ME-05 Voting systems and social choice: what resists strategic capture

The permanent loss of industrial supply chains and the retreat of the bureaucratic state necessitate the reconstruction of governance from the ground up. As human populations reconstruct their political architectures—scaling from the household to the village, the district, and the bioregion—they are confronted by an immutable constraint of human ecology: the persistence of the dark triad traits. Narcissism, Machiavellianism, and psychopathy are deeply embedded phenotypic variations within the human population, occurring at predictable frequencies. Governance structures that rely on the assumption of universal goodwill or the romance of the primitive invariably succumb to strategic capture by these hyper-competitive actors. It is a naturalistic fallacy to assume that because an arrangement is ancient, it is inherently good, or that because a community is small, it is inherently fair. Small, localized communities throughout deep time have frequently been characterized by brutal factionalism, kin-based tyranny, and warlordism.

This document provides an exhaustive foundation for post-collapse political architecture, evaluating the mathematical properties, historical track records, and resistance to strategic manipulation of major social choice mechanisms. The analysis assesses which systems survive the concerted efforts of dark-triad actors to subvert them, prioritizing primary sources, empirical field data, and rigorous computational social choice theory.

The Mathematical Boundaries of Social Choice

The pursuit of a perfect voting system is bounded by mathematical impossibility. Modern social choice theory rests on two foundational proofs that dictate the absolute limits of democratic aggregation.

First, Kenneth Arrow's Impossibility Theorem (1951) demonstrates that when voters have three or more discrete options, no rank-order electoral system can simultaneously satisfy a set of basic fairness criteria: non-dictatorship, unrestricted domain, independence of irrelevant alternatives, and Pareto efficiency[1]. Second, the Gibbard-Satterthwaite theorem (developed independently by Allan Gibbard in 1973 and Mark Satterthwaite in 1975) proves that any deterministic voting system that chooses a single winner from three or more candidates is susceptible to tactical voting, unless the system is a pure dictatorship[2].

These theorems establish a grim baseline for post-collapse governance: there is no mathematically pure system that perfectly translates individual preferences into a collective will without opening avenues for strategic manipulation. Therefore, the defense against dark-triad capture cannot rely on mathematical perfection alone. Instead, it must rely on computational complexity, randomized bottlenecks, information asymmetry, and game-theoretic deterrence.

Condorcet's Jury Theorem: The Baseline of Collective Truth

Before evaluating specific electoral systems, one must understand the foundational premise of

collective decision-making: Condorcet's Jury Theorem. Proposed by Marie Jean Antoine Nicolas de Caritat, Marquis de Condorcet, in 1785, the theorem models a binary choice, such as a guilty or innocent verdict in a trial.
The theorem rests on two axioms. The first is the unconditional competence premise, which assumes each voter has an independent probability $p > 0.5$ of choosing the correct answer. The second is the unconditional independence premise, which asserts that voters make decisions completely independently of one another[3]. Under these exact conditions, the probability of a correct majority decision P_n for an odd number of voters n is defined by the binomial distribution[3]:

$$P_n = \sum_{k=\lfloor n/2 \rfloor + 1}^{n} \binom{n}{k} p^k (1-p)^{n-k}$$

As the number of voters n approaches infinity, the probability of the group making the correct decision approaches an absolute certainty of 1[3].
What proponents argued regarding this theorem was that it provided a mathematical justification for majoritarian democracy, proving the inherent "wisdom of crowds" and suggesting that mass democratic assemblies would inevitably converge on the objective truth. What the historical record shows is entirely different. Crowds and mass juries frequently make disastrous, highly correlated errors, leading to mob rule, mass hysteria, and the election of tyrants.
What modern scholarship infers resolves this contradiction. Modern analysts, notably Bryan Caplan in his 2007 work *The Myth of the Rational Voter*, point out that on complex issues, individual voter competence is systematically biased, meaning p is frequently less than 0.5 [3]. Furthermore, the independence axiom is universally violated in human society. As Romeijn and Atkinson (2011) and Berend and Paroush (1998) note, voters share common causes. They listen to the same charismatic leaders, rely on the same rumors, and conform to peer pressure, rendering their votes highly correlated rather than independent[5].
Capture Test: A dark-triad actor easily captures a Condorcet jury by attacking the independence axiom. Through charismatic populism, intimidation, or control of information flows, the Machiavellian creates highly correlated voting blocks. Once independence is destroyed, the mathematical guarantee of the theorem collapses, and the crowd acts as a single, easily manipulated entity whose collective competence drops below the threshold of a coin toss.

Scale Ledger	Viability	Reasoning
Household (4 to 10 people)	Works	Individuals possess high

		private knowledge ($p > 0.5$) on localized, daily survival tasks.
Hamlet or band (30 to 50)	Works	Peer-to-peer knowledge remains strong; independence is maintained if debate is rigorously open.
Village (150 to 500)	Vulnerable	Informal gossip networks emerge, allowing a single narcissist to correlate the votes of the village.
Parish or district (1,500 to 5,000)	Fails	Voters can no longer personally verify facts, relying entirely on mediated information and local elites.
Town or watershed (15,000 to 50,000)	Fails	Factional polarization guarantees highly correlated voting blocs.
Region or bioregion (0.5 to 5 million)	Fails	Independence axiom is entirely destroyed by regional mass communication.
Nation or continent (50 to 500 million)	Fails	Mass media completely correlates the electorate.
Planet (8 billion)	Fails	Globalized narratives ensure zero statistical independence among voters.

Plurality and the Borda Count: Early Vulnerabilities

The most common electoral system in human history is Plurality (First-Past-The-Post), where voters select one option and the candidate with the most votes wins. Plurality is acutely vulnerable to the "spoiler effect," where two similar candidates split the majority vote, allowing a cohesive, highly disciplined minority faction to elect a polarizing dark-triad leader.
Seeking to remedy this, Jean-Charles de Borda proposed the Borda Count to the Académie Française in 1770[1]. In a Borda Count with n candidates, a voter ranks them from first to last. The first choice receives $n-1$ points, the second $n-2$, down to 0 for the last choice. The points are summed, and the candidate with the highest total wins[1].
What proponents of the Borda Count argued was that the system would always elect the consensus candidate who was broadly acceptable to the entire electorate, eliminating the danger of a polarizing extremist winning with a fractional plurality[9]. What the historical record shows is that within Borda's own lifetime, the Académie Française abandoned the system because voters immediately began voting strategically to manipulate the outcome[9].
What modern scholarship infers is divided. Mathematicians like Donald Saari (1994, 1995) argue the Borda count theoretically minimizes voting paradoxes by guaranteeing transitive preference ordering[9]. However, scholars like McLean and Urken (1995) point out the system is fundamentally flawed in the presence of strategic actors[9]. The strongest case against Borda comes from the Marquis de Condorcet himself, who observed that the system relies on irrelevant factors to form its judgments and is bound to lead to error[9].
Capture Test: A Machiavellian actor easily exploits the Borda Count using two tactics: "truncation" and "cloning." First, voters are instructed by the faction leader to "truncate" their ballots—ranking only the faction's preferred candidate and leaving the rest blank, or strategically ranking the most dangerous, highly-competent opponent dead last (a tactic known as burying) to artificially lower their score[9]. Second, a dark-triad candidate can use "strategic nomination." By running several dummy "clone" candidates who are ideologically identical to themselves, they artificially inflate the total points available in their specific sector of the ballot, mathematically burying the opposition[9]. When confronted with this exact strategic manipulation, Borda himself famously admitted his system was "only intended for honest men"[9].

Scale Ledger	Viability	Reasoning
Household (4 to 10 people)	Works	Transparent face-to-face interaction makes running dummy candidates socially impossible and transparent.
Hamlet or band (30 to 50)	Vulnerable	Factions begin to form; strategic burying of rivals becomes a viable and

		invisible tactic.
Village (150 to 500)	Fails	Slate-making and orchestrated truncation render the mathematical output meaningless.
Parish or district (1,500 to 5,000)	Fails	Political parties fully institutionalize clone candidates to harvest points.
Town or watershed (15,000 to 50,000)	Fails	Strategic manipulation becomes the absolute requisite for any political success.
Region or bioregion (0.5 to 5 million)	Fails	Borda scores become disconnected from actual voter preference entirely.
Nation or continent (50 to 500 million)	Fails	System scales disastrously under mass party discipline.
Planet (8 billion)	Fails	Structurally incapable of handling massive candidate fields without catastrophic cloning.

Approval Voting and Score Voting

Approval voting allows voters to cast an equal vote for as many candidates as they wish, without ranking them. The candidate with the most overall approval votes wins[11]. Score Voting (or Range Voting) is a variation where voters rate candidates on a numerical scale (e.g., 0 to 5), and the highest average wins.

Approval voting saw significant modern empirical adoption in Fargo, North Dakota, which approved the system in a 2018 ballot initiative and subsequently utilized it in 2020, 2022, and 2024 municipal elections[11]. Similarly, voters in St. Louis, Missouri, passed Proposition D in November 2020 with 68.15% support, implementing a unified nonpartisan approval primary[12].

In the March 2021 St. Louis mayoral primary, a field of four candidates competed to replace retiring mayor Lyda Krewson. Tishaura Jones advanced with 51.70% approval, alongside Cara Spencer with 46.35% approval, eliminating Lewis Reed (38.56%) and Andrew Jones (14.42%)[18]. Turnout was exceptionally robust for a municipal election at 29.15%, with 44,571 vote cards cast[18]. The average ballot contained 1.6 approval votes per voter[15].

What proponents argued, led by organizations like the Center for Election Science, was that approval voting eliminates vote-splitting, reduces negative campaigning, and provides a clear mandate, as the winner almost always has the explicit approval of a true majority[12]. What the historical record shows is that in St. Louis, approval voting successfully prevented the spoiler effect that had plagued the 2017 mayoral race, where Lyda Krewson had won a crowded primary with only 32% of the vote against a fractured progressive field[22].

What modern scholarship infers, however, highlights a critical vulnerability known as "bullet voting." In the 2021 St. Louis election, empirical data demonstrated a severe demographic and geographic divide in voting behavior. Voters in predominantly white wards utilized their multiple votes—expressing approval for both Spencer and Jones—while voters in predominantly African-American wards overwhelmingly "bullet voted," casting a single vote for only one candidate (either Jones or Reed) and withholding approval from all others[23].

The strongest case against Approval Voting centers on this exact dynamic. Critics, such as the African American Aldermanic Caucus in St. Louis, warned that the system creates faux consensus candidates and mathematically penalizes voters who honestly express multiple preferences[23].

Capture Test: The dark-triad actor attacks Approval Voting by enforcing strict, cult-like discipline among their followers to "bullet vote"—casting exactly one vote for the dark-triad candidate and zero for all moderately acceptable alternatives. Meanwhile, honest, civic-minded voters spread their approvals across multiple candidates they deem acceptable. The mathematics of the system heavily penalize the honest voters, turning their secondary approvals into weapons that elevate a rival and defeat their primary choice. A psychopath uses extreme polarization and fear to ensure their base bullet votes, functionally reverting the sophisticated system back to a First-Past-The-Post plurality dynamic that favors organized extremism[21].

Scale Ledger	Viability	Reasoning
Household (4 to 10 people)	Works	Highly effective for simple, low-stakes consensus choices (e.g., resource allocation).
Hamlet or band (30 to 50)	Works	Trivial to count by hand without electricity or complex tallies.

Village (150 to 500)	Highly Viable	The best minimal viable product for basic post-collapse elections; highly transparent hand-counting.
Parish or district (1,500 to 5,000)	Viable	Hand-counting scales linearly $O(N)$. Simple paper ballots are easily audited.
Town or watershed (15,000 to 50,000)	Vulnerable	Bullet-voting propaganda and factional discipline become highly effective at this scale.
Region or bioregion (0.5 to 5 million)	Vulnerable	Factional polarization leads to near-universal bullet voting, eroding the system's intended benefits.
Nation or continent (50 to 500 million)	Fails	Devolves entirely into a two-party plurality system due to mass strategic voting.
Planet (8 billion)	Fails	Cannot sustain nuanced preference expression under global polarization.

Ranked Choice Voting and PR-STV

Ranked Choice Voting (RCV), known internationally as the Alternative Vote or Instant-Runoff Voting (IRV), asks voters to rank candidates in order of preference. If no candidate secures an absolute majority of first-preference votes, the candidate with the fewest votes is eliminated. Their ballots are then transferred to those voters' next highest preferences. This process repeats until a candidate surpasses the 50% threshold. When this mathematical mechanism is applied to multi-member districts, it is called Proportional Representation by the Single Transferable Vote (PR-STV).

PR-STV has been used for parliamentary elections in Ireland since the foundation of the state in 1921, and Australia has utilized variations of ranked voting for over a century. In the United States, Maine became the first state to adopt RCV for federal congressional elections in 2018[11]. The 2018 Maine 2nd Congressional District (ME-02) race provided a definitive empirical test. In the first round, Republican incumbent Bruce Poliquin led with 134,184 votes (46.33%) against Democrat Jared Golden's 132,013 votes (45.58%), alongside independent candidates Tiffany Bond (16,552 votes) and Will Hoar (6,875 votes)[24]. Because no candidate reached 50%, Bond and Hoar were eliminated. In the second round, their voters' secondary preferences overwhelmingly transferred to Golden, who won the election with 142,440 votes (50.62%) to Poliquin's 138,931 (49.38%)[25].

What proponents argued was that RCV eliminates the "disruptor" or "spoiler" effect, allowing voters to honestly support third-party candidates without fear of wasting their vote or accidentally helping their least-preferred candidate win[28]. What the historical record shows is that the system operates exactly as designed in preventing plurality victories by polarizing figures. In the Maine 2018 race, the system successfully consolidated the center-left majority behind Golden[26]. In Ireland, the PR-STV system relies on the Droop Quota, defined as $\lfloor \frac{\text{Total Valid Votes}}{\text{Total Seats}+1} \rfloor + 1$. This quota ensures precise mathematical proportionality and prevents major parties from sweeping districts, allowing independent candidates to thrive[29].

What modern scholarship infers highlights the hidden costs of the system's complexity. The strongest case against RCV focuses on "ballot exhaustion"—where voters do not rank all candidates, leading to their ballots being discarded in later elimination rounds. In the Maine ME-02 2018 election, 8,253 ballots were completely exhausted by the final round, meaning those voters had no say in the final outcome between Golden and Poliquin[24]. Furthermore, RCV suffers from a bizarre mathematical paradox known as *non-monotonicity*: it is possible under certain specific distributions that ranking a candidate *higher* on a ballot can actually cause them to *lose* the election by altering the order of early eliminations in a way that transfers votes to their strongest rival.

Capture Test: A dark-triad actor exploits the mechanics of single-winner RCV by deliberately running extreme "wedge" candidates designed to disrupt the exact order of elimination. Because RCV only evaluates top-preference votes in each successive round, a polarizing Machiavellian with a solid, unyielding 35% base can easily survive early eliminations. Meanwhile, moderate consensus candidates who are everyone's second choice get eliminated early due to a lack of passionate first-preference support (the "center-squeeze" effect). However, multi-member PR-STV is highly resistant to dark-triad capture; the strict mathematical quota system ensures that a psychopath can only ever win one seat directly proportional to their base, structurally preventing absolute dictatorial control of an assembly[29].

Scale Ledger	Viability	Reasoning
Household (4 to 10 people)	Unnecessary	Overly complex for micro-scale consensus.

Hamlet or band (30 to 50)	Works	Easy to physically sort paper ballots into piles for elimination rounds.
Village (150 to 500)	Works	Counting PR-STV by hand is tedious but entirely possible with physical ballots and sorting tables.
Parish or district (1,500 to 5,000)	Viable	Requires highly trained counting clerks and strict chain-of-custody protocols for ballot transfers.
Town or watershed (15,000 to 50,000)	Vulnerable	Logistically grueling without optical scanners; exhausted ballots increase significantly.
Region or bioregion (0.5 to 5 million)	Fails without Grid	Cannot be scaled securely across vast geographies without computers, due to the need to aggregate all ballots centrally to calculate elimination rounds.
Nation or continent (50 to 500 million)	Fails without Grid	Impossible to compute transfer quotas across decentralized paper precincts.
Planet (8 billion)	Fails without Grid	Requires absolute digital infrastructure.

Condorcet Methods: Schulze and Ranked Pairs

A Condorcet winner is a candidate who would win a hypothetical one-on-one matchup against every other candidate in the field. Neither Plurality, the Borda Count, nor RCV guarantees the election of a Condorcet winner, and they frequently eliminate them[9]. Condorcet methods explicitly seek this consensus winner by charting every possible pairwise matchup in an

exhaustive matrix.

However, a mathematical anomaly known as a Condorcet cycle can occur (e.g., A beats B, B beats C, but C beats A), requiring a complex tie-breaking resolution. The Schulze method (developed by Markus Schulze in 1997) and Ranked Pairs (developed by Nicolaus Tideman in 1987) are the premier computational solutions to this paradox[31]. Ranked Pairs sorts all pairwise victories by their absolute margin of victory and "locks" them into a directed graph from largest to smallest, skipping any match that would create a circular cycle[31]. The Schulze method identifies the strongest "beatpath" between any two candidates, defining the strength of a path $\pi_V(c, d)$ as the minimum margin along that specific path, and declares candidate c the winner if $\pi_V(c, d) \geq \pi_V(d, c)$ for all other candidates d[31].

What proponents argued was that these are the most mathematically robust and strictly fair voting methods ever devised, entirely immune to cloning, resistant to tactical voting, and guaranteed to always elect the true majority consensus[31]. What the record shows is that their adoption has been limited almost entirely to highly technical digital spheres, such as Debian, the Wikimedia Foundation, and the Pirate Parties. In extensive Monte Carlo simulations, Schulze and Ranked Pairs almost never produce a different result, agreeing on the winner in over 99% of structured preference profiles[31].

What modern scholarship infers is that these systems possess profound cryptographic defense against manipulation through sheer computational complexity. Calculating the Schulze winner requires the Floyd-Warshall algorithm, operating at an $O(m^3)$ complexity for m candidates[31]. For a coalition to strategically manipulate Schulze or Ranked Pairs, the calculation is often NP-hard (nondeterministic polynomial-time hard)[34]. Leading critics point out that this exact complexity makes the system utterly opaque to the average voter, destroying trust in the electoral process because the outcome cannot be easily verified or explained on a sheet of paper.

Capture Test: The dark triad meets its match in computational complexity. To manipulate a Schulze election, a Machiavellian faction must know the exact pairwise preferences of every other voter in the electorate, and then solve an NP-hard problem to determine exactly how their coalition should falsify their rankings to alter the beatpaths without accidentally electing a worse enemy[34]. The cognitive and computational load of manipulation exceeds human capacity. (Note: recent scholarship by Hemaspaandra, Lavaee, and Menton (2015) shows that while manipulation is NP-hard generally, it can be fixed-parameter tractable regarding bribery in certain limited-candidate bounds[37], but the barrier remains massive).

Scale Ledger	Viability	Reasoning
Household (4 to 10 people)	Works	A pairwise matrix can be drawn on a slate and tallied easily for 3 to 5 options.

Hamlet or band (30 to 50)	Viable	Hand-tallying the matrix is possible, though resolving cycles requires high mathematical literacy.
Village (150 to 500)	Fails without Grid	Matrix construction for dozens of candidates across hundreds of ballots is prone to massive clerical error.
Parish or district (1,500 to 5,000)	Fails without Grid	$O(m^3)$ beatpath calculation by hand is a logistical nightmare.
Town or watershed (15,000 to 50,000)	Fails without Grid	Impossible to execute in a timely, verifiable manner without processors.
Region to Planet	Fails without Grid	Requires advanced computational infrastructure.

Quadratic Voting (QV)

Quadratic Voting, formalized by Steven Lalley and E. Glen Weyl (2015, 2018), abandons the "one person, one vote" paradigm to capture not just the *direction* of a voter's preference, but its absolute *intensity*[39].

Voters are given a finite budget of "voice credits" or tokens. They can buy votes for or against multiple proposals, but the cost increases quadratically: 1 vote costs 1 credit, 2 votes cost 4 credits, 3 cost 9 credits, and 10 votes cost 100 credits[40].

What proponents argued, specifically Weyl and Posner, was that QV achieves asymptotic utilitarian efficiency[41]. By forcing voters to pay quadratically, it perfectly balances the intense, existential preferences of a minority against the mild, indifferent preferences of a vast majority, effectively curing the democratic disease of the "tyranny of the majority"[40]. What the record shows is a highly successful empirical trial in April 2019, when the Democratic caucus of the Colorado House of Representatives used QV to prioritize 120 appropriations bills using a $40 million budget. Lawmakers were given 100 tokens each. The system successfully halted the herd-mentality "follow-up effect" typical of legislative bargaining, cleanly identifying the bills

with the deepest, most genuine support rather than just broad, shallow approval[39].
What modern scholarship infers is that under strict quasi-linear preference assumptions, as the population size grows to infinity, an individual's marginal pivotality drops to near zero, forcing perfectly honest revelation of preference[41]. However, the strongest case against QV points to its fatal vulnerability in environments lacking absolute identity verification.
Capture Test: The dark triad captures QV seamlessly through "Sybil attacks" and collusion. Because marginal votes become increasingly expensive, a psychopathic leader with 100 tokens cannot afford 10 votes (which costs the full 100 tokens). Instead, they create 10 fake identities or coerce 10 vulnerable followers (a Sybil attack), giving each identity 10 tokens to buy 3 votes each (costing 9 tokens per identity). Through distributed collusion, they now wield 30 votes for the exact same capital cost. QV is hyper-vulnerable to identity fraud, proxy voting, and black-market vote-buying[43].

Scale Ledger	**Viability**	**Reasoning**
Household (4 to 10 people)	Works	Tokens can be physical (e.g., beads). Face-to-face identity verification prevents Sybil attacks entirely.
Hamlet or band (30 to 50)	Works	Excellent for allocating scarce communal resources where intensity of need varies.
Village (150 to 500)	Viable	Requires a strict, physically audited registry of citizens to prevent proxy hoarding.
Parish or district (1,500 to 5,000)	Vulnerable	Coercion and vote-buying markets emerge; wealthy factions distribute tokens to frontmen.
Town or watershed (15,000 to 50,000)	Fails without Grid	Impossible to track quadratic costs across multiple polling stations without centralized ledgers.
Region to Planet	Fails without Grid	Without biometric digital ID

		databases to prevent Sybil attacks, the system collapses to fraud instantly.

Liquid Democracy and LiquidFeedback

Liquid democracy is a hybrid system that allows voters to either vote directly on an issue or delegate their voting weight to a trusted proxy. Crucially, this delegation is transitive (if A delegates to B, and B delegates to C, C casts both their votes) and instantly revocable[45].

The most prominent empirical deployment of this system occurred within the German Pirate Party, which utilized a software platform called LiquidFeedback from August 2010 to November 2013. The platform processed 499,009 votes and 6,517 initiatives over 1,200 days[46].

What proponents argued was that liquid democracy seamlessly bridged direct democracy and representative democracy, allowing dynamic, issue-specific expertise to surface naturally without creating a permanent, entrenched political class[45]. What the historical record shows is that the system rapidly degenerated into an extreme, cult-like oligarchy.

What modern scholarship infers is derived from a landmark network analysis by Kling, Kunegis, Hartmann, Strohmaier, and Staab (2015). They analyzed the complete delegation network of the Pirate Party and discovered that delegations followed a strict power-law distribution with an exponent of 1.38, indicative of massive power concentration[47]. A handful of individuals, most notably an academic named Martin Haase, accumulated enormous blocks of delegated votes, becoming unelected "super-voters" or "super-delegates"[45]. Leading critics, such as Kahng, Caragiannis, and Micha (2019), point out that voters rarely delegate to those with objective expertise; rather, they delegate to highly visible actors who confirm their existing biases[52].

Capture Test: Liquid democracy is a perfectly designed playground for narcissists and Machiavellians. A highly visible, charismatic influencer farms delegations via emotional manipulation and constant, aggressive visibility. Because human attention is finite, regular voters experience cognitive overload and readily abandon their agency, delegating their votes to loud "experts"[49]. The dark-triad super-voter then wields dictatorial power. While the theoretical defense is "instant recall" (revoking the delegation), empirical data shows voters rarely monitor the system closely enough to revoke delegations before catastrophic votes are cast[45].

Scale Ledger	Viability	Reasoning
Household to Band	Irrelevant	In groups under 50, people just talk; formal delegation is entirely unnecessary.
Village (150 to 500)	Fails	Instantly collapses into a

		cult-of-personality oligarchy run by the loudest individuals.
Parish or district (1,500 to 5,000)	Fails without Grid	Impossible to track transitive, cascading delegations by hand in real-time.
Town to Planet	Fails	Power-law dynamics guarantee extreme centralization of power into the hands of demagogues.

Continuous and Market-Based Governance: Conviction Voting and Futarchy

Post-collapse survivors who attempt to resurrect the digital governance theories of the early 21st century often point to blockchain-era DAOs (Decentralized Autonomous Organizations). **Conviction Voting (CV)** allows voters to stake tokens on proposals. The longer tokens are staked, the more "conviction" accumulates, calculated along a half-life decay curve. When accumulated conviction passes a dynamic threshold (tied to treasury funds), the proposal passes[53]. DAOs like Aragon, 1Hive, and the Commons Stack experimented heavily with this continuous voting model[53].

Futarchy, proposed by economist Robin Hanson in 2013, relies on the principle "vote on values, but bet on beliefs." It uses prediction markets to govern. A population votes on a core metric (e.g., maximizing the town's winter food stores), and two prediction markets are spun up: one predicting the metric if a policy is enacted, and one if it is not. The policy is automatically enacted based on which market predicts a higher price[57]. MetaDAO on the Solana blockchain implemented live futarchy from 2023 to 2025, operating with a market cap of roughly $730,000 during early trials[57].

What proponents argued was that continuous mechanisms and market feedback perfectly aligned economic incentives with governance outcomes, replacing fallible human voting with objective market intelligence[53]. What the record shows is extreme volatility, low voter participation, and immediate susceptibility to wealth consolidation. What modern scholarship infers, notably pointed out by Lynn Stout, is that markets are not objective truth-seeking mechanisms; they are highly reactive to capital concentration[61].

Capture Test: Both systems are completely defenseless against capital-rich dark triad actors (referred to in digital ecosystems as "whales"). In Conviction Voting, an exhausted, laboring

populace cannot monitor continuous thresholds 24/7; a highly coordinated psychopathic faction simply waits until the community is asleep or distracted, stakes their tokens collectively, and drains the treasury[53]. In Futarchy, prediction markets suffer from aggressive market manipulation; a Machiavellian actor with enough capital can artificially pump the "pass" market, willingly absorbing short-term trading losses simply to force a governance action that benefits them materially outside the market[62].

Scale Ledger	Viability	Reasoning
All Scales (Household to Planet)	Fails Post-Collapse	Both require high-frequency digital ledgers, continuous liquidity, automated market makers (AMMs), and inviolable smart contracts. Both are entirely irrelevant without a global electrical grid and processors.

The Master Protocol: Venetian Iterated Sortition (1268–1797)

If computational complexity is the only mathematical defense against the dark triad, how can a post-collapse society achieve this without computers? The answer lies in the Republic of Venice, which maintained a stable, tyrant-free republic for over 500 years using a brilliant, low-tech algorithm to elect the Doge[63].

The Venetian protocol, established in 1268, alternated between random sortition (drawing lots) and high-threshold supermajority voting across an exhausting 10 rounds[64]. The Great Council (often containing over 1,000 oligarchs) gathered.

1. 30 members were chosen by lot.
2. The 30 were reduced to 9 by lot.
3. The 9 elected 40 (requiring 7 of 9 approval).
4. The 40 were reduced to 12 by lot.
5. The 12 elected 25 (requiring 9 of 12 approval).
6. The 25 were reduced to 9 by lot.
7. The 9 elected 45 (requiring 7 of 9 approval).
8. The 45 were reduced to 11 by lot.
9. The 11 elected 41 (requiring 9 of 11 approval).
10. The 41 elected the Doge (requiring 25 of 41 approval)[63].

What proponents argued was that it prevented any single powerful family from buying the election and ensured that only a universally respected, moderate candidate could survive the

gauntlet[64]. What the record shows is that Venice remained free of hereditary dictatorship for 500 years, an unprecedented run of republican stability in human history[64].

What modern scholarship infers is astonishing. Mathematical analysis by Lines (2007) and computational models demonstrate that this system acts precisely as a cryptographic hashing function made of human beings[64]. The alternating bottlenecks of sortition wipe out deterministic vote-buying, because a briber never knows which corrupted officials will actually survive the random lottery to cast a vote in the next round[66]. The high supermajority requirements (e.g., 7 of 9, or 77%) meant that narrow factional majorities (51%) were entirely powerless; consensus was forced mathematically[66]. The strongest case against the system is simply that the Venetian Great Council was an exclusive, wealthy oligarchy, restricting the democratic base[70].

Capture Test: A Machiavellian attempts to buy the election. They spend a fortune bribing 40% of the Great Council. In the first lottery of 30, they secure roughly 12 people. In the random reduction to 9, probability dictates they might secure 3 or 4. The next step requires 7 out of 9 votes to advance a slate. The Machiavellian's 4 agents are mathematically trapped; they cannot force a decision without the consent of the uncorrupted voters. The alternating randomness breaks the causal chain of dark-triad manipulation. To mathematically guarantee a win, an attacker would have to corrupt upward of 80% of the entire society, at which point manipulation is moot—they already *are* the consensus[64].

Scale Ledger	**Viability**	**Reasoning**
Household to band (30 to 50)	Unnecessary	Far too cumbersome and time-consuming for the daily choices of 50 people.
Village (150 to 500)	Supreme	The ultimate low-tech, high-security protocol for selecting vital executive leaders without electricity. Requires only wooden balls, an urn, and an afternoon.
Parish or district (1,500 to 5,000)	Supreme	Easily scales to thousands, provided a central physical assembly space exists.
Town or watershed (15,000 to 50,000)	Viable	Requires a representative sub-assembly to act as the initial Great Council to keep the first lotteries

		manageable.
Region or bioregion (0.5 to 5 million)	Vulnerable	Requires the physical assembly of the initial elector pool, severely limiting geographic scalability without fast transit.
Nation to Planet	Fails	Cannot operate without physical proximity of the electoral colleges.

Essential Texts for the Rebuilding Era

- Arrow, K. J. (1951). *Social Choice and Individual Values*.
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Implementability after the Fall

To rebuild self-governance without a bureaucratic state, an electrical grid, or an internet architecture, communities must rely on systems that perfectly balance cryptographic resistance to manipulation with absolute physical simplicity. The minimum viable requirements to initiate these processes are sparse but non-negotiable: a designated, defensible meeting place; physical records (parchment, slates, or paper tallies); a shared calendar to enforce strict, predictable voting windows; fundamental literacy and numeracy for the counting clerks; and physical tokens (beads, wooden balls, or marked clay) for secure ballot casting and sortition.
The Rule a Village Could Count By Hand: For routine administrative decisions or multi-seat councils, **Approval Voting** is the optimal hand-counted system. It requires only additive arithmetic ($O(N)$), eliminating the need for multi-round recount logistics (like STV) or impossible mathematical matrices (like Schulze). For the high-stakes election of a singular executive (such as a magistrate or militia commander), the **Iterated Sortition (Venetian)** method is mandatory. It requires no math beyond counting to 45, utilizes physical urns to ensure randomness, and completely neutralizes factional bribery.
Household (4 to 10 people): The minimum viable version of governance here requires no

formal ballots. Governance at this scale relies on kin-selection, patriarchal/matriarchal heuristics, and face-to-face consensus.*First failure to expect:* The natural tyranny of the physically strongest, most aggressive, or oldest member, overriding the consensus of the weak.

Village of 300: The minimum viable version utilizes Approval Voting for the general council and simple sortition (drawing lots) for menial civic duties.*First failure to expect:* The emergence of two warring, blood-tied families. If the village relies solely on Approval Voting, a charismatic, Machiavellian leader of one family will enforce strict "bullet voting" among their kin, breaking the consensus design and capturing the council by leveraging the honesty of the unaligned, independent villagers.

District of 3,000: The minimum viable version requires a representative assembly drawn by lot (sortition) from the 3,000 citizens to act as a legislative body. This assembly then uses the full Venetian Protocol (alternating lots and supermajority votes) to select an executive magistrate.*First failure to expect:* Record-keeping corruption. Without digital timestamps or cryptographic hashes, a dark-triad counting clerk will simply forge the paper tallies or load the sortition urns with weighted, identifiable balls. Security immediately transitions from the theoretical realm of electoral math to the physical auditing of the urns and the physical intimidation of the clerks.

Summary of Robust Findings

1. Plurality and the Borda Count are mathematically trivial to manipulate via vote-splitting and dummy candidate cloning.
2. Approval Voting increases broad consensus but inevitably decays into a plurality system via strategic "bullet voting" by disciplined factions.
3. Condorcet's Jury Theorem requires absolute voter independence; propaganda destroys this, rapidly inverting crowd wisdom into mob rule.
4. RCV/STV effectively manages multi-faction representation and ensures proportionality, but suffers from severe ballot exhaustion and non-monotonicity.
5. Schulze and Ranked Pairs offer profound defense via computational complexity (NP-hard manipulation) but are practically impossible to hand-count above the band level.
6. Quadratic Voting successfully surfaces the intensity of preference but is hopelessly vulnerable to Sybil attacks without strict, unforgeable identity registries.
7. Liquid democracy and transitive delegation inevitably collapse into extreme oligarchies following strict mathematical power-law distributions.
8. Continuous and market-based systems (Conviction Voting, Futarchy) rely entirely on digital infrastructure and are highly vulnerable to capital whales.
9. Iterated sortition combined with supermajority voting (Venice) acts as a human hashing function, successfully breaking the causal chain of bribery and manipulation.
10. Low-tech post-collapse security requires physical randomization (sortition) to simulate the anti-manipulation defenses of digital computational complexity.

Contested or Open Questions

- **The Cognitive Limit of Rank Ordering:** It remains heavily contested within empirical

literature at what exact threshold of candidates (N) the average human voter's ability to rationally rank preferences collapses into random noise, potentially invalidating Condorcet and RCV outcomes entirely.
- **The Real-World Utility of Non-Monotonicity:** Some theorists argue that the non-monotonic anomalies present in RCV are so statistically rare in real-world scenarios as to be negligible, while critics argue they represent a fatal, inherent flaw in democratic legitimacy.
- **Competence in Adversarial Environments:** Under Condorcet's Jury Theorem, it is unproven whether the introduction of a dedicated, highly funded disinformation faction permanently forces average voter competence p below 0.5, or if localized, observable physical reality provides an asymptotic floor to deception.

Principles

- Any deterministic voting system without random sortition will eventually be mathematically gamed by a dark-triad actor operating with perfect information.
- Increasing the cognitive or computational complexity of a voting protocol serves as a highly effective cryptographic defense against coordinated manipulation.
- Transitive vote delegation, such as liquid democracy, reliably and measurably accelerates the concentration of power into oligarchy via power-law dynamics.
- The intensity of a voter's preference cannot be safely monetized or mathematically quantified without absolute, unforgeable verification of physical identity.
- Random selection (sortition) interspersed with high supermajority thresholds breaks the causal chain of bribery, nepotism, and factionalism.

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