MIT 15.S50 Lecture 5

Friday, January 27th, 2012

"Independent Chip Model" (ICM)

- In a cash game, clearly you should make decisions that maximize your expected # of chips (dollars).
- I've always told you do the same in tournaments.
- A lot of you complained that staying in the tournament is a more important factor.
- You are right, since a tournament has escalating payouts for surviving longer.
- But, this factor is not as relevant as you may think, as I now prove.

ICM

- ICM is a way to calculate exactly what your equity in a tournament is.
- Eg. 3 players left:
  - 1st pays $5
  - 2nd pays $3
  - 3rd pays $2
- Statement: “Your chances of winning the tournament is proportional to your % of the total chips”.

Assuming this statement is true…

- We can write calculators to calculate your exact equity!
- Eg. Suppose the chip stacks are A: 5000, B: 3000, C: 2000.
- If you're person C:
  - Your chances of winning is 20%
  - To calculate your chances of coming 2nd:
    - Conditioned on the fact that A wins (50%), your chances of coming 2nd is 2000/5000 = 0.4
    - Conditioned on the fact that B wins (30%), your chances of coming 2nd is 2000/7000 = 2/7
    - Overall, your chances of coming 2nd is 0.4 (0.5) + 2/7 (0.3) = 2/7
- Your equity is \$2+ 0.2 (\$3) + 0.29 (\$1) = \$2.89

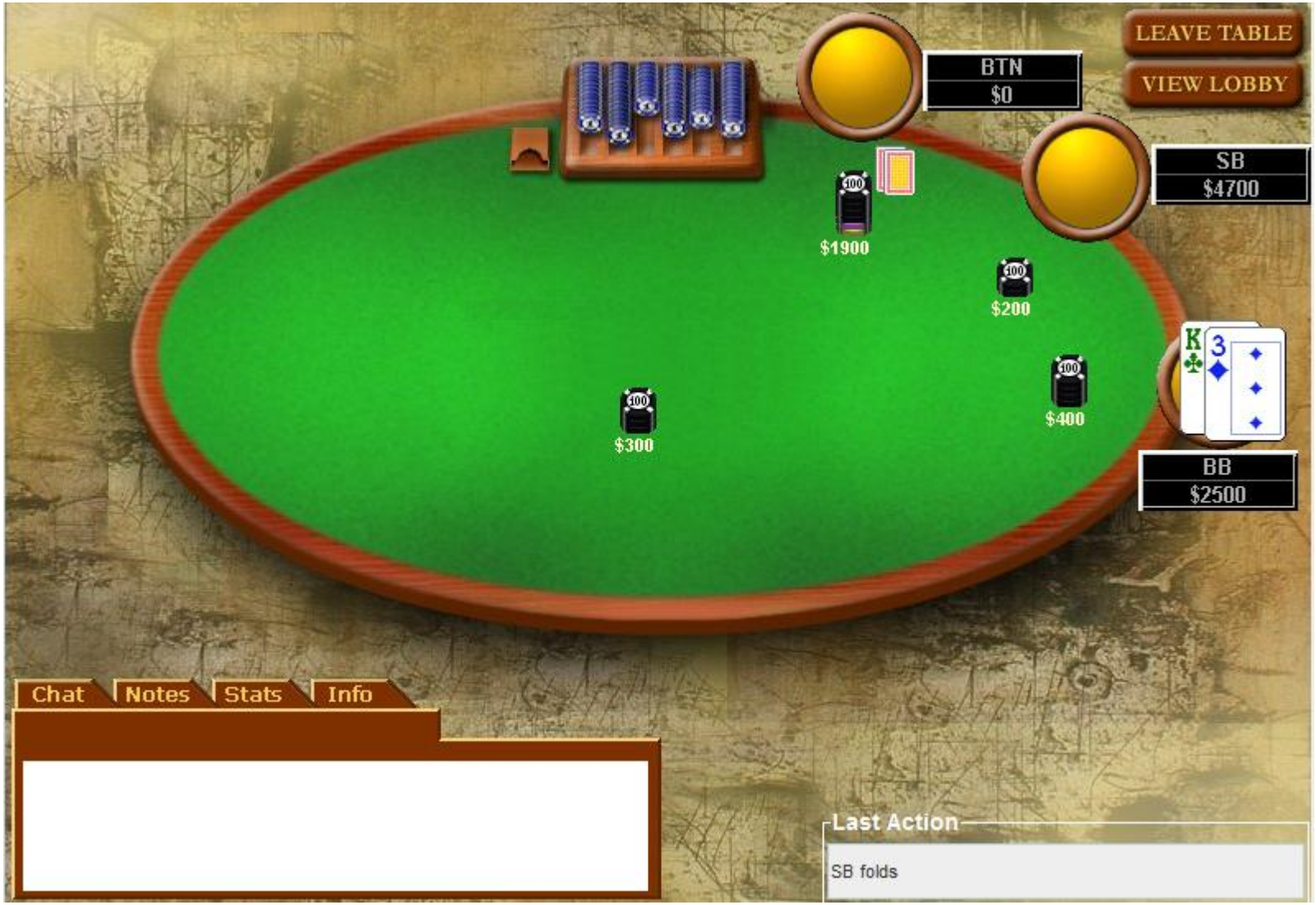
ICM Calculators

- If there's say 7 players left, you have no hope of doing this calculation by hand. (To calculate your chances of coming 6th, you need to sum 5! = 120 terms.)
- Fortunately, google "ICM calculator" and it will do this for you.

Why you still need to be loose

- Let's look at an actual situation where
  - There are 3 players left
  - Payouts are $5, $3, $2 (about what they are on Pokerstars tournaments that you play)
  - Stack sizes are 5000, 3000, 2000
- We will do some math for how much equity you need. This calculation **takes into consideration** the factor of wanting to stay alive in the tournament. It purely maximizes your expected $ payout (not chip payout) from the tournament.
- So if this calculation says that you should call, then there can be no more complaints! =)

Sample hand


LEAVE TABLE
VIEW LOBBY
BTN
$0
SB
$4700
$1900
$200
$400
$300
BB
$2500
Chat
Notes
Stats
Info
Last Action
SB folds

Analysis

- Normally need **35%** equity (calls 1500 to win a total pot of 4300)
- However, under ICM, the calculation is different:
  - Fold: Stacks will be 2500, 2800, 4700. Equity according to ICM calculator is $3.07.
  - Call and lose: Stacks will be 1000, 4300, 4700. Equity according to ICM calculator is $2.46.
  - Call and win: Stacks will be 5300, 4700. Equity = $3 + .53($2) = $4.06.
- Suppose my chances of winning is x. x needs to be high enough such that
  - $x(4.06)+(1-x)(2.46)>3.07$.
- Solving for equality, we get that x = **38%**. The requirements are only slightly higher than normal!

ICM Calculator Screenshot

		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Totals
		50.000	30.000	20.000								100.000
Player 1	1000	05.000	04.924	14.718	-	-	-	-	-	-	-	24.641
Player 2	4300	21.500	12.873	02.818	-	-	-	-	-	-	-	37.191
Player 3	4700	23.500	12.204	02.464	-	-	-	-	-	-	-	38.168
Player 4		-	-	-	-	-	-	-	-	-	-	-
Player 5		-	-	-	-	-	-	-	-	-	-	-
Player 6		-	-	-	-	-	-	-	-	-	-	-
Player 7		-	-	-	-	-	-	-	-	-	-	-
Player 8		-	-	-	-	-	-	-	-	-	-	-
Player 9		-	-	-	-	-	-	-	-	-	-	-
Player 10		-	-	-	-	-	-	-	-	-	-	-
Totals	10000	50.000	30.000	20.000	-	-	-	-	-	-	-	100.000

The correct play

- Assuming BTN's range is the top 50% of hands, you have 39% equity with 76s, enough to call.
- If his range is the top 30% of hands (which is absurdly tight), then you only have 37.6% equity. Calling would be positive chip-EV (expected value) but not positive money-EV.

Cases where ICM is easy to calculate

- Cash games: There is no such thing as ICM.
  - Expected # of chips
  - ~expected $, since chips = money.
- Winner-take-all tournaments:
  - Expected # of chips
  - ~ chances of winning tournament
  - ~ expected $
- Two players left in tournament: same situation as a winner-take-all tournament.

So I cheated a bit…

- I chose an example where the difference between $-EV and chip-EV was small.
- Imagine you are far into the payouts of a big tournament with 0.1% of the chips. Then clearly your $-EV will be significantly higher than your chip-EV (fraction of chips).
- In this case, folding a really good hand, could potentially be alright, just to survive longer, since you have no hope of winning the tournament anyway.
- Also, Satellites are examples of extreme ICM situations.

Some more facts about ICM

- Small stacks have $-EV higher than chip-EV. Big stacks have $-EV lower than chip-EV.
- When there is about to be a large pay jump (prize bubble, final table bubble, on the final table), the difference between $-EV and chip-EV is mor significant.
- In these situations, big stacks should go all-in frequently, and small stacks should rarely call all-ins (which allows big stacks to go all-in even more frequently).

Some preflop numbers to memorize

- Bigger pair vs. smaller pair: **80/20**
  - AA vs KK: 81.9%
  - AA vs 88: 80.5%
  - 33 vs 22: 80.4%
- A pair vs. zero overcards: **80/20**
  - AA vs AKo: 93.2%
  - AA vs 65s: 77.5%
  - JJ vs T9s: 81.7%
  - QQ vs 74o: 84.8%
  - KK vs K2o: 94.6%

Some preflop numbers to memorize

- A pair vs. one overcard: **70/30**
  - QQ vs AJo: 71.7%
  - QQ vs AJs: 68%
  - QQ vs AQs: 65.7%
  - 88 vs A2o: 70.2%
  - 33 vs A2o: 68.8%
- "Dominating" the other person: **70/30**
  - AKo vs AQs: 70.1%
  - AKs vs AQo: 75.4%
  - AKo vs AQo: 74.4%
  - AKo vs KQo: 74.8%
  - AJo vs A2o: 72.6%
  - A8o vs A2o: 65.7%
  - A5o vs A2o: 56.2%

Some preflop numbers to memorize

- Two overcards vs. a pair: **50/50**
  - AKs vs 22: 49.9%
  - AKo vs 22: 47.4%
  - AKo vs QQ: 43%
  - T9s vs 22: 54%

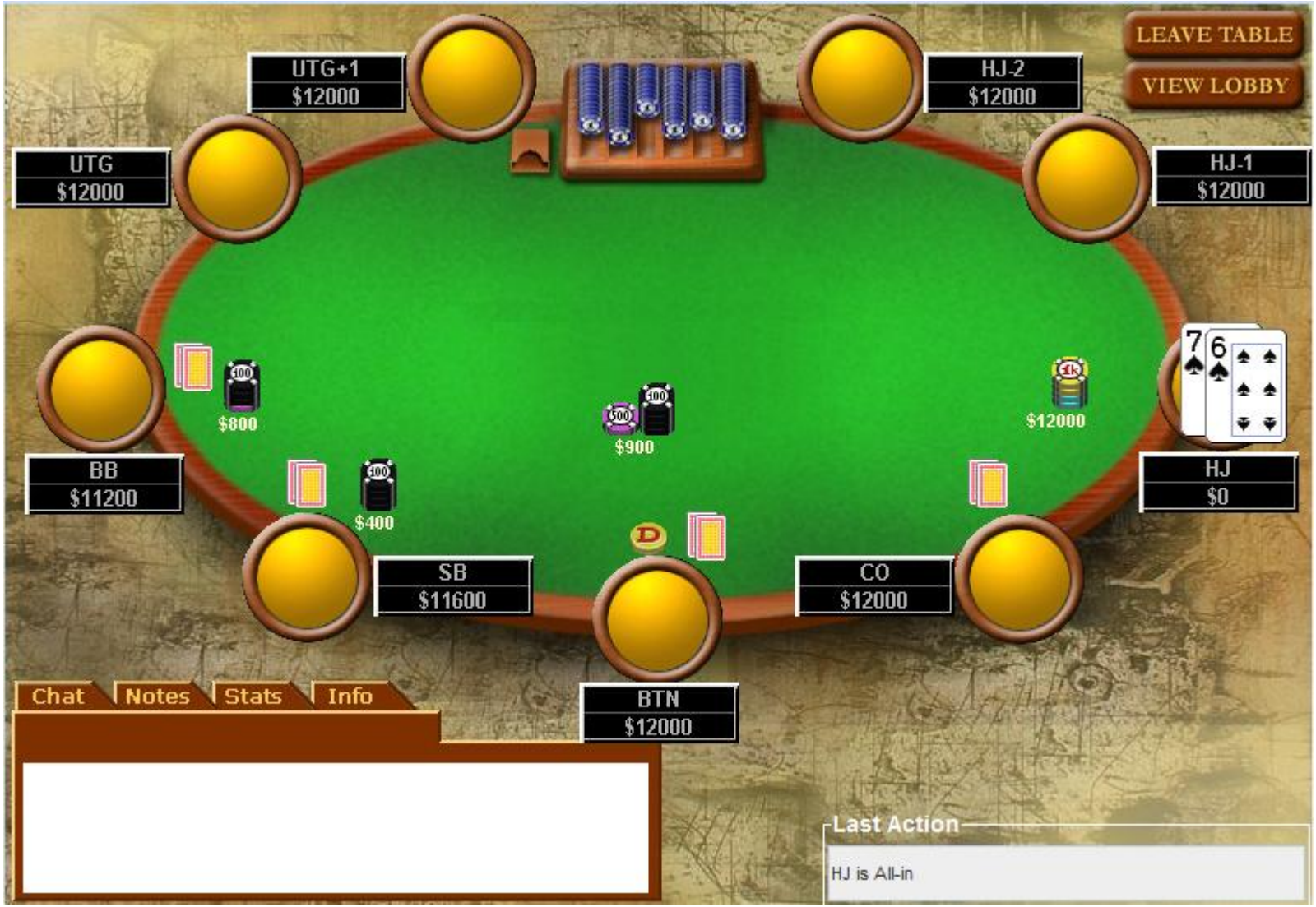
A>B>C>D

- AB vs CD: **60/40**
  - AKs vs 76s: 61.1%
  - AKo vs Q7o: 67.7%
- AC vs BD: **60/40**
  - AQo vs K9s: 60.1%
  - K7o vs J3o: 63.7%
- AD vs BC: **60/40**
  - A2o vs K3o: 61.4%
  - A2o vs T9s: 51.6%
  - AJs vs KQs: 59%

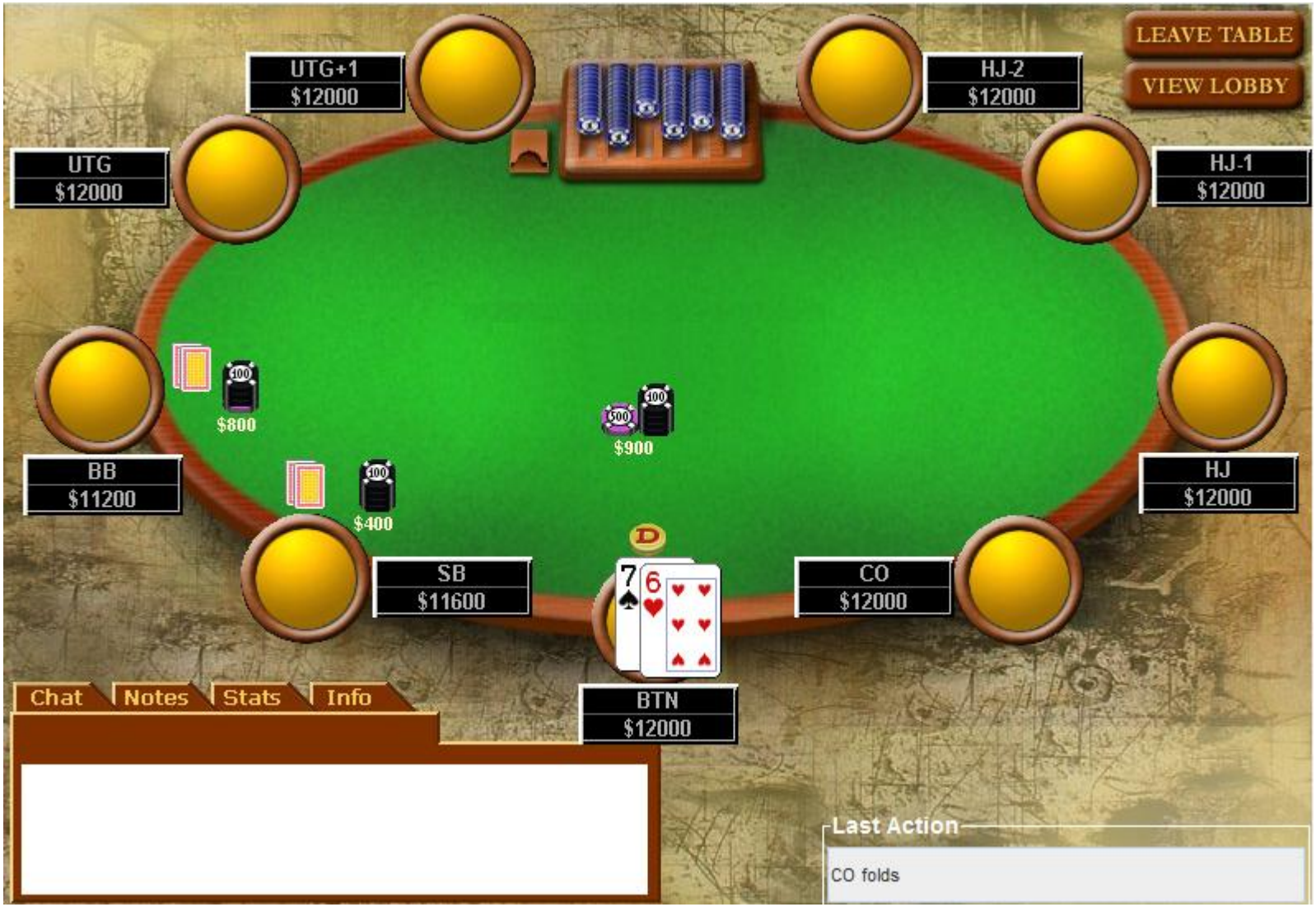
The importance of suitedness

- Remember some numbers:
  - AKo vs AQs: 70.1%
  - AKs vs AQo: 75.4%
  - AKo vs AQo: 74.4%
- Suitedness changes your equity so much when you're behind! Whereas it changes your equity much less when you're ahead.
- When you're the one going all-in, you will usually be behind when called. Thus, suitedness matters so much, because it gives you additional ways to catch up and pull ahead.
- When you're the one calling, you'll usually already be ahead, so suitedness matters less.

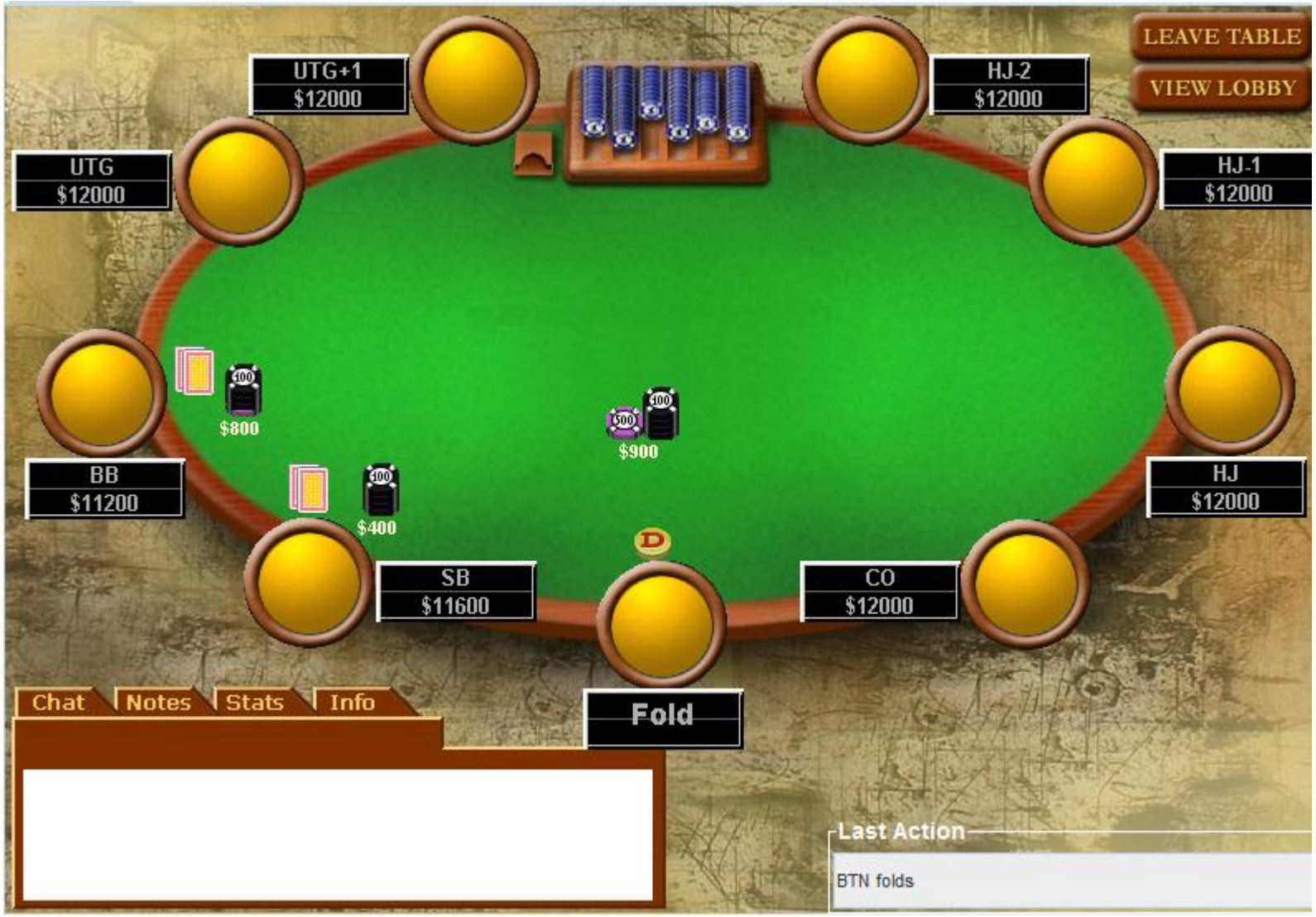
I would all-in with 76s for 15BB's from the HJ



But I would not with 76o from the BTN!



Fold.


LEAVE TABLE
VIEW LOBBY
UTG+1
$12000
HJ-2
$12000
UTG
$12000
HJ-1
$12000
BB
$11200
HJ
$12000
SB
$11600
CO
$12000
$800
$900
$400
Chat
Notes
Stats
Info
Fold
Last Action
BTN folds

Recall the 3 factors of preflop play

1. Cards
2. Position: The later, the more frequently you can go all in.
3. (Effective) stack size: The smaller, the more frequently you can go all in.

When 3) is smaller, players (especially the BB) may call you with very weak cards, just because the odds are so good.

Preflop All-in Epiphany

To shove hands like 87s, the most important thing is to have lots of chips. This guarantees that you will only get called by good hands, which you do relatively well against.

To shove hands like A2o, the most important thing is having not that many players behind you. You will get called frequently, but sometimes by a hand worse than A2o. If there's too many players behind you, there's just too high a risk of someone picking up a better Ace or pair.

Run through the rest of my $109 tournament

- [see Universal Replayer]