

# PAI GOW POW!

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This game uses a standard 52 card deck plus one joker. The joker maybe used to fill in a straight or a flush, other wise it is considered an ACE.

Pai Gow Pow is a side bet for Pai Gow Poker . The Pai Gow portion of the game may be played by any rules approved by the WSGC. The Pai Gow Pow side bet is administered as follows.

Each player has the option to place a bonus wager in addition to the Pai Gow bet . The Minimum bet for the Pai Gow Pow bet is 1\$ , and the maximum is what ever amount the house chooses within WSGC regulations. The house may allow players to bet more on the Pai Gow Pow bet, than the main Pai Gow bet if they choose. The house always banks the Pai Gow Pow bonus bet even if a Player is banking the Pai Gow portion.

The house may set any minimum aggregate limit they choose within WSGC regulations provided that the \$ 5,000.00 minimum is met, and provided the aggregate maximum they choose complies with WSGC rule 230.40.810

After the players have set their hands the dealer begins to take and pay as normal . Paying each players bonus first then their hand ,before moving on to the next player. Players win a bonus for a 7 card hand of 3 of a kind or better .Additionally players win a PAI GOW POW bonus if they have one of the following 3 hands 9 high, 10 high, or Jack high.

Straights, flushes pairs 3 of a kind or Jokers eliminate any Pai Gow Pow Jack high or lower bonus. A player with 2-3-4-5-6 plus 7-8 does not have an 8 high Pai Gow Pow winner. They do How ever have a straight and would win the corresponding bonus for that hand.

## JOKER IN HAND

In addition to the Pai Gow Pow side bet there is a second side bet that may be ordered called Joker in Hand, Patent Pending. This bet pays 6-1 if the player receives a joker in their hand. Minimums and maximums for this bet are set by the house.

The game requires a custom felt for Pai Gow Pow that may be ordered from Higgins Enterprise Inc. by calling (253) 531-1282 For the Envy Bonus, envy buttons must also be used They can be ordered from Higgins or any other supplier licensed by the WSGC.

## THE ENVY BONUS FEATURE

When a player places a 5\$ bonus bet the house gives them an envy button placed on top of the wager. If any other player at the table has a qualifying hand all players with an envy button win the corresponding bonus.

A player May not collect an envy bonus on the house hand, or their own hand. If they are playing two or more hands one hand may envy the other.

Players may win more than one envy bonus if there are multiple envy bonus hands on the table. The envy bonus does not count towards the house aggregate pay out limit.

Players may not win an Envy Bonus off the house hand. Players may not bet on the house hand or side bet on another players hand. The envy bonus does not count as side betting on another players hand. Any discrepancies (misdeals) are to be handled by the house policy for such occurrences , this policy must comply with WSGC rules for such an occurrence. Below are the pay tables for Pai Gow Pow.

# POW PROGRESSIVE

Pow Progressive jackpot this may be used in place of either the pow bonus or the joker in hand you may not under any circumstance use all three at the same time this wager is a 1\$ wager

The jackpot may be hooked up to a third party progressive system if available and approved by the WSGC. It may also be run Manually as follows.

- 1) Place a second drop box on the table to drop losing wagers into.
- 2) Set up an approved accounting process with the WSGC
- 3) Conspicuously post the jackpot amount on the table.
- 4) Seed the jackpot with at least \$500

When running a jackpot manually at the end of the day the chips will be counted the house may take out an amount equal to the days payouts from the chip tray. The remaining amount less any administrative / handling fees allowed by the WSGC are added to the jackpot and posted the next day .

In addition you may Do the following as long as it conforms to WSGC regulations.

- 1) Take out 100% of seed money before raising the jackpot
- 2) Take out a portion of the seed money, placing the remaining into the jackpot until all seed monies are recovered.
- 2) Start a backup Jackpot when the primary jackpot reaches \$5000 Start a second backup Jackpot when the first backup Jackpot reaches \$5000. Back up jackpots may not exceed \$5000.00 unless the primary jackpot is \$20,000.
- 3) In the event the tray paid Jackpots exceed the daily play. You may issue carryover owed to the house out of future win , or remove the shortage from a backup Jackpot.

Pay table PP-1 is as follows

- 7 Card natural straight flush 100% of the jackpot
- 7 card straight flush with a joker 50% of the jackpot.
- 5 aces 25% of the jackpot

The following are the tray paid jackpots

- 9 high Pai Gow..... 100
- Royal Flush ..... 100
- 10 High Pai Gow.....75
- Straight Flush.....75
- Jack High Pai Gow .....25
- Four of a kind.....25
- Full House.....6

65.57% of the wagers will be paid back via the tray payouts.

Pay table PP-2 is as follows

- 7 Card natural straight flush 100% of the jackpot
- 7 card straight flush with a joker 50% of the jackpot.
- 5 aces 25% of the jackpot

The following are the tray paid jackpots

- 9 high Pai Gow..... 100
- Royal Flush ..... 100
- 10 High Pai Gow.....50
- Straight Flush.....50
- Jack High Pai Gow .....25
- Four of a kind.....25
- Full House.....7

61.27% of the wagers will be paid back via the tray payouts.

## MATHEMATICAL ANALYSIS OF

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# PAI GOW POKER SIDE BET

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### RULES

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The side bet in **Pai Gow Poker** is a straightforward wager. Player's place their wagers in the appropriate areas of the table before any cards are dealt. The dealer then deals 7 cards face down to each player and himself. If a player's 7 cards contain any of the winning hands on the pay table, they are paid odds on their side bet wager according to the displayed pay schedule.

In addition, if a player wagers \$5 or more on the side bet, he qualifies for the **envy bonus**. If another player at the same table gets a 9-high pai gow hand, straight flush, royal flush, 5 aces, or 7-card

straight flush (wild or natural), the original player wins a bonus. See “envy bonus” column in Table 1. Players do not receive envy bonuses for their own hands, but may win more than one bonus per round.

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### ANALYSIS

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From 53-card deck, there are 154,143,080 unique ways to deal 7 cards to a player. To analyze the side bet, I wrote a program in Java that cycled through all possible 154,143,080 7-card hands. For each set of 7-cards, the program determined if the cards contained either a winning hand or losing hand and if the former, which type of winning hand. After cycling through all possible 7-card deals, the program then produced the tally of each type of winning hand on the pay table.

Using this information, I was able to determine the **expected value (EV)** of the side bet. The table

below gives a detailed breakdown of this number:

Pay table 1

Hand	Pays	Envy Bonus	Combinations	Probability	Frequency	EV %	Envy EV% (per extra player)
9-High Pai Gow	100	\$50	31,080	0.0002	4,960	2.0163%	0.2016%
10-High Pai Gow	10	\$0	248,640	0.0016	620	1.6130%	0.0000%
Jack-High Pai Gow	4	\$0	963,480	0.0063	160	2.5002%	0.0000%
Natural 7-card straight flush	2500	\$500	32	0.0000	4,816,971	0.0519%	0.0021%
Wild 7-card straight flush	500	\$200	196	0.0000	786,444	0.0636%	0.0051%
Five aces	250	\$75	1,128	0.0000	136,652	0.1829%	0.0110%
Royal flush	100	\$50	26,092	0.0002	5,908	1.6927%	0.1693%
Straight flush	50	\$20	184,644	0.0012	835	5.9894%	0.4791%
Four of a kind	25	\$0	307,472	0.0020	501	4.9868%	0.0000%
Full house	5	\$0	4,188,528	0.0272	37	13.5865%	0.0000%
Flush	4	\$0	6,172,088	0.0400	25	16.0165%	0.0000%
Three of a kind	2	\$0	7,672,500	0.0498	20	9.9550%	0.0000%
Straight	2	\$0	11,034,204	0.0716	14	14.3168%	0.0000%
Two Pairs	-1	\$0	35,553,816	0.2307	4.3	-23.0655%	0.0000%
Pair	-1	\$0	64,221,960	0.4166	2.4	-41.6639%	0.0000%
Other	-1	\$0	23,537,220	0.1527	6.5	-15.2697%	0.0000%
			154,143,080	1.0000		<b>-7.0273%</b>	<b>0.8682%</b>

Table 1: Side Bet EV summary. The EV shown at the bottom of the last column assumes that the player has wagered \$5, i.e. the minimum bet that qualifies a player for the envy bonus.

For the pay schedule shown above, the expected value of the side bet wager when there are no other players at the table OR when the player wagers less than \$5 is -7.0273%. This translates into a **house edge of 7.0273%**.

When a player wagers \$5 or more on the side bet, the expected value of his wager varies by the number of other players at the same table. The following gives the house edge depending on the number of additional players at the same table for a \$5 wager:

Number Of Other Players	Player's EV%	House Edge
0	-7.0273%	7.0273%
1	-6.1591%	6.1591%
2	-5.2909%	5.2909%
3	-4.4227%	4.4227%
4	-3.5545%	3.5545%
5	-2.6863%	2.6863%

Table 2: Side Bet EV and house edge for a \$5 wager

The values in the table above are based on a \$5 wager. This is the optimal wager size that maximizes the EV of the side bet.

**ADDITIONAL PAY SCHEDULE**

The following 2 tables show the expected value of an alternative version of the pay schedule:

Pay Table 2

Hand	Pays	Envy Bonus	Combinations	Probability	Frequency	EV %	Envy EV% (per extra player)
9-High Pai Gow	100	\$50	31,080	0.0002	4,960	2.0163%	0.2016%
10-High Pai Gow	20	\$0	248,640	0.0016	620	3.2261%	0.0000%
Jack-High Pai Gow	4	\$0	963,480	0.0063	160	2.5002%	0.0000%
Natural 7-card straight flush	2500	\$500	32	0.0000	4,816,971	0.0519%	0.0021%
Wild 7-card straight flush	500	\$200	196	0.0000	786,444	0.0636%	0.0051%
Five aces	200	\$75	1,128	0.0000	136,652	0.1464%	0.0110%
Royal flush	100	\$50	26,092	0.0002	5,908	1.6927%	0.1693%
Straight flush	50	\$20	184,644	0.0012	835	5.9894%	0.4791%
Four of a kind	20	\$0	307,472	0.0020	501	3.9894%	0.0000%
Full house	4	\$0	4,188,528	0.0272	37	10.8692%	0.0000%
Flush	4	\$0	6,172,088	0.0400	25	16.0165%	0.0000%
Three of a kind	2	\$0	7,672,500	0.0498	20	9.9550%	0.0000%
Straight	2	\$0	11,034,204	0.0716	14	14.3168%	0.0000%
Two Pairs	-1	\$0	35,553,816	0.2307	4.3	-23.0655%	0.0000%
Pair	-1	\$0	64,221,960	0.4166	2.4	-41.6639%	0.0000%
Other	-1	\$0	23,537,220	0.1527	6.5	-15.2697%	0.0000%
			154,143,080	1.0000		<b>-9.1655%</b>	<b>0.8682%</b>

Table 3: Side Bet EV summary for alternate pay schedule.

Number Of Other Players	Player's EV%	House Edge
0	-9.1655%	9.1655%
1	-8.2973%	8.2973%
2	-7.4291%	7.4291%
3	-6.5609%	6.5609%
4	-5.6927%	5.6927%
5	-4.8245%	4.8245%

Table 4: Side Bet EV and house edge for a \$5 wager, alternate pay schedule.

Pay Table 3 same as pay table one how ever there is no envy bonus for a 9 high

Hand	Pays	Envy Bonus	Combinations	Probability	Frequency	EV %	Envy EV% (per extra player)
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