

Monopoly Deal Under the Microscope: Large-Scale Simulation, Folk-Strategy Testing, and Policy Optimization in a Full-Rules Multiplayer Card Game

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Abstract

Monopoly Deal is a 106-card, two-to-five-player card game of imperfect information with payment sub-decisions, response chains and a large body of folk strategy that has never been tested. We present, to our knowledge, the first full-deck, full-rules analysis of the game at every supported player count. We built an exact rules engine (`mdeal`), validated it against an independent engine on 180,000 games, and used it for three studies. Every number below comes from one evidence base: 861 cells, 42.2 million games, run under Hasbro’s 2024 rulebook defaults at two, three, four and five players, 40,000 games per claim cell and 20,000–200,000 for the design cells, every cell stating its own size and margin. (1) A corpus study: 643 posts and 2,662 comments from `r/monopolydeal`, 188 BoardGameGeek threads and eleven strategy web sites were reduced to 717 strategy claims, 393 of them testable, and 180 experimental variants run as 666 cells. Re-scored at four player counts, the verdicts are 150 refuted, 95 confirmed, 30 conditional and 15 inconclusive, with nothing left untested. The most widely repeated advice (delay completing sets to dodge the Deal Breaker, bank before you build, hold the Deal Breaker for the winning moment) is among the most costly, at -2.7 to -14.1 percentage points against fair share. (2) A policy study: a 111-parameter linear feature policy optimised by evolution strategies beats the folk policy by $+12.7$ to $+16.8$ points across 2–5 players; a paired common-random-number rollout step improves on it by nothing at 2–3 players and by $+9.0$ and $+11.5$ points at 4–5 players, locating the remaining edge in multiplayer table dynamics; a one-rule in-turn lookahead for two-step wins recovers $+1.5$ to $+2.1$ points of that gap at every count, and the evolved policy with that rule, the recommended strategy, wins 66.9/51.9/41.3/34.4% of games against folk tables at 2–5 players. (3) A bot study (the one component not re-run in round 4): every open-source Monopoly Deal bot we could find, ported into the engine under the printed rules; the strongest wins 13.2% of 2-player and 3.8% of 5-player games against the evolved policy, the un-tuned folk policy beats all of them, and a perfect-information MCTS bot that reads every hand falls from 19.0% to 1.5% as the table grows. (4) Structural facts: seat 1 wins 57.3% of 2-player games between equal folk policies and 56.9% between evolved ones; between folk players the first-seat edge decays to nothing by four players ($+2.7$, $+0.3$, -0.2 at 3/4/5p) while between evolved players it holds at $+6.9$ / $+6.6$ / $+5.7$ / $+5.2$; the ten two-colour rent cards are worth 15.8 points to a 4-player folk seat; a legal-random player wins 0.34% of 4-player games; explicit card counting is worth about one point. (5) The engine’s defaults follow Hasbro’s 2024 rulebook, under which a Just Say No answered on one’s own turn costs one of the three plays; switching from the 2008 reading moves no headline number by more than 0.14 points, but it makes an attack fired as the third play indefensible: a Deal Breaker backed by a Just Say No and a spare play succeeds 99% of the time and 85% without the play, and deliberately firing attacks last costs a folk player 3.2–4.2 points and the evolved policy 6.3–10.8. We also correct one rule the engine had wrong: the Forced Deal restricts only the card *taken* from a complete set, so a player may offer a card out of their own complete set, and playing the card as printed is worth about two points to a strong player — all of it from opponents misusing the option on a third of their Forced Deals, none of it from the strong player, whose own win rate moves by at most 0.20 pp when granted it. Four folk conclusions reverse against the earlier rounds: all-out aggression is no longer a head-to-head gain ($+6.8 \rightarrow +0.8$); passing the first turn is a loss at two players and a gain at four and five; the wild rent-flip edge at two players was an artefact of a permissive engine and is refuted there while holding at four and five; and the Forced-Deal-into-Deal Breaker combo, the most praised move on the forum, scores exactly zero against opponents built never to say no. Fishing for the Just Say No with a Sly Deal before a Deal Breaker is refuted at 3–4 players; hoarding the Just Say No for Deal Breakers is refuted; Houses and Hotels are worth nothing to a strong policy and less than

nothing at four and five players; and rent farming cannot be priced at all. We also report negative results (a determinized UCT agent that lost to its own rollout policy, a solver-taught policy weaker than evolution, a teacher-fit of the linear weights that loses to its own starting point) and a seeding bias in the 2-player control that was diagnosed and fixed; under the current seeding the all-BASELINE control sits at fair share at every player count. All results are versus specific opponent policies inside a heuristic policy class; nothing here is an equilibrium.

1 Introduction

Monopoly Deal (Hasbro, 2008) is a fast card game derived from Monopoly. A player wins by laying three complete property sets of different colours. Each turn a player draws two cards and makes up to three *plays*: bank a card as money, lay a property, or play an action card (rent demands, single-target and table-wide money charges, three kinds of property theft, a cancellation card that can itself be cancelled). Payments are made from public assets, in cards, with no change; hands are hidden. The game is played by two to five people, and the community that plays it has produced a substantial folk literature of advice: bank money before laying property, never complete a set until you can win, save the Deal Breaker for the winning turn, count the Just Say No cards, and so on.

None of that advice had been tested. The one prior computational paper on the game [12] studies an 83-card, three-colour, two-player variant with no theft cards, no wilds and no buildings, as a specimen of a class of games with bounded one-sided response phases, and trains a tabular CFR agent on it. The only peer-reviewed full-deck study [7] is a heuristic bot with three hand-coded personalities and one reported number. Eight open-source engines exist; three of them silently play a 108-card deck, and none publishes a win rate or a game-length distribution (Section 2).

This paper reports what happens when the full game is simulated at scale. Our contributions:

1. An exact, deterministic, serialisable rules engine for the full 106-card deck and 2–5 players, with every ambiguous ruling exposed as a switch, cross-validated against an independent engine (Section 4).
2. A method for turning a community’s strategy folklore into pre-registered simulation cells: 717 claims from Reddit, BoardGameGeek and the web, 393 testable, 180 variants run at 2, 3, 4 and 5 players (666 cells) at 40,000 games each (Section 5).
3. A parameterised folk policy, a 111-feature linear policy optimised by evolution strategies, three search-based reference agents, and a one-rule in-turn lookahead for two-step wins, evaluated against each other at every player count (Sections 6, 9).
4. A port of every public open-source Monopoly Deal bot into the same engine under the printed rules, with fidelity checks against the original engines, and a round-robin against the folk and evolved policies (Section 11).
5. Structural measurements: seat advantage, game length, card-class values, the value of counting, the value of seeing banks, house-rule and deck-modification effects (Sections 7, 14).
6. One canonical round of experiments (round 4) in which every cell the work depends on was re-run under the 2024 rulebook defaults and one further engine fix, at four player counts and double the earlier cell size, with a matched control run that isolates the engine fix (Section 10).
7. Honest negative results and a full account of the limitations of the policy class and evaluation protocol (Sections 12, 15).

Every number in this paper is read from the project’s experiment logs; the rules engine, claim harness and result files are released with the paper (Section 16).

2 Related work

Wolf (2025). The only prior paper [12] defines Bounded One-Sided Response Games (BORGs), in which an action hands control to the opponent for a finite non-reciprocal sequence of moves (here: paying rent card by card), and argues that vanilla tabular Monte Carlo CFR [14] handles them without modification. The environment is deliberately reduced: two players, three colours (Brown, Pink, Green), an 83-card deck of 30 properties, 20 cash cards (\$1 and \$3 only), 30 rent cards and 3 Just Say No; no Sly Deal, Forced Deal, Deal Breaker, Debt Collector, Birthday, Pass Go, House, Hotel, Double the Rent, property wilds or any-colour rent; no hand limit; JSN-on-JSN counters disallowed; two complete sets to win. The state abstraction keys on the

set of available abstract actions and the turn index only (about 100 information sets in practice). Training took 19 minutes on eight CPU cores for 1,000 self-play games; the agent wins about 100% against a random selector and about 75% against a risk-aware heuristic. No exploitability or best-response value is computed, and no first-mover edge is reported. A follow-up blog post [13] adds tabular and neural REINFORCE and an actor-critic on the same variant. Our study is complementary: the full deck, all ten colours, every action card, 2–5 players, and a heuristic-plus-search policy class rather than an equilibrium method.

Lazarusli et al. (2015). A breadth-first search over card plays with three personalities (Aggressive, Defensive, Normal) [7]; the best combination won 45%, with the opponent mix and player count not given in the abstract.

Open-source engines. We surveyed eight engines on GitHub. `brylee123/MonopolyDeal` (2019) publishes a card table with 3 Hotels and 4 Forced Deals (108 cards); `johnsears/monopoly-deal` and `lucaspellegrinelli/monopoly-deal-ai` inherit the error. `johnsears` ships an MCTS agent that searches with all hands visible (the author’s word is “cheats”). `OldManAlpha/Monopoly-Deal` (Java, 50.9k lines) has a 1,047-line heuristic bot and a non-commercial licence clause. `sr-jarvis/monopoly-deal` (TypeScript) is the only 2–5-player engine with a heuristic suite and a tournament harness, but its rules validation was documented as out of scope as of mid-2026. `trolleyman/monopoly-deal` (Rust) has the correct deck and four hard-coded players. `shuckc/monodeal` [10] (Python, MIT) has the correct card counts, a 106-card conservation assertion and the best written list of rule edge cases, but values Just Say No at \$3 and Debt Collector at \$5 (official: \$4 and \$3) and gives the Hotel a +\$5 rent bonus (official: +\$4). We used a patched copy of `monodeal` as the independent engine for parity testing (Section 4.2). None of these projects publishes a win rate, a game-length distribution or any strategy measurement.

Methods. Our optimiser is an OpenAI-style evolution strategy with antithetic sampling and rank normalisation [9]. The rollout agents are one-step policy improvement in the sense of Bertsekas [1], over determinizations of hidden information [8], with common random numbers [3]; the failed search agent is determinized UCT [6, 2]. The winner’s-curse effect that biases Monte Carlo selection is the optimizer’s curse of [11].

3 The game and its formalisation

Deck. The 106 playing cards (the box holds 110; four are rules cards) are: 28 properties (2 Brown, 3 Light Blue, 3 Pink, 3 Orange, 3 Red, 3 Yellow, 3 Green, 2 Dark Blue, 4 Railroad, 2 Utility); 11 property wilds (1 Light Blue/Brown, 1 Light Blue/Railroad, 2 Pink/Orange, 2 Red/Yellow, 1 Dark Blue/Green, 1 Green/Railroad, 1 Railroad/Utility, 2 any-colour); 34 actions (2 Deal Breaker \$5, 3 Just Say No \$4, 3 Sly Deal \$3, 3 Forced Deal \$3, 3 Debt Collector \$3, 3 It’s My Birthday \$2, 10 Pass Go \$1, 3 House \$3, 2 Hotel \$4, 2 Double the Rent \$1); 13 rent cards (two of each of five two-colour pairs at \$1, three any-colour rents at \$3); and 20 money cards ($6 \times \1, $5 \times \$2$, $3 \times \$3$, $3 \times \$4$, $2 \times \$5$, $1 \times \$10$). Set sizes are 2 for Brown, Dark Blue and Utility, 4 for Railroad, 3 otherwise. The deck carries \$252 of face value; a random card is worth \$2.38 and a five-card opening hand about \$11.9 in bank terms. Only 20 cards are pure money; 47 (actions and rents) are money that also does something.

Turn. Draw 2 (draw 5 if the hand is empty); make up to three plays; discard down to 7. A play is: bank any non-property card (a banked action is money forever), lay a property (a wild is assigned a colour), play an action, play a rent card (optionally with Double the Rent, itself a play), or place a House/Hotel on a complete buildable set. Rearranging one’s own wilds between sets is free, subject to the null-cycle rule of Section 4.1. The first player to hold three complete sets of different colours wins. The engine checks for a win after every state change; whether a win reached on another player’s turn (by receiving a set-completing card in payment) is declared at once or on the winner’s own turn is an option whose default is the printed rule (Section 4).

Payment. The payer chooses cards from bank and/or table properties totalling at least the amount owed; no change is given; cards in hand are never used; if public assets are insufficient everything is handed over. The two any-colour wilds have no monetary value and cannot be paid. Received property goes to the receiver’s table. The rulings the official text leaves open are enumerated in Appendix A; each is an engine option with a documented default, and two of them (whether a Just Say No costs a play on one’s own turn, and what happens

to a building on a broken set) were settled by Hasbro’s 2024 rulebook [4] and are the defaults everywhere in this paper (Section 4).

Decision points. A policy is an object answering five queries: `choose_play` (over the exhaustive legal list, including `end`); `choose_payment` (a subset of assets); `respond_jsn` (a boolean, offered only when the player holds a Just Say No); `choose_discards`; and wild-colour assignment, which is folded into `choose_play` as explicit plays. Legal-move generation is exhaustive, so policies never construct illegal moves. Public information is everything except hands and draw order; card counting from the discard pile and move history is legal and expected.

Deck arithmetic. Some hypergeometric facts frame what follows. The probability that a five-card opening hand holds at least one Just Say No is 13.6%, a Deal Breaker 9.3%, a Pass Go 39.7%, a Sly or Forced Deal 25.7%, a rent card 48.7%. At a four-player table some opening hand holds a Just Say No with probability 47.0%, a Deal Breaker 34.3%, a Sly or Forced Deal 72.4%. The expected round on which the first Deal Breaker enters any hand is 6.9 (2p), 4.1 (3p), 2.7 (4p) and 1.9 (5p); the third Just Say No 17.9, 11.3, 8.0 and 6.0. Without Pass Go the deck is exhausted at the end of round 24/16/11/9 for 2/3/4/5 players; with ten Pass Go cards it is earlier, so 4–5-player games routinely reshuffle. Dark Blue is the outlier colour: \$8 rent from two cards (\$15 with House and Hotel), the highest rent per card in the deck, with only five cards able to serve it.

4 Engine

`mdeal` is a pure-Python engine: one mutable `Game` object, an exhaustive legal-play generator, and policies as objects. All randomness is drawn from a per-game generator seeded from the game seed, so a game replays exactly given the same policies. Property tests cover card conservation (106 cards at all times), invariant preservation over random and BASELINE games, determinism under seed, the three-colour win condition, payment without change and without touching the hand, the unpayable any-colour wild, Deal Breaker taking buildings with a JSN counter-chain, and orphaned-building handling.

Seeding. Seats rotate with the seed (`seat = seed % n`) so every policy sees every seat equally. The original engine seeded Python’s Mersenne Twister directly with consecutive small integers; Section 13 describes the bias this produced and the fix (the seed is hashed with BLAKE2b before seeding). Every number reported as current in this paper comes from the round-4 batch, which uses the hashed seeding throughout, seed 0 upward in every cell.

Rule defaults and the 2024 rulebook. Hasbro’s current instruction sheet (part G0351, “© 1935, 2024 Hasbro”, read on 2026-09-19 [4]) settles two rulings the 2008 sheet left open: “If played during your turn, it counts as one of your three cards” for the Just Say No, and “If the property set they’re on becomes incomplete, discard them” for Houses and Hotels. The only Just Say No a player can play on their own turn is the answer to an opponent’s Just Say No against their action, so the first rule means that an attack fired as the third play cannot be defended. The engine defaults follow this sheet: `jsn_costs_play` and `jsn_needs_play_left` (the strict reading: the answer costs one of the three plays and cannot be played with none left; the lenient reading, deducted but always playable, remains a switch) and `orphan_building=discard`. Experiments E01–E43 were first logged under the 2008 reading, under which a Just Say No never costs a play and an orphaned building goes to the owner’s bank. E07c (Section 10.1) re-ran the headline cells on identical seeds under both rule sets and found no number moving by more than 0.14 pp; round 4 then re-ran every cell under the 2024 defaults, so no result quoted here as current depends on the old reading.

The Forced Deal restriction. The card’s restriction (“You may not TAKE a property that’s part of a complete set”) names the card taken only, so a player may offer a card out of one of their own complete sets, breaking it. The engine forbade this on both sides through experiments E01–E49; `forced_deal_give_from_full` now defaults to true, and false reproduces the stricter reading those cells ran under. Section 10.2 measures the difference: it moves the recommended policy’s own win rate by at most 0.20 pp, and widens its margin over folk play by about two points, because the folk policy misuses the play on a third of its Forced Deals.

Win timing. The 2008 printed sheet says a player declares the win on their own turn; many tables let a player win the moment a set-completing card arrives by payment. The engine option `win_on_others_turn` now follows the printed rule. E07 measured no difference beyond noise between the two in seat edge, skill gap or game length (2p seat edge 57.1 vs 57.4%, evolved-versus-folk 64.1 vs 64.2%; 4p 25.5 vs 25.7% and 38.6 vs 38.5%).¹

4.1 The null-cycle wild rule

Rearranging one’s own wilds is free under the printed rules, and the sheet puts no limit on how many times a wild may move within a turn. Taken literally that permits a strictly pointless sequence: move a wild off a colour and move it straight back, with no other play in between. The two moves restore the identical position — same cards, same sets, same bank, same hand, same plays remaining — so the pair can never gain anything, and a search or an optimiser that is allowed to make it wastes decisions on it. The engine therefore blocks the return: *a wild may not be moved back to a colour it has left since the last real play of the turn*. A real play (banking, laying, an action, a rent, a building) clears the record and frees every wild to move again.

This removes move *sequences*, never single moves, and only sequences whose start and end states are identical. Three worked examples:

- **Forbidden.** A Pink/Orange wild sits in the player’s Pink set. The player moves it to Orange, then, with nothing played in between, moves it back to Pink. The second move is now illegal. The position after the first move is a real position the player must live with until they make a play.
- **Allowed, and untouched.** The E12 rent-flip line: move the Dark Blue/Green wild from Green to Dark Blue, charge Dark Blue rent, then move it back to Green to re-complete the Green set before ending the turn. The rent is a real play, so it clears the record and the return is legal. Every number in Section 8 for the rent flip is measured with this line available.
- **Allowed, but now binding.** The E11 “Deal Breaker dodge”: at the end of a turn, move an any-colour wild out of a completed Brown set so that no monopoly is showing. Legal. What is no longer legal is undoing the dodge later in the same turn without playing anything, so a policy that dodges must accept where it has put the card.

The rule was added part-way through the round-4 batch (commit `f2fc861`), which turned the cells already finished into a matched control: the same plans, the same seeds, the same 2024 rule set and the same cell sizes on the engine without the rule. **Of the 482 cells measured on both engines, 63 — 13% — move by more than the combined 95% margin of the two runs, against the 5% expected by chance.** The movers are concentrated in the variants that lean on wild movement: the largest are `E44_evolved_attack_third` at 2p ($-9.14 \rightarrow -6.29, \pm 0.69$), `E24_no_db_aggro` at 2p ($+7.57 \rightarrow +5.65, \pm 0.69$), `E44_evolved_attack_third` at 3p ($-11.59 \rightarrow -9.67, \pm 0.58$), the 2p rent flip ($+1.47 \rightarrow -0.13, \pm 0.69$), the 2p wild dodge ($-2.57 \rightarrow -4.15, \pm 0.69$) and the value of wild movement to the folk player at 2p ($0.0 \rightarrow 1.4, \pm 0.69$). The game at large does not move: the all-BASELINE control shifts by -0.01 pp at four players.

What the rule takes away is the free undo. A policy that flips a wild speculatively must now live with where it put the card, and the position it is left in is a real position rather than an artefact of an unbounded free-move loop. The pathology it removes is visible: before the fix, the evolved policy would shuffle a wild back and forth until the engine’s 60-move runaway guard fired, in 67 of 400 games. A stricter option for the live game, `wild_move_once_per_play` (a wild may move at most once between real plays), exists but is **off** in every research run; before each remote batch launches, the engine is asserted to carry the 2024 defaults, to block the reversal, and to free the wild again after a real play.

Throughput. The specification target was at least 300 games per second per core at four players and at least ten million games per day on one laptop. Measured throughput is approximately 4,000 complete four-player games per second for folk-policy tables on a 10-core Apple M-series laptop (about 125 games per second per core); the feature policy is roughly four times slower per game. Cloud runs fan out over Modal with up to 300 single-CPU containers, 400 games per remote call, and a driver that aggregates locally.

¹E07’s sensitivity sweep (12,000 games per cell, Table 18) was run under the 2008 defaults and was not re-run in round 4; it is quoted here only as the historical check that the open rulings do not matter, not as a current measurement.

4.2 Cross-engine validation

We ran 20,000 games per cell at 2, 3, 4 and 5 players under three policy pairs against a patched copy of `shuckc/monodeal` (card values and Hotel bonus corrected; nothing under `mdeal` was modified), plus a 10,000-game ablation: 180,000 games in total. A card-by-card deck comparison found all counts and all ten rent tables identical. The parity study predates both engine changes of this section; it tests move-for-move rule agreement under a fixed policy, which neither change touches.

Under an identical deterministic *greedy-simple* policy (lay the first property-like card, else bank the first money card, else end; never JSN), every game-length and outcome statistic agrees within its 95% interval at every player count: mean turns 35.9 vs 36.4 (2p), 235 vs 241 (3p), 363 vs 362 (4p); draw rates 0.6 vs 0.6%, 54.5 vs 56.0%, 89.7 vs 89.5%. The one metric that differs (+0.02 to +0.09 full sets; -1.5 pp draws at 3p) is explained by a documented rule interpretation: a set made only of any-colour wilds counts as complete in `mdeal` and never in `monodeal`. Under uniformly random play restricted to the move vocabulary both engines share, turns, JSN plays, full sets, rent demanded, payments and the winning-colour distribution agree to within 1–6% (turns +1.2/ +3.1/ +2.1%; rent +0.2/ +4.9/ +2.8%; winning-triple total-variation distance indistinguishable from sampling noise). The residual after ablating the largest known rule difference is about +1 turn and +1.5–2 payments per game, in the direction predicted by `monodeal`’s Double-the-Rent auto-attach quirk. The large gaps seen when each engine uses its *native* random policy (e.g. 64.4 vs 48.0 mean turns at 4p) vanish under the matched vocabulary and are entirely attributable to `monodeal` implementing a much smaller move set (no Sly or Forced Deal, no banking of action cards, JSN only against Deal Breaker). No rules bug was found in `mdeal`; three non-blocking nits were logged (an unread option flag, a misnamed statistic that records rent demanded rather than paid, and a missing off-turn win check under a non-default option).

5 Community corpus and claim testing

Harvest. From the Arctic Shift archive [5] we took every r/monopolydeal post and comment with text: 643 posts and 2,662 comments (December 2018 to September 2026); 75 photo, meme and Monopoly-GO trading posts were skipped, and 27 further claims came from Monopoly Deal threads in r/monopoly and r/boardgames. A first pass recorded 571 distinct Reddit claims, 293 flagged testable. From BoardGameGeek we harvested 188 threads and 1,030 listed posts (General 48 threads/229 posts, Rules 130/743, Strategy 10/58) at one request per 2.1 s. From the web we read monopolydealstrategy.com’s eleven strategy pages, monopolydealrules.com, BoostYourPlay, two Medium posts, Instructables, wizzley, playpartygame, drinkplayground, a StackExchange dump and eight BGG strategy snapshots: 104 candidate claims, 53 duplicates of existing claims, 51 new (11 already covered by an existing experiment, 34 needing a new variant, 6 not operationalisable). The merged file holds **717 claims, 393 testable by simulation**; each claim carries its source, Reddit score, and an experiment sketch. Quotes were kept under fifteen words; everything else is paraphrase.

Mapping claims to cells. Claims were grouped into 34 experiments (E10–E43) ranked by the number of claims settled and their summed Reddit score. Each experiment defines one or more *variants*: a subclass of the folk BASELINE (Section 6) with one behavioural rule changed, stated relative to BASELINE’s decision order, plus per-game behaviour counters (how often the rule fired, what it withheld). Rule-knob claims (house rules, deck removals) seat BASELINE against BASELINE under the rule and are read against the all-BASELINE descriptive cell E33. A verification script runs 200 games per variant at four players with engine invariants checked after every turn and a behaviour assertion per variant. Verdict criteria were written before the cells were run.

Protocol. One variant seat versus folk BASELINES, seat rotating with the seed. **Every claim cell is run at 2, 3, 4 and 5 players, 40,000 games per cell**, double the size of the first two rounds and the size the plan originally called for. The metric is the variant’s win rate minus its fair share $1/n$, in percentage points, with a 95% interval of at most ± 0.49 pp at 2p, ± 0.46 at 3p, ± 0.43 at 4p and ± 0.39 at 5p — the value for a cell near fair share, and tighter for cells far from it. Where a cell has a matched control on the same seeds — and every claim cell does, since all cells at a given count play the same deals — we also report the *paired* difference from that control, with the interval of the difference (McNemar on the per-seed win bitmaps), which is tighter than the unpaired interval whenever the variant rarely fires. Design cells run larger: 100,000 games for the headline tournaments and the high-count audit re-runs, 200,000 for the rarest triggers, 20,000 for the decision tables and for cells that ran after the laptop’s link to the cloud degraded. **Every row states its own size and interval,**

and a cell that was rescaled from its design size records that too. Verdict labels: `CONFIRMED` or `REFUTED` when the delta is outside the interval in the stated direction; `CONDITIONAL` when the claim holds only at some player counts; `INCONCLUSIVE` when the delta is inside the interval or the measurement cannot separate the claim from something else.

Tally. Scoring every claim at every player count against the pre-registered criteria gives **150 refuted, 95 confirmed, 30 conditional, 15 inconclusive and none untested** (a claim counts once per reading rule it appears in, and 133 verdict lines cover them). The overall label is the per-count label where the counts agree, a single label plus the counts where it holds when the rest are inconclusive, and `CONDITIONAL` where counts disagree. Thirty conditional verdicts is the substantive result of running everything at four counts: a fifth of the advice in this game is true at some table sizes and false at others.

Controls. Under the current seeding the all-BASELINE variant seat scores $+0.14 \pm 0.49$ (2p), -0.14 ± 0.46 (3p), $+0.20 \pm 0.43$ (4p) and $+0.20 \pm 0.39$ (5p): fair share at every count, inside the interval everywhere. No control offset is applied to any number in this paper. This is a change from the first two rounds, whose 2-player cells carried a measured -1.21 pp seeding bias and whose round-2 cells shared a seed range with small 3p and 4p offsets; Section 13 records that history and its fix, and every correction that referenced it has been removed. Twelve BASELINE quirks were catalogued during the first rounds that made specific cells uninformative — BASELINE never played Birthday at 2p, never moved wilds, never banked a Deal Breaker — and the two that mattered were fixed in the policy before round 4, so every cell in this paper runs the same folk BASELINE: with the rent-flip step and with Birthday firing whenever any opponent holds $\geq \$2$.

6 Policies

RandomLegal. Uniform over all legal plays (including banking any card, Sly and Forced Deals and wild moves) with a 15% end-turn bias per decision, JSN with probability 0.5 against anything, random discards.

Baseline (folk policy). A parameterised encoding of the community’s own advice, in a fixed decision order: (1) win now; (2) Pass Go; (3) complete a set; (4) Deal Breaker if the set’s value is ≥ 9 ; (4b) flip a wild to the colour that raises a rent before charging it; (5) rent if it takes $\geq \$3$; (6) Sly or Forced Deal if the gain is ≥ 4 ; (7) Hotel or House; (8) Debt Collector on the richest target holding $\geq \$3$, Birthday if any opponent holds $\geq \$2$; (9) property toward the most advanced set; (10) bank (the largest money card while below the \$5 floor, else the cheapest spare card under hand pressure); (11) end. It JSNs every Deal Breaker and any rent or debt $\geq \$4$, keeping one JSN back once it owns a full set; pays bank-largest-first, then property by set progress; discards by a keep-value order (JSN 10, Deal Breaker 9, Sly 6, Double the Rent 5, ...). Six of its thresholds are continuous knobs (bank floor, rent minimum, JSN minimum, JSN reserve, debt minimum, cheap-set preference).

FeaturePolicy (linear policy). Every decision is a linear score over hand-crafted features with a learnable weight vector θ of **111 parameters**: base preferences for each of 15 play kinds; banking terms (money value, poverty, rent-card penalty, hand pressure, a penalty per action subtype); property terms (set progress, completion, win, set rent, wild use, supply per colour, new colour, third-colour exposure); charge terms (amount, whether the target must pay from the table, leader bonus, Double-the-Rent cost, target’s sets); steal terms; Deal Breaker terms (rent, new colour, their sets, wins, hold-if-no-sets); build and wild-move gains; end-turn terms; eleven standing-conditioned terms (lead, behind, leader, two-set opponents); eight *card-counting* terms added late in the project (unseen JSN/Deal Breaker counts, per-opponent hypergeometric odds of holding one by hand size, and a behavioural “let an attack through since last draw, so probably no JSN” flag); four hand-flow terms (a play that empties the hand means “draw five next turn”); ten JSN terms (a base per attack type, amount, reserve, sets, progress); five payment-ordering weights; and sixteen discard keep-values. The features were chosen so the optimiser can express, or reject, every folk claim. The default θ reproduces BASELINE closely.

Evolution strategy. OpenAI-ES with antithetic sampling and rank-normalised gradient estimates [9]: population of 12–16 perturbation pairs, $\sigma = 0.08$ scaled per parameter, learning rate 0.4. Fitness of θ is its mean win rate over G games seated (rotating) among opponents drawn from a pool: the incumbent, a hall of fame of the last six incumbents, and the folk BASELINE at rate 0.25, so the policy must beat diverse opponents rather than

Table 1: E01: seat win rates, folk BASELINE in every seat, 100,000 games per row, fixed seats, 2024 defaults.

Players	Win rate by seat (first ... last)	Fair	Mean turns	Median	JSN/game	Refused/game
2	57.3 / 42.7%	50.0	16.30	16	0.80	0.020
3	36.0 / 31.4 / 32.6%	33.3	19.71	19	0.97	0.023
4	25.3 / 23.9 / 25.0 / 25.7%	25.0	22.08	22	1.12	0.030
5	19.8 / 19.0 / 20.0 / 20.3 / 20.9%	20.0	23.42	23	1.28	0.037

exploit one. Common random numbers are used within a generation, and an elitist safeguard accepts an update only if it does not lose to the incumbent on fresh seeds by more than one point. Local runs used 1,000–1,200 games per candidate for roughly 130–140 generations; cloud runs used 50 generations at 256,000 games per generation. The cloud weights per player count are the ones evaluated everywhere below.

Position solver and rollout agents. A determinization solver evaluates every legal play in a described situation by resampling the hidden cards (opponents’ hands and draw order, consistent with everything the mover can see) and playing out with a fast policy. Three search agents were built on it. *Rollout* (E02, E05): one-ply Monte Carlo with BASELINE in every seat. *Determinized UCT* (E13): for each of D determinizations, K iterations of UCT on the perfect-information game with payment, JSN, discard and wild-colour decisions inside the tree delegated to the fast policy, leaves scored by rollout to a horizon with partial credit by set lead, root statistics summed across determinizations. *RolloutCRN* (E13c, E16): take the top- k plays by the linear policy’s own score plus **end**; for each of D determinizations and R rollout seeds, play *every* candidate from the identical (d, r) start with the same fast policy in every seat to the end of the game; pick the best mean. Because candidates share (d, r) , outcome noise is correlated and the differences between plays are estimated with low variance. This is one exact step of policy improvement over the fast policy [1] and a proper fixed-point test: if it cannot beat the linear policy, the linear policy is locally optimal under its own continuation.

Solver-as-teacher. A dataset of solver-scored decision points can be fit by replaying each state, letting $\text{FEATUREPOLICY}(\theta)$ choose among the scored plays, and crediting it with the solver’s value of its choice; θ is then optimised by ES on the mean credited value.

7 Structural results

7.1 Seat position and game length (E01, E01b)

Table 1 gives 100,000 games per player count with fixed seats and folk BASELINE in every seat (standard error per seat 0.13–0.16 pp). The first player’s edge is large head-to-head (+7.3 pp), moderate at three (+2.7 pp) and gone at four and five, where the *last* seat does best. A “turn” is one player’s turn, so a 4-player game lasts about 5.5 rounds and a 2-player game about 8.1 rounds each. Just Say No is played 0.80–1.28 times per game (there are three in 106 cards), and the 2024 rule refuses an answer 0.020–0.037 times per game.

The seat edge between skilled players (E01b). E01 is folk against folk. With the recommended policy (the evolved weights plus the two-step lookahead of Section 9.4) in every seat, seat 1 wins 56.9% at 2p, 39.9% at 3p, 30.7% at 4p and 25.2% at 5p (fair 50.0/33.3/25.0/20.0); with the weights alone, 57.1/40.0/30.8/25.6%. Head-to-head the edge is about the same as between folk players (+6.9 against +7.3 pp); at three to five players it is not. Between folk players the first seat’s advantage decays to +2.7, +0.3 and -0.2 pp; between evolved players it stays at +6.6, +5.7 and +5.2 (Figure 1). The folk policy wastes the tempo of moving first; the evolved policy converts it at every table size, so the seat edge is a property of skilled play rather than of the two-player game.

7.2 What each card class is worth (E03, E42)

One seat plays a BASELINE forbidden from using a card class as an action (it may still bank it); the drop from fair share measures the class’s value to the folk policy (40,000 games per cell; 95% interval ± 0.18 –0.49 pp, tightest where the drop is largest). Table 2 shows the ranking at all four counts. Rent and Pass Go dominate everywhere.

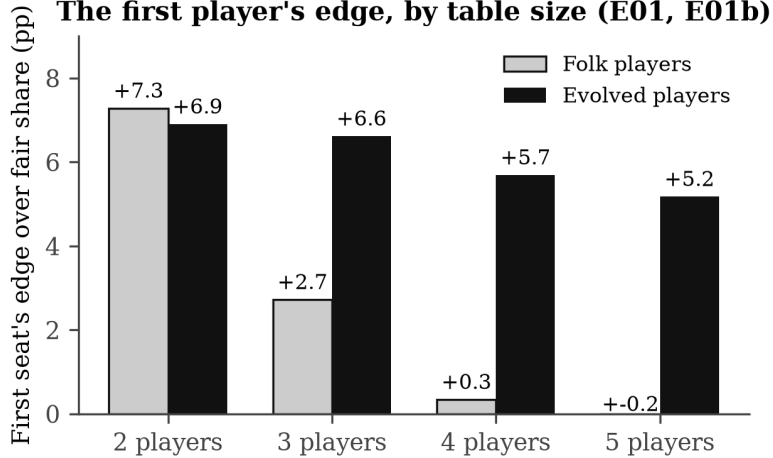


Figure 1: The first seat’s edge over fair share with folk players in every seat (E01) and with the recommended policy in every seat (E01b), 100,000 fixed-seat games per bar (20,000 for the five-player evolved bar). Between folk players the edge decays from +7.3 pp at 2p to -0.2 at 5p; between evolved players it stays between +5.2 and +6.9 at every count. Moving first is worth about six points to a player who knows how to use it.

Table 2: E03: win-rate drop (percentage points below fair share) when one BASELINE seat may not play a card class as an action. 40,000 games per cell, rotating seat, 2024 defaults; 95% interval at most $\pm 0.49/0.46/0.43/0.39$ at 2/3/4/5 players and as tight as ± 0.18 for the largest drops.

Card class	2p	3p	4p	5p	Ratio 2p/4p
Rent cards	13.14	16.70	18.29	16.53	0.7
Pass Go	19.35	16.57	12.49	9.99	1.5
Deal Breaker	14.25	12.24	8.46	6.34	1.7
Debt Collector	8.58	5.77	3.81	2.41	2.3
Sly Deal	8.10	7.77	5.21	3.24	1.6
Just Say No	7.84	5.62	3.23	2.24	2.4
It’s My Birthday	4.78	5.64	5.50	5.10	0.9
Forced Deal	2.14	2.90	1.69	0.79	1.3
Moving wild cards	1.44	1.86	0.73	0.69	2.0
Double the Rent	0.98	0.94	-0.01	-0.17	—
House / Hotel	0.88	1.05	0.35	0.01	2.5

Cards whose effect scales with the number of opponents (rent, Birthday) matter far more at three to five players; single-target cards (Deal Breaker, Sly Deal, Debt Collector, Just Say No) matter far more head-to-head, by factors of 1.3 to 2.4. To the folk policy, Double the Rent, buildings and wild moves are nearly worthless; this is a statement about the folk policy, not the cards, and Sections 8 and 10.4 qualify it.

Splitting the rent class (E42): forbidding the three any-colour rents costs $-6.31/-5.49/-4.09/-2.50$ pp; forbidding the ten two-colour rents costs $-7.03/-12.84/-15.77/-15.20$, the largest single-class ablation in the run. Per card an any-colour rent is worth $3.0\times$ a two-colour rent head-to-head (2.10 vs 0.70 pp) and $0.86\times$ at four players (1.36 vs 1.58). The two classes sum to 13.3 (2p) and 19.9 (4p), against E03’s whole-rent ablation of 13.1 and 18.3.

7.3 Aggression and the Birthday card (E04, E09)

An *Aggro* variant (fire every attack immediately, never hold, never end early) wins 50.80% of 2-player games against BASELINE (fair 50), 31.70% at three, 21.33% at four and 16.32% at five; a *Hoarder* (attack only for $\geq \$5$ or a winning/denying Deal Breaker; JSN only against Deal Breaker) wins 47.31/30.64/22.73/17.93% (40,000 games per cell). Maximal aggression is worth $+0.80 \pm 0.49$ pp head-to-head — a real but small edge — and $-1.63/-3.67/-3.68$ at three, four and five players; hoarding loses 2.1–2.7 pp at every count (Figure 3). **This**

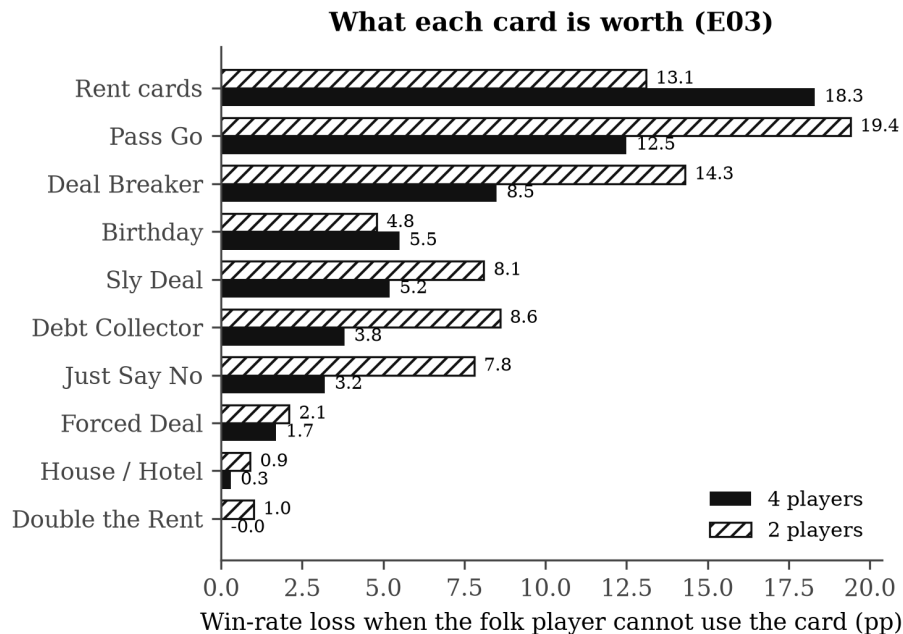


Figure 2: Win-rate loss when one folk seat may not play a card class as an action (E03, 40,000 games per cell), at four players (solid) and two (hatched). Rent cards and Pass Go dominate at both counts. Rent and Birthday, whose effect scales with the number of opponents, are the only classes worth more at four players than at two; every single-target card (Deal Breaker, Sly Deal, Debt Collector, Just Say No, Forced Deal) is worth 1.3–2.4× more head-to-head.

reverses the earlier reading. Under the pre-round-4 engine and the unfixed folk policy, Aggro scored +6.8 pp head-to-head, and the gain came from two artefacts: the old BASELINE never played It’s My Birthday at two players, so the attacker got that card for free, and the old engine let a policy undo wild moves for nothing. With both fixed, all-out aggression is nearly neutral at two players and a handicap at every larger table. What survives is the shape: single-target cards dominate head-to-head, so spending them fast costs nothing there, while at four and five players attacks are diluted across three or four opponents and early aggression paints a target.

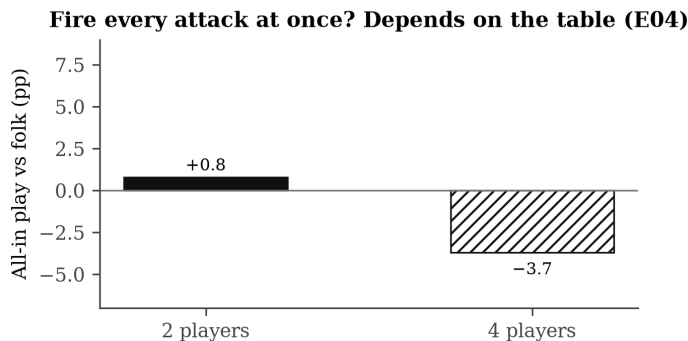


Figure 3: The Aggro variant (fire every attack at once, never hold, never end early) against folk tables (E04, 40,000 games per cell): +0.8 pp over fair share head-to-head and −3.7 at four players. The same rule is nearly free against one opponent and a handicap against three.

E09 tests the Birthday card directly (40,000 games per cell): playing it whenever an opponent holds $\geq \$2$ scores 50.28/33.37/25.30/20.39% — fair share at every count — against 45.23/27.69/19.51/14.90% for always banking it, a gap of 5.1/5.7/5.8/5.5 pp. The argument is arithmetic: banking is +\$2; playing is +\$2 for me and at least −\$2 for each opponent, since no change is given. E03’s Birthday ablation agrees (4.78/5.64/5.50/5.10).

7.4 Skill versus luck (E25, E24)

A RANDOMLEGAL player at a folk table wins 3.40% at 2p, 1.04% at 3p, 0.34% at 4p and 0.27% at 5p. The ES-optimised FEATUREPOLICY wins 60.88, 48.90, 39.25 and 32.15% (+10.88/ +15.57/ +14.25/ +12.14 pp), i.e. 1.22 $\times$, 1.47 $\times$, 1.57 $\times$ and 1.61 $\times$ fair; the recommended policy (Section 9.4) wins 66.9/51.9/41.3/34.4%. The absolute skill spread (ES minus random) shrinks with player count (57.5 to 31.9 pp), which is forced by the shrinking fair share; relative to fair the strong player’s advantage grows. Removing both Deal Breakers from the deck widens the spread (2p: 57.5 to 62.4 pp; 4p: 38.9 to 42.4), and the random player also does better without them (4.34% vs 3.40% at 2p): the Deal Breaker is a weapon the folk table uses against weak play. Streaks that players cite as evidence of luck are ordinary: in a 100-game series between two equal players someone wins eight in a row with probability 31.5% (six or more: 80.7%).

7.5 What a folk game looks like (E33)

All-BASELINE instrumented cells (40,000 games per count) give the base rates against which claims were read. Mean turns 16.28/19.72/22.06/23.42 at 2/3/4/5p. Wins within three rounds: 0.49%, 2.38%, 6.95%, 15.34%. Mean full sets at the win 3.03–3.09. The winner’s sets include a card received by payment, steal or Deal Breaker in 97.8–100% of games, and a whole Deal Breaker-taken set in 47.0–53.9%. A Deal Breaker is played 0.89–1.76 times per game and succeeds 77.8–80.8% of the time. Comebacks from two full sets behind: 6.6–8.3%. JSN wars (chains of two or more) occur in 8.0–8.4% of games, and a counter is refused under the 2024 rule 0.021–0.037 times per game. Quadruple rents occur in 2.9–4.4% of games; the mean largest single rent per game is \$6.37–6.56; rents of \$30 or more occur in 0.15–0.27% of games and \$60 was seen once in 40,000 four-player games. Starting hands matter: hands with two or more Deal Breaker/JSN win 1.55–1.77 $\times$ fair, money-heavy hands 0.64–0.79 $\times$ (the worst class), property-heavy 0.78–0.93 $\times$; the spread between best and worst class is 77.7 vs 39.5% at 2p and 41.7 vs 17.4% at 4p. The player who collected the most money in the first two rounds wins 1.24 $\times$ fair at 2p, 1.37 $\times$ at 3p, 1.58 $\times$ at 4p and 1.89 $\times$ at 5p.

8 Folk claims tested

Table 3 lists the twelve findings ranked by effect size times how widely the claim is believed (claim counts and summed Reddit score Σ). Every delta is against fair share at 40,000 games per cell under the 2024 defaults; the all-BASELINE control sits at fair at every count, so no offset is applied. Figure 4 prices the six most widely repeated rules side by side.

Smaller effects worth recording: un-completing a set with a wild at end of turn (the “Deal Breaker dodge”) now costs at every count (−4.15/ −3.23/ −1.41/ −1.12), and −7.92/ −6.32/ −3.58/ −2.29 when flips cost a play (E11, E20); paying a charge with the fewest cards is +0.68/ +0.44/ +1.20/ +0.78 (E39); stealing a card so that a rent card in hand becomes playable, then renting, is +0.63/ +0.08/ +0.75/ +0.94 (E38); never banking a rent card is +0.84 at 4p and +0.81 at 5p and nothing at 2–3p, while banking a dead two-colour rent costs −0.42/ −1.48/ −1.96/ −2.26 (E31); eager Double the Rent is +0.83/ +0.78/ +1.08/ +0.96, positive at every count (E22); Dark-Blue-first colour priority costs −0.67 to −1.36 (E29). The one “my simulator says” policy in the corpus (E43: always play three cards, JSN anything, Pass Go at once, always steal two-card-colour cards, never lay a two-card-set card alone) is +2.58 $\pm$ 0.49 at 2p and +0.49 to +0.80 at 3–5p; Section 10.6 takes it apart.

The Forced-Deal-into-Deal Breaker combo is worth nothing. The most praised move on the forum — Forced Deal a card into an opponent’s set to complete it, then Deal Breaker the completed set — measures +0.11/ −0.22/ +0.12/ +0.14 against folk tables, inside the interval at every count, and its paired difference from the matched control is −0.03/ −0.08/ −0.09/ −0.06 with intervals of $\pm$ 0.06. Against opponents constructed never to say no, so that the Just Say No confound is gone, it scores 57.96/38.77/28.59/22.55% against 58.02/38.84/28.69/22.66% for a plain BASELINE on the same table: *exactly zero*, and marginally negative in the pairing. Paying an opponent the card that completes their set and then breaking it is the same story (57.88/38.76/28.67/22.63). The combo fires in 1.4–3.0% of games, most often head-to-head, and follows through about a third of the time, because the receiver may place a gifted wild somewhere else. It is refuted.

The folk thresholds are a local optimum. Both extremes of charge timing and every JSN threshold tested (2, 4, 8) lose to or tie BASELINE’s own \$3/\$3/\$2 rent, debt and Birthday thresholds and its \$4 JSN

Table 3: The twelve findings that matter most, from the 666 claim cells (180 variants at up to four player counts) at 40,000 games each. Deltas are percentage points versus fair share at 2p / 3p / 4p / 5p; 95% CI at most $\pm 0.49/0.46/0.43/0.39$, tighter for the largest effects.

#	Finding	Effect	Belief	Exp
1	Delaying full sets to dodge the Deal Breaker is the most expensive advice in the game. Never completing a set until you can win: $-14.12/-13.69/-9.69/-5.73$. Counting the Deal Breakers first still costs $-10.91/-6.62/-2.47/-0.82$. Only “complete when holding a JSN or Deal Breaker” is close to free, and only at 4–5p ($-0.96, -0.06$).	-5.7 to -14.1	24 claims, $\Sigma 71$	E10
2	Holding property in hand loses, and more holding loses more. Lay only with a rent card in hand: $-22.98/-17.12/-9.48/-4.27$. Never lay a wild until it completes a set: $-2.98/-3.37/-1.92/-0.91$. Hold everything for a one-turn win: $-44.76/-27.06/-18.39/-12.54$. Holding 2-card-set pieces is the one free form, and at five players it turns into a small gain ($+0.68$).	-0.9 to -44.8	10 claims, $\Sigma 28$	E30
3	“Bank before you build” is backwards. Withhold property until \$3 banked: $+0.02/-1.71/-3.44/-3.48$; until \$5: $-1.86/-4.71/-6.35/-5.76$; until \$8: $-7.75/-9.77/-10.24/-7.94$; until \$10: $-11.55/-12.94/-11.89/-8.89$. Monotone in the floor, and worst in the middle of the table. Refusing to bank money at all costs $-8.72/-6.76/-4.46/-2.71$.	-2 to -12.9	13+1 claims, $\Sigma 25$	E13, E35
4	Slow openings lose head-to-head and win at a full table. Pass turn 1: $-6.66/-0.59/+1.04/+2.35$; pass two turns: $-15.72/-4.81/-3.63/-2.49$; keep $\leq \$2$ on the table for two turns: $-5.30/-2.31/-1.87/-1.03$. Passing turn 1 at 2p forfeits almost exactly the first-seat edge (7.3 pp); with three or four opponents a deeper hand beats tempo.	-15.7 to $+2.4$	9+3 claims, $\Sigma 31$	E14, E36
5	Holding the Deal Breaker for “the winning moment” is the second most expensive rule found. Play it only when it wins: $-7.83/-6.12/-3.59/-2.74$; a Deal Breaker is left unplayed at game end 0.26 times per game head-to-head. Wait until also holding a JSN: $-4.12/-3.18/-1.48/-1.18$. Prefer an empty-handed target: $-7.24/-5.21/-2.64/-2.04$. A folk Deal Breaker succeeds 78–81% of the time whenever played.	-1.2 to -7.8	6 web claims, 5 sites	E37
6	Paying with “dead” railroads and utilities before cash is a 5–9 pp mistake ($-8.85/-8.46/-7.32/-5.06$). Paying the smallest bank subset that covers the charge beats shed-the-big-bill by $+0.75/+0.50/+1.15/+0.75$.	-5 to -9 ; $+1$	8 claims, $\Sigma 28$	E16
7	Doing nothing is not a move. Passing instead of banking: $-6.46/-5.55/-3.53/-1.78$. Discarding the card an opponent needs rather than laying it: $-0.70/-2.10/-1.29/-0.94$. Pass Go last instead of first: $-1.41/-2.93/-2.80/-3.04$. Emptying the hand to draw five pays at every count: $+0.98/+0.97/+0.88/+0.50$.	-1 to -6.5 ; $+1$	6 claims, $\Sigma 30$	E19
8	The free wild flip for rent is a multiplayer edge, not a two-player one. Flip a wild to the colour that raises the rent, rent, flip back: $-0.13/+0.93/+2.25/+2.12$, from 0.33–0.68 flips per game. Head-to-head it is refuted; at four and five players it is the largest positive edge found. When a flip costs a play the edge does not vanish, it moves ($+0.26/-0.66/+0.96/+1.04$).	$+2.1$ to $+2.3$ (4–5p)	4+7 claims, $\Sigma 20$	E12, E20
9	Rent is a game of chicken — above two players. Holding rent and Debt Collector until the charge is $\geq \$8$ or would take property: $-3.24/+1.01/+2.63/+2.11$. Every other timing rule loses at every count (fire at \$1+: $-2.12/-1.68/-3.10/-2.31$; wait for \$8 targets: $-4.72/-3.54/-4.03/-0.90$).	-3.2 to $+2.6$	9 claims, $\Sigma 44$	E15
10	The game is not “mostly luck.” Legal-random wins 3.40/1.04/0.34/0.27% at 2/3/4/5p; the ES policy beats folk play by $+10.88/+15.57/+14.25/+12.14$ and the recommended policy by $+16.9/+18.6/+16.3/+14.4$.	32–57 pp spread	8 claims, $\Sigma 783$	E25, E24
11	Watch the banks, then aim the charge at the bank that cannot pay. Blind targeting costs $-4.58/-4.79/-4.03$ at 3/4/5p. Aiming Debt Collector and the any-colour rent at the opponent with property on the table and a bank smaller than the charge gains $+2.14/+2.76/+2.50$ from 0.51 re-targets per game at 4p. Every other targeting rule tested loses.	-4 to -4.8 ; $+2.1$ to $+2.8$	5+2 claims, $\Sigma 13$	E26, E39
12	The opening hand and the first two rounds matter more than any table-politics advice. DB/JSN-rich hands win 1.55–1.77 $\times$ fair; money-heavy 0.64–0.79 $\times$. The early-money leader wins 1.24–1.89 $\times$ fair. “Target the leader” ($-0.68/+0.09/+0.17$ at 3/4/5p) and every JSN-discipline variant change nothing.	1.2–1.9 $\times$ fair	26+7+4 claims	E33, E27, E18

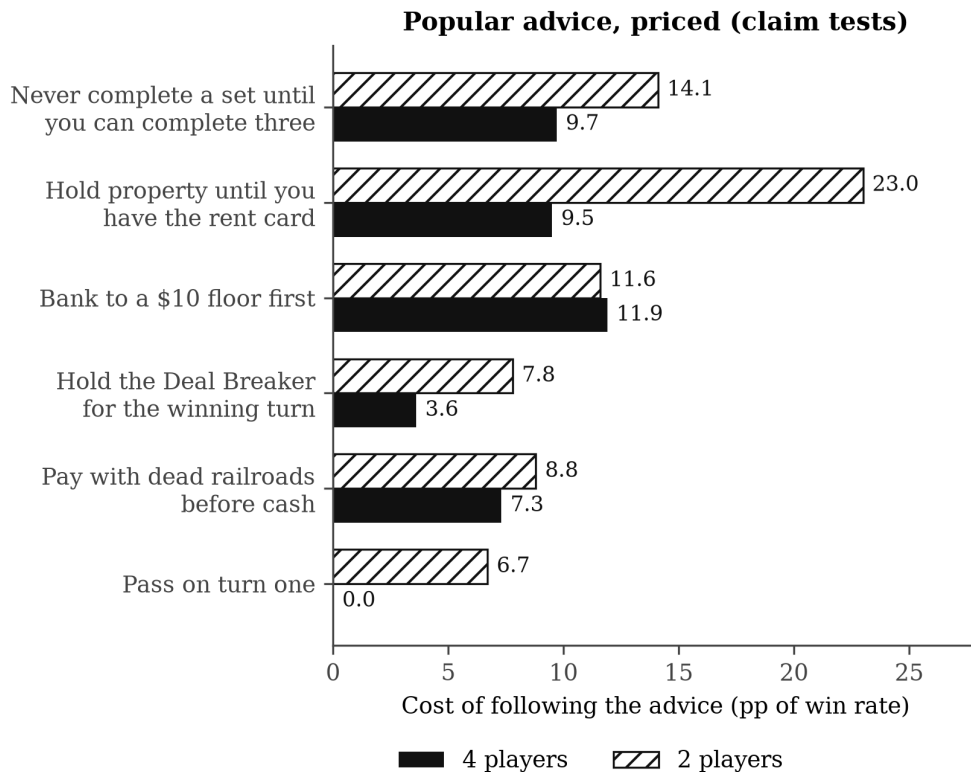


Figure 4: Six widely repeated pieces of advice, priced as the win-rate cost of following them against the folk BASELINE (40,000 games per cell). The four-player bar for “pass on turn one” is zero because at four players the advice is no longer a cost: passing the first turn now *gains* +1.04 pp.

threshold: `jsn_threshold_2` $-0.14/-0.79/+0.09/-0.01$, `jsn_threshold_8` $-0.31/-0.56/+0.02/+0.04$, `jsn_only_breaker` $-0.65/-0.94/-0.22/-0.15$ (hoarding the Just Say No for Deal Breakers is refuted at 2–4 players), `jsn_anything` $+0.49/-0.55/-0.00/-0.24$. The community’s numbers are about right; its *qualitative* rules (delay, hoard, bank first, wait) are what cost.

Rent farming cannot be priced. Charging rent on the winning turn before going out is free ($+0.06/-0.17/+0.16/+0.20$, inside the interval at every count), and deliberately farming rent for one extra turn instead of winning is also inside it ($+0.04/-0.23/+0.08/+0.10$); farming for two turns is a small loss ($-0.42/-0.68/-0.39/-0.26$) whose unpaired interval covers it at three of four counts. The verdict is inconclusive: the situation is too rare for a 40,000-game cell to separate the claim from noise, and we do not quote a price for it.

8.1 Down to one card: dump it (E15 of the results log)

With one card in hand and a play remaining, discarding it draws five next turn instead of two. Against folk BASELINES (40,000 games per cell, rotating seat), “always dump” is $+0.71/+0.64/+0.77/+0.43$ pp over fair; “always hold” is $-0.28/-0.97/-0.40/-0.13$. No exception improves on always dumping: not for a Just Say No ($+0.68/+0.55/+0.66/+0.41$), a Deal Breaker ($+0.73/+0.65/+0.77/+0.43$), a rent card ($+0.41/+0.34/+0.65/+0.36$), \$4+ money ($+0.68/+0.60/+0.74/+0.40$), an attack card ($+0.66/+0.57/+0.73/+0.40$) or a property ($+0.69/+0.58/+0.74/+0.39$). The situation arises in 6–14% of games by player count (counted by E19’s matched `dump_to_zero` variant, which fires on the same trigger), so the per-occurrence effect is several points of win probability (Figure 5).

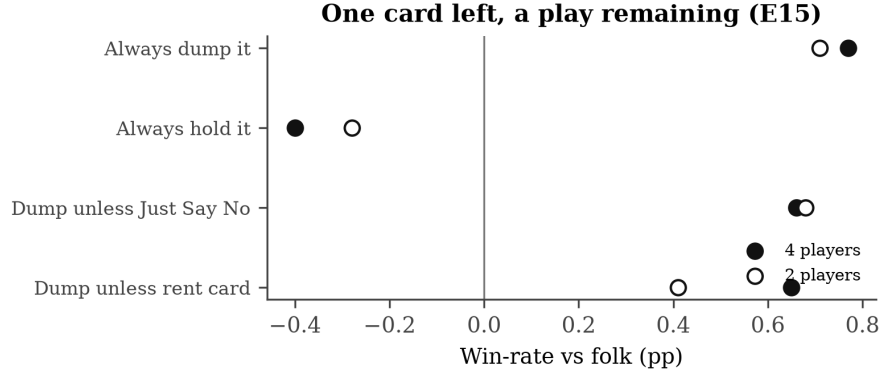


Figure 5: One card in hand with a play remaining (E15 of the results log, 40,000 games per cell): win rate versus fair share for four rules, 2p (open) and 4p (filled). Always dumping the last card to draw five next turn is $+0.71/+0.77$ pp; always holding it is $-0.28/-0.40$; every exception tested, including keeping a Just Say No or a rent card, is worse than dumping.

Table 4: E06: win rate (%) of the row policy seated among copies of the folk BASELINE, rotating seat, 2024 defaults. “la” is the cloud-evolved weights for the count plus the two-step-win lookahead. Cell sizes: 100,000 games (E06 rows at 2–3p; 20,000 at 4–5p), 40,000 (E25, E04, E43).

Policy seated among folk BASELINES	2p (fair 50.0)	3p (33.3)	4p (25.0)	5p (20.0)	Exp
Evolved weights + lookahead (<i>recommended</i>)	66.89	51.93	41.30	34.39	E06
Evolved weights alone	65.81	50.13	39.28	32.73	E06
Local ES FEATUREPOLICY	60.88	48.90	39.25	32.15	E25
myforwik bundle	52.58	34.04	25.80	20.49	E43
Aggro (fire everything at once)	50.80	31.70	21.33	16.32	E04
Hoarder	47.31	30.64	22.73	17.93	E04
RANDOMLEGAL	3.40	1.04	0.34	0.27	E25

9 Policy optimisation

9.1 Evolved policy versus folk play (E06)

Table 4 seats each policy among copies of the folk BASELINE under the 2024 defaults. The cloud-evolved weights beat the folk BASELINE by $+15.8$ pp at 2p, $+16.8$ at 3p, $+14.3$ at 4p and $+12.7$ at 5p; with the two-step lookahead of Section 9.4 the same weights win **66.9/51.9/41.3/34.4%**, $+16.9/+18.6/+16.3/+14.4$ pp over fair. This is the paper’s headline for the recommended policy. Ten times more evaluation games per candidate in the cloud had bought $+0.8$ to $+1.8$ pp over the local runs and nothing measurable against the local weights themselves: the linear feature policy is at its ceiling, roughly $+13$ to $+17$ pp over folk play.²

9.2 What evolution learned (E14)

Resetting one evolved 4p weight at a time to its folk default and measuring against the full evolved policy (20,000 games per cell, rescaled from a design size of 60,000; ± 0.60 pp) shows that the gain is one big idea and three small ones (Table 5). Big: lay property less greedily; **prop_progress** fell from 4.0 to 2.3, and restoring it costs -3.58 pp. The folk policy over-develops and under-attacks. Small: a lower base appetite for laying property (-0.70), charge rent more readily (-0.47), hold fewer properties in hand (-0.23), and prefer rents that force property payment ($+0.06$, now inside the interval). Ten of the weights that evolution “moved” reproduce the reference cell exactly: they never change a decision. Figure 6 shows the ranking.

²The local ES tournament (E06, 6,000 games per pairing) and the cloud-versus-local check (E06c) were run under the old defaults and were not re-run in round 4; the specialisation result they carried — that the 2p-evolved weights beat the 4p-evolved weights head-to-head but lose to them at 3–5 players — is reported here as a round-1 finding, not as a current measurement.

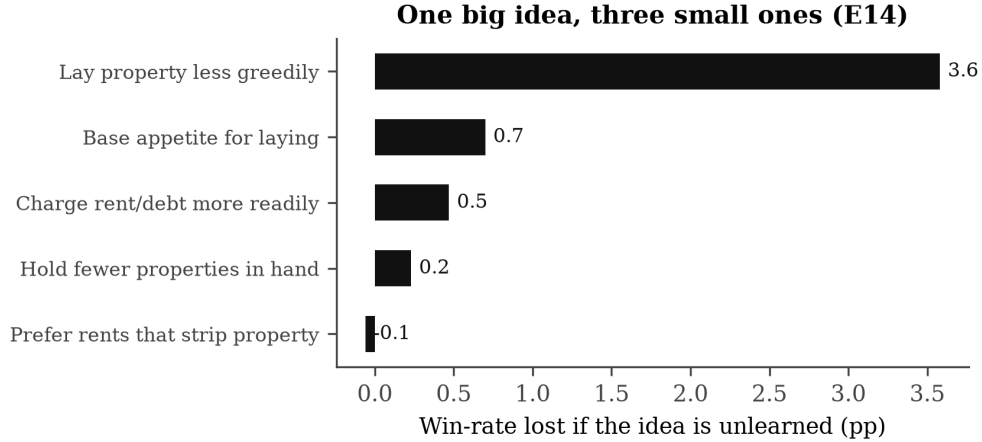


Figure 6: Cost of resetting one evolved 4p weight to its folk default, measured against the full evolved policy (E14, 20,000 games per cell, ± 0.60 pp). One idea, laying property less greedily, is worth 3.6 pp on its own; the next four together are worth about 1.3 points and only the first two clear the interval; the fourteen other weights evolution moved change no decision, or change it by at most 0.08 pp, and are omitted.

Table 5: E14: cost of un-learning one evolved 4p weight (reset to folk default) versus the full evolved policy. 20,000 games per cell; fair 25.0; ± 0.60 pp; the +0.23 shared by the null resets is the seed-set offset, so costs are read against 25.22.

Weight reset to folk value	Win rate	Cost vs fair
<code>prop_progress</code> (4.0 $\rightarrow$ learned 2.3)	21.42%	-3.58
<code>kind_prop</code> (base appetite for laying property)	24.30%	-0.70
<code>take_amount</code> (appetite for charging rent/debt)	24.53%	-0.47
<code>keep_prop</code> (hold property in hand less)	24.77%	-0.23
<code>steal_my_gain</code>	24.98%	-0.03
<code>take_from_table</code> (prefer rents that strip property)	25.06%	+0.06
10 other moved weights	25.225% each	+0.23 (identical games)

Table 6: E13c: paired common-random-number rollout agent versus the converged linear policy, 2024 defaults and hashed seeds. The agent is expensive (about 3–12 CPU-seconds per game), so the cells are small and the intervals wide.

Table	Games	Rollout agent	Fair	Δ	95% CI
2p	200	47.0%	50.0	-3.0	± 6.9 (n.s.)
3p	400	32.0%	33.3	-1.3	± 4.6 (n.s.)
4p	400	34.0%	25.0	+9.0	± 4.6
5p	400	31.5%	20.0	+11.5	± 4.6

9.3 Is the linear policy a fixed point? (E13c, E16)

RolloutCRN (top-8 plays, 12 determinizations $\times$ 4 rollouts to game end, the converged linear policy as the fast policy in every seat) seated against the converged linear policy gives one step of policy improvement (Table 6). At 2 and 3 players the rollout step does not beat the linear policy (-3.0 and -1.3 pp, both inside wide intervals): the linear policy is close to locally optimal under its own continuation. At 4 and 5 players the step is worth $+9.0$ and $+11.5$ pp, and the improvement grows with the number of opponents. The cells are small and the intervals are ± 4.6 pp, but the sign and the ordering are stable across rounds. The unexploited strategy lives in multiplayer table dynamics: whom to hit, when to hide.

Where the teacher disagrees (E05/E16). Sampling mid-game decisions from BASELINE games and labelling each by paired rollouts over the evolved policy’s top-8 plays plus `end` gives 2,317 states at 2p, 2,235 at 3p, 2,240 at 4p and 2,181 at 5p (Table 7). The folk BASELINE’s play is the teacher’s best in 28/25/25/22% of states,

losing 3.5/5.2/5.2/6.0 pp of win probability per decision on average, with 26/37/34/37% of its decisions losing 5 pp or more. The evolved linear policy agrees in 39/35/36/34% and loses 3.4/5.0/5.0/5.8; it differs from the teacher by more than 2 pp in 61/65/64/66% of states. Both numbers are inflated by the winner’s curse over nine noisy candidates, so they are upper bounds on the true gap. Disagreement by standing is consistent at every count: the evolved policy disagrees most when level (66–75%) and least when leading (47–56%). The most common corrections at four players are lay property $\rightarrow$ bank (258 states), a different property (212), Pass Go $\rightarrow$ lay property (130), Pass Go $\rightarrow$ bank (122) and charge $\rightarrow$ lay property (84); “end the turn” is the teacher’s best play in 4–7% of states, which the folk policy essentially never chooses (1% agreement at five players). The remaining edge is in ordering and selection within a turn — which colour, which card to bank, when Pass Go goes — which is exactly what a linear scorer over per-play features struggles to express.³

Table 7: E05/E16 (round 4): folk and evolved play against the paired-rollout teacher, 2024 defaults. “Loss” is the teacher’s best value minus the played value, in pp of win probability per decision. Solver = 12 determinizations $\times$ 4 rollouts to game end over the top-8 plays plus **end**.

Players	States	Folk = best	Folk loss	Folk $\geq$ 5 pp	Evolved = best	Evolved loss	Evolved $>$ 2 pp
2	2,317	28%	3.5	26%	39%	3.4	61%
3	2,235	25%	5.2	37%	35%	5.0	65%
4	2,240	25%	5.2	34%	36%	5.0	64%
5	2,181	22%	6.0	37%	34%	5.8	66%

The largest single folk mistakes the teacher finds are almost all choices of *which* property to lay or which wild to commit: at four players, giving the Pink/Orange wild in a Forced Deal rather than laying the Dark Blue/Green wild as Dark Blue (+96 pp), a Light Blue rent rather than a Sly Deal on Green (+90), a Red rent aimed at the wrong opponent (+88), a house rather than a Brown property (+85) and a Deal Breaker where a Debt Collector on the same player was better (+83). At two players: a Brown rather than a Utility (+75), the Pink/Orange wild as Pink rather than the Railroad/Utility wild as Utility (+46) and Pass Go rather than a Utility (+35). These are best-of-nine estimates and therefore upper bounds.

9.4 The two-step win: an in-turn lookahead (E19b)

The E16 disagreements share a shape. With two full sets down, the linear policy scores one play at a time and misses two-play combinations that complete a third colour within the turn: lay then steal, steal then lay, lay then lay. E19 adds a search that fires only when a win is reachable within the turn’s remaining plays and otherwise leaves every decision to the linear scorer. Seated among copies of the same weights without it (rotating seat), the lookahead policy wins 51.50% at 2p, 35.45% at 3p, 27.03% at 4p and 21.67% at 5p: $+1.50 \pm 0.31$, $+2.12 \pm 0.30$, $+2.03 \pm 0.62$ and $+1.67 \pm 0.57$ pp (100,000 games at 2–3p, 20,000 at 4–5p). One deterministic rule recovers about a fifth of the 4-player rollout gap (E13c, +9.0) and about a seventh of the 5-player gap, and it costs nothing to teach: with two sets down, before any other play, look for two cards that finish a third colour this turn. Figure 7 stacks the pieces — the evolved policy’s edge over folk play, the lookahead’s addition and the rollout step above them. The recommended strategy is the evolved policy plus this rule; against folk tables it wins 66.9/51.9/41.3/34.4% at 2–5 players.

9.5 The value of counting (E12)

Eight explicit counting features (unseen JSN and Deal Breaker counts, per-opponent hypergeometric odds by hand size, the behavioural no-JSN flag) were added to the converged cloud weights and fine-tuned for 25 cloud generations. Seated among the pre-counting weights (20,000 games per count, ± 0.6 – 0.7 pp) the counting-tuned policy scores 50.11% at 2p (+0.10, noise), 33.53% at 3p (+0.20, noise) and 26.05% at 4p (+1.05, just outside the interval). Explicit counting, in the linear forms tested, is worth about a point at a four-player table and nothing measurable head-to-head; folklore rates it far higher. Two caveats: the linear policy’s “supply per colour” feature was already a form of counting, and a search agent may extract more. The larger counting-adjacent effect is *seeing banks*: blind targeting costs $-4.58/-4.79/-4.03$ pp at 3/4/5 players (E26), which is what a

³The 4 $\times$ -rollout confirmation re-solve of the top-60 folk mistakes (E16b) and the teacher-fit of the weights (E17 of the results log) were run under the old defaults and were not re-run; they are reported in Section 12 as historical negative results.

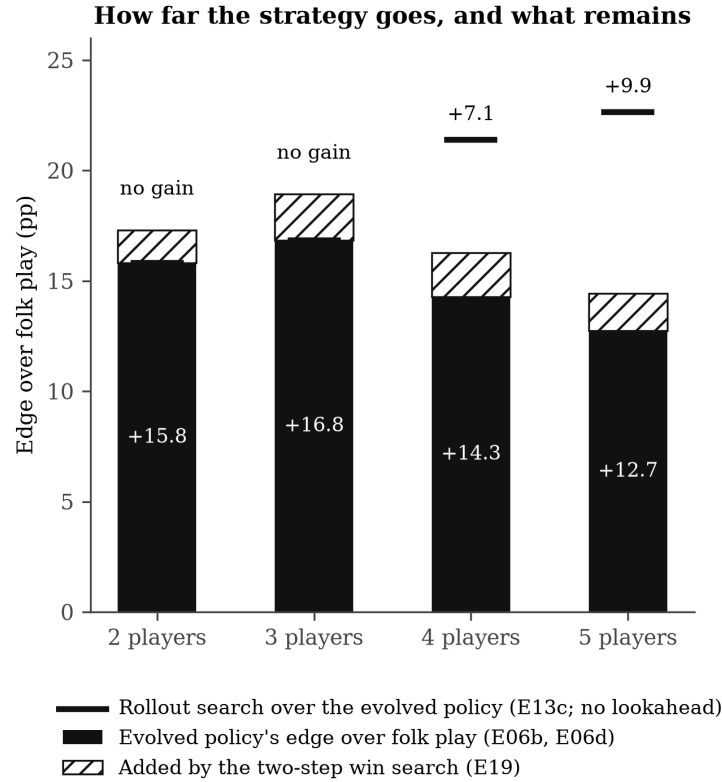


Figure 7: The strategy ladder by table size: the evolved policy's edge over folk play (solid), the gain from the in-turn two-step-win search (hatched, E19b), and, drawn as a tick above the evolved edge, the gain of paired-rollout search over the evolved policy measured without the lookahead (E13c). At two and three players search finds nothing; the remaining edge grows with the number of opponents.

face-down-money house rule hands to whoever counts. Figure 8 puts the two additions to the 4p policy side by side.

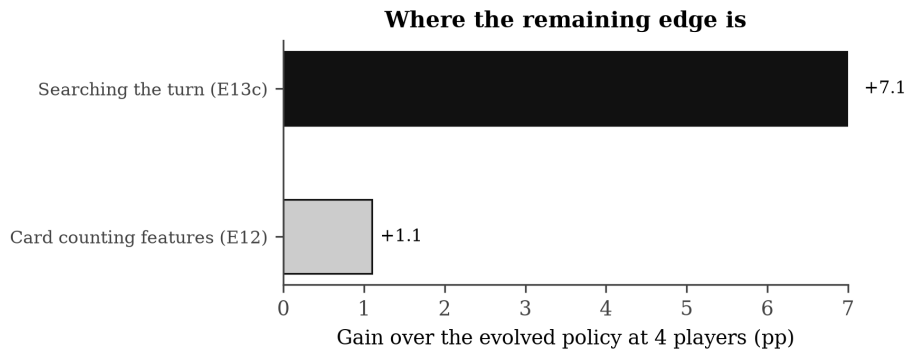


Figure 8: Two ways to add to the evolved 4p policy: eight explicit card-counting features fine-tuned by evolution (E12, +1.1 pp, 20,000 games) against one step of paired rollout search over the same policy (E13c, +9.0 pp, 400 games). Knowing what is unseen is worth about a point; searching the turn is worth nine.

10 Round 4: the canonical evidence base

Round 4 re-ran every cell the paper depends on under both of the engine’s current rules — the 2024 rulebook defaults of Section 4 and the null-cycle wild rule of Section 4.1 — at **2, 3, 4 and 5 players**, with hashed seeds and seed 0 upward in every cell: 861 cells covering 244 distinct variants across 47 experiments, 42.2 million games; 666 of the cells (180 variants) are claim cells and the rest are tournaments, ablations and decision tables. Claim cells run at 40,000 games ($\pm 0.49/0.46/0.43/0.39$ pp); design cells at 100,000 or 200,000; a few tournament and decision-table cells at 20,000 after the laptop’s link to the cloud degraded, and those carry their design size alongside their actual size so that no number is quoted at a precision it does not have. The all-BASELINE controls sit at $+0.14/ -0.14/ +0.20/ +0.20$ pp, inside the interval at every count, so every delta in this paper is read against fair share directly. This section reports the experiments that exist only in this round; Sections 7–9 already quote round-4 numbers throughout.

10.1 Does the 2024 rulebook change anything? (E07c)

Table 8 re-runs the headline cells on identical seeds under the 2008 and the 2024 defaults, 100,000 games per cell ($SE \approx 0.15$ pp), on the engine as it stood before the null-cycle fix, so that the rule change is isolated. “Denials” count, per game, the turns on which the mover held a Just Say No, wanted to answer one, and had no play left. Nothing moves outside ± 0.5 pp; the largest shift is $+0.14$. The strict rule refuses a counter in 2% of folk 2-player games and 9% of evolved 5-player games, but a refused counter only changes a game in which the attacker would in fact have countered, and those games re-roll to the same win rate; mean length is unchanged (16.45 to 16.47 turns at 2p, 22.46 to 22.49 at 4p). Claim #375 held that the new rule kills the Just Say No war. It bites — a counter is refused in 0.021–0.037 of folk games and 0.031–0.090 of evolved games — but Just Say No wars per game fall only from 0.092/0.096/0.097 under the old rule to 0.080/0.084/0.081 at 2–4p: one war in eight, not the wars themselves. The claim is confirmed in direction and small in size.

Table 8: E07c: the same 100,000 seeds per cell under the 2008 and the 2024 defaults, pre-f2fc861 engine, so that the rulebook change is measured alone. “la” is the cloud-evolved weights for the count plus the lookahead; seat cells are fixed-seat, la-versus-folk cells rotate the seat. Denials are per game under the 2024 defaults; $SE \approx 0.15$ pp.

Cell	2008 defaults	2024 defaults	Δ (pp)	JSN denials/game
la vs folk, 2p (fair 50)	66.74%	66.80%	+0.06	0.024
la vs folk, 3p (fair 33.3)	51.66	51.80	+0.14	0.031
la vs folk, 4p (fair 25)	41.36	41.42	+0.06	0.037
la vs folk, 5p (fair 20)	34.62	34.62	0.00	0.045
all-folk seat-1 edge, 2p	56.80	56.80	0.00	0.020
all-folk seat-1 edge, 4p	25.45	25.45	0.00	0.030
all-evolved (la) seat-1 edge, 2p	56.65	56.65	0.00	0.030
all-evolved (la) seat-1 edge, 3p	39.70	39.73	+0.03	0.050
all-evolved (la) seat-1 edge, 4p	30.70	30.70	0.00	0.067
all-evolved (la) seat-1 edge, 5p	25.39	25.39	0.00	0.089

Taken with the wild-rule isolation of Section 4.1, this settles which of the two engine changes moved the numbers that moved between rounds. The rulebook moved nothing measurable; the wild rule moved 63 of 482 cells, all of them in variants that lean on wild movement; and the rest of the movement between rounds is the folk-policy fix and the seeding change described in Sections 5 and 13.

10.2 The Forced Deal card read exactly: giving from one’s own complete set (E50)

The 2024 Forced Deal card reads: “Swap any one of your properties with any one of another player’s. You may not TAKE a property that’s part of a complete set.” The restriction names the card *taken*, not the card *given*, so a player may offer a card out of one of their own complete sets, breaking it and (under the 2024 orphan-building rule) discarding any House or Hotel on it. The engine forbade both sides until this experiment; `forced_deal_give_from_full` now defaults to true and false reproduces the stricter reading under which every other cell in this paper was run.

Players	Fair	Win rate of the recommended policy (%)				Paired difference (pp)	
		none	hero	folk	both	hero – none	folk – none
2	50.0	66.74	66.64	68.77	68.67	-0.10 ± 0.03	$+2.03 \pm 0.17$
3	33.3	51.85	51.67	54.19	54.02	-0.18 ± 0.05	$+2.34 \pm 0.21$
4	25.0	41.05	40.85	43.29	43.08	-0.20 ± 0.05	$+2.23 \pm 0.23$
5	20.0	34.16	33.97	36.01	35.84	-0.18 ± 0.05	$+1.86 \pm 0.23$

Table 9: E50b: who gains when the Forced Deal is played as the card is printed. *none* = neither side may offer a card from its own complete set (the engine every other cell in this paper ran on); *hero* = only the recommended policy may; *folk* = only the BASELINE opponents may; *both* = today’s default. 40,000 games per cell, identical seeds, recommended policy in the rotating seat among folk BASELINES; cell win rates carry ± 0.46 – 0.49 pp unpaired, the difference columns are paired on the per-seed win bitmaps.

Switched globally, the rule is worth about two points: the recommended policy wins 68.52% against 66.57% at two players and 43.30% against 41.30% at four (20,000 games per cell, identical seeds), with Forced Deals per game essentially unchanged (0.920 against 0.906). A global switch cannot say whose gain that is, so E50b imposes the restriction at the *policy* level instead — a wrapper deletes from a seat’s legal-play list any Forced Deal whose offered card sits in one of that seat’s own complete sets — and runs four cells at each player count, 40,000 games each on seeds 0–39,999 (Table 9).

The decomposition. None of the two points is the strong player exploiting the play; all of it is the opponents misusing it. The recommended policy offers a card from one of its own complete sets on 0.9% of its Forced Deals (0.6% at five players), 0.002–0.005 times per game; the folk BASELINE does it on **28–38%** of its Forced Deals, 0.13–0.35 times per game. Dividing the cell delta by the folk rate prices the blunder at $+15.5/+9.3/+6.8/+5.4$ pp to a strong opponent at 2/3/4/5 players, the most expensive single mistake measured anywhere in this study. The folk policy scores the card it offers by that card’s progress toward an *unfinished* set, so a card inside a complete set scores as zero progress — the cheapest card on its table when it is the dearest. In consequence it breaks a set worth \$5.21 of full-set rent to finish one worth \$3.39, discards a House or Hotel on the way in 24% of such plays at two players, hands the receiver a set-completing card 17% of the time, and recovers the broken colour only a quarter of the time.

What the play is, when a strong policy makes it. The pre-registered hypothesis — that breaking one’s own set while taking a needed card is a Deal Breaker dodge that also steals — is refused by the data. Across 617 such plays by the recommended policy at four player counts, the number made while any opponent held a Deal Breaker is *one*, and the number that left the player with no complete set at all is *zero*; 90–95% are made with two complete sets already down. The dodge is structurally unavailable: a folk player fires a Deal Breaker on the turn it arrives, so an opponent starts the hero’s turn holding one, with the hero holding a complete set, on only 401/506/608/1,411 of the hero’s turns in 40,000 games (conditional on which, a Deal Breaker lands within the round 69.6/59.3/38.7/18.3% of the time). By the time the dodge would help, the card has landed.

What the play actually is, is a three-play win that uses a complete set as a card store. Two sets are down and a third colour is one card short on another player’s table. The player offers a card out of one of the finished sets, takes the card that completes the third colour, and then re-lays the offered card’s twin from hand: the broken set is whole again and it is the third. Classifying the 617 positions by how the broken colour returns: a second pile of the same colour was already complete in 16–23% (the give costs nothing at all), the hand held a card of the broken colour in 55–63%, the card taken was itself of that colour in 1–2%, and in 17–24% neither held and a second steal on the same turn did the work or the set stayed broken. The broken colour is complete again before the turn ends in 89–96% of plays, and the turn wins the game in 83–92%. Under the stricter reading the only offerable cards are those in *incomplete* sets — exactly the cards the player is still building with — so the same swap costs progress; under the printed card it costs nothing.

It is nevertheless worth nothing overall, because it substitutes for a win the policy finds anyway: on the seeds where it plays the swap it wins 98.1/98.2/98.6% of games at 2/3/4 players, and the same policy denied the play wins 98.6/95.3/97.3% of the same games. The small negative in the *hero* column is not, mostly, a strategic cost either. The policy’s in-turn win search scans the first 30 candidate plays only, and the wider rule lengthens the legal-play list by (cards in one’s complete sets) $\times$ (opponent table cards). Replaying 20,000 games per count

and asking, at every decision where the play was legal, what the restricted wrapper would have chosen: the two differ 656/785/750/496 times, and in 85–90% of those the wide policy was not playing the new card at all — the truncated search simply looked at a different set of candidates.

What this does and does not change elsewhere in the paper. Every Forced Deal result reported here — the card values of Tables 2 and 12, the teacher’s give-the-right-card mistakes of Section 9, the Forced-Deal-into-Deal Breaker refutation, and every claim verdict — was measured with the play forbidden on both sides, which the *none* cell reproduces exactly; its recommended-policy win rates (66.74/51.85/41.05/34.16) sit inside the margin of the headline 66.9/51.9/41.3/34.4, so nothing is invalidated. What changes is the *ceiling*: against a table that plays the card as printed, the recommended policy’s margin over folk play is about two points wider than every figure in this paper.

10.3 Attack order under the 2024 rule (E44)

Under the 2024 sheet the only Just Say No a player can play on their own turn is the answer to an opponent’s Just Say No against their action, and it costs a play, so an attack fired as the third play cannot be defended. The forum’s reading of the new rule was that it “created a play-big-action-last strategy” (claim #285); the arithmetic says the opposite. E44 seats five variants at 40,000 games per cell, rotating seat: a folk BASELINE that, holding a Just Say No with two or more plays left, plays a planned Deal Breaker at once (*Deal Breaker first*); the same rule for any attack (*any attack first*); the mirror, everything else first and attacks last (*attacks last*); and the last two rules on the evolved policy among evolved opponents, read against an all-evolved reference table (Table 10, Figure 9).

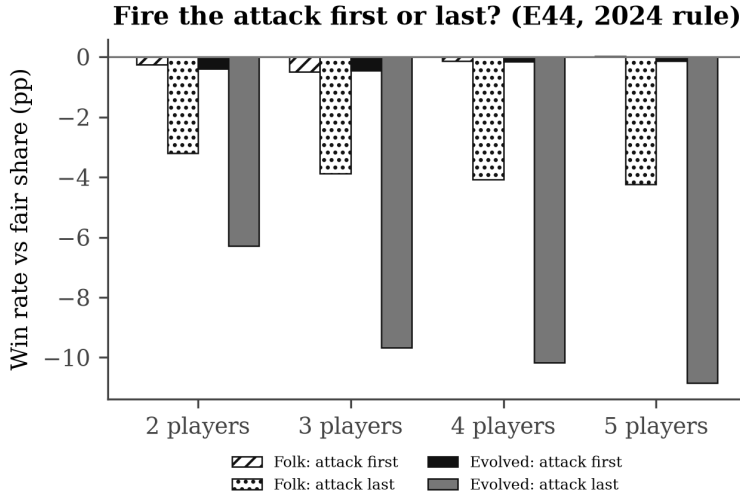


Figure 9: E44: firing the attack first costs nothing and firing it last is expensive, at every table size and for both policies (40,000 games per cell). Both policies already fire early, so the explicit rule gains nothing; the mirror costs the folk player 3.2–4.2 pp and the evolved player 6.3–10.8.

Table 10: E44: attack order under the 2024 rule, win rate minus fair share (pp), 40,000 games per cell ($\pm 0.49/0.46/0.42/0.39$). Folk variants sit among folk BASELINES; evolved variants among copies of the evolved policy, whose reference all-evolved table scores 49.86/33.01/24.98/19.94%.

Variant	2p	3p	4p	5p
Folk: Deal Breaker first	+0.15	−0.13	+0.22	+0.20
Folk: any attack first	−0.25	−0.50	−0.14	+0.03
Folk: attacks last (mirror)	−3.20	−3.87	−4.07	−4.23
Evolved: any attack first	−0.40	−0.45	−0.15	−0.14
Evolved: attacks last (mirror)	−6.29	−9.67	−10.18	−10.84

Table 11: E44: what happens to a Deal Breaker on an all-evolved table, by whether the attacker holds a Just Say No and has a play left: (a) Just Say No in hand and a play left, (b) Just Say No in hand, no play left, (c) no Just Say No. 40,000 games per count. On folk tables the corresponding success rates are 98–99 / 74–80 / 70–76% and the target answers 17–24 / 20–26 / 24–30% of the time.

Players	Deal Breakers/game	Fired 3rd	JSN-backed, 3rd	Answered (a)/(b)/(c)	Succeeds (a)/(b)/(c)	Refused/game
2	0.94	9.8%	9.3%	17.7 / 15.2 / 23.0%	99.2 / 84.8 / 77.0%	0.031
3	1.21	18.3	18.4	16.1 / 14.5 / 22.6	99.4 / 85.5 / 77.4	0.047
4	1.52	19.6	20.7	16.3 / 14.9 / 20.6	99.7 / 85.1 / 79.4	0.068
5	1.81	23.5	23.4	16.2 / 14.9 / 20.7	99.7 / 85.1 / 79.3	0.090

Table 11 gives the mechanism. A Deal Breaker fired with a Just Say No in hand and a play left succeeds 99% of the time; the same card fired as the third play succeeds 85% on the evolved table and 74–80% on folk tables, barely better than holding no Just Say No at all (77–79% evolved, 70–76% folk). The target answers with a Just Say No 16–18% of the time when the attacker holds one and 21–23% when the attacker holds none. A Just Say No in hand is therefore worth 20–22 pp of Deal Breaker success, but only with a play left to spend it; as the third play the card in hand buys 6–8 pp. Both policies already play this way. Pass Go and a set-completing property are the only things BASELINE plays ahead of a Deal Breaker, and the evolved policy fires only 10% (2p), 18% (3p), 20% (4p) and 24% (5p) of its Deal Breakers as the third play, so teaching the rule explicitly gains nothing measurable — -0.13 to $+0.22$ pp for Deal Breaker first, inside the interval, and “any attack first” costs 0.0–0.5 because a rent pulled ahead of a property lay collects less. The mirror is expensive: deliberately firing attacks last costs the folk player 3.2/3.9/4.1/4.2 pp at 2–5 players and the evolved player 6.3 to 10.8. The evolved figure is an upper bound, since the mirror also forces the evolved policy into worse non-attack orderings before the attack; the clean cost of the rule is the (a)-versus-(b) gap times the share of Deal Breakers it moves. The advice is not a new habit but the avoidance of a bad one: never leave the attack you care about for the third play. Two side counts from the all-evolved table settle claims the folk policy could not test: the evolved policy plays 62–78% of its Double the Rents rather than banking them, against the claim (#315) that the card is banked 90% of the time, and banks 0.6–4.1% of its Deal Breakers (#470). Both claims are refuted.

10.4 What each card is worth to the evolved policy (E45)

E03 priced each card class to the folk policy. E45 repeats the ablation with the strong player in every seat: the handicapped seat plays the cloud-evolved weights for the count plus the lookahead, may not play one card class as an action (it may still bank it), and sits among unrestricted copies; 20,000 games per cell (rescaled from a design size of 100,000), ± 0.32 –0.69 pp depending on how far the cell sits from fair share; the matched control cells without a handicap sit at -0.25 / -0.84 / $+0.10$ / $+0.20$ pp. Table 12 and Figure 10 give the values at 2–5 players beside the folk values of E03.

Table 12: E45: win-rate drop (pp below fair share) when one evolved seat may not play a card class as an action, 20,000 games per cell, rotating seat, 2024 defaults; 95% interval ± 0.32 –0.69 pp, quoted per row in the released JSON. The folk values of E03 are given for comparison. Negative values are gains.

Card class	2p	3p	4p	5p	Folk 2p	Folk 4p
Deal Breaker	21.06	14.43	10.70	8.45	14.25	8.46
Pass Go	12.91	11.99	10.25	9.23	19.35	12.49
Just Say No	12.02	8.32	5.41	3.81	7.84	3.23
Sly Deal	9.01	7.76	5.25	3.97	8.10	5.21
Rent cards	7.18	13.39	14.38	14.34	13.14	18.29
Debt Collector	6.12	6.54	4.64	3.62	8.58	3.81
Forced Deal	4.83	4.83	3.33	1.83	2.14	1.69
It’s My Birthday	2.63	5.23	6.03	6.38	4.78	5.50
Moving wild cards	1.98	2.59	0.84	0.41	1.44	0.73
Double the Rent	1.17	1.91	0.96	0.41	0.98	−0.01
House / Hotel	0.03	0.27	−0.71	−0.76	0.88	0.35

The strong player gets more out of the cards that need aiming and timing and less out of the ones that pay automatically. Relative to the folk values, the Deal Breaker is worth +6.8 pp more at 2p and +2.2 at 4p, the

What each card is worth to a strong player (E45)

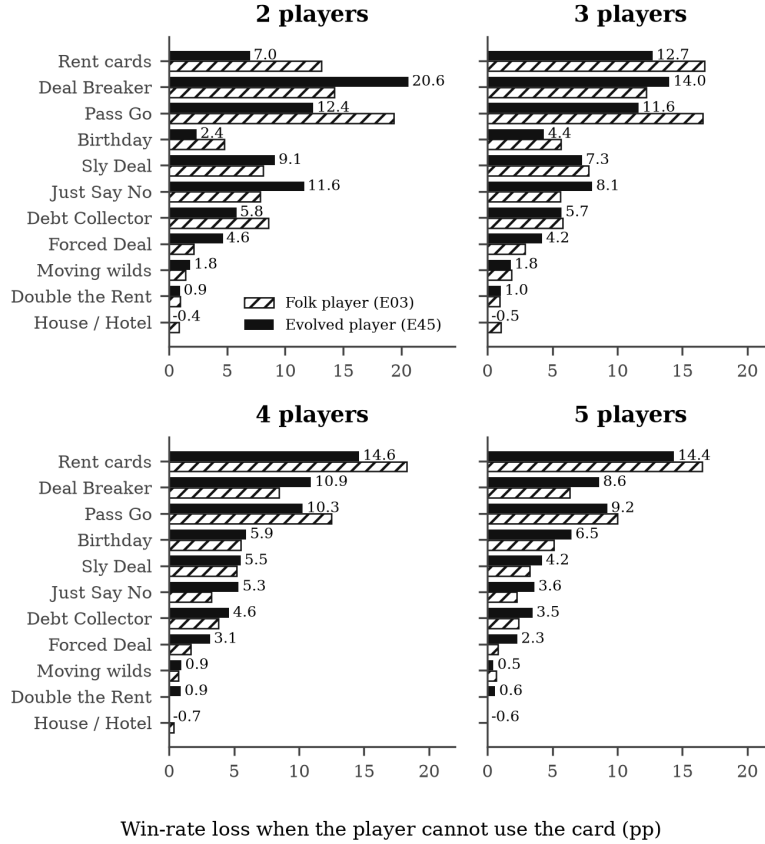


Figure 10: Win-rate loss when one evolved seat may not play a card class as an action (E45, 20,000 games per cell, solid bars) at 2–5 players, with the folk values of E03 (hatched). The strong player gets more out of the cards that need aiming and timing (the Deal Breaker, Just Say No, Sly and Forced Deal, moving wilds) and less out of the blunt money cards (Pass Go, rent, Debt Collector); Houses and Hotels are worth nothing to it, and less than nothing at four and five players.

Just Say No +4.2 and +2.2, the Forced Deal more than double at both counts, and moving wilds slightly more. Pass Go is worth far *less* (12.9 against 19.4 at 2p, 10.3 against 12.5 at 4p) and so are rent cards (7.2 against 13.1 at 2p, 14.4 against 18.3 at 4p) and Debt Collector: the evolved policy has other ways to make money and to spend a turn. **Houses and Hotels are worth nothing to the strong player, and less than nothing at four and five players** (−0.71 and −0.76 pp: forbidding it to build is a measurable gain). On the paired comparison against the matched control the handicapped seat gains at every count, including two and three players (+0.23/ +0.57/ +0.61/ +0.56). Forbidding it to build is a small gain, because it banks the cards for \$3–4 instead. That says the evolved weights over-build, and that under the 2024 rule, which discards a building when its set is broken, a building on a breakable set is a liability. Head-to-head the Deal Breaker (21.1) and Pass Go (12.9) top the table; at four players the order is rent, Deal Breaker, Pass Go, Birthday, Just Say No, Sly Deal, Debt Collector, Forced Deal, Double the Rent, wild moves, buildings, and at five Pass Go and the Deal Breaker swap. Birthday rises with the table size for both policies (2.6/5.2/6.0/6.4 to the evolved player), which confirms claim #715.

10.5 Fishing for the Just Say No (E46)

Claims #167 and #277 advise playing a Sly Deal at the target before the Deal Breaker to draw out the Just Say No. The first round could not score it: the bait variant stored the turn number where it should have stored the target seat, so its “bait drew a Just Say No” counter compared a seat with a turn index and never fired. The counter was fixed and the missing control added: a variant that counts the identical trigger (about to Deal

Breaker with two or more plays left, not a winning play, a Sly Deal at the same target in hand) and plays the Deal Breaker first, as BASELINE does. Both actors (the folk BASELINE; the evolved policy with lookahead) were run against both tables (folk; evolved) at 200,000 games per cell where the cloud was available and 20,000 otherwise (Table 13).

Table 13: E46: bait a Sly Deal before the Deal Breaker versus the matched control that fires the Deal Breaker first. Δ is the paired difference from that control on the same seeds. “Trigger”: share of games in which the situation arises. “Won given trigger”: the actor’s win rate in those games, bait / no bait.

Actor → table	<i>n</i>	Games	Δ (paired)	Trigger	Held JSN	DB success	Won given trigger
Folk → folk	2	200,000	-0.05 ± 0.04	8.5%	29%	75.0 / 76.2%	67.6 / 68.2%
Folk → folk	3	200,000	-0.34 ± 0.05	7.0	27	77.2 / 78.2	50.4 / 55.3
Folk → folk	4	200,000	-0.37 ± 0.05	6.0	25	78.4 / 79.2	37.1 / 43.3
Folk → folk	5	200,000	-0.29 ± 0.05	5.5	23	80.0 / 81.1	29.8 / 35.1
Folk → evolved	2	200,000	-0.04 ± 0.17	9.8	26	82.3 / 80.2	56.2 / 57.8
Folk → evolved	3	200,000	-0.33 ± 0.16	8.3	24	82.9 / 80.1	31.0 / 34.5
Folk → evolved	4	200,000	-0.41 ± 0.15	7.1	22	84.1 / 81.7	21.1 / 27.5
Evolved → evolved	2	20,000	$+0.04 \pm 0.09$	4.1	20	87.1 / 83.0	76.8 / 75.8
Evolved → evolved	3	20,000	-0.20 ± 0.12	4.3	24	83.6 / 79.1	50.0 / 54.7
Evolved → evolved	4	20,000	-0.18 ± 0.12	4.1	20	87.4 / 84.6	36.7 / 41.4
Evolved → evolved	5	20,000	-0.24 ± 0.12	3.9	21	84.0 / 81.7	28.0 / 34.4

The situation arises in 4–10% of games and the target holds a Just Say No 20–29% of the time, but the bait rarely fishes: against a folk table the fraction of holders who spend the Just Say No on the Sly Deal is indistinguishable from zero, and against a strong table it is about 5% of baits. Against a strong table the bait does raise the Deal Breaker’s own success by 2–4 pp (87.1 against 83.0% head-to-head), so the fished-out cards are real, but the play spent on the bait sends the Deal Breaker to the third slot — 21% of the time for a folk actor, 37–42% for a strong actor at 3–4 players — where the 2024 rule forbids answering, and it spends the Sly Deal on a target chosen for the bait rather than for the steal. Net: $-0.34 / -0.37$ pp at 3/4 players for a folk actor on a folk table, $-0.33 / -0.41$ on a strong table, $-0.20 / -0.18$ for a strong actor on a strong table, against paired intervals of ± 0.05 to ± 0.17 . In the games where the choice arises the baiter wins 3.5–6.4 pp less at 3–4 players. **Verdict: refuted.** The cost is concentrated at three, four and five players (-0.2 to -0.4 pp) and is only marginally negative head-to-head (-0.05 ± 0.04 for a folk actor, $+0.04 \pm 0.09$ for a strong one). The play costs more than the fish is worth.

10.6 The myforwik bundle, factor by factor (E47)

The one simulation-derived policy in the corpus (E43) is $+2.58$ pp at 2p, larger than any of its parts. E47 runs the full 2^4 factorial of its four variable parts at every player count, 16 cells per count at 40,000 games each: D, dump the hand to zero; J, Just Say No anything; S, steal the two-card colours first; H, hold one’s own pairs (Pass Go first is BASELINE’s own step 2 and is constant). Table 14 and Figure 11 give the Yates contrasts, the mean of the eight cells with a factor on minus the eight with it off (± 0.24 pp at 2p, ± 0.20 at 5p).

Table 14: E47: Yates contrasts (pp, ± 0.20 – 0.24) for the four parts of the myforwik bundle and their interactions, 16 cells of 40,000 games at each count.

Term	2 players	3 players	4 players	5 players
D dump to zero	+1.03	+1.24	+0.84	+0.40
J Just Say No anything	+0.41	−0.38	−0.30	−0.53
S steal two-card colours first	+1.17	+0.03	−0.35	−0.28
H hold pairs	−0.10	+0.01	+0.34	+0.65
$S \times H$	+0.84	+0.68	+0.39	+0.27
$D \times S$	+0.19	+0.16	+0.12	+0.02
$D \times H$	−0.16	−0.09	+0.05	+0.01
$J \times H$	−0.22	−0.14	−0.12	−0.06
$D \times J; J \times S$	+0.15; +0.07	+0.11; −0.01	+0.07; 0.00	+0.08; −0.08
Control / full bundle (vs fair)	+0.14 / +2.58	−0.14 / +0.71	+0.20 / +0.80	+0.20 / +0.49

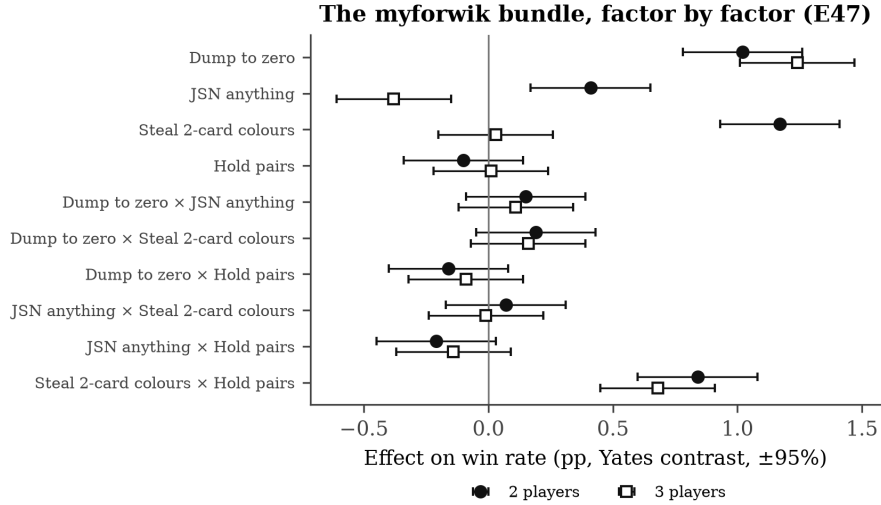


Figure 11: The myforwik bundle taken apart (E47): Yates contrasts with 95% intervals for each factor and interaction at 2 players (filled) and 3 (open), 16 cells of 40,000 games per count. Head-to-head the gain is stealing the two-card colours, emptying the hand and the steal-by-hold interaction; at three players only emptying the hand and the interaction survive, and “Just Say No anything” becomes a cost.

At 2 players the bundle’s +2.58 is three things: stealing the two-card colours (+1.17), emptying the hand (+1.03) and the guessed interaction, $S \times H$ (+0.84). Holding one’s own pairs is worthless alone (the H-only cell is -0.50) but pays when combined with stealing the opponent’s, because together they corner Brown, Dark Blue and Utility head-to-head; Just Say No-anything adds +0.41, every other interaction is within ± 0.25 , and the best cell is the full bundle. Above two players the picture inverts term by term: the steal main effect vanishes at three (+0.03) and turns negative at four and five, Just Say No-anything turns into a cost at every larger count (-0.30 to -0.53), holding pairs turns into a gain (+0.34, +0.65), and the best cell is the bundle without Just Say No-anything, $D+S+H$ at +1.21/ +1.10/ +1.03 against the full bundle’s +0.71/ +0.80/ +0.49. Emptying the hand and the pairs corner are what survive. The interaction the earlier round inferred is real and of the stated size, but it carries about a third of the two-player gain, behind stealing the pairs and emptying the hand.

10.7 Five players

Every claim cell now has a five-player row, so the five-player game is no longer an extension of the study but part of it. Table 15 lists 28 representative variants at five players beside their four-player readings.

Table 15: Twenty-eight claim variants at five players beside their four-player readings, win rate minus fair share (pp), 40,000 games per cell (± 0.39 at 5p, ± 0.43 at 4p).

Exp	Variant	5p	4p	Exp	Variant	5p	4p
E10	delay_always	-5.73	-9.69	E19	dump_to_zero	+0.50	+0.88
E10	delay_protected	-0.06	-0.96	E22	always_double	+0.96	+1.08
E10	delay_counting	-0.82	-2.47	E31	never_bank_rent	+0.81	+0.84
E11	wild_dodge	-1.12	-1.41	E39	pay_fewest_cards	+0.78	+1.20
E12	wild_rentflip	+2.12	+2.25	E43	myforwik_bundle	+0.49	+0.80
E13	bank_floor_3	-3.48	-3.44	E18	jsn_anything	-0.24	-0.00
E13	bank_floor_5	-5.76	-6.35	E18	jsn_only_breaker	-0.15	-0.22
E13	bank_floor_8	-7.94	-10.24	E37	db_only_to_win	-2.74	-3.59
E14	pass_first_1	+2.35	+1.04	E37	db_after_other_db	+0.03	-0.06
E15	charge_now	-2.31	-3.10	E37	db_with_jsn_backup	-1.18	-1.48
E15	charge_rich_5	-0.62	-0.55	E37	db_prefer_empty_hand	-2.04	-2.64
E15	charge_rich_8	-0.90	-4.03	E37	db_wait_jsn_spent	-1.27	-1.79
E15	rent_chicken	+2.11	+2.63	E37	bank_db_to_refill	+0.19	+0.18
E38	steal_for_rent	+0.94	+0.75	E37	bait_lay_for_db	+0.20	+0.18

A five-player folk game (all-BASELINE, 40,000 games) lasts 23.4 turns (4.7 rounds); it has 1.28 Just Say Nos, 0.083 Just Say No wars and 0.037 refused counters; 1.76 Deal Breakers are played and 81% succeed; there are 4.7 steals and 7.7 rents; the comeback rate from two sets behind is 6.6%; the early-money leader wins 37.8% ($1.89\times$ fair); a starting hand with two or more Deal Breakers or Just Say Nos wins 32.6% ($1.63\times$ fair) and a money-heavy start 12.8%.

What is different at five. There is no seat edge for folk players (first seat 19.8%, last 20.9%), but the evolved player in seat 1 wins 25.2%, +5.2 pp: skill converts the first move at any count. Passing the first turn is a gain at five (+2.35) after being a gain at four (+1.04) and a disaster at two (−6.66): with four opponents a deeper hand beats tempo. Patience with charges pays, the wild rent-flip is again among the largest single edges (+2.12), and delaying full sets costs less than anywhere (−5.73 against −14.12 at 2p and −9.69 at 4p) because games are long and Deal Breakers plentiful, 1.8 per game — yet every Deal Breaker timing rule still loses. Bank floors cost less than at four players, not more (−7.94 against −10.24 for the \$8 floor), because with four opponents the money is needed. Just Say No discipline is flat, since with five hands there is always someone to spend it on. The skill gap is smallest at five (+14.4 pp over fair for the recommended policy) but the unexploited edge is largest: the lookahead adds +1.67, the rollout ceiling sits +11.5 above the weights alone, and 24% of the evolved player’s Deal Breakers still go as the third play. Folk play is worst at five, at 22% agreement with the rollout solver and 6.0 pp lost per decision; its worst classes are the Deal Breaker (14% agreement, 9.6 pp lost), charges (16%, 8.1) and rent (26%, 7.3); “bank it instead of laying it” is its most common correction (264 of 2,181 states), and “end the turn” — the solver’s best play in 7.0% of five-player states — is one the folk policy chooses 1% of the time.

10.8 Decision tables (E08)

Twenty thousand games per policy and count, with the observed policy rotating its seat, record what each policy actually does rather than what it is worth. Figure 12 shows the evolved policy’s Just Say No discipline at four players. Both policies block 100% of Deal Breakers whenever they hold a Just Say No, at every count and in every standing. Everything below the Deal Breaker separates them. At four players the evolved policy blocks a rent of \$8 or more 93–98% of the time and a \$5 Debt Collector 95–98%; the folk BASELINE blocks the same \$8 rent 58% of the time when behind and 5–7% when level or leading, because its \$4 threshold interacts with its one-JSN reserve. The evolved policy also conditions far more sharply on standing: it blocks a \$5–\$7 rent 95% of the time when behind and 53% when leading, and a Sly Deal 32% when behind and 13% when leading. Neither policy ever blocks It’s My Birthday. On Deal Breaker timing, the folk policy fires a Deal Breaker it holds 76–78% of the time even with no full sets of its own, while the evolved policy fires only 17–22% at three to five players and 48% head-to-head, holding the card until it owns a set of its own (75–86% with one set, 91–98% with two).

10.9 Audit of the inconclusive and untested verdicts (E49)

Every verdict line that the first two rounds left inconclusive or untested was re-examined and sorted into three bins: settled by one of the experiments above, settled here by a larger cell or by a set of constructed positions solved with paired rollouts, or genuinely untestable in the engine. After the audit, **no verdict line is left untested**.

Settled by larger cells. At 200,000 games the 2p wild rent-flip is -0.19 ± 0.22 , so the flip is refuted head-to-head and confirmed at four and five players; the 2p \$5 bank floor is -2.16 ± 0.22 ; paying near-exact at 3p is $+0.59 \pm 0.21$; never gifting the completing card at 4p is $+0.38 \pm 0.19$ from 0.118 gifts avoided per game, about +3.2 pp per gift avoided. The Forced-Deal-into-Deal Breaker combo was run against opponents who never Just Say No so that the confound is gone, and scores zero (Section 8). At 100,000 games, spending the Just Say No on anything beats hoarding it for Deal Breakers head-to-head (+0.62 against −0.62, ± 0.31 each) and makes no difference at 3–5p, both trailing BASELINE’s threshold rule; never countering a Just Say No with a Just Say No at 4p is -0.35 ± 0.27 . The house rule that charges a play for moving a wild adds +0.15 turns per game at 2p and +0.32 at 4p (under 1.5%), leaves Deal Breakers played unchanged (0.897 against 0.892 at 2p, 1.519 against 1.500 at 4p) and steals unchanged (2.46 against 2.48 at 2p), against the claim that free flipping neuters both. Whether a Just Say No against a doubled rent cancels the whole rent or only the doubler is immaterial (+1.21 against +1.01 for the always-doubler at 4p, a difference of 0.20 ± 0.38); the “\$10 in the bank to win” house rule adds no luck (a random player wins 3.0/0.3% at 2p/4p under it, 3.4/0.3 without). Six re-runs at 100,000

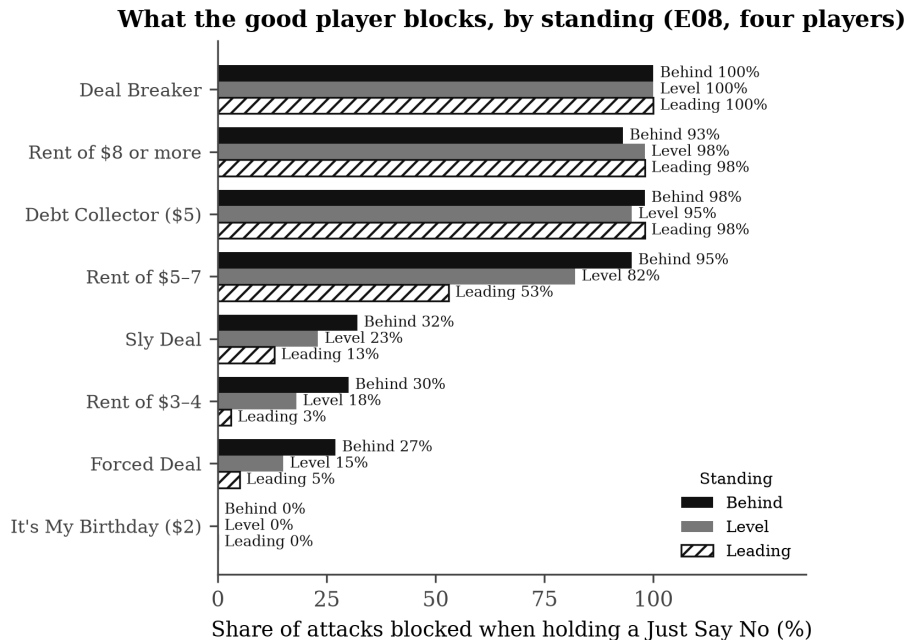


Figure 12: What the recommended policy blocks with a Just Say No it holds, by attack and standing, at four players (E08, 20,000 games). The Deal Breaker is always blocked; everything else is conditioned on the attack's size and on whether the player is behind, level or leading.

games were nulls or small losses: targeting the leader $+0.02/-0.00$ at 4p/5p, holding the \$10 (-0.39 to -0.04) against banking it at once ($+0.24$ to $+0.62$), two-card colours first at 2p -0.17 ± 0.31 , banking the any-colour rent under \$3 at 4p -0.35 ± 0.27 , passing unless holding an attack $+0.02 \pm 0.27$, steal first on the winning turn $+0.28 \pm 0.27$. Banking the last Pass Go when it is the last card and the last play is indistinguishable from playing it ($+0.24$ against $+0.21$ at 2p, ± 0.31): leaning true, not worth a rule. Two mechanism claims behind the delay verdicts were also scored: the always-delayer is stolen from 1.22/1.14/0.98/0.80 times per game against 1.24/1.22/1.09/0.93 for normal play, and Deal-Broken less than half as often (0.14–0.16 against 0.28–0.35), so it is not more exposed — it loses because it never finishes. And with every player delaying, Deal Breakers fall to 0.22 per game head-to-head (from 0.89) but *rise* to 2.07 and 2.41 at 4p and 5p (from 1.50 and 1.76), because those games run 39–65% longer. “The Deal Breaker has no target once everyone delays” is therefore confirmed at two players and refuted at three, four and five.

Settled by constructed positions. Five questions that arise too rarely for whole-game cells were put to the solver on positions constructed to contain the choice (Table 16). Dumping a Deal Breaker into the bank to draw five, with three or fewer cards in hand and nothing to break, is a $-16.5/-15.6$ pp mistake per decision; taking the wild rather than the plain card when stealing is $+4.5/+3.3$ pp per decision but arises 0.03 times per game ($+0.09$ overall); a House or Hotel that cannot be placed should be banked ($+0.5/+1.4$ pp per decision), while withholding one that could be placed gains nothing in whole games; the \$10 should be banked soon but not necessarily first; and the order of steal and win on the winning turn is $+0.6 \pm 0.4$ at 2p and -1.0 ± 0.6 at 4p, no reliable edge.⁴

What the engine still cannot see. A handful of claims carry a component no run of this engine can score, and they are scored only on the part it can. What an opponent *believes* when a Deal Breaker is “hidden” in the bank, and whether the table then plays scared (#680’s second half, #679), needs a model of opponent belief the engine does not have; the outcome halves of both claims are scored in E37 (banking a Deal Breaker to refill the hand is confirmed, baiting a set is refuted). Bank card order and hidden banks (#678, #701) are not modelled

⁴The constructed-position solves of Table 16 were run under the 2024 defaults but on the engine before the null-cycle fix, and were not repeated. They concern decisions about banking and stealing, not wild movement, and the whole-game cells that cover the same claims (`build_only_safe`, `steal_prefer_wild`, `win_steal_first`, `hold_ten`) were re-run and agree in sign.

Table 16: E49: rare decisions solved on constructed positions by paired rollouts (round 3, 2024 defaults, pre-f2fc861 engine). The effect is the solved value of the claimed play minus the policy’s play, pp of win probability per decision.

Decision (claim)	Positions	Effect per decision
Bank the Deal Breaker with ≤ 3 cards and nothing to break (#680)	3,100 (3p/4p)	−16.5 / −15.6
Take the wild rather than the plain card when stealing (#683)	21,000 (3p/4p)	+4.5 / +3.3 (0.03 per game)
Bank a building that cannot be placed (#547/#112)	28,000 (2p/4p)	+0.5 / +1.4
Bank the \$10 before anything else, first two rounds (#55)	7,800 (2p/4p)	+0.1 / −0.5 $\pm$ 0.1
Steal first on the winning turn (#692)	6,000 (2p/4p)	+0.6 $\pm$ 0.4 / −1.0 $\pm$ 0.6

at all. A Debt Collector aimed at small bills (#691) differs from the folk rule in under 0.1 charges per game, so its refutation rests on a cell that could not resolve a 0.1 pp effect either way. The dead-colour discard (#687) concerns a colour that is truly dead in 2.9–11.4% of games and a discard that fires 0.0008–0.0063 times per game, a card that would be discarded at the hand limit anyway. The railroad-payment claim (#667) turns on a set that completes in 3.4–9.5% of games. Bankruptcy and perpendicular-wild house rules (#674, #698, #702, #712) are not in the engine and have no verdict.

11 Public bots under the printed rules (E18 of the results log)

Four of the eight surveyed repositories ship a bot. We ported each into `mdeal` under the printed rules: the `sr-jarvis/monopoly-deal` decision engine (a planner lane with an action-card lane, a “handicapped” live lane with difficulty levels, and a strategy-profile ladder used by its tournament runner); `lucaspellegrinelli`’s `RandomAI`; `monodeal`’s built-in `Player` (play the first generated action, JSN only against a Deal Breaker, banded-powerset payment); and `johnsears`’s `MCTSAgent`, which searches the full state with every hand and the deck order visible. Each port was checked against the original bot running on its own engine with behavioural counters (plays per turn, card-kind mix, tactic mix, game length): 2p and 3p agree within about 5%, and 4p games run 10–30% longer on the originals for documented engine reasons (doubled complete-set rent, 108-card decks). All twelve policies pass a 100-game invariant check at 2p and 5p. Two findings concern the sources themselves. The shipped `sr-jarvis` bot deadlocks: its ladder returns a discard decision whenever the hand exceeds seven cards, even in the action phase, so a bot that ends a turn on seven cards draws to nine and never plays again (on its own engine 91% of its 2-player turns have zero plays); we report the faithful port and a one-line-fixed variant.

*This study was not re-run in round 4.*⁵

Round-robin. Each policy was seated (rotating seat) among copies of each other policy, 4,000 games per cell (± 1.5 pp); the cheat bot was run one way, among copies of five opponents, 150 games each (± 8 pp). The mean win rate of our un-tuned folk BASELINE over the seven other core policies is 90.5% at 2p, 81.6 at 3p, 74.3 at 4p and 66.7 at 5p; it beats every public bot at every table size (75–100% of 2p games). The strongest public bot under the printed rules is the least sophisticated, `monodeal`’s `Player` (75.2/61.7/54.5/45.7 mean; 27.3% against BASELINE at 2p). The `sr-jarvis` planner with its deadlock repaired scores 57.3/47.5/43.4/39.8 (12.2% against BASELINE), its GRANDMASTER lane 54.8/45.1/41.2/37.8, `RandomAI` 51.4/34.5/23.2/15.8, our RANDOMLEGAL 36.7/23.9/14.6/9.1, the faithful `sr-jarvis` port 23.0/20.0/18.2/18.4 and its tournament profile 10.6/3.5/0.7/0.0. Every ordered pair is in the released JSON, so transitivity can be checked (`monodeal` beats `sr-jarvis` 75.7%, `sr-jarvis` beats `RandomAI` 59.8%, `RandomAI` beats `monodeal` 29.4%).

Against the evolved policy. Table 17 seats each bot among copies of the evolved policy and the evolved policy among copies of each bot. No public bot is a serious opponent: the best of them wins 13.2% of 2-player and 3.8% of 5-player games against the evolved policy; the `sr-jarvis` planner, with its tactic planner, threat inference and combo lanes, wins 5.9% and 1.2% after repair and 0.0% in the configuration its own tournament runner uses. The cheating MCTS (40 UCT iterations per play, 6/4/4 rollouts per JSN, payment and discard

⁵The bot round-robin and Table 17 were run under the 2008 defaults on the engine before the null-cycle fix, at 4,000 games per cell (± 1.5 pp). E07c bounds the rulebook’s own effect at ≤ 0.14 pp, far inside those intervals. The null-cycle rule is not bounded for these cells: none of the ported bots moves wilds at all except through our own legal-move generator, and the evolved policy’s exposure to the rule is the one measured in Section 4.1, but we do not claim the bot numbers to better than about a point. They are reported as the ordering they establish — no public bot is competitive — not as precise win rates.

option, 60-turn horizon, 0.3–1.6 s wall per game on 8 workers, about 3–12 CPU-seconds) beats the random bots but loses to the folk BASELINE (34.0% at 2p) and to the evolved policy (19.0% at 2p, 12.0 at 3p, 3.5 at 4p, 1.5 at 5p). At about forty random rollouts per decision, perfect information is worth less than a decent static evaluation, and its value collapses with more players because the “every opponent minimises me” backup and uniformly random rollouts are wrong models of a five-seat table; its 71.5% round-robin average at 2p comes from feasting on the weak bots.

Table 17: E18: each public bot against the evolved FEATUREPOLICY (cloud weights per player count). In each cell the first number is the bot’s win rate seated among evolved copies, the second the evolved policy’s win rate seated among copies of the bot. 4,000 games per cell (± 0.2 –1.5 pp); cheat bot 200 games (± 2 –5 pp). Not re-run in round 4; see the footnote in this section.

Bot	2p (fair 50)	3p (33.3)	4p (25)	5p (20)
our folk BASELINE (reference)	35.1 / 66.0	19.0 / 48.2	13.9 / 39.1	9.5 / 33.8
shuckc/monodeal Player	13.2 / 87.0	6.0 / 76.0	4.5 / 66.8	3.8 / 53.2
sr-jarvis planner (deadlock fixed)	5.9 / 93.6	2.5 / 84.3	1.8 / 70.8	1.2 / 58.1
sr-jarvis live MEDIUM (15% injected mistakes)	5.0 / 94.9	2.0 / 85.8	1.4 / 73.3	1.1 / 59.6
sr-jarvis GRANDMASTER	4.8 / 95.2	2.4 / 87.0	1.6 / 75.8	1.0 / 65.4
lucaspellegrinelli RandomAI	4.9 / 94.8	1.0 / 90.4	0.4 / 91.9	0.3 / 93.6
sr-jarvis planner (faithful, deadlocks)	2.4 / 97.6	0.8 / 93.1	0.7 / 85.7	0.5 / 76.4
our RANDOMLEGAL	1.6 / 98.6	0.2 / 96.8	0.1 / 96.8	0.1 / 97.9
sr-jarvis profiles BALANCED / DEFENSIVE / HOARDER	0.0 / ≥ 99.9	0.0 / 100	0.0 / 99.9	0.0 / ≥ 97.6
johnsears MCTS, cheat (reads all hands and the deck)	19.0 / 81.0	12.0 / 74.0	3.5 / 79.0	1.5 / 81.0

12 Negative results

Determinized UCT lost to its own rollout policy (E13). With 6 determinizations $\times$ 40 iterations, a 16-turn horizon and set-lead partial credit, the UCT agent seated against the converged linear policy won 14.0% at 2p (fair 50) and 13.8% at 4p (fair 25) over 400 games each. The failure is diagnosable. About ten noisy samples per candidate play produce a winner’s-curse selection of lucky rollouts [11]; and scoring the horizon by set lead rewards early set completion, which the claim tests (E10) show is exactly what loses. The replacement, paired common-random-number rollouts to game end, removed both problems (Section 9).

Solver-taught weights are weaker than evolution (E06). Fitting FEATUREPOLICY to about 900 solved decisions gave +8 pp over BASELINE at 2p and +5.7 at 4p, against +14 and +12.8 for evolution in the same run. Too few labelled states, and a teacher whose rollouts use the folk policy, cannot compete with direct optimisation of the win rate. Refitting the converged weights to the stronger rollout teacher’s labels (E17 of the results log) did no better: at 2p it changed nothing (49.1%, fair 50.0) and at 4p the fitted weights lost to their own starting point by 1.8 pp (23.2%, fair 25.0). The teacher’s improvements cannot be expressed as a re-weighting of the per-play linear features without damaging other decisions, which locates the remaining 4–5p edge in non-linear, sequence-level decisions within a turn.

The winner’s curse inflates every teacher gap (E16b). Because each label is the best of nine noisy candidates, the largest gaps are the most inflated. Re-solving the top-60 folk-mistake states at four times the rollouts (192 per candidate) shrank the mean gap from 40.9 to 36.2 pp at 4p, with 60 of 60 keeping a gap of at least 5 pp, and from 24.2 to 18.4 pp at 2p, with 57 of 60 surviving. Every per-decision gap in Section 9 should be read as an upper bound of roughly this size.⁶

Card counting is worth about one point (E12). As reported in Section 9, the counting-tuned weights gain +0.10/ +0.20/ +1.05 pp at 2/3/4 players against an opponent that already plays well.

⁶E13, E06’s solver-taught arm, E17 and E16b were run under the 2008 defaults on the pre-f2fc861 engine and were not re-run; they are negative results about method, and the round-4 labels of Table 7 replace the numbers they were measured against.

Table politics did nothing measurable. “Target the leader” differs little from BASELINE, which already aims Debt Collector at the richest bank and Deal Breaker at the most valuable set ($-0.68/+0.09/+0.17$ at 3/4/5p; a 100,000-game re-run makes the null precise, $+0.02 \pm 0.27$ at 4p and -0.00 ± 0.25 at 5p). Being ganged up on by a whole table changes the strong player’s edge by about a point ($+16.48/+15.57/+12.96$ against $+15.57/+14.25/+12.14$ unganged). Every JSN-discipline variant sits inside or at the edge of the interval.

13 The 2-player control bias and its fix

The first round of claim cells was run under a biased seeding, and the bias was found by its control. All-BASELINE 2p cells with a rotating seat scored 48.79% instead of 50%, with zero draws. Reproduced with the plain engine: the first-player win rate was 55.99% on even seeds and 58.40% on odd seeds. Python’s Mersenne Twister, seeded with consecutive small integers, produces a first shuffle that correlates with seed parity; since the variant’s seat was **seed % 2**, the variant seat inherited a -1.2 pp bias in every 2p cell. The fix (2026-09-18) hashes the seed with BLAKE2b before seeding the generator. A second, smaller artefact appeared in round 2, where five near-inert variants revealed a -1.00 pp 3p offset and a $+0.40$ 4p offset that were properties of that run’s shared seed range rather than of the engine.

Both are history. Round 4 re-ran every cell under the hashed seeding from seed 0, and its all-BASELINE controls sit at $+0.14/-0.14/+0.20/+0.20$ pp at 2/3/4/5 players, inside the interval at every count. **No number in this paper carries a control offset, and every “vs control” correction of the earlier drafts has been removed.** The episode is worth recording for two reasons: a seeding bias of this shape is invisible in any single cell and shows up only in a control that was pre-registered to be exactly fair, and one of the reversals this paper reports (all-out aggression at two players) was partly an artefact of exactly this kind.

14 House rules and deck modifications

Because every disputed ruling is an engine option, the community’s house rules can be priced (all cells 40,000 games, BASELINE tables unless noted; E20–E24). Every all-BASELINE house-rule cell sits within ± 0.52 pp of fair at every count, which is the first thing to say about them: none of these rules changes who wins, only how the game feels.

The unsettled rulings do not matter (E07). Each open ruling of Appendix A was toggled and the all-BASELINE seat edge and the evolved-versus-folk win rate re-measured at 2p and 4p (Table 18). None moves any number we measure by more than noise: the 2p seat edge stays within 57.1–57.4%, the 4p seat edge within 25.5–25.8%, the evolved policy’s win rate within 64.1–64.3% (2p) and 38.4–38.7% (4p), and mean game length at 16.7 turns (2p) and 22.4 (4p). Two of the table’s rows, Just Say No counts as a play and orphaned buildings discarded, are now the engine defaults, and E07c confirms at 100,000 games per cell on identical seeds that the switch moves no headline number by more than 0.14 pp.

Table 18: E07: sensitivity to the unsettled rulings and three house rules, 12,000 games per cell, each toggled from the 2008 defaults the engine used before 2026-09-19. Seat-1 edge is the first seat’s win rate with folk BASELINE in every seat; evolved vs folk is the evolved policy’s win rate seated among BASELINE copies. This sweep was not re-run in round 4 and is quoted as the historical insensitivity check.

Rule setting	2p seat-1 edge	2p evolved vs folk	4p seat-1 edge	4p evolved vs folk
2008 defaults	57.4%	64.2%	25.7%	38.5%
Two doublers on one rent forbidden	57.3	64.2	25.8	38.4
JSN counts as one of the 3 plays	57.4	64.3	25.6	38.5
Win only on your own turn	57.1	64.1	25.5	38.6
Orphaned buildings discarded	57.4	64.3	25.8	38.7
Same-colour cards may be split	57.4	64.2	25.7	38.5
JSN cancels only the doubler	57.4	64.2	25.7	38.6
<i>House rule:</i> wild flip costs a play	57.4	63.3	25.7	37.4
<i>House rule:</i> hand limit 10	57.2	63.5	26.0	37.3
<i>House rule:</i> four plays per turn	56.7	71.0	27.5	42.3

A *wild flip costs a play* moves the rent-flip edge rather than removing it (+0.26/−0.66/+0.96/+1.04 against −0.13/+0.93/+2.25/+2.12 free) and makes the Deal Breaker dodge much worse (−7.92/−6.32/−3.58/−2.29 against −4.15/−3.23/−1.41/−1.12); game length on the variant seat moves by +0.15–0.41 turns, under 2%, and Deal Breakers played and steals per game are unchanged, against the claim that free flipping neuters both. *Forbidding quadruple rent* leaves the eager doubler’s edge unchanged (+0.88/+1.17 against +0.83/+1.08 at 2p/4p); ×4 rents happen in 2.9–4.4% of games. *Four sets to win* lengthens games by 30–40% (2p 16.28 → 21.23 turns; 4p 22.06 → 30.83), raises Deal Breaker plays per game by 31% (2p) and 57% (4p) and JSN plays by 30% and 59%, makes comebacks 1.55–1.58× as common, and widens the skill probe’s edge by 3.6 pp (2p) and 4.6 pp (4p): more decisions, more skill, which is the community’s own reason for the rule and the one house rule that gets it right. *Speed Deal* (draw 3, five plays) shortens games by 33–35% (2p 10.88 turns, 3p 12.98, 4p 14.41) and leaves the all-BASELINE table at fair.

Removing the Deal Breakers lengthens games by only 0.12–0.58 turns (0.5–3%), against the forum belief that games would run “like real Monopoly”; it widens the skill spread (Section 7) and lowers comebacks (8.3 → 7.6% at 2p, 7.2 → 5.3% at 4p). *Removing the \$10* raises property payments by 4–8% (2p 3.76 → 4.07 per game); *removing all \$4/\$5/\$10 cards* at 2p raises them by 46% (3.76 → 5.47) and shortens games by 1.7 turns. *Six Pass Go instead of ten* adds 0.72 turns at 2p and 0.77 at 4p. *Removing the two-colour wilds* lengthens games by 21–25% (2p 16.28 → 20.37, 4p 22.06 → 26.69) and sends more wins through a Deal Breaker-taken set (60.6% at 2p and 65.1% at 4p against 49.7 and 50.3).

15 Limitations

- **Policy class.** Every optimised result is inside a 111-parameter linear scorer over hand-crafted per-play features, plus one step of rollout improvement on top of it. E13c shows the linear policy is not a fixed point at 4–5 players, E16 shows where it fails, and the E19 lookahead recovers only part of the gap with one rule. Nothing here bounds what a richer policy could do.
- **Not an equilibrium.** The rollout agents are approximate best responses to a specific fixed policy, not equilibrium strategies; no exploitability is computed. Evolution used a hall of fame and a 25% folk-opponent rate to avoid over-fitting one opponent, but the resulting weights are best responses to that pool.
- **Results are versus specific opponents.** Every claim verdict is a delta against tables of the folk BASELINE. A rule that loses against BASELINE may win against different opponents, which is why the round-4 design runs the key variants against evolved tables as well (E44, E45, E46) and why every cell is reported per player count.
- **No table talk.** The engine models no negotiation, collusion, kingmaking agreements or bluffing beyond what the cards themselves express. Human tables have all of these.
- **Cell size and resolution.** Claim cells are 40,000 games, so effects under about 0.5 pp at 2p and 0.4 at 5p are inside the unpaired interval; the paired difference from the matched control resolves 0.05–0.4 pp for variants that fire rarely, and design cells at 100,000–200,000 resolve 0.2–0.3. A handful of cells that ran after the laptop’s cloud link degraded were rescaled from 100,000 to 20,000 games and resolve only 0.6–0.7 pp; they are the 48 E45 cells, the 20 E14 weight resets (design 60,000), 13 of the E46 cells, the four E13c rollout cells, three E12 cells, the two five-player E01b cells, three E06 rows (`1a_vs_folk` at 4p and 5p, `theta_vs_folk` at 5p) and the two 4–5-player E19b rows. Each states its own size, and `canonical.json` records the design size beside it.
- **Player counts.** All four supported counts are now covered at equal depth: 200 cells at two players, 211 at three, 240 at four and 210 at five. Thirty verdicts are conditional on the count, so a result at one table size should not be carried to another.
- **Rule interpretation.** Two rulings the 2008 text left open are settled by the 2024 rulebook and are the defaults; E07c shows that the switch moves nothing by more than 0.14 pp. Six remain unsettled (Appendix A); their defaults were chosen from the majority community reading, and the parity test shows that at least one of them (all-wild sets) changes statistics measurably. The engine plays the strict reading of the 2024 Just Say No rule (with no play left the answer cannot be made); the lenient reading is a switch that was not separately measured.
- **The null-cycle wild rule.** The engine forbids returning a wild to a colour it left since the last real play of the turn. This is a deviation from the printed text, which puts no limit on wild movement. We argue in Section 4.1 that it can only remove strictly pointless move sequences — a flip and its immediate reversal restore the identical position — and the matched control shows it moves 63 of 482 cells, all in variants

that lean on wild movement. It is nonetheless a modelling choice, and a table that allows unlimited free reversals is playing a slightly different game from the one measured here.

- **Cells not re-run.** Four groups of numbers predate round 4 and are marked where they appear: the bot round-robin (E18), the rule-sensitivity sweep (E07), the local ES tournament (E06/E06c), and the method-level negative results (E13, E16b, E17). The constructed-position solves of Table 16 predate only the null-cycle fix. None of them is a claim verdict.
- **Mechanisms the engine cannot see.** Several claims turn on what an opponent believes (a Deal Breaker “hidden” in the bank makes the table play scared), on hidden or ordered banks, or on events too rare to price. These are recorded as untestable rather than scored.

16 Reproducibility

The engine, policies, claim harness, variant definitions, result JSON files and verdict document are released with the paper. Every game is determined by (policies, seed, rule options); the seed is hashed with BLAKE2b before seeding the generator, and every round-4 cell starts from seed 0. Seats rotate with the seed unless a cell is marked fixed-seat.

The canonical evidence base is `experiments/results/round4/canonical.json`: **861 cells, 244 distinct variants across 47 experiments, 42.2 million games**, each row carrying its experiment, cell, player count, win rate, delta against fair share, 95% interval, game count, where it ran, its design size when it was rescaled, its matched control and paired difference, and, for the 482 rows measured on both engines, a `wild_rule` record of the before and after values. Of the 861 rows, 692 are 40,000-game cells, 107 are 100,000, 15 are 200,000, 43 are 20,000 and four are the expensive rollout cells at 400–1,000 games. Per-count coverage is 200 rows at two players, 211 at three, 240 at four and 210 at five. The matched pre-fix control run is `experiments/results/round4/pre_f2fc861/`; the per-count solver label sets are `labels_crn_{2,3,4,5}.jsonl` with their regret reports; the decision tables are `e08.json`; the claim verdicts re-scored at four counts are `experiments/results/claims/VERDICTS-2024.md`, and the historical round-1–3 verdicts are kept beside them, untouched.

Outside round 4, the reported experiments are: 180,000 games in the parity study; 50 generations at 256,000 games per generation in each cloud ES run; 4,000 per cell in the bot round-robin (cheat bot 200 per cell against the evolved policy, 150 in the round-robin); 12,000 per cell in the E07 sensitivity sweep; 6,000 per pairing in the local E06 tournament; 400 per table in E13; 192 rollouts per candidate for the 120 E16b re-solves; and 66,000 constructed positions solved by paired rollouts (28,000 buildings, 21,000 steal-the-wild, 7,800 early-\$10, 6,000 winning-turn order, 3,100 Deal Breaker dump). Cloud runs used Modal with up to 300 single-CPU containers and 400 games per remote call; local runs used a multiprocessing pool on one Mac. The engine runs about 125 folk-policy games per second per core, about 4,000 per second on a 10-core laptop, and the feature policy about four times slower. The full tournament matrices per player count, the E18 bot ports with their fidelity notes and every ordered-pair cell, all per-cell JSON with 95% intervals and behaviour counters, and the claim file with its source URLs are in the repository. The claim file’s identifiers are 0-based line indices; the web claims are #666–#716.

17 Conclusion

Monopoly Deal rewards playing cards, not holding them. The most widely repeated advice on the game’s forums (delay completing sets, bank before you build, save the Deal Breaker for the winning turn, pay with dead property) costs its user between 1 and 45 percentage points against a plain folk table; the community’s numeric thresholds, by contrast, sit near a local optimum. Running every claim at every supported table size is what the study most needed: thirty of the verdicts are conditional on the player count, and the advice that reverses is not marginal advice. Passing the first turn is a 6.7-point disaster head-to-head and a 1.0- to 2.4-point gain at four and five players. Flipping a wild to charge a bigger rent, the largest positive edge in the four-player game at +2.3, is worth nothing head-to-head. All-out aggression, which an earlier and more permissive engine priced at +6.8 points head-to-head, is worth +0.8. And the Forced-Deal-into-Deal Breaker combo, the most praised move on the forum, scores exactly zero against opponents built never to say no.

A linear policy evolved against diverse opponents beats folk play by 13–17 points at every player count and is at its ceiling; a rollout step over it finds nothing at two and three players and 9–12 points more at four and

five, where the remaining strategy is about whom to hit and when to hide. Counting cards is worth about a point; watching banks is worth four to five; one rule — look for a two-card finish when two sets are down — adds 1.5–2.1 points at every count, and the evolved policy with that rule wins 66.9/51.9/41.3/34.4% against folk tables at 2–5 players. Under the 2024 rulebook, which charges a play for a Just Say No answered on one’s own turn, the rule switch itself moves nothing by more than 0.14 points, but an attack fired as the third play cannot be defended: a Deal Breaker backed by a Just Say No and a spare play succeeds 99% of the time, the same card fired third 85%, and firing attacks last costs a folk player 3.2–4.2 points and a strong one up to 10.8. Fishing for the Just Say No with a Sly Deal first loses 0.3–0.4 points at three and four players; hoarding the Just Say No for Deal Breakers is refuted; and to a strong policy Houses and Hotels are worth nothing at all, and less than nothing at four and five players.

At five players folk play is at its worst — 22% agreement with a rollout solver, six points of win probability lost per decision — and the single correction it most needs is the least glamorous: bank the card instead of laying it. Seat 1 wins 57.3% of 2-player games between folk equals and 56.9% between evolved equals, and between skilled players the first-seat edge no longer decays with table size, while between folk players it is gone by four. The deck’s value concentrates in the ten two-colour rent cards and the ten Pass Go cards for a folk player, and in the Deal Breaker and Pass Go for a strong one. No public Monopoly Deal bot is a serious opponent: the best wins 13.2% of 2-player and 3.8% of 5-player games against the evolved policy, the un-tuned folk policy beats every one of them, and a bot that reads every hand still loses. The obvious next steps are a non-linear policy trained on the rollout teacher’s labels, a multiplayer opponent model that captures the table dynamics the linear policy misses, and human-play data.

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A Rulings left open by the official text

Each is an engine `RuleOption`; the default is in parentheses. Items 5 and 8 were settled by the 2024 rulebook [4] and are listed with those defaults; the other six remain open.

1. Two Double the Rent cards with one rent card give $\times 4$ (allowed; uses all three plays). Hasbro consumer-affairs replies quoted on Reddit say yes.
2. Two full sets of the same colour and one rent card: charge for one set, the larger (majority reading and the video game).
3. Just Say No against a multi-player rent or Birthday cancels only the JSN player’s own payment (majority reading of “against you”).
4. A player can win on another player’s turn, e.g. by receiving a set-completing card (the default is the printed rule, own turn only; E07 finds no measurable difference).
5. A building left on a set broken by payment, Sly Deal or Forced Deal is discarded (the 2024 sheet: “If the property set they’re on becomes incomplete, discard them”; the 2011 consumer-service ruling sent it to the owner’s bank, and E07 finds no measurable difference).
6. Rent on a colour held only as a wild is allowed at the one-card rate; an any-colour wild alone in a set likewise (contested).
7. Rearranging wilds never counts as a play (official), but a rearrangement may never leave a building on an incomplete set, and may not return a wild to a colour it left since the last real play of the turn (Section 4.1).
8. A Just Say No played on one’s own turn, which can only be the answer to an opponent’s Just Say No, counts as one of the three plays and cannot be played with none left (the 2024 sheet: “If played during your turn, it counts as one of your three cards”; `jsn_costs_play` and `jsn_needs_play_left`). The 2008 reading, under which a Just Say No never consumes a play, is a switch; so is the lenient 2024 reading, deducted but always playable. Off one’s turn a Just Say No is free under every reading.

Not a ruling: giving from one’s own complete set in a Forced Deal. The card’s own text settles this, and the engine got it wrong until 2026-09-20. “You may not TAKE a property that’s part of a complete set” restricts the card taken; the card given may come from anywhere on the giver’s table, including a complete set, which then breaks and loses any building on it. `forced_deal_give_from_full` (true) plays the card as printed; false reproduces the stricter reading under which experiments E01–E49 were run. Section 10.2.

Further options: `plays_per_turn` (3), `hand_limit` (7), `draw_per_turn` (2), `draw_when_empty` (5), `allow_split_sets` (false), `wild_move_costs_play` (false), `wild_move_once_per_play` (false), `jsn_vs_rent_cancels_doubler_only` (false), `buildings_movable` (false), `max_turns` (400, then a draw).

B Claim experiments

The 34 claim experiments, with the number of claims each settles and the summed Reddit score: E33 descriptive statistics (30 claims, $\Sigma 76$); E10 set-completion timing (24, 71); E17 Forced Deal into Deal Breaker (18, 71); E22 Double the Rent and $\times 4$ (17, 39); E23 sets and plays house rules, Speed Deal (16, 35); E13 bank floor (13, 25); E24 deck removals (12, 25); E15 charge timing (10, 44); E30 hold-in-hand strategies (10, 28); E11 wild dodge (9, 34); E14 opening tempo (9, 31); E25 skill vs luck (8, 783); E19 hand management (8, 30); E16 payment policy (8, 28); E27 table politics (7, 33); E20 wild-move house rule (7, 12); E29 colour priority (7, 10); E18 JSN discipline (6, 7); E37 Deal Breaker timing (6 web claims); E39 charge targeting and payment (6 web); E31 rent-card and building retention (5, 40); E26 blind targeting (5, 13); E35 actions as money (5 web); E12 wild rent flips (4, 8); E38 steal targeting (4 web); E34 Pass Go as money (4 web); E40 what to lay and hold (4 web); E36 3–4p openings (3 web); E21 JSN costs a play (2, 10); E28 the \$10 (2, 3); E32 the winning turn (1, 2); E41 steal first on the winning turn (1 web); E42 rent-card class value (1 web); E43 the myforwik bundle (1 web). Four further

experiments were added for the 2024 rule set: E44 attack order, E45 card values to the evolved policy, E46 Just Say No fishing, E47 the bundle factorial, plus the E49 audit. Every experiment runs at 2, 3, 4 and 5 players.