« System 40: Ellis' Crown Jewel
Can Betting on Birthdays Make You Rich? (Short Version) »

Can Betting on Birthdays Make You Rich?

(A shortened version of the following discussion can be found here.)

Scott, a member named "eirescott" at a free baccarat forum, recently presented his attempt to create a winning baccarat strategy which has a supposedly real mathematical edge. The basis of his strategy is the birthday paradox, which is a curious and rather non-intuitive fact in probability theory regarding the chances that any two objects will match within a group. For example, in a group of 30 people, there's a 70% chance any two share the same birthday, and in a group of 50, the probability rises to 97%. Many find this rather counter-intuitive, since there are 365 possible birthdays (ref: Wikipedia "Birthday Problem").

Can this curious fact in probability theory be exploited to give a gambler a positive advantage?

Scott boasts, "Yes!" and that he has successfully applied the birthday paradox to baccarat, roulette, craps, or any other even-bet coin-flip type game, to give a gambler a real mathematical advantage. Many at the forum jumped onto Scott's bandwagon, proclaiming it to be the holy grail. Indeed, Scott named his final version, "Eirescott's Grail."

However, the truth is that Scott's approach is based upon a misinterpretation and misapplication of the birthday paradox. Consequently, Scott's Birthday Paradox Grail does not change the odds at all, and anyone using his method should expect to lose in the long run as much as he would lose by simply single side betting Player or Banker.

To understand why it is flawed, let us carefully consider the essence of his approach.

Instead of 365 birthdays, Scott works with 8. His method groups 3 Player and Banker decisions into every possible unique combination to form 8 objects:

1. PPP
2. PPB
3. PBP
4. PBB
5. BPP
6. BPB
7. BBP
8. BBB

Scott uses the birthday paradox formulas to calculate that given 8 distinct objects, the probability that any 2 objects will match in a combination of N objects are:

Birthday Paradox Probabilities (8 distinct, possible objects):

Number of objects (N)	Probability of any 2 objects matching
1	0.00%
2	12.50%
3	34.38%
4	58.98%
5	79.49%
6	92.31%
7	98.08%

8	99.76%
9	100.00%

Each group of 3 Player-Banker decisions is treated as a distinct object, and as explained above, there are 8 such possible objects. Scott's method attempts to exploit the birthday paradox's greater than 50% probability of matching in a group of 4 or more.

To use his method, first gather at least 4 non-matching groups from the shoe decisions or from pre-fabricated, randomly generated sets of objects. Based on these, begin to bet that the next groups will match one of the previous groups.

For example, let's suppose the first 4 non-matching groups are

PPP BPP PBP BBB

Wait for the next 2 shoe decisions, which, say, are BB. Then compare these decisions to see if it appears to begin to match any of the previous 4. In this case, BB appears to begin to match the 4th object BBB. So, bet that the next shoe decision will be a B, since doing so tries to match the BBB of the first 4. According to Scott's misinterpretation of the birthday paradox, the chances that the next shoe decision will turn out to be B will occur with a greater than 50% probability. Indeed, he says, the more non-matching objects you have, the greater the probability that your bets to match one of them will become. Once you have 8 non-matching objects, you should have a 99.76% chance of winning! Who can lose with those odds?

However, such reasoning is flawed.

First, what does the birthday paradox really say? The birthday paradox gives the probabilities that *any 2 objects* will match in a random combination of N objects. For example, from the table above, given 8 distinct possible objects, the chances that any 2 match in a random combination of 5 objects is nearly 80%. That is, if you examine 10,000 combinations of 5 objects, you will find about 8,000 combinations with at least 2 matching members. This is absolutely true, and this is all that the birthday paradox says. However, the 2 matching objects can be *any 2* in the combination.

The birthday paradox says nothing about what Scott really wants to know: "What is the probability that once N non-matching objects occur, the next object matches a previous one?"

To answer this question, we don't need the birthday paradox, just simple counting.

For example, let's start out with just 1 object in the combination. Then the only way the next object will match the first is if it is the same object. That is, only 1 object out of 8 possible will match, so the probability is simply 1/8 or 12.5% .

With two non-matching objects, the chances the next object will match one of the two is simply 2/8 = 1/4, or 25%, since from the 8 possible, two may match one of the existing objects in the combination.

With three non-matching objects, the chances the next object will match one of the three is simply 3/8 or 37.5%, since from the 8 possible, three may match one of the existing objects in the combination.

Working out the remaining probabilities the next object will match one of N non-matching objects gives the following results:

Number of non-matching objects (N)	Probability of next object matching
1	12.50%
2	25.00%
3	37.50%
4	50.00%
5	62.50%
6	75.00%
7	87.50%
8	100.00%

But don't these probabilities still give you a greater than 50% chance of matching if you start betting after 4 non-matching objects have occurred?

No, because these probabilities are based on 8 distinct, completely unambiguous objects, such as marbles numbered 1 through 8.

On the other hand, Scott's Player-Banker objects contain considerable ambiguity which affects the probabilities, ultimately making them all 50%.

To see why, consider the 7th row in the above table. With unambiguous objects, whenever you have a combination of 7 non-matching objects, there is a 7/8 = 87.5% chance the next object will match one of the previous 7, simply because from the 8 unambiguous objects to choose from, 7 may match one of the existing objects in the combination.

But consider what happens with Scott's Player-Banker objects.

Only one scenario exists: 3 groupings of 2 ambiguous objects, and one unambiguous object.

For example, let's consider the case where the 7 non-matching objects are:

PPP PPB PBP PBB BPP BPB BBP

Note that the objects can occur in any order, but I arranged them in this specific order to emphasize the ambiguity. Also note that the same conclusions of the following analysis can be found for any combination of 7 non-matching, Player-Banker objects, even though the example uses only one possibility.

Now let's say the next two shoe decisions are PP:

PPP PPB PBP PBB BPP BPB BBP PP

The problem is two objects in the existing combination have PP, so it is impossible to attempt to match one of them due to the ambiguity. Do you bet P to match PPP, or do you bet B to match PPB? In this situation, it is just a 50% guess.

Likewise, had the next 2 shoe decisions been PB or BP, the same ambiguity would exist:

PPP PPB PBP PBB BPP BPB BBP PB

PPP PPB PBP PBB BPP BPB BBP BP

In all three situations, the ambiguity reduced the probability right back down to 50%. Scott's solution is to simply not bet when ambiguous situations like these arise. In the long run, 3/4 = 75% will contain ambiguity and thus be non-actionable, leaving only 1/4 = 25% of the combinations unambiguous and actionable.

Okay, so in the above example, we don't bet those 75% ambiguous PP, PB, and BP cases, and wait for the 25% BB unambiguous cases, which is:

PPP PPB PBP PBB BPP BPB BBP BB

Here, since BBP previously occurred only once, there is no ambiguity, so you would bet P to match it. In fact, the probability that it will match is still just 50%, because the next decision could be P or B with equal probability. Thus, the next group to occur is equally likely BBP or BBB.

Here's another way to see it. By not betting on the ambiguous cases, 6 of the 7 objects in the combination are effectively eliminated, since you can never bet on them, leaving only 1 actionable object. When that betting opportunity arises, what is your chance of matching and winning? Well, in our example above, there are only 2 possibilities, BBP and BBB, and only one of them will match the object BBP, so the probability to match is just 1/2 = 50%.

So, there are a couple of ways to understand why instead of 87.5%, the actual probability that the 8th object will match one of the previous 7 is always only 50%. One way it to simply understand that there are not really 8 distinct objects, but only 2. Another way is to think that the probability for a match is 87.5%, but because some decisions can't be made due to ambiguity, the effective probability is reduced to 50%.

Next, let's apply the same reasoning to determine what is the probability the 7th object will match after 6 non-matching objects have occurred. If the objects were unambiguous, the probability is 6/8 = 3/4, or 75%. But what is it for Scott's Player-Banker objects?

Just like before, we expect ambiguity to prevent us from betting at times. This time, two scenarios can arise:

Scenario A: In this scenario, there are 3 ambiguous sub-groups, such that it is impossible to use any of them to match the next object.

For example:

PPP PPB PBP PBB BPP BPB

… where I use red, blue, and magenta to highlight the ambiguous members of each group.

In this case, just like before, if the first two members of the next object are PP, PB, or BP, you cannot bet to match since both matching possibilities are present and the situation is completely ambiguous, at best a 50% proposition. If the first two members of the next object are BB, again you cannot bet, since there is no prior object starting with BB to match, which is also an ambiguous scenario.

So, in the fully ambiguous scenario, you cannot bet due to ambiguity.

Scenario B: In this scenario, there are 2 ambiguous sub-groups and 2 unambiguous objects which may be used as the basis to be matched.

For example:

PPP PPB PBP PBB BPP BBB

… where I use red and blue to color the objects which are ambiguous.

So, if PP or PB occur next, we must not bet due to ambiguity. Thus we sit out half of all the occurrences of this scenario. But during the other half of the time when BP and BB occur, we should try matching BPP by betting P, and matching BBB by betting B. For each case, there is a 50% chance of winning, simply because there are only 2 objects left under consideration, either the elements P or B, or the objects BPP/BPB or BBB/BBP.

Even though you will bet less than half the time due to sitting out the ambiguous scenarios, when you do bet the unambiguous scenarios, your odds are still just 50%. Thus, ambiguity effectively reduces the 75% match rate to 50%.

Using the same reasoning for the remaining rows N = 1 to N = 5, we deduce the same conclusion: ambiguous scenarios are always non-actionable, while the unambiguous scenarios always reduce down to a choice between only 2 possibilities. Thus, the probability that any given bet will win regardless how many non-matching objects preceded it is unsurprisingly always just 50%. Forced inaction due to ambiguity hurts the probabilities for rows N = 5 to 7, reducing them to 50%. It does not change the probability for N = 4, which stays at 50%. And it actually helps the probabilities in rows N = 1 to 3, increasing them to 50%, because it prevents unnecessary losses by effectively always limiting the choices to 2 objects instead of 8.

For example, consider the case N = 1. With 8 unambiguous objects, the probability to match the next one is 1/8 = 12.5%. But if you have one of Scott's Player-Banker objects (let's say PPB), you will only bet when the first two members of the next object matches that of the first two members of the existing object (PP), saving you from betting when any other combination occurs (PB, BP, or BB). Thus, when the possible match (PP) forms, you bet for a match (bet B), and the chance to win is 50%. Thus, inaction due to ambiguity helps prevent many possible losing bets for N = 1 to 3, effectively raising the probability to match from 12.5% (N=1), 25% (N=2), and 37.5% (N=3) up to 50%.

Scott's more aggressive "dominant" bet, which tries to bet the 1st and 2nd members of an object based on the existing objects in the combination likewise ultimately reduce to just 50%.

It is only an illusion that Scott has 8 distinct objects. There are not even 4 distinct objects made up by meta-groupings of

(PPP PPB), (PBP PBB), (BPP BPB), (BBP BBB),

because the members of the meta-groups are themselves ambiguous. These meta-groupings can be simply called PP, PB, BP, and BB. Like before, no advantage can be gained with 4 such objects, because ambiguity will always make the probability of each bet 50%.

For the sake of completeness, let's group the meta-groupings into 2 meta-meta-groupings:

(PP PB) and (BP BB).

Doing this, you are back to having simply P and B, which have always been the only distinct, unambiguous objects all along.

Scott mistakenly assumes his 8 objects of Player-Banker can be mathematically treated as 8 distinct, non-ambiguous objects, when in fact, they are not, since they consist of only 2 distinct, unambiguous objects, P and B. His odds of winning any time he makes a bet always remains just 50%.

That is, baccarat is not a game with 8 possible, unambiguous decisions. It is a game with only 2 possible, unambiguous decisions. Grouping the decisions into a greater number of objects in his fashion does not change the odds.

So, the actual probabilities after properly accounting for the ambiguous nature of Scott's Player-Banker objects are simply:

Number of non-matching objects (N)	Probability of next object matching
1	50.00%
2	50.00%
3	50.00%
4	50.00%
5	50.00%
6	50.00%
7	50.00%

To experimentally verify these probabilities, I wrote a program to run through 1,000,000 random combinations of 1,2,3,4,5,6, and 7 of Scott's Player-Banker objects to examine how many times the next randomly chosen object matched one of the previous ones. I properly accounted for ambiguity and bet only the unambiguous scenarios. To yield the highest percentages possible, the test simulates a perfectly fair game using 8 groupings of 2 distinct objects without considering baccarat drawing rules or commissions. My results agree nicely with what is theoretically expected.

Number of non-matching objects	Number of next object matches	Percentage of next object matches	Number of next object non-matches	Percentage of next object non-matches
1	124,669	49.81%	125,634	50.19%
2	213,748	49.88%	214,781	50.12%
3	266,976	49.90%	268,096	50.10%
4	285,997	49.98%	286,214	50.02%
5	268,295	50.03%	267,923	49.97%
6	214,510	50.07%	213,939	49.93%
7	124,962	50.00%	124,961	50.00%

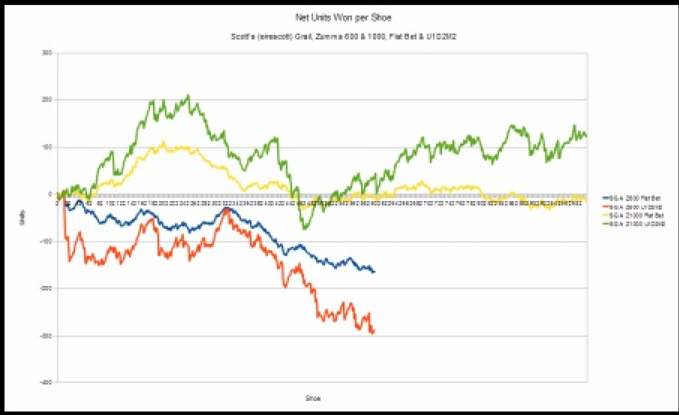
I also found the percentage of unambiguous, actionable betting opportunities which arose from each 1,000,000 combinations, and they also agreed with theoretical expectations:

Number of non-matching objects	Total number of unambiguous possibilities per 1,000,000	Percentage unambiguous possibilities per 1,000,000
1	250,303	25.03%
2	428,529	42.85%
3	535,072	53.51%
4	572,211	57.22%
5	536,218	53.62%
6	428,449	42.84%
7	249,923	24.99%

Full baccarat drawing rules and commissions were taken into account when I tested Scott's Grail method over 102,600 shoes in Baccarat Simulation Series 7. I found an overall -1.26% negative expectancy flat betting, with Player winning 49.2906% and Banker winning 50.7094%, comparable to the results of other methods I've tested. Thus, Scott's Grail performs in the long run no better than single side betting Player or Banker.

Notice that the variance in the graphs appear much greater than the other methods' results. This is due to the fact that Scott's method bets infrequently compared to the other methods, and so it simply takes longer for the variance to show a statistically significant average. Scott's method bets only a few times per shoe, whereas the other methods bet every hand, around 70 bets per shoe. So, with Scott's method, the ups and downs simply become stretched out over a longer period of time, making the fluctuations more prominent on an inter-shoe chart basis, fluctuations which would be just as apparent on an intra-shoe chart basis for methods betting every decision.

Indeed, the apparently prolonged variance may contribute to the illusion that Scott's Grail actually works, as some forum members who are actually using it to gamble with real money are claiming. If they are winning, they are catching the normal upswings in the variance, for example, as seen in the graph of the net units won in the Zumma 1000 shoe.



If they continue to use the method, the odds disfavor long term success. My simulation results show in the long run over 102,600 shoes, the eventual outcome is the same negative expectation as the other methods, as the next graph clearly shows. And that's simply because Scott's Grail does not have a real mathematical edge.

Another sign that the method has no mathematical edge in practice is that Scott uses a negative progression. No method with a real advantage requires a negative progression.

Also, others at the forum have independently verified that Scott's birthday paradox approach loses overall to the Zumma 600 and Zumma 1000 shoes.

To his credit, Scott has shared his Eirescott Birthday Paradox Grail completely freely, and he has spent a lot of time and effort at the forum helping other members learn his method. So, while he is mistaken, he is not intentionally trying to scam anyone. In his manual, he writes if he were selling this, he would charge $1,000. Since in the long run, Scott's Grail is no better than simply single side betting, it's a good thing he gave it out for free.

Is the birthday paradox real? Absolutely!

Can you bet on it? Not in baccarat!

Disclaimer: The betting strategies and results presented are for educational and entertainment purposes only. Gambling involves substantial risks, and the odds are not in the player's favor by design. The author does not state nor imply any system, method, or approach offers users any advantage, and he shall not be held liable under any circumstances for any losses whatsoever.

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This entry was posted on October 17, 2010 at 7:33 pm and is filed under Life with tags ambiguous, analysis, baccarat, banker, bet, betting progression, birthday, birthday paradox, birthday problem, counting, distinguishable, eirescott, eirescott's grail, expectancy, frequency, gambling, group, holy grail, marble, math, mathematical advantage, mathematical edge, non distinguisable, object, player, prefabricate, probability, random sets, result, scenario, Scott, simulation, statistics, strategy, test, testing, unambiguous, Zumma, Zumma 1000, Zumma 600. You can follow any responses to this entry through the RSS 2.0 feed. You can leave a response, or trackback from your own site.

10 Responses to "Can Betting on Birthdays Make You Rich?"

Baccarat Simulation Series 7 Results: Scott's (eirescott) Grail « ImSpirit Says:
October 17, 2010 at 7:44 pm

[…] Read a discussion of the results in Can Betting on Birthdays Make You Rich? […]

Reply

Can Betting on Birthdays Make You Rich? (Short Version) « ImSpirit Says:
October 18, 2010 at 3:08 pm

[…] The full discussion with detailed explanations and examples can be found here: Can Betting on Birthdays Make You Rich? […]

Reply

Eirescott's Grail - Final Edition - Page 4 - Baccarat Forums Says:
October 23, 2010 at 5:56 am

[…] Blog Critique Of This System
There is a great blog critique of the BP system. I read most of it. It does very well to explain the basics of the system.

There are tests that were allegedly done with specialized software – I don't quite understand the graphs – granted I didn't look to intensely at the entire blog to understand the graphs.

It is a very fair critique and ultimately concludes that this can't work and is ultimately no different than betting P or B.

I'm not sure I entirely agree with that conclusion. I do see that this is very balanced. I see that we are very close to "breaking-even" most of the time and there are ups and downs.

I have said that you should leave while you are up. I have also noticed that this system never really takes you into dangerous territory – a place where you bet 2% to 5% of your bankroll and ultimately lose it all!

I believe that – at worst – this is a perfect observer of balanced chaos. Where we can see the flow of ups-and downs and capitalize – with proper MM – on the highs to squeeze-out our profits.

Have a look at the blog. I believe it is written by a member here.

Again – it is very fair and I will likely review it for clues to what I may be able to improve-on re MM.

https://imspirit.wordpress.com/2010/10/17/can-betting-on-birthdays-make-you-rich/

EIRESCOTT [...]

Reply

virtuoid Says:
October 23, 2010 at 11:28 am

Thank you for the comments, Scott.
I appreciate your efforts at the forum.
I didn't want to post this there, because I didn't want to distract away from your work and following there.
Let me know if I can help test anything in the future.
All the best.

Reply

David Says:
October 24, 2010 at 9:44 am

Virtuoid

Nice work on this and nice site. Quick question about your BP simulation: Did you simulate the use of new, different, pre-fabricated sets for each "room" or group of decisions?

Thanks
David

Reply

virtuoid Says:
October 24, 2010 at 10:08 am

Thanks, David.

Yes, in the simulation over 102,600 shoes, I followed the rules in Scott's Final Grail version. I created pre-fabricated sets of 4 objects, each made up of 3 randomly generated PB decisions. These are used as the basis to match the next 3 objects of 3 actual PB decisions. After each room of 7 objects is complete, I started the next room with a freshly constructed set of 4 random PB objects, and so on. So, each completed room has 7 objects, the first 4 of which are freshly randomly generated, and the last 3 of which are actual decisions from the shoe.

In principle, how you form the first 4 basis objects, whether from the actual PB decisions themselves as in Scott's original version, or as randomly generated pre-fabricated sets as in Scott's Final version, shouldn't matter.

Scott would say it doesn't matter because he believes his method is based on completely random processes, so as long as the 4 basis objects are randomly formed, they would do just as well as anything else.

But the real reason it doesn't matter is because, according to my analysis, you never do better than 50/50 anyway. You would do just as well to simply flip a coin or keep betting down a single side, and in the long run, expect to do just as well as trying to match using Scott's method.

Reply

David Says:
October 24, 2010 at 3:20 pm

Thanks Virtuoid, my initial results were more equivocal, although did not apply the same degree of rigor and sample size. I found distinctly different results when I applied different approaches to the 4 pre-fabricated objects.

Anyway, great blog – can you be PMd?

David

Reply

virtuoid Says:
October 24, 2010 at 3:59 pm

Thanks, David.

Yes, the specific results, of course, will depend on the objects used as the basis for matching, whether from the actual shoe or pre-fabricated, but in the long run, the general direction of the trend should converge.

Feel free to PM me here by submitting a comment and indicating you'd like to correspond privately.

Reply

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24 Karat Fool's Gold Beats Both Zummas « ImSpirit Says:
October 29, 2010 at 5:31 pm

[…] is true for Scott's (eirescott) Birthday Grail method (ref. Can Betting on Birthday's Make You Rich), Rodriquez's method bets relatively infrequently. Hence, the ups and downs in the score […]

Reply

Does a Ph.D. Help in Baccarat? « ImSpirit Says:
November 4, 2010 at 2:08 pm

[…] Birthday Paradox Grail, Player and Banker decisions are grouped into triplets, ref. Can Betting on Birthdays Make You Rich?.) The frequencies of each doublet are tallied as they occur while playing a shoe. Based on his […]

Reply

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