

PP292 — The declared card as a wild card

Jeffery Lyn Huckstead · Cerebral Graphix · 29 September 2026 · site release v3.5 · working note · Part of *Project 51: Reading the Record Across Rules*, DOI [10.5281/zenodo.23048482](https://doi.org/10.5281/zenodo.23048482)

Status words: **PROVED** (argument given here), **COMPUTED** (exact enumeration or seeded check, with a script and receipt), **OPEN**, **DESIGN** (a choice, not a result). This is a card model. There is no zero data and nothing here concerns the Riemann hypothesis. "Riemann" is the name of a published rule-based dealer. RH STATUS: OPEN.

o. The question

Poker 51 declares one card, I = 2♣, and keeps it out of the deal. The published working paper proves that removing it leaves five categories at their exact 52-card probabilities:

- one pair,
- two pair,
- three of a kind,
- full house,
- four of a kind.

These are the categories defined only by repeated ranks.

The question here is what happens when I comes back into play with a rule. The four rules studied put I back in the deck (52 cards). Every natural card keeps its meaning. A hand holding I is worth the best hand it can make:

Variant	I may stand for
Wild I	any card; with four of a rank, five of a kind
The bug	an ace, or any card that completes a straight, flush or straight flush; with four aces, five aces
I any suit	a two of any suit
I any rank	a club of any rank

Rules and evaluator: `area-51/poker-51/poker51-variants-v1.js` . Five of a kind ranks above a straight flush.

1. Exact counts (COMPUTED)

Every hand is counted:

- **Variants:** $C(52,5) = 2,598,960$ hands, of which 249,900 hold I.
- **Standard game:** $C(51,5) = 2,349,060$ hands.

Script: `wild-census-v1.mjs` ; receipt: `WILD_CENSUS_v1.json` . An independent recount of the 249,900 I-hands in `tests/v3_5/verify-poker51-variants-v1.mjs` reproduces every number.

Hand	Standard (51)	Wild I	The bug	I any suit	I any rank
Five of a kind	—	12	1	—	—
Straight flush	38	195	195	46	72
Four of a kind	564	2,868	763	624	1,188
Full house	3,384	5,976	3,978	3,744	6,678
Flush	4,615	7,098	7,098	6,587	5,076
Straight	9,690	19,581	19,581	10,194	19,704
Three of a kind	49,632	125,664	57,640	54,912	89,628
Two pair	111,672	111,672	125,730	123,552	146,718
One pair	992,640	1,149,069	1,100,868	1,098,240	1,153,071
High card	1,176,825	1,176,825	1,283,106	1,301,061	1,176,825

How often I improves a hand (COMPUTED), counted against the same five cards with I read as a plain 2♣, out of the 249,900 I-hands:

Variant	Hands improved
Wild I	205,244
I any rank	196,757
The bug	69,277
I any suit	1,485

2. Wild I admits no consistent ranking (COMPUTED)

With the standard ranking, three of a kind (125,664 hands) is more common than two pair (111,672), yet it ranks higher.

Now rank two pair above three of a kind instead. The 76,032 hands holding exactly one natural pair plus I are then read as two pair. That gives 187,704 two pairs against 49,632 threes of a kind, and the order is inverted again.

This is the wild-card paradox of S. Gadbois ("Poker with wild cards — a paradox?", *Mathematics Magazine* 69 (1996), 283–285); see also "Reconciling wild cards and poker", *CHANCE* (2011), doi:10.1007/s00144-011-0035-4. Here it is counted exactly on the declared-card deck.

The note goes one step further than the two-step flip, with an exhaustive search (`ranking-search-v1.mjs`, receipt `RANKING_SEARCH_v1.json`).

The test. For each ordering of the categories that occur ($10! = 3,628,800$ orderings when five of a kind is possible, $9! = 362,880$ otherwise), every I-hand is read as its highest-ranked reachable category under that ordering. The ordering is consistent if every category is strictly rarer than each category below it.

Variant	Orderings tried	Consistent orderings
Wild I	3,628,800	none
The bug	3,628,800	exactly one: the standard ranking, with five aces on top
I any suit	362,880	exactly one: the standard ranking
I any rank	362,880	exactly one: the standard ranking with flush above full house , as short-deck poker ranks them

Scope. This is exact for this deck and these rules. Players are assumed to read I for the highest-ranked category they can reach; kickers do not affect category counts.

3. I any suit keeps five categories at their exact 52-card counts (PROVED)

Proposition. Under the I-any-suit rule, the number of hands in each of one pair, two pair, three of a kind, full house and four of a kind equals its count in the ordinary 52-card deck:

Category	Count
One pair	1,098,240
Two pair	123,552
Three of a kind	54,912
Full house	3,744
Four of a kind	624

Proof. Read I as the natural $2\clubsuit$. This gives a bijection between the variant's hands and the ordinary 52-card hands. Choosing I's suit never changes the hand's multiset of ranks, since I is a two either way. A hand with a repeated rank is never a flush, because a flush has five distinct ranks. So the suit choice cannot move a hand into or out of any of the five repeated-rank categories. Each such hand is in the same category under both readings, and the counts agree. ■

The suit choice matters only when the four natural cards share a suit. It turns exactly **1,479 high-card hands into flushes** and **6 straights into straight flushes**; everything else is unchanged (COMPUTED).

This pairs with the paper's removal theorem:

Operation on the declared card	The five repeated-rank categories
Remove it (51 cards)	keep their exact 52-card probabilities
Make it suit-wild (52 cards)	keep their exact 52-card counts

The mechanism is the same in both. The five categories depend only on which ranks repeat; everything that moves is in the order-dependent categories: straights, flushes, straight flushes and high cards.

4. Riemann in the variants

Draw rule (DESIGN). Riemann always keeps I. Among its natural cards it keeps what the published House rule keeps in the hand that I makes at its best. The standard game's rule is unchanged.

Reads (COMPUTED). The v0.3 policy is unchanged; only its inputs change. Its belief table is rebuilt for each variant by `build-riemann-belief-variants-v1.mjs` : seed 51, the same sample sizes as the standard table, the variant's deck, evaluator and draw rule.

Variant	Sampled deals	Table sha256
Wild I	10,852,510	74bc82e2...
The bug	11,484,425	cfbce677...

The verifier checks both hashes, and with `--regenerate` rebuilds both tables byte for byte.

Why rebuilding matters (COMPUTED, seeded). Over 20,000 after-draw spots per variant, the same policy was run with the standard table in place of the rebuilt one:

Variant	Decisions that change	Average read error
Wild I	4.5%	overstates its hand by 2.4 points
The bug	4.2%	almost no overall bias

Against a random hand, Riemann's reference row, some standard hands sit lower under Wild I:

Hand	Standard game	Wild I
Pair of jacks	0.795	0.732
Two pair, kings up	0.958	0.926
Three sevens	0.979	0.956

5. What the site does with this (DESIGN)

- **Playable.** Poker 51 v0.4 adds a game switch: Standard · Wild I · The bug.
 - **Wild I** is the conventional wild game. It keeps the standard ranking, as table games do, and the Rule Card states that no consistent ranking exists.
 - **The bug** is the preset this research recommends: the only one of the four rules where I changes play substantially (69,277 improved hands) and the standard ranking stays the unique consistent one.
- **Research only.** I any suit is the most interesting result for the papers, but it changes too few hands (1,485) to be worth a mode. I any rank is kept here for its flush/full-house swap.
- **Not claimed.** That either variant, or Riemann's play in it, is fair, optimal or an equilibrium. Strategy returns are unmeasured (OPEN).

6. Status

Claim	Status	Where
The counts in §1	COMPUTED	census + independent recount
Wild I: no ordering of the ten categories is consistent	COMPUTED	all 3,628,800 orderings
The bug, I any suit: the standard ranking is the unique consistent ordering	COMPUTED	all orderings
I any rank: unique consistent ordering puts flush above full house	COMPUTED	all orderings
I any suit keeps the five repeated-rank categories at their exact 52-card counts	PROVED	§3
Riemann's rebuilt tables change about 1 in 22 after-draw decisions	COMPUTED (seeded)	verifier
Returns, optimality or equilibrium in either playable variant	OPEN / not claimed	—

7. Reproduce

From the site root, with Node 20+ and no packages:

```
node research/project-51/poker-51/wild/wild-census-v1.mjs      # ~3 minutes
node research/project-51/poker-51/wild/ranking-search-v1.mjs  # ~1 minute
node tests/v3_5/verify-poker51-variants-v1.mjs [--regenerate]
```

RH STATUS: OPEN.