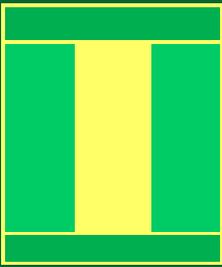# Problem 21 and its solution

♠Q63
♥Q632
♦AJ3
♣642

♠AJT842
♥4
♦4
♣AJT83

İrfan Doğan and Orhan Topal told me about this 4♠ hand from 2015 Bermuda Bowl. You don't have enough time and the tools to calculate the odds. So, just decide what you would do in a few minutes, and pick one of the lines below.

You are in 4♠ vs. silent opponents. The opening lead is ♦5.

Line 1: Play ♠Q.

Line 2: Start with a ♣, then play ♠A and ♠J (if LHO follows, overtaking with the ♠Q).

Line 3: Start with a ♣; if LHO wins; and returns a ♣, play ♠A and ♠J; if LHO returns another ♦, play ♠J and if that wins, continue with ♠T.

(I had asked this as a poll question in the 'bridgewinners' site, the results are; Line 1: 21 votes, Line 2: 12 votes, Line 3: 34 votes, Abstain: 5 votes.)

SOLUTION

Line 1: wins in the following cases.

When RHO has ♠Kx: if ♣'s are NOT 5-0 or 0-5; 20.35x96.0 = 19.54 %

When RHO has stiff ♠K or ♠Kxx: if ♣'s are 3-2 or 2-3 or either opponent has stiff ♣9 or ♣Q or ♣K; 24.85x(67.80+16.92) = 21.05 %

When RHO has ♠Kxxx: if either opp. has ♣KQ tight; 4.80x6.78 = 0.33 %

Total when RHO has ♠K = **40.92 %**

When RHO has ♠xx: if RHO has ♣KQx or ♣Kx or ♣Qx or ♣KQ tight or LHO has ♣KQ tight; 20.35x37.29 = 7.59 %

When RHO has ♠xxx or ♠x or void ♠: if either opp. has ♣KQ tight; 29.65x6.78 = 2.01 %

Total when RHO does not have ♠K = **9.60 %**

TOTAL for Line 1 = 50.5 %.

Line 2: wins in the following cases.

(a) When RHO has ♣Kx or ♣Qx or ♣KQ: if ♠'s are 2-2 or any opp. has stiff ♠K or LHO has ♠Kxx or ♠Kxxx; 23.73x76.56 = 18.17 %

(b) When RHO has ♣Kxx or ♣Qxx: if ♠'s are 2-2 or any opp. has stiff ♠K; 20.35x53.13 = 10.81 %

(c) When RHO has ♣KQx: if ♠'s are 2-2 or any opp. has stiff ♠K or RHO has ♠Kxx or ♠Kxxx; 10.2x76.56 = 7.81 %

(d) When RHO has two non-honor ♣'s: if any opp. has stiff ♠K; 10.2x12.43 = 1.27 %

(e) When RHO has three non-honor ♣'s: if any opp. has stiff ♠K or RHO has ♠Kxx or ♠Kxxx; 3.39x35.86 = 1.22 %

When ♣'s are 3-2 or 2-3, TOTAL = **39.28 %**

(f) When RHO has stiff ♣K or ♣Q: if ♠'s are 2-2 or any opp. has stiff ♠K; 5.64x53.13 = 3.00 %

(g) When RHO has a singleton non-honor ♣: if RHO has stiff ♠K; 8.46x6.21 = 0.53 %

(h) When RHO has ♣K975 or ♣Q975: if any opp. has stiff ♠K; 5.64x12.43 = 0.70 %

(i) When RHO has ♣KQxx: if ♠'s are 2-2 or either opp. has stiff ♠K; 8.46x53.13 = 4.49 %

When ♣'s are 4-1 or 1-4, TOTAL = **8.72 %**

I could not find a way to make it when ♣'s are 5-0 or 0-5; even if there is a way, its contribution to the overall will be ignorable.

TOTAL for Line 2 = 48.0 %

Line 3: wins in the following cases.

(a) Same as Line 2 = 18.17 %

(b) When RHO has ♣Kxx or ♣Qxx: if ♠'s are 2-2 or any opp. has stiff ♠K or RHO has ♠Kxx 20.35x71.76 = 14.60 %
(Compared to Line 2, +3.79)

(c) Same as Line 2 = 7.81 %

(d) When RHO has two non-honor ♣'s = % 0
(Compared to Line 2, -1.27)

(e) When RHO has three non-honor ♣'s: if RHO has stiff ♠K or ♠Kxxx; 3.39x11.01 = 0.37 %
(Compared to Line 2, -0.85)

When ♣'s are 3-2 or 2-3, TOTAL = **40.95 %**

(f) Same as Line 2 = 3.0 %

(g) When RHO has a singleton non-honor ♣ = 0 %
(Compared to Line 2, -0.53)

(h) When RHO has ♣K975 or ♣Q975: if LHO has stiff ♠K; 5.64x6.21 = 0.35 %
(Compared to Line 2, -0.35)

(i) Same as Line 2 = 4.49 %

When ♣'s are 4-1 or 1-4, TOTAL = **7.84 %**

TOTAL for Line 3 = 48.8 %

NOTES

(1) I had to suppose in some combinations in Line 2 and 3 that the defense never slips, otherwise no way to calculate. For instance, in (a), when RHO has ♣Kx or ♣Qx, if he/she also has ♠Kxx, I assumed that the contract goes down. To set it, either RHO must insert the ♣ honor when played from the dummy on the 2nd trick (in this case defense becomes easier) or LHO, when in with the ♣, should play another ♣ and then when RHO gets the trick with ♠K, he/she will go to the partner via ♥ and get a ♣ ruff. In practice, this is not so easy in my opinion, especially when the defense has limited information about the declarer's hand.

Even only in this combination, if one assumes that about half of the time the defense may fail, then the success rate of Line 2 roughly increases to 50 % and that of Line 3 to 51 %.

Also in items (b) and (c), although the defense is comparatively easy, the 'correct defense' assumption was made.

*(2) In item (e), I supposed that both the defense and the declarer perform very logically, which may not be easy at the table. In this case, LHO has ♣KQ tight. If ♠'s are 2-2, the contract cannot be made, because the declarer reaches the dummy to take the losing ♣ finesse (again). If LHO has ♠Kxx, he/she returns the now-stiff ♣ honor and gets the ruff later going to the partner with a ♥. If RHO has ♠Kxx, the situation may really get complicated. Now, LHO does not return the stiff ♣ honor, plays another ♦; RHO wins the ♠J (**played after ♠A in Line 2**) allowing the declarer to reach the dummy; but the declarer does not fall into the trap and collects LHO's now-stiff ♣ honor. As a result, in Line-2 (e), when LHO has ♣KQ tight, it makes if any opp. has stiff ♠K or RHO has ♠Kxx or ♠Kxxx.*

*However, **in Line 3 (e), since the declarer plays ♠J without cashing ♠A and continues with ♠T**, now RHO has to win the second ♠ to enable the declarer to reach the dummy and the declarer loses two ♣ tricks. Then, in Line 3 (e), contract can be made if RHO has stiff ♠K or ♠Kxxx (but not if she/he has ♠Kxx).*

In fact, because its contribution to the total is relatively small, item (e) is less important; whereas the assumption of 'correct defense' in items (a), (b) and (c) may cause significant differences in practice.

(3) Line 3 is superior to Line 2 only in one combination, where RHO holds ♣Kxx or ♣Qxx; it loses in a few combinations. Yet, the gain is about 1 % greater than the total loss.

CONCLUSION

On paper (with the 'correct defense' assumption), the probabilities of success are:
Line-1: % 50.5
Line-2: % 48.0
Line-3: % 48.8

In practice, however, there are several distributions in Line 2 and 3 for which the probability of inaccurate defense cannot be ignored. The decision is yours…

CORRECTION
In Line 3 (e), it was assumed that it can be made when RHO has stiff ♠K or ♠Kxxx. This changed the result from 49.0 % to 48.8 %.