Straights and Flops: Part 2

Brian Alspach

This article is the second part of a look at making straights in hold'em and Omaha. The first item of business is an apology for mistakes in the numbers for Omaha. I just discovered a consistent mistake I was making throughout the Omaha calculations resulting in the numbers being wildly incorrect. Consequently, I am going to delay examining Omaha until later.

The following table summarizes the information for hold'em. Given that one has a flop that allows a straight in one, two or three ways, the table gives the probabilities that out of ten random hold'em hands, at least one of the hands has a straight.

one way	two ways	three ways
.131	.249	.352

Let us now turn our attention to individual hands. Players' hands range from those that cannot possibly flop a straight to those that can make a straight with four different rank sets. For example, a player holding K-6 cannot possibly flop a straight. On the other hand, a player holding 6-5 can make a straight with any of the rank sets 2-3-4, 3-4-7, 4-7-8 or 7-8-9.

For each rank set that makes a player a straight, there are 64 possible flops because there are four possible cards for each rank. There are 19,600 possible flops from our player's standpoint, so to get the probability that a player flops a straight, we simply multiply 64 by the number of rank sets giving her hand a straight and divide by 19,600. That is how we get the probabilities in the next table.

no way	one way	two ways	three ways	four ways
0	.0033	.0065	.0098	.0131

Probabilities of flopping a straight

Even when a player is holding a hand that allows four different rank sets producing a straight, the odds against flopping a straight are about 75-to-1. This may explain why it doesn't happen too often for you. On the other hand, what does happen is that people flop straight draws. Let's take a look at some of the numbers there.

First of all, most player hands allow open-ended straight draws. The K-6 hand mentioned above has an open-ended straight draw after a flop of 10-J-Q. However, this kind of straight draw is weakened by the fact that a player holding A-K already has a straight and the best the K-6 player can do is tie the made straight unless she can hit a bigger flush.

The point is that making a straight that uses four board cards often is beat or tied by another straight. Consider a hand such as 6-5 with four rank sets making a straight.

If the flop has a 3-4, 4-7 or 7-8, then the player has an open-ended straight draw. There is now a wide range of possibilities for the third card in the flop. One possibility is that the third card pairs one of the other two. Some caution must be exercised here because once the board has a pair other bigger hands are possible. There are 144 flops of this type.

The third card could be any of seven ranks that don't give the player a straight or a card that pairs one of the player's cards. This means it could be any of 34 cards. We then get 1,632 flops with three distinct ranks giving the player an open-ended straight draw. Altogether there are 1,776 flops giving the player an open-ended straight draw. This gives a probability of .091 that the player flops an open-ended straight draw.

A so-called double gutter draw also has the same chances for the player to make a straight as an open-ended draw. The only draws in this category we haven't already counted in the 1,776 flops above are those resulting from a flop of 2-4-8 or 3-7-9. This gives us another 128 flops so that the probability of a flop which gives the player any of eight cards for a straight is .097. The odds against such a flop are about 9-to-1.

Now consider a one-gapper hand such as 7-5. The only flops with two ranks that give an open-ended straight draw are 4-6 and 6-8. There are 96 flops of this type with a pair in the flop. If the flop has three distinct ranks, then for the third card, either 4-6 or 6-8 can have any of seven other ranks or pair one of the player's cards that give an open-ended straight draw. This gives 1,088 flops. The rank sets 2-3-4 and 8-9-10 give risky open-ended straight draws for another 128 flops. A-3-4, 3-6-9, and 8-9-J give 192 flops with double-gutter draws. Altogether we have 1,504 flops that give eight cards for a straight. The probability of this is about .077 or odds against of about 12-to-1..

Suppose you have flopped three cards that give you any of eight cards for a straight. The probability of making a straight on the turn card is 8/47 so that your odds against making the straight on the turn are 39-to-8 which is approximately 5-to-1. The probability of missing the straight on the turn but making it on the river is 156/1,081 giving odds against this outcome of about 6-to-1. However, the latter probability is not particularly useful because your betting decision about paying to see the turn card should be based on the pot odds you are getting compared to the 5-to-1 odds against making the straight on the turn card.

The probability of missing the straight on both the turn and the river is 741/1,081 which means about 68.5% of the time you will not make the straight.