Introduction to the Theory & Practice of Poker

Lecture #2

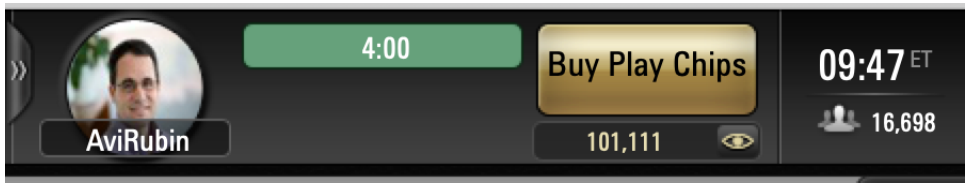
Jan 14, 2020

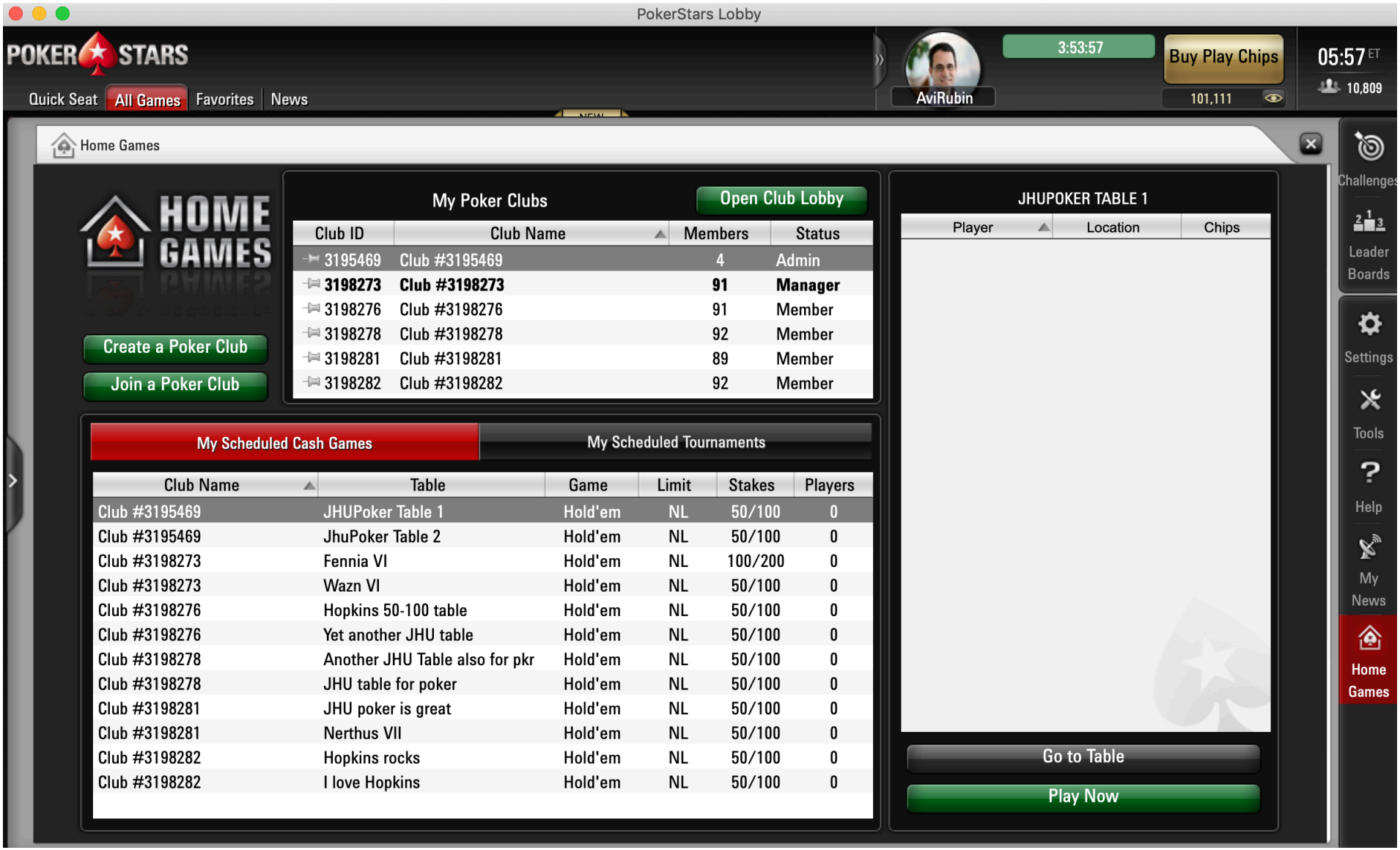
Playing poker

- We have switched to PokerStars
  - See detailed email in BlackBoard on joining
  - Email me if you did not get that message and need instructions
- Start playing poker tonight!
- Calculating cash results
  - Self-reporting
  - Keep track of 15k add ons, Every 4 hours
  - Keep track of tourney buy-ins
- 7-11 pm are most encouraged hours
  - But tables will be available at all times
- We will do a dry run poker tourney either this weekend or Monday
  - Tournaments cost 20k in chips, make sure you have them for the satellites
    - You can buy 1M for $2.99, but you shouldn't have to

Cash trophy

- To be eligible
- Start with 50,000 in chips
  - 35k + initial add on of 15k
- No more than 5 add-ons allowed
  - On the honor system, so keep track
- By noon on Thursday, Jan 23, update our google doc with
  - Your cash balance, adjusted for tournament subtractions
- You will need to supply screen shot
  - And proof of tourneys




PokerStars Lobby
POKERSTARS
Quick Seat
All Games
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Home Games
HOME GAMES
Create a Poker Club
Join a Poker Club
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Open Club Lobby
Club ID
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Members
Status
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JHUPOKER TABLE 1
Player
Location
Chips
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My Scheduled Cash Games
My Scheduled Tournaments
Club Name
Table
Game
Limit
Stakes
Players
Club #3195469 JHUPoker Table 1 Hold'em NL 50/100 0
Club #3195469 JhuPoker Table 2 Hold'em NL 50/100 0
Club #3198273 Fennia VI Hold'em NL 100/200 0
Club #3198273 Wazn VI Hold'em NL 50/100 0
Club #3198276 Hopkins 50-100 table Hold'em NL 50/100 0
Club #3198276 Yet another JHU table Hold'em NL 50/100 0
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Club #3198281 JHU poker is great Hold'em NL 50/100 0
Club #3198281 Nerthus VII Hold'em NL 50/100 0
Club #3198282 Hopkins rocks Hold'em NL 50/100 0
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Challenges
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Tournaments

- Make for great TV
  - All the money on the table heads up
  - Lots of drama
  - WSOP Main Event on ESPN
- Greater element of luck than in cash games
  - We'll look at the theory of why
- Anybody can win on any given day

- Chris Moneymaker changed the poker world

2003 Main Event

- $10,000 Entry fee
- 839 players entered (as opposed to 2019, with 6,140)
- Final 3 players:
  - Chris Moneymaker
  - Sam Farha
  - Dan Harrington
- 10th place: Phil Ivey

- Top 3 prizes
  - 1st place: $2.5M
  - 2nd place: $1.3M
  - 3rd place: $650,000


J♥ 10♦
FARHA
ALL IN
5♦ 4♠
76%
MONEYMAKER
J♠ 5♠ 4♣
COMMUNITY

Introductory concepts

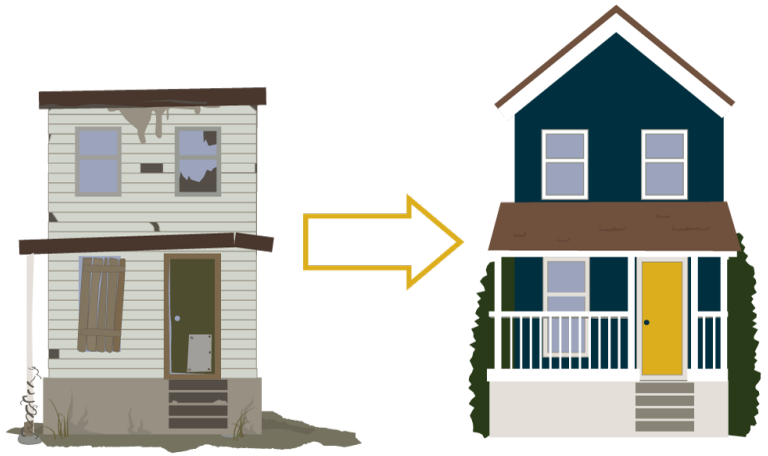
Fundamentals

Expected value

- Example: House flipping
  - Fixer upper for $300k
  - Contractor says for $80k can make it so it can sell for $500k
  - Realtor charges 6% to sell
  - What is your expected value?

500,000 – (300,000 + 80,000 + .06 x 500,000)
= 500,000 – 410,000
= 90,000 profit

You should do it!!

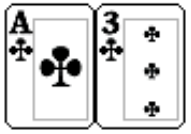


Expected value

- In house flipping
  - Expected value is
    - Sale price MINUS cost of rehab and commissions
- In poker
  - Expected value in a hand is
    - How much you win when you win MINUS how much you lose when you lose
    - More accurate:

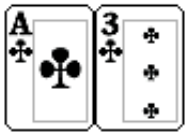
      How much you win times probability of winning MINUS
      how much you lose times probability of losing
- Key to poker is to push your positive expectations
  - And fold your negative expectations

Expected value in action

- Your hand: 
- After the turn, the board is: 
- Pot contains $50, and you have $20 left, you are heads up
- Tight, solid opponents bets $20
  - You know him, and he would only do this with 2 pair or better
- Should you call or fold?

(show of hands, Why call? Why fold?)

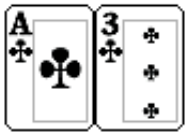
Example (cont.)

Your hand: 

- If you fold, your expected value at this point is zero.
- What about calling?
  - You need a club to win
  - There are 13 clubs in a deck
  - You have 2 clubs, and 2 clubs are showing, so 9 clubs left
  - There are 46 unknown cards left: 9 clubs and 37 non-clubs
  - 9/46 = 0.196, so there is approx. 20% of river being a club
  - You win 20% of the time; when you win, you win $70 (50 + 20)
    0.2 x 70 = $14
  - You lose 80% of the time; when you lose, you lose $20
    0.8 x -20 = -$16
  - So the expected value from the hand is $14 - $16 = -2
  - On average, in this spot, you will lose $2
- Don't call!!!

What if there had been $180 in the pot instead of $50?

Example ($180 in the pot)

Your hand: 

- If you fold, your expected value at this point is zero.
- What about calling?
  - You need a club to win
  - There are 13 clubs in a deck
  - You have 2 clubs, and 2 clubs are showing, so 9 clubs left
  - There are 46 unknown cards left: 9 clubs and 37 non-clubs
  - 9/46 = 0.196, so there is approx. 20% of river being a club
  - You win 20% of the time; when you win, you win $200 (180 + 20)
    0.2 x 200 = $40
  - You lose 80% of the time; when you lose, you lose $20
    0.8 x -20 = -$16
  - So the expected value from the hand is $40 - $16 = 24
  - On average, in this spot, you will win $24
- Call!!!

Pot Odds

- An easier way to calculate previous example
- Ratio of amount in the pot to the amount of the bet to call
- $70 in the pot (after opponent bets $20)
- $20 to call the bet
- $20 to win $70 is 70 to 20 pot odds, or 3.5-to-1
- 37 non-clubs in the deck; 9 clubs
- Odds against hitting are 37-to-9 or just over 4-to-1

- ***Whenever odds against are worse than pot odds, don't call!***
- ***Whenever pot odds are better than odds against, call!***

If pot had $180 before opponent's $20 bet, what are the pot odds when it's your turn?

Pot Odds

Example: Pot odds

- You hold: 
- Board after the turn is: 
- Pot: $150
- You have $50; one opponent has $200; another opponent has $100
- Player with $200 goes all in; second player calls
- Should you call or fold?

Call or fold?

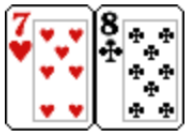
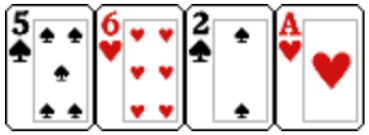
Your hand: 

Board: 

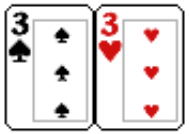
Pot: $150

- Safe to assume both players have a club in their hand
- Will cost you $50 to call (rest goes into side pot)
- Pot odds:
  - 250-to-50 (why?), which is 5-to-1
- How many ”outs” do you have?
  - 1 ace; 3 Jacks; 3 eights; 3 fours = 10 cards to make full house or quads
  - 46 unknown cards in the deck; 36 of them don’t help
  - Odds against are 36 to 10, or 3.6-to-1
- Pot odds are better than odds against, so you should call!
- Extra credit: Odds against are actually 3.4-to-1, why?

Exercise: Pot Odds

- Volunteer student come up and solve on the board
- You have: 
- Board is: 
- There is 180 in the pot; opponent goes All In for $50. You have him covered.
- Opponent accidentally shows you his hand: 
- Should you call or fold?
- Step 1: Calculate pot odds
- Step 2: Calculate odds against (how many outs?)
- Step 3: Make decision
- What if opponent goes All In for $10?

Exercise 2: Pot Odds

- Work with a partner in the class
- You have: 
- Board is: 
- There is $200 in the pot; opponent goes All In for $100. You have him covered.
- Opponent accidentally shows you his hand: 
- Should you call or fold?
- Step 1: Calculate pot odds
- Step 2: Calculate odds against (how many outs?)
- Step 3: Make decision

- What if your opponent held Ah3h instead of 33?

Exercise 3: Pot Odds

- On the turn
  - You have top pair, top kicker
  - You believe you opponent has a flush draw (9 outs)
- There is $100 in the pot
- What is the minimum you should bet so that it is a mistake for him to call?

Answer:

Odds against 37-9 which is 4.1 to 1

Pot odds 4 to 1 so $(100 + x)/x = 4$ for a toss up

$100/x + 1 = 4$

$100/x = 3$

$100 = 3x$

$x = 100/3 = 33$

Anything greater than 33 will give wrong odds to call

Exercise 3: Pot Odds

- You can do the same exercise for any number of outs
  - Don’t just bet – have a **purpose** for your bets
- When making a bet ask yourself
  - Is this bet amount giving him correct odds to call?
  - If he is no a draw, can I get him to call incorrectly?
- Always consider opponent’s hand
  - Try to force them into a mistake

Don’t give your opponent pot odds to call

- As you can see in the last exercise
  - Betting 1/3 of the pot gives a flush draw odds to call
  - Betting more than 1/3 of the pot does not give them odds to call
    - Would be a mistake for them to call ½ pot or ¾ pot

- Your goal is to cause opponent to make a mistake
  - You are the house
  - You want every edge
  - Calling without the right odds is a losing proposition

- Don’t call when getting the wrong odds
- Don’t offer a drawing opponent the odds to correctly call

Pot Odds – some limitations

- Imperfect information – you don't really know what opponent has
  - You can often deduce a range of hands
  - Harder if they are tricky
- Not every decision is an All In situation
- Pot odds calculated on the flop
  - There are still 2 cards to come

And yet, Pot Odds is perhaps the #1 most important concept in NLHE.

Phil Helmuth

- Winningest tournament player
- 15 WSOP bracelets
- 5 WPT final tables
- Over $14M career earnings at WSOP
- Fifth all time money ranking
- Nickname: “Poker Brat”
  - Lots of antics at the table
  - Sore loser, ungracious winner
- Arguably the GOAT in tournaments (he’ll tell you himself)

Phil Helmuth discusses “Outs”

How many outs for Mark?

Calculating Outs

- Involves some calculation and some guess work
- What does your opponent have?
  - Could your supposed outs actually give him a better hand?
  - For example, you hit a straight, but he makes a flush?
- Say in middle position, you hold: 
- You raise, and opponent behind you in position calls
- Flop: 
- You check, and opponent bets. How many outs do you have?

Outs example

Your hand: 

Flop: 

- Opponent has:
  - A big hand – 2 pair or better
    - You need a K or a 9 for a straight, 8 outs
    - Backdoor Flush draw, 10/47 on turn and 9/46 on River: call it 2 outs
    - But, even if we hit, he could hit a full house, so subtract 2 outs
    - Let's assign it 8 outs
  - He has an A in his hand
    - Unlikely he'll beat a straight or flush, so 10 outs
  - He has a J in his hand
    - Now, 3 more outs for the Q, so 13 outs
  - He has a lower pair
    - 16 outs, with the three 10s in the deck
- We actually have no idea what he has, so going with 10 outs is probably best in this scenario.

Handy Outs table

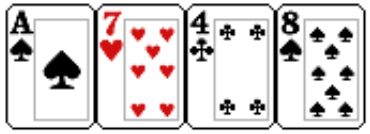
Number of outs	Drawing Hand
4	2 pair, needing a full house; or inside straight draw
6	2 overcards needing to make a pair
8	Open-ended straight draw
9	Flush draw
11	Flush draw plus a pair needing to improve to trips
12	Flush draw plus inside straight draw
15	Flush draw plus open-ended straight draw

Rule of thumb: 14 outs makes you even money against a better hand
And you will always be getting better than even pot odds from any bet.

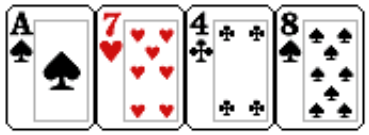
Express odds vs. implied odds

- Pot odds when all in
  - Express odds. It is what it is. Easy decisions. Simple math.
- Pot odds with chips behind
  - How much will you win if you hit your draw?
  - Some draws are obvious, e.g. flush draws
  - Some are hidden, e.g. straight draws
- Implied odds
  - What are the pot odds, taking into account future betting?

Example – implied odds

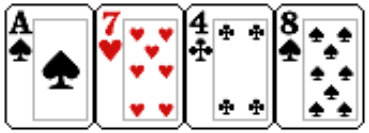
- Your hand: 
- The board after the turn: 
- You are heads up in position
- Pot $180
- You have $500 in your stack, and so does your opponent
- Opponent bets $100
  - Most likely he has an A, but regardless, you assume you are behind
- Should call, fold, or raise?

Example – implied odds

- Your hand: 
- The board after the turn: 
- Pot $180
- You have $500 in your stack, and so does your opponent
- Calculate pot odds:
  - 100 to win 280, so 2.8-to-1
- Calculate odds against:
  - 46 unseen cards, 37 bad and 9 good (flush), so 37-to-9, just over 4-to-1
- Do not have *express* odds to call
- So fold??
  - Not so fast

Implied odds example

Your hand: 

The board: 

Pot: $180

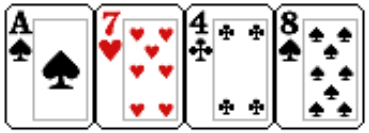
Stacks $500

He bets: 100

- If we call, on the river, the pot is $380
  - And we each have $400 left
- If we miss our draw, we are not putting more in the pot
  - And we will probably lose
- Scenarios if we hit our draw
  - He might bet, and we raise, and either way win more
  - Hi might check, we bet $100 into $380, and he'll probably call getting 4.8-to-1
  - He might check, we bet $200, giving him 2.9-to-1, so maybe he'll call
  - He might check, we go all in for $400, possible he'll call

Implied odds example

Your hand: 

The board: 

Pot: $280

Stacks $500

To call: 100

- Let's reexamine Turn decision
  - If we win extra $100 on the River
    - Implied pot odds are really 3.8-to-1, still not good enough to call
  - If we win extra $150 on the River
    - Implied pot odds are really 4.3-to-1, totally adequate to call

- Factors to consider
  - How likely would this opponent be to call $200 bet on River if a spade comes?
  - How likely is he to realize I'm drawing to a spade?
  - Any chance he'll put me on a bluff and call All In bet on River if spade comes?
    - Also, if he's on spade draw too, my implied odds are huge, and I'm probably ahead anyway.
  - More advanced: If I miss my draw and bluff, can I get him to fold?

- My decision
  - In this Turn spot, folding is ok, but I like to call the turn bet and then bet $200 on the River if a spade comes and he checks.