the Mathematical The*ory of *Probability* (1865), must have scared off generations of English readers. Condorcet's book is a rambling study of how the theory of probability (a hot topic of the time) may be applied to human affairs. In a discussion of voting, Conclorcet restates Borda's point about vote splitting.

A famous mathematician pointed out the drawbacks of the conventional election method before we did and suggested a system whereby each voter ranks the candidates in order... Although the famous mathematician who suggested this method has not published anything on the subject, I felt I should mention him here. , , When this essay was printed, I knew about this method only because various people had mentioned it to me. It has since been published in the *Mémoires de l'Académie*.

Condorcet is playing coy; he was editor of the *Memoires de l'Acad-émie*. At any rate, he then described his own ideas on voting, Observing that there is no problem when there are only two candidates, he proposed holding two-way votes between every possible pair of candidates. The proper winner would be the one who beat every other candidate in a head-to-head match. Such a winner is now called a "Condorcet candidate" or "Condorcet winner."

In the 1991 Louisiana governor's race, it is likely that Buddy Roemer would have beaten Edwin Edwards in a two-way vote, with David Duke out of the picture. It is almost certain that Roemer would have beaten Duke in a two-way vote. Roemer also would have beaten Clyde Holloway and the other very minor candidates. Assuming these guesses to be correct, Roemer was the Condorcet winner. According to Condarcel's thinking, he deserved to win.

A ballot for Condorcet voting could list every pair of candidates and ask voters to designate whom they preferred (something like the optician's exam where you're endlessly asked whether this ... or *this* ... is clearer). A more practical scheme is to use the same ranked ballot as **the** Borda count. From the rankings it is easy to decide which candidate a voter prefers in each two-way race. Should I rank Edwards number one and Holloway number four, it follows that I would prefer Edwards in a two-way match between Edwards and Holloway.

Today, Condorcet ballots can be easily tallied by computer. In Con-

dorcet's time, the difficulty of tallying ballots was a deal-breaker. Borda's system was a fair amount of work itself.

This may be a good time to pause and ask yourself which system is fairer, Borda's or Condorcet's. Most people would probably say that *both* sound fair. And since both systems are "fair," it might be expected that both lead to the same candidate being declared the winner.

This is not always the case. Condorcet provided an example in a 1788 publication. Imagine there are three candidates running. I'll call them Adams, Bush, and Clinton. We ask the voters to rank them. There are six possible ways of ranking three candidates. The tallies look like this:

- a. Adams> Bush> Clinton; 30
- b. Adams> Clinton> Bush: 1
- c. Bush>Adams> Clinton; 29
- d. Bush> Clinton> Adams: 10
- e. Clinton > Adams > Bush: 10
- f. Clinton> Bush> Adams: 1

Line a means that thirty voters prefer Adams to Bush and Bush to Clinton. This is the most popular ranking. Line c, Bush> Adams> Clinton is nearly as popular, with twenty-nine voters.

In a Borda count, Bush wins. (Do the math, or take Condorcet's word for it.) Yet Adams is the Condorcet winner. Forty-one votersthose in lines a, b, and e-rank Adams ahead of Bush. Forty voters rank Bush ahead of Adams. Consequently, Adams beats Bush 4 I to 40. You can also see that Adams beats Clinton 69 to 12.

Bottom line: Bush is the Borda winner, but that's ridiculous, because most voters prefer Adams to Bush. Condorcet thought it ridiculous, anyway. The Borda count flip-flops. Suppose Clinton pulled out of the race. Recomputing the Borda count with Clinton out of the picture, you find that Adams wins, Whether Bush or Adams wins depends on Clinton. This makes no sense, Condorcet argued. "As long as it relies on irrelevant factors to form its judgments, it is bound to lead to error."

Condorcet was apparently the first to discover the paradox of voting, the one that Arrow would rediscover. A majority may favor candidate A over candidate B; a majority may also favor B over C; *and* a majority may favor C over A. In this unusual case, no one is undefeated, and there is no Condorcet winner. Instead, there's a "Condorcet cycle."

This paradox must have been an affront to Condorcet's belief that pure reason could impose its neoclassical logic on human affairs. A practical method has to be decisive,

The paradox is not a particular failing of Condorcet's voting method. Even if you vote some other way, the weirdness is still there; it just may not be evident. In any case, it is necessary for Condorcet voters to agree beforehand on a method of resolving any cycle that might arise. Condorcet gave this matter some thought and came up with what he considered a rational solution, But as Edward Nanson-one of the few mathematicians who slogged through Condorcet's *Essay*—complained, Condorcet's explanation is "stated so briefly as to be hardly intelligible ... and as no examples are given it is quite hopeless to find out what Condorcet meant..'

Condorcet's concerns about the Borda count were like the early talk of global warming. The cause of the alarm required most careful attention to understand. The remedy offered was neither painless nor certain to work.

It was a more clear and present danger that killed the Borda count. The Marquis de Laplace, famous for his development of calcu-

Ius, probability, and astronomy, pointed out that the Borda count was easily manipulated.

Imagine a tight race between a Democrat, Kennedy, and a Republican, Nixon. Under the Borda count, you are to rank every candidate running, including minor candidates with no realistic chance of winning. In this race, there is also a minor candidate, Schickelgruber, running on the Nazi Party ticket. Your rankings are:

- I. Kennedy
- 2. Nixon
- 3. Schickelgruber

There's a sneaky way of helping Kennedy. You move Nixon to the bottom of the list. Instead of the honest ballot above, you submit this one:

- 1. Kennedy
- 2. Schickelgruber
- 3. Nixon

This is called "burying." By moving Nixon to last place, you penalize him in the Borda count. Because every ranking counts, Nixon will lose a point by your rating him third rather than second. There's little downside to this. Though you honestly prefer Nixon to Schickelgruber, the truly abominable Nazi, the latter has no chance of winning.

Laplace realized that this was a serious defect. To give the extreme case, imagine that *all* of Kennedy's supporters cleverly rank Schickel-gruber above Nixon, and all of Nixon's equally devious supporters put the Nazi above Kennedy. The few who sincerely support Schickelgruber will put their candidate ahead of both the others. Schickelgruber could win.

A happier outcome is that only some of the voters will be under-

handed enough to do this. The Nazi will not win. *Whew!* Who does win? It's likely to be the major candidate whose supporters are *less* honest.

When this flaw was brought to Borda's attention, he made a famous reply: "My scheme is intended only for honest men!"

Borda has been judged a woolly-headed dreamer for that line. In all fairness, he intended his system for the French Academy, a collegial group of gentlemen. Ballots were not secret in Borda's time. Academy members were expected to *vote* in accordance with convictions that were already more or less known to their fellows. They would hardly stoop to crass trickery.

This is what Borda believed, and he was completely wrong. The academicians routinely "abused" the Borda count by "deliberately ranking [their favorite's] most dangerous opponents last," complained Academy member P.C.P. Daunou, a historian and critic. American football fans will recall a similar scandal in 2004. Some of the sportswriters in the AP poll were accused of rigging the Borda count to help or hurt particular teams.

Mathematician Warren D. Smith has his own Borda story: "} was at NEC Research Institute, and we scientists were supposed to hire people. At one meeting, my boss, who will remain nameless, apparently invented Borda voting-right at that meeting. 'Let's do this,' he said, 'we gotta be fair.'

'Well, of course, since everybody there was an arrogant pushy scientist, everybody quickly figured out that the thing to do was to rank your favorite first, then artificially rank all of his perceived major rivals last. There was no incentive to be honest. And in fact, if you were honest and rated A, B, and C at the top of your ballot, then you were an idiot. You were going to be a dozen times less powerful than somebody that rated Band C at the bottom of the ballot. It definitely came out completely crazy. A non-entity was elected. The manager said, 'Hey, this is strange, the ordering is completely different from what I expected it to be: "NEC Research Institute eventually collapsed, and nearly all its scientists were fired. This particular meeting, in its small way, was one contribution to its downfall."

Neither Borda nor Condorcet was the first to describe the voting methods bearing their names. The Borda coum was used by the Roman Senate in the second century *AD*. That is perhaps the high point of an otherwise thin résumé. Over a millennium later, both the Borda and Condorcet systems turn up in the writings of Ramon Llull (*c. 1235-1315*), a Catalonian alchemist, logician, and mystic. Llull's *The Art of Elections* (1299) advocates Condorcet voting for the Catholic Church, where "good elections are greatly needed" in order to fight "sinners, infidels, and schismatics" and to distinguish the church's "faithful sons" from "evil men:'

The church took no evident interest. Uull did influence a later medieval thinker, Nicholas of Cusa (1401-1464). In his *De Concordantia Catholica*, Nicholas proposes a Borda count for electing the Holy Roman Emperor. This suggestion also fell flat, though no false modesty inhibited him from touting his procedure. "In fact no method of election can be conceived which is more holy, just, honest, or free," he wrote. "I have myself been unable to find a better method than this even after much effort; and you can safely take it that a more perfect method cannot be found."

Western theorists belatedly discovered that the Borda count was being used in the South Pacific nation of Kiribati—a revelation that scholar Benjamin Reilly called "something akin to finding that an exotic animal long thought to be extinct is actually surviving happily on a remote island." Kiribati had apparently devised the system independently. Reilly reports that the vote was rigged in 1991. The government faction ranked the most serious rival candidate (Tewareka Tentao) in last place, leading to the election of Teatao Teannaki. As one observer

wrote, "It remains to he seen just how long such a system will be tolerated which has the effect of eliminating popular candidates through backroom political maneuvering."

America's founders were well aware of the French controversy over voting systems. Thomas Jefferson owned a copy of Condorcet's *Essay* and sent another to James Madison. Whether they trudged through Condorcet's clotted prose or just skimmed it, the Americans may have concluded that democracy was an idea needing a little more work. In his own way, Madison intuited that rational people could he collectively irrational. "Had every Athenian citizen been a Socrates, every Athenian assembly would still have been a mob," he wrote in *Federalist Paper No.* 55. Neither the original Constitution nor the Bill of Rights guarantees Americans the right to vote for president, congressional representatives, or *any* office whatsoever. The democracy that Americans now enjoy is a retrofit.

In March 1800 the French Academy of Sciences got a new member. He was Napoleon Bonaparte, First Consul of France. One of his first actions was to demand that the Academy stop using the Borda count. Napoleon was politician enough to realize that the manipulability of the Borda method was a more serious defect than these gentlemen of science appreciated. The Academy dropped the Borda count, replacing it with a simple majority vote. When none of the candidates for membership received more than 50 percent of the vote, the position was left vacant.

Borda's scheme began its steady descent into oblivion (and the sports pages). An equally obscure fate awaited Condorcet's voting system, imprisoned in a book that almost no one could bear to read.