Choose Your Weapon Part 2

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You may recall from Part I that the fate of humanity hangs in the balance over the outcome of a single hand of hold'em between the commander of a Zapaduan battle station and a randomly chosen Canadian poker player. There are some conditions for the contest. The Zapaduan commander is going to play the two red aces and the Canadian player gets to choose any two cards he or she wishes as long as it is not the two black aces. If the hand ends in a win for the Canadian or a tie, humanity will be spared; otherwise, humanity is doomed.

In Part I, we saw that if one chooses a pair of rank x, one will have a better chance of beating the red aces if one chooses one red card and one black card as compared to choosing the two red cards of rank x. By using a similar analysis, it is not hard to verify that the two black cards of rank x will have a better chance of winning than one red card and one black card of rank x. Thus, if the player representing Earth is going to use a pair, the best choice is to pick the two black cards of that rank.

I shall refer to quads, full houses, trips, two pairs, one pair and a high card hand as a clumping hand. I shall refer to straight flushes, flushes, and straights as sequential hands. If one were going to choose a pair, we have seen already that we should choose the suits to be clubs and spades because this maximizes the chance of getting a flush. It is easy to see that changing the rank has little effect on the number of boards giving the pair a winning clumping hand. What does change is that as we move towards the middle ranks, we increase the chances for obtaining a straight that beats the red aces. Thus, we shall use the black eights as the pair we check.

Suited aces do not appear to be a particularly good choice because we surrender considerable strength with regard to clumping hands as our opponent is holding two aces. The best hope for a suited ace is to aim to optimize sequential hands. The ace already makes most flushes a winner so that we should choose a second rank that improves the chances of making a winning straight. Thus, we choose A♣10♣ as the suited ace we check.

If one chooses two cards of different ranks x and y, where neither is an ace, it is clear that choosing two suited cards is better than choosing two cards of distinct suits because one needs only three cards of a given suit to make a flush. It also is easy to see that the closer in rank the two cards are, the better the chances for making a straight. Two successive ranks have the maximum number of ways of making straights as long as the ranks are away from the rank of ace. This leads us to using the 5♣6♣ and the 6♣7♣ in order to maximize the chances

of making a sequential hand that beats the red aces.

There are $C(48,5) = 1,712,304$ possible boards. The next table gives the number of boards for which our four test hands either beat or tie the red aces. The calculations are tedious and need to be carefully verified.

hand	wins	ties
A-10 clubs	206,947	20,910
8-8 black	342,208	5,928
6-7 clubs	362,959	6,450
5-6 clubs	362,905	7,367

Note that 6♣7♣ wins slightly more than 5♣6♣, but when we factor in the condition that ties are in our favour as well, we see that the best hope for humanity is for the randomly chosen Canadian player to choose either the 5-6 of clubs or the 5-6 of spades. We sum the numbers of wins and ties and obtain 21.6% as the chance of humanity surviving.

At the appointed time the same two aliens emerge from the ship to carry out the single hand of hold'em that will decide the fate of humanity. They ask if the Canadian player has been chosen and learn that a player has been chosen. The crowd parts as the chosen player strolls forward. He looks familiar to those of us in the know. Yes, indeed, it is Dr. Who. Humanity, our chances are looking better!