Poker Card Analysis - July 2017

The Directors
GVC Plc

This is to confirm that iTech Labs has examined the game logs for Poker games for the period **July 01, 2017 to July 31, 2017** as recorded by the respective game servers and analyzed the Poker cards for statistical randomness. The results of the analysis are given below.

URLs: www.partypoker.com, www.bwin.be, www.bwin.es, poker.bwin.fr, www.bwin.it, www.bwin.com, http://da.partypoker.com, http://da.partycasino.com, www.danskespil.dk, www.partypoker.fr, www.giocodigitale.it, www.partypoker.es, www.partypoker.net, poker.pmu.fr, www.sh.bwin.de

1. Actual and theoretical probabilities for various Poker hands

These calculations were done for Royal Flush, Straight Flush, Four of a Kind, Full House, Flush, Straight, 3 of a Kind, 2 pairs, 1 Pair, High Card. The following table compares the observed proportion of times the various types of hands occurred (**Sample** column). **Probability** column shows the theoretical values. **Lower** and **Upper** are the 95% confidence limits.

Hands	Probability	Lower	Sample	Upper
Royal Flush	0.00003	0.00003	0.00003	0.00003
Straight Flush	0.00028	0.00027	0.00028	0.00029
4 of a kind	0.00168	0.00166	0.00168	0.00170
Full House	0.02596	0.02589	0.02593	0.02603
Flush	0.03025	0.03018	0.03026	0.03032
Straight	0.04619	0.04610	0.04616	0.04628
3 of a kind	0.04830	0.04821	0.04835	0.04839
2 pairs	0.23496	0.23478	0.23485	0.23514
1 pair	0.43823	0.43802	0.43838	0.43844
High Card	0.17412	0.17396	0.17407	0.17428
	1.00000			

Notes:
a) In the above table, all observed probabilities (**Sample** column) are within the 95% confidence limits.
b) The probability of 0. 43823 means there are 43,823 chances in 100,000 for getting a pair.

2. Actual and theoretical probabilities for Ranks

The theoretical probabilities for the ranks are shown in the **Probability** column. The **Sample** column shows observed probabilities. **Lower** and **Upper** are the 95% confidence limits.

Rank	Probability	Lower	Sample	Upper
A	0.07692	0.07688	0.07689	0.07697
2	0.07692	0.07688	0.07694	0.07697
3	0.07692	0.07688	0.07692	0.07697
4	0.07692	0.07688	0.07692	0.07697
5	0.07692	0.07688	0.07694	0.07697
6	0.07692	0.07688	0.07693	0.07697
7	0.07692	0.07688	0.07692	0.07697
8	0.07692	0.07688	0.07690	0.07697
9	0.07692	0.07688	0.07691	0.07697
10	0.07692	0.07688	0.07692	0.07697
J	0.07692	0.07688	0.07692	0.07697

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Q	0.07692	0.07688	*0.07698*	*0.07697*
K	0.07692	0.07688	0.07692	0.07697

Notes:

a) In the above table, all observed probabilities (**Sample** column) except one (1) are within the 95% confidence limits.

b) Theoretical probability of 0.07692 means, there are 7,692 chances for any particular rank to occur in 100,000 cards.

3. Actual and theoretical probabilities for Suits

The theoretical probabilities for the suits are shown in the **Probability** column. The **Sample** column shows observed probabilities. **Lower** and **Upper** are the 95% confidence limits.

Suit	Probability	Lower	Sample	Upper
Clubs	0.25000	0.24993	0.24999	0.25007
Diamonds	0.25000	0.24993	0.24997	0.25007
Hearts	0.25000	0.24993	0.25002	0.25007
Spade	0.25000	0.24993	0.25001	0.25007

Notes:

a) In the above table, all numbers in the **Sample** column (observed probabilities) lie within 95% confidence intervals.

b) Theoretical probability of 0.25 means, there are 25 chances for any particular suite to occur in 100 cards.

Comments on analysis

In the calculations for 'Actual and theoretical probabilities for various Poker hands', 'Actual and theoretical probabilities for Ranks' and 'Actual and theoretical probabilities for Suits', 1 (one) out of 27 sample values (corresponding to 3.70%) lie outside the 95% confidence limits. It is acceptable for about 5% of the confidence limits to be exceeded.

The above results for Poker indicate that the RNG is working correctly.
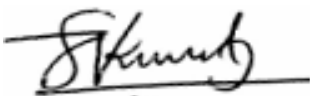
4. Conclusion

Analysis for 'Odds on various hands', 'Ranks' and 'Suits' indicated statistical randomness.

iTech Labs has done limited sanity checks to verify the integrity of the game logs. iTech Labs also maintains a copy of the game logs for verification purposes. There were a large enough number of game records to give the calculations sufficient statistical power.

We conclude that the Random Number Generator (RNG) is working correctly.

Please click here to see the Original report.

Signed:

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Date: September 20, 2017

Signed:

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Disclaimer.
While it is not possible to test all possible scenarios in a laboratory environment, iTech Labs has conducted a level of testing appropriate for a component test of this type.