

# MIT 15.S50 Lecture 1

January 11<sup>th</sup>, 2016

# Welcome to MIT 15.S50!

- ▶ Instructor: Will Ma
  - ▶ League Manager: Leigh Marie Braswell
  - ▶ Credits: G 3 units
- 

# Schedule

Day	Location	Notes
Mon, Jan 11 <sup>th</sup>	E62-276	Homework 1 out
Wed, Jan 13 <sup>th</sup>	E62-276	
Fri, Jan 15 <sup>th</sup>	E62-276	Homework 1 due
Wed, Jan 20 <sup>th</sup>	E62-276	Homework 2 out
Fri, Jan 22 <sup>nd</sup>	E25-111	
Mon, Jan 25 <sup>th</sup>	E62-276	Homework 2 due
Wed, Jan 27 <sup>th</sup>	E62-276	
Fri, Jan 29 <sup>th</sup>	E62-276	guest speaker?

# Grading

- ▶ Pass/Fail
- ▶ Need to do all of the following:
  - Attend at least 6 out of 8 lectures
  - Complete the 2 homeworks
  - Accumulate 10 points in the online Pokerstars league for MIT 15.S50

# Pokerstars Tournament Lobby

The screenshot shows the PokerStars Tournament Lobby for tournament 673215278. The interface is dark-themed with white and green text. At the top left is the PokerStars logo. The main header area displays the tournament name and type: "No Limit Hold'em" with a buy-in of 280 + 20. It also states "Open for Registration (maximum 45 entrants)". A notification on the right says "5-table tournament will begin when 45 players have registered." Below this, it notes "The buy-in, entry fee, and prizes awarded are in Play Money chips."

The central area is divided into two main sections. The left section provides tournament details: "PokerStars Tournament 673215278", "Sit & Go", "Total prize pool: 12,600.00", "7 places paid", and "Currently registered players: 23". The right section shows a prize ladder:

1st	4,410.00
2nd	3,150.00
3rd	2,016.00
4th	1,008.00
5th	882.00
6th	630.00
7th	504.00

At the bottom left, there is a "Register" button. At the bottom right, there are "Player Info" and "Main Lobby" buttons. The right side of the lobby features a player list table:

Player	Chips	Rank
ASL1974 (Germany)		
Bushie7 (Australia)		
Cadog52 (United Sta...		
CaeserVVV57 (Unite...		
DavePDef (United St...		
de Fonte (Russia)		
doninen (United Sta...		
dsray (United States)		
GoatWar (United Sta...		
haune12345 (Germa...		
Jb_Silk (Canada)		
koljan545 (Russia)		
McVee88 (Canada)		
miguel an818 (Spain)		
O Great One1 (Austr...		
pokermom54rv (Unit...		
presseclick (Italy)		
prostoSweta (Kazakh...		
RNscuba (United Sta...		
simpleman62 (Unite...		
Tyler88157 (Russia)		
V.Ivanovna (Russia)		
wolfeyes69 (United S...		
zeus542011 (Italy)		

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# Club Leaderboard



## MIT 15.S50



Club Manager: CutiePi314    Established: November, 2011    Members: 222    Club ID: 557832

[Club Home](#)   [Schedule](#)   [Results](#)   **[Standings](#)**   [Options](#)   [Manage Games](#)   [Manage Club](#)

### Club Standings

Real Money   **Play Money**

Season 1 (2012)   [Rename...](#)

Rank	Player	Games	Points	Average	KO
1	AdamT_MIT	89	172.13	1.93	64
2	weileaf	53	119.95	2.26	107.5
3	Md. W. MIT	69	107.53	1.56	99.5
4	Maokai_MIT	58	104.39	1.8	117
5	yongnali	71	102.45	1.44	86.5
6	JohnR_MIT	87	91.92	1.06	106
7	GetWhipped!	67	91.28	1.36	106.5
8	eugenem_MIT	85	90.95	1.07	93.5
9	YutaK_MIT	58	86.05	1.48	43
10	morty2015	81	81.27	1	64.5
11	CalebC_MIT	58	78.46	1.35	53.5
12	ZackS_MIT	64	77.2	1.21	81.5
13	iltack_mit	69	73.12	1.06	66
14	qtdkj	41	72.08	1.76	56.5
15	JungLee_MIT	38	66.22	1.74	67
16	kevinc_mit	36	64.16	1.78	47
17	DavidF_MIT	55	63.88	1.16	60.5
18	jaewonk_MIT	84	62.64	0.75	68.5
19	AndrewJ_MIT	34	59.72	1.76	57.5
20	ARI_O_MIT	76	59.54	0.78	117
21	eric.h_mit	63	56.27	0.89	55
22	JohnK_MIT	54	50.22	0.93	51
23	ahessMIT	56	44.83	0.8	60
24	pandazzzz	68	44.17	0.65	37



**AdamT\_MIT**  
Cambridge

Member since:  
January, 2012



### Season Statistics ( Play Money )

Total Points: 172.13 ( 1.93 PPG )  
Games Played: 89, 2 win(s)  
Finishes: **Best Place: 1 of 53**  
**Worst Place: 46 of 47**  
In The Money: 38 out of 89 ( 43% )  
[Gold] x 2  
[Silver] x 2  
[Bronze] x 6  
Knockouts: 64

\* Tournaments with less than four players do not count towards player statistics.

\* Points are only awarded in tournaments with four or more players.

# Pokerstars League

- ▶ Play money tournaments on Pokerstars
  - ▶ Just try your best to win play money in the tournaments. This roughly translates to “points”.
  - ▶ The total points awarded for a qualified tournament are exactly equal to the number of players in the tournament. So a 20-player tournament awards 20 points and a 50-player tournament awards 50 points. The points awarded are spread across the top third of participants, with a higher proportion going to higher placements in the finish order. (Rounding may occur to ensure that total points equal total players and top third of players is a whole number.)
- 

# Prizes

- ▶ iPad Air Wi-Fi 16GB, courtesy of Jane Street Capital
- ▶ \$200 Amazon gift certificate, courtesy of Akuna Capital
- ▶ (9) subscriptions to poker training website Cardrunners, with durations (in months) 6,4,3,2,2,1,1,1,1
- ▶ (2) one-hour private coaching sessions from Mike "Timex" McDonald, and myself
- ▶ (2) ifidelity Groove Bluetooth Speakers, courtesy of Jane Street Capital
- ▶ (2) BOOMPODS headpods, courtesy of Jane Street Capital
- ▶ (2) \$50 Amazon gift certificates, courtesy of Akuna Capital
- ▶ (10) \$20 Amazon gift certificates, courtesy of Akuna Capital (will be given during class and office hours)

# Daily Tournament Schedule

- ▶ 6:00 PM – Daily 6-handed (2 hrs)
  - ▶ 7:00 PM – Daily Major (3 hrs)
  - ▶ 8:00 PM – Daily Turbo (2 hrs)
  - ▶ 9:00 PM – Daily Deepstack (3 hrs)
  - ▶ 10:00 PM – Daily Shortstack (2 hrs)
  - ▶ 11:00 PM – Daily Hyper-turbo (1 hr)
  - ▶ Late registration for 1 hour
  - ▶ Can multi-table
  - ▶ Could change / have specials; talk to the League Manager
- 

# Tournament Policy

- ▶ Although this is a play money league for beginners, we want to see people trying to learn, playing their best poker.
  - ▶ If we see regular behavior that suggests otherwise, we may kick you out of the league (and thus the class)
  - ▶ Eg. Going all-in every hand, sitting out regularly, giving chips away to a friend
- 

# Stress of Playing

- ▶ Your tournament results will be visible to anyone in the league. Anyone in the league can watch you play hands.
  - ▶ I hope no one is uncomfortable with this. We are all trying to learn.
  - ▶ I hope it's a good social experience as well as a good learning experience.
- 

# Start playing right away!

- ▶ The 10 points requirements is actually very easy to meet, but the later you start, the harder it seems.
  - ▶ It's difficult to relate to lecture material if you never play poker yourself.
  - ▶ I do not want the 10 points requirement to be a source of stress for anyone. If you enjoy playing poker, play in lots of online tournaments, and cannot get to 10 points, I'll make considerations.
- 

# Other Fun Stuff

- ▶ MIT Poker Club in-person tournament
  - ▶ MIT Pokerbots finals
  - ▶ Everything happening weekend of Jan 30<sup>th</sup>–31<sup>st</sup>
- 

# Listeners

- ▶ Listeners are allowed, even if you are non-MIT
  - ▶ Listeners are allowed to participate in online league (MIT poker club, Princeton poker club folks may join us)
  - ▶ Only class participants are eligible for prizes
- 

# Attendance Tracking

- ▶ Approach Leigh Marie either before class, during the break, or after class
- ▶ Please don't forget!

# Syllabus

- ▶ Poker Concepts – preflop ranges, 3–betting, continuation betting, check–raising, floating, bet sizing, implied odds, polarization, ICM theory, data mining in poker
  - ▶ Math Concepts – probability and expectation, variance and the Law of Large Numbers, Nash Equilibrium
  - ▶ General Concepts – decisions vs. results, exploitative play vs. balanced play, risk management
- 

# The Decision Mentality



# Expected Value (“+EV”)

- ▶ Credit card roulette: poker players “split” the bill by selecting one person to pay at random
  - ▶ Fair “on average”
  - ▶ Saves time!
  - ▶ Thrilling
- 

# Who is the Gentleman?

- ▶ Poker pro Matt goes to dinner with poker pro Steven and brings Emily, a close friend who he also has romantic interest in
  - ▶ When the bill comes, Matt agrees to pay for Emily's meal by putting in two credit cards to Steven's one
  - ▶ Matt, being a luck sack, pulls both his credit cards out before Steven's
- 

**Who should Emily thank for her meal?**



# Who should Emily thank for her meal?

- ▶ In this class, we want everyone to think in terms of EV and not results, so Emily should be thanking Matt.
  - ▶ At the time, Emily thanked Steven for her meal. Matt was upset and told the entire poker community about it.
- 

# Law of Large Numbers

- ▶ Over your lifetime, the amount you end up paying from credit card roulette is the same as you would've paid from splitting the bill
  - ▶ “All randomness eventually averages out to its expected value.”
  - ▶ What does “eventually” mean?
- 

# Risk

- ▶ The “riskier” the gamble, the longer it will take
  - ▶ But no matter how risky, eventually it’ll get’cha!
  - ▶ Death, taxes, and the Law of Large Numbers
- 

# Bad Decision, Good Result

- ▶ You get off the wrong bus stop because you were distracted
  - ▶ Upset at yourself, you analyze how to not get distracted in the future
  - ▶ You find \$1 000 on the ground at this wrong bus stop
  - ▶ You immediately stop analyzing and marvel at your riches
- 

# In poker...

- ▶ Good decisions still yield a bad result 49% of the time
  - ▶ Bad decisions still yield a good result 49% of the time
  - ▶ You must have an insatiable desire to improve yourself, improve your decision-making, regardless of the result
  - ▶ If you made \$10000 in a situation where you could've made \$12000, that's not good enough
- 

# Levels of Poker Reasoning



# 3 Levels of Reasoning

- ▶ Level 1: My hand vs. your hand

# Jennifer Tilly hand

- ▶ “I thought you had pocket kings”
- ▶ <http://www.poker.org/videos/jennifer-tilly-i-thought-you-had-pocket-kings-118900/>

# Example of Level 1 Reasoning

- ▶ “I thought you had pocket kings”
  - ▶ No matter how strong a read you think you have on your opponent, to put your opponent specifically on KK out of all the possible combinations of cards is mathematically unfounded.
- 

# 3 Levels of Reasoning

- ▶ Level 1: My hand vs. your hand
  - ▶ Level 2: My hand vs. your range of hands (“Exploitative Play”)
- 

# Example of Level 2 Reasoning



- ▶ We know opponent is tight and doesn't like bluffing
- ▶ We model opponent's range as AK–A8

# Pot Odds

- ▶ The pot is currently 21 000, 13 000 from earlier betting rounds and the 8000 our opponent just put out.
- ▶ We are considering calling for 8000. If we lose, our net result from this decision is  $-8000$ . If we win, we get our 8000 back, as well as the 21 000 in the pot, resulting a net of 21 000.
- ▶ Therefore our win:lose ratio needs to be at least 8000:21 000 for calling to be +EV.

# Example of Level 2 Reasoning



- ▶ AK, AQ, AJ, A8 8 combos each. AT, A9 6 combos each. In total, 33 combos that beat us, 11 combos that we beat.
- ▶ Equity =  $11 / 44 = 25\%$
- ▶ Pot odds = 21 to 8 ~ 2.56 to 1. Need equity  $1 / 3.56 \sim 28\%$  to call

# Reading a Soul

- ▶ Hand reading is about using the opponent's past actions and your knowledge of their tendencies to tweak your probabilities on their hand
  - ▶ Hand reading is not about pegging your opponent on a specific hand
  - ▶ The sunglasses and ear-plugs are mostly a marketing scheme
- 

# “Exploitative Play”

- ▶ You can go very far with Level 2 reasoning, if you can build reasonable models for your opponent’s range and correctly compute the equities of hands.
  - ▶ Level 2 reasoning is best targeted towards individual opponents with specific tendencies that you are trying to take advantage of.
- 

# Knowing the Enemy

*The fatal flaw in every plan is the assumption that you know more than your enemy.*

- ▶ Your opponent does not play according to a fixed static algorithm.
- ▶ They are an intelligent entity who is also building models for you, and adapting their strategy to beat you!

# 3 Levels of Reasoning

- ▶ Level 1: My hand vs. your hand
  - ▶ Level 2: My hand vs. your range of hands (“Exploitative Play”)
  - ▶ Level 3: My range of hands vs. your range of hands (“Optimal Play”)
- 

# Example of Level 3 Reasoning



- ▶ Given my previous actions in this hand, I will end up in this spot with the range AJ–A7,

# “Optimal Play”

- ▶ I know my opponent's propensity is to bet  $1/1.6$  of pot on the river, ie. in this situation they are risking 8000 to win 13000 with their bluffs.
- ▶ I must call with a frequency such that their EV from bluffing is 0.
- ▶ My call:fold ratio needs to be 1.6:1, ie. I must call  $1.6/2.6 \sim 61.5\%$  of the time. AJ is definitely in the top 61.5% of hands I can have, so I call.

# Analogy with RPS

- ▶ Exploitative Play: “Since my opponent just played Rock 3 times in a row, I think their chances from playing Rock a 4<sup>th</sup> time is diminished. Therefore, I will play Scissors.”
  - ▶ Optimal Play: “I will memorize a sequence of random bits and always play each of Rock, Paper, Scissors with probability  $1/3$ .”
- 

# How do you make money playing “optimally”?

- ▶ In RPS, you don't.
  - ▶ In poker, there are enough opportunities to be inconsistent (eg. call 65s but sometimes fold 76s in the same spot, eg. check-raise a strictly inferior range than optimal), that the theoretical “optimal” strategy will slowly extract money from even the best players.
- 

# “Nash Equilibrium”

## Optimal Play

- Play R, P, S all with 33% probability (memorize a sequence of random bits?)
- You are indifferent to your opponent's move
- Make money only when your opponent does something strictly suboptimal
- Good vs. opponents you respect
- Need to train your mentality

## Exploitive Play

- Select between R, P, S by observing patterns in your opponent's play
- You are susceptible to being out-read by your opponent
- Make a lot of money when you are winning the mind games; lose a lot when you are losing them
- Good vs. beginners
- Intuitive

# Blinds, Position, and Equity



# Who's Taller?

- ▶ Anyone can join the contest for \$1
  - ▶ The tallest person who joined gets the entire pot
  - ▶ (also known as k-beauty game)
- 

# The Importance of Blinds

- ▶ Poker without blinds would be like the Who's Taller game.
  - ▶ The motivation of every hand starts with stealing the money that was forced into the pot. Without the blinds, there is no game.
  - ▶ You would always fold KK pre-flop if there were no blinds.
- 

# Stack Size

- ▶ Your stack size is always measured relative to the blinds. Having \$400 in front of you in a game where the blinds are \$1 / \$2 is, for our purposes, completely equivalent to having \$4000 in front of you in a \$10 / \$20 game.
- ▶ In both situations above, we say that you have “200 bets”, or “200 big blinds”, or “200BB”.

# Effective Stack Size

- ▶ Why is stack size important? It essentially tells you “how much you’re playing for”, *relative* to the blinds.
  - ▶ What we actually care about is *effective* stack size, which takes into account the stack sizes of the people remaining in the pot as well.
- 

# Calculating Effective Stack Size



- ▶ We are only wagering up to 12.5BB (the Big Blind's stack size).
- ▶ Sure, we could have wagered our entire 21BB vs. UTG+1 or UTG+2, but they have already folded.

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# Calculating Effective Stack Size 2

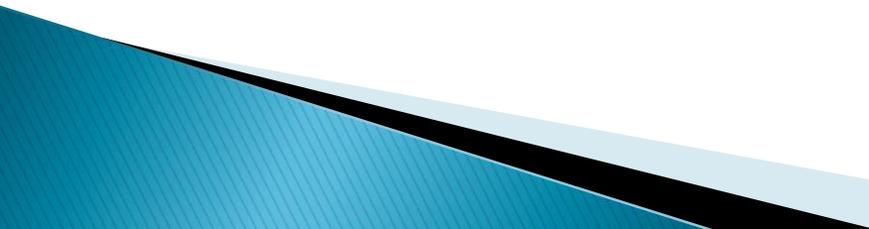


- ▶ Technically the effective stack size for Lojack is his entire stack (16BB), but only one person covers him, so in reality he is not risking 16BB vs. 5 people.

# The Importance of Position

- ▶ How many players are remaining to compete vs. me for the blinds?
- ▶ The fewer players, the less strong my hand needs to be to attack the blinds.

# Key to Naming Positions

- ▶ The key to naming positions is being clear how far away you are from the Button.
  - ▶ UTG (Under-the-Gun) refers to the player to the left of the Big Blind, and is technically the same as Lojack in a 6-handed table ... but it is much better to say Lojack since you know it is 3 from the Button. Alternatively, say “UTG at 6-handed table”.
  - ▶ If everyone folds to you and you are Cutoff, you don't even need to specify how many players were at the table, for the purposes of hand analysis.
- 

# Let's look carefully at position names on the same hands...



# Let's look carefully at position names on the same hands...



# Understanding Equity

- ▶ The equity of your cards is like your “secret height” for the Who’s Taller game.
  - ▶ Your equity is the probability of your cards winning the pot (equivalently, the fraction of the pot you would win) once all the remaining cards are dealt.
- 

# Simple Example: Counting Outs



# Simple Example: Counting Outs



- ▶ Hero has  $8+9-3=14$  outs.
- ▶ Equity =  $14/44 = 7/22 \sim 1/\pi \sim 32\%$

# Example 2: Counting Hands



- ▶ We know opponent is tight and doesn't like bluffing
- ▶ We model opponent's range as AK-A8

# Example 2: Counting Hands



- ▶ AK, AQ, AJ, A8 8 combos each. AT, A9 6 combos each. In total, 33 combos that beat us, 11 combos that we beat.
- ▶ Equity =  $11 / 44 = 25\%$
- ▶ Pot odds = 21 to 8 ~ 2.56 to 1. Need equity  $1 / 3.56 \sim 28\%$  to call

# Eg.3: All-in Preflop with Known Hands

Equity of AKs  
= 50.085%



- ▶ <http://www.cardplayer.com/poker-tools/odds-calculator/texas-holdem>

# Computing Equity in General

- ▶ 1<sup>st</sup> example was probability over river cards
- ▶ 2<sup>nd</sup> example was (Bayesian) probability over unknown
- ▶ Need calculator in general
- ▶ Download Pokerstove:  
<http://www.thepokerbank.com/tools/software/pokerstove/>

# Eg. 4: All-in on Flop vs. Range

- ▶ Get it in with 2d2s on 5c3c2h vs. a range of JJ+
- ▶ Equity is ~85%

PokerStove - [PStove1]

7% File Edit View Window Help

Hold'em

Hand Distribution	Equity
Player 1 R D JJ+	15.032%
Player 2 R D 2d2s	84.968%
Player 3 R D	
Player 4 R D	
Player 5 R D	
Player 6 R D	
Player 7 R D	
Player 8 R D	
Player 9 R D	
Player 10 R D	

Board: 5c3c2h select

Dead Cards: select

Evaluate

Clear All

Enumerate All  
 Monte Carlo

Output

Text results appended to pokerstove.bt

23,760 games 0.000 secs 4,752,000 games/sec

Board: 5c 3c 2h  
Dead:

	equity	win	tie	pots won	pots tied	
Hand 0:	15.032%	13.56%	01.47%	3222	349.50	{JJ+}
Hand 1:	84.968%	83.50%	01.47%	19839	349.50	{2d2s}

Ready

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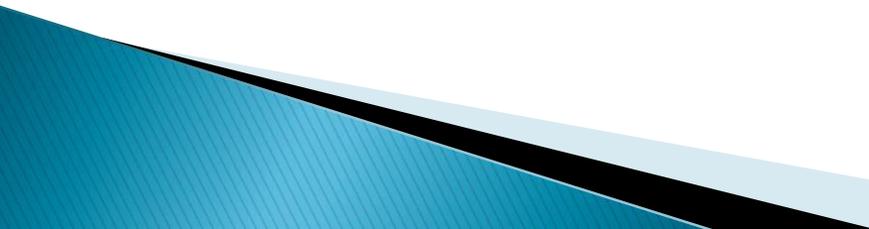
# Summary of Equity

- ▶ You want to understand what equity means in every situation, and know how to calculate it (with Pokerstove).
- ▶ Examples:
  - Counting outs (can do in head)
  - Counting hands (can do in head)
  - All-in pre-flop (can memorize)
  - Anything more complicated (use Pokerstove a lot and try to memorize)

# Raising to win Blinds and Antes



# Antes

- ▶ An extra small bet that each player must put into the pot each hand; these sum to around a big blind
  - ▶ Come in during the later stages of a tournament; inexistent in cash games
  - ▶ This gives you so much more incentive to try to steal the blinds, since now essentially everyone posted a blind
  - ▶ Don't think of antes in the pot as just "the blinds are bigger", since you don't have to raise (and risk) any bigger to steal the blinds
- 

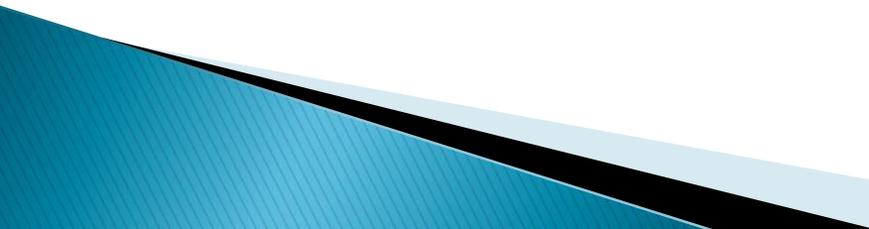
# What antes look like...



# So you want the blinds...

- ▶ If no one has raised yet, do not call. Raise to give yourself a chance of winning the blinds without seeing a flop.
- ▶ This is definitely **beginner mistake #1**.

# Raise Sizing

- ▶ The minimum raise is to raise to 2BB. However, this is a bit small. You give the blinds the odds to make a profitable call.
  - ▶ On the other hand, if you raise to an amount too large (say all-in), you are risking more than necessary to make your steal.
  - ▶ You want to hit that “sweet spot” between the minimum raise size of 2BB and all-in.
  - ▶ Reasonable rule of thumb: raise to 2.25BB in tournaments.
- 

# Going All-in Preflop

- ▶ If you have 12BB or less (and there are antes), just go all-in, instead of raising to 2.25BB.
- ▶ Recall: rationale for raising big is to prevent blinds (and others) from calling for cheap; rationale for raising small is to lose less if we get re-raised and have to fold.
- ▶ But 12BB is little enough that you never really want to fold after committing 2.25BB, so all the benefits of raising small have disappeared
- ▶ Change rule to 10BB without antes

# “To live, you must be willing to die”

- ▶ Being too scared to go all-in preflop is definitely **beginner mistake #2**.

# What your goal should be

- ▶ Beginners tend to make all decisions based on their cards, ignoring what effective stack size they would be wagering, and position.
  - ▶ Experienced players are willing to raise the blinds with much weaker hands from good positions, and risk going all-in a lot more frequently when their stack size is low. Their cards are almost the least important factor.
- 

# Concrete Opening Ranges



# Tightish Range to Open from UTG at 9-handed table (7 players left)



# Note how tight this is!

- ▶ Almost all beginners make the mistake of playing too many hands, especially from early position.
  - ▶ Remember, only the best out of 9 hands wins the pot. When there's 9 hands, that hand will be very good! Second best gets nothing. So don't play a hand unless you think it can be the best of 9 hands.
- 

# Hands to add for UTG+1 (6 players left)



# UTG+2 (5 players left)





# Hijack (3 to button)



# Cutoff (2 to button) : approx 30%

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
AKo	KK	KQs	KJs	KTs	K9s	K8s	K7s	K6s	K5s	K4s	K3s	K2s
AQo	KQo	QQ	QJs	QTs	Q9s	Q8s	Q7s	Q6s	Q5s	Q4s	Q3s	Q2s
AJo	KJo	QJo	JJ	JTs	J9s	J8s	J7s	J6s	J5s	J4s	J3s	J2s
ATo	KTo	QTo	JTo	TT	T9s	T8s	T7s	T6s	T5s	T4s	T3s	T2s
A9o	K9o	Q9o	J9o	T9o	99	98s	97s	96s	95s	94s	93s	92s
A8o	K8o	Q8o	J8o	T8o	98o	88	87s	86s	85s	84s	83s	82s
A7o	K7o	Q7o	J7o	T7o	97o	87o	77	76s	75s	74s	73s	72s
A6o	K6o	Q6o	J6o	T6o	96o	86o	76o	66	65s	64s	63s	62s
A5o	K5o	Q5o	J5o	T5o	95o	85o	75o	65o	55	54s	53s	52s
A4o	K4o	Q4o	J4o	T4o	94o	84o	74o	64o	54o	44	43s	42s
A3o	K3o	Q3o	J3o	T3o	93o	83o	73o	63o	53o	43o	33	32s
A2o	K2o	Q2o	J2o	T2o	92o	82o	72o	62o	52o	42o	32o	22

SHIFT, CTRL, ALT  
modify selection

All

Any Suited

Any Broadway

Any Pair

Clear

Selected

55+,A2s+,K5s+,Q7s+,J8s+,T8s+,9

30.2%

# Button (1 to button): Approx 55%

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
AKo	KK	KQs	KJs	KTs	K9s	K8s	K7s	K6s	K5s	K4s	K3s	K2s
AQo	KQo	QQ	QJs	QTs	Q9s	Q8s	Q7s	Q6s	Q5s	Q4s	Q3s	Q2s
AJo	KJo	QJo	JJ	JTs	J9s	J8s	J7s	J6s	J5s	J4s	J3s	J2s
ATo	KTo	QTo	JTo	TT	T9s	T8s	T7s	T6s	T5s	T4s	T3s	T2s
A9o	K9o	Q9o	J9o	T9o	99	98s	97s	96s	95s	94s	93s	92s
A8o	K8o	Q8o	J8o	T8o	98o	88	87s	86s	85s	84s	83s	82s
A7o	K7o	Q7o	J7o	T7o	97o	87o	77	76s	75s	74s	73s	72s
A6o	K6o	Q6o	J6o	T6o	96o	86o	76o	66	65s	64s	63s	62s
A5o	K5o	Q5o	J5o	T5o	95o	85o	75o	65o	55	54s	53s	52s
A4o	K4o	Q4o	J4o	T4o	94o	84o	74o	64o	54o	44	43s	42s
A3o	K3o	Q3o	J3o	T3o	93o	83o	73o	63o	53o	43o	33	32s
A2o	K2o	Q2o	J2o	T2o	92o	82o	72o	62o	52o	42o	32o	22

SHIFT, CTRL, ALT  
modify selection

All

Any Suited

Any Broadway

Any Pair

Clear

Selected

33+,A2s+,K2s+,Q2s+,J3s+,T5s+,9

55.8%

# Small blind

- ▶ Let's compare opening from the small blind to opening from the button.
  - ▶ Opening from the small blind, you have to get through one fewer person
  - ▶ You also have to wager less to raise, since half a bet has automatically been put in already.
  - ▶ However, you are out of position.
  - ▶ All in all, these factors balance out and you can open the same range from the small blind as you would from the button.
  - ▶ The fact that you are out of position hurts less and less as stacks get shallower.
- 

# All-in Ranges vs. Opening

- ▶ When the effective stack size is closer to the minimum needed to be going all-in, your all-in range should be similar to the opening ranges I suggested
  - ▶ When the effective stack size is much smaller (eg. 5BB), your all-in range can be a bit bigger, but not a lot bigger
- 

# What do you do here?



# Some calculators say all-in with 22.2% is okay (approximately what you open)

Hold'em Distribution [Player 1]

Cards Preflop

AA	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s	A2s
AKo	KK	KQs	KJs	KTs	K9s	K8s	K7s	K6s	K5s	K4s	K3s	K2s
AQo	KQo	QQ	QJs	QTs	Q9s	Q8s	Q7s	Q6s	Q5s	Q4s	Q3s	Q2s
AJo	KJo	QJo	JJ	JTs	J9s	J8s	J7s	J6s	J5s	J4s	J3s	J2s
ATo	KTo	QTo	JTo	TT	T9s	T8s	T7s	T6s	T5s	T4s	T3s	T2s
A9o	K9o	Q9o	J9o	T9o	99	98s	97s	96s	95s	94s	93s	92s
A8o	K8o	Q8o	J8o	T8o	98o	88	87s	86s	85s	84s	83s	82s
A7o	K7o	Q7o	J7o	T7o	97o	87o	77	76s	75s	74s	73s	72s
A6o	K6o	Q6o	J6o	T6o	96o	86o	76o	66	65s	64s	63s	62s
A5o	K5o	Q5o	J5o	T5o	95o	85o	75o	65o	55	54s	53s	52s
A4o	K4o	Q4o	J4o	T4o	94o	84o	74o	64o	54o	44	43s	42s
A3o	K3o	Q3o	J3o	T3o	93o	83o	73o	63o	53o	43o	33	32s
A2o	K2o	Q2o	J2o	T2o	92o	82o	72o	62o	52o	42o	32o	22

SHIFT, CTRL, ALT  
modify selection

All  
Any Suited  
Any Broadway  
Any Pair  
Clear

Selected  
AA

♦	♣		
♥	♣	♥	♦
♠	♣	♠	♦

22.2%

OK Cancel Apply

# What range do you call with?



# What equity should you need?

- ▶ A straight up pot odds calculation says
  - Getting 23 to 20 = 1.15 to 1 odds
  - Thus need  $1/2.15 \sim 46.5\%$
- ▶ But 2 players behind who can wake up with monster hands, so in reality we need a bit more

# 55+

PokerStove - [PStove1]

7% File Edit View Window Help

Hold'em

Hand Distribution	Equity
Player 1 R D 22+, A2s+, K8s+, Q9s+, J8s+, T8s+, 98s, 8	51.446%
Player 2 R D 55	48.554%
Player 3 R D	
Player 4 R D	
Player 5 R D	
Player 6 R D	
Player 7 R D	
Player 8 R D	
Player 9 R D	
Player 10 R D	

Board:  select

Dead Cards:  select

Stop (99% Complete)

Clear All

Enumerate All  
 Monte Carlo

Output

Text results appended to pokerstove.txt

2,948,587,488 games 0.000 secs 589,717,497.600 games/sec

Board:  
Dead:

	equity	win	tie	pots won	pots tied	
Hand 0:	51.446%	50.90%	00.55%	1500757428	16184160.00	{ 22+, A2s+, K8s+, Q9s+, J8s+, T8s+, 98s, 87s, A8o+, KJo+, QJo }
Hand 1:	48.554%	48.00%	00.55%	1415461740	16184160.00	{ 55 }

Ready

# A9s+

The screenshot shows the PokerStove application window titled "PokerStove - [PStove1]". The interface includes a menu bar (File, Edit, View, Window, Help) and a toolbar. The main window is divided into several sections:

- Hold'em**: The active tab.
- Hand Distribution**: A table with columns for Player, Hand, and Equity. Player 1 has a hand of "22+, A2s+, K8s+, Q9s+, J8s+, T8s+, 98s, 8" with an equity of 50.468%. Player 2 has a hand of "A9s" with an equity of 49.532%.
- Board**: A text input field with a "select" button.
- Dead Cards**: A text input field with a "select" button.
- Buttons**: "Stop (99% Complete)", "Clear All", "Enumerate All" (selected), and "Monte Carlo".
- Output**: A text area showing simulation results.

**Hand Distribution Table:**

Player	Hand	Equity
Player 1	22+, A2s+, K8s+, Q9s+, J8s+, T8s+, 98s, 8	50.468%
Player 2	A9s	49.532%
Player 3		
Player 4		
Player 5		
Player 6		
Player 7		
Player 8		
Player 9		
Player 10		

**Output Text:**

```
Text results appended to pokerstove.txt
1,712,304,000 games 0.001 secs 1,712,304,000,000 games/sec
Board:
Dead:
equity win tie pots won pots tied
Hand 0: 50.468% 47.14% 03.33% 807212652 56960346.00 { 22+, A2s+, K8s+, Q9s+,
J8s+, T8s+, 98s, 87s, A8o+, KJo+, QJo }
Hand 1: 49.532% 46.21% 03.33% 791170656 56960346.00 { A9s }
```

# ATo+

Hold'em

Hand Distribution	Equity
Player 1 R/D { 22+, A2s+, K8s+, Q9s+, J8s+, T8s+, 98s, 8 }	49.364%
Player 2 R/D { ATo }	50.636%
Player 3 R/D	
Player 4 R/D	
Player 5 R/D	
Player 6 R/D	
Player 7 R/D	
Player 8 R/D	
Player 9 R/D	
Player 10 R/D	

Board:  select

Dead Cards:  select

Evaluate

Clear All

Enumerate All  
 Monte Carlo

Output

Text results appended to pokerstove.txt

5,136,912,000 games 0.000 secs 1,027,382,400,000 games/sec

Board:  
Dead:

	equity	win	tie	pots won	pots tied	
Hand 0:	49.364%	46.13%	03.23%	2369723460	166075524.00	{ 22+, A2s+, K8s+, Q9s+, J8s+, T8s+, 98s, 87s, A8o+, KJo+, QJo }
Hand 1:	50.636%	47.40%	03.23%	2435037492	166075524.00	{ ATo }

Ready

# KQs

The screenshot shows the PokerStove application window titled "PokerStove - [PStove1]". The interface includes a menu bar (File, Edit, View, Window, Help) and a toolbar. The main window is divided into several sections:

- Hold'em**: The active tab.
- Hand Distribution**: A table showing the equity of various hands. The top two rows are highlighted in yellow.
- Equity**: A column showing the percentage equity for each hand.
- Board**: A text input field with a "select" button.
- Dead Cards**: A text input field with a "select" button.
- Buttons**: "Stop (99% Complete)", "Clear All", "Enumerate All" (selected), and "Monte Carlo".
- Output**: A text area showing simulation results.

Player	R/D	Hand	Equity
Player 1	R/D	22+, A2s+, K8s+, Q9s+, J8s+, T8s+, 98s, 8	50.747%
Player 2	R/D	KQs	49.253%
Player 3	R/D		
Player 4	R/D		
Player 5	R/D		
Player 6	R/D		
Player 7	R/D		
Player 8	R/D		
Player 9	R/D		
Player 10	R/D		

Output:

```
Text results appended to pokerstove.txt
1,780,796,160 games 0.001 secs 1,780,796,160,000 games/sec
Board:
Dead:
equity win tie pots won pots tied
Hand 0: 50.747% 48.65% 02.09% 866414632 37284606.00 { 22+, A2s+, K8s+, Q9s+,
J8s+, T8s+, 98s, 87s, A8o+, KJo+, QJo }
Hand 1: 49.253% 47.16% 02.09% 839812316 37284606.00 { KQs }
```

# Do you call with, eg., KQs?



# Improved Pot Odds

- ▶ Pot odds calculation:
  - Getting 43 to 18 = 2.39 to 1 odds
  - Thus need  $1 / 3.39 \sim 29.5\%$
- ▶ There are no more players behind, so we need only this equity to call

# Way more than enough!

The screenshot shows the PokerStove application window titled "PokerStove - [PStove1]". The interface includes a menu bar (File, Edit, View, Window, Help) and a toolbar. The main area is divided into several sections:

- Hold'em | Hand Distribution:** A table listing 10 players with their hand distributions and equity percentages. The equity values are highlighted in yellow.
- Board:** A text input field with a "select" button.
- Dead Cards:** A text input field with a "select" button.
- Buttons:** "Evaluate", "Clear All", "Enumerate All" (selected), and "Monte Carlo".
- Output:** A text area containing the following text:

```
INTERRUPTED! Enumerate All equities unreliable, use Monte Carlo
Text results appended to pokerstove.txt
962,277,688 games 0.937 secs 1,026,977,255 games/sec
Board:
Dead:
equity win tie pots won pots tied
Hand 0: 26.025% 25.87% 00.15% 248949771 1481105.33 { 22+, A2s+, K8s+, Q9s+,
19s+, T8s+, 98s, 87s, 48s+, K1s+, Q1s }
```

The status bar at the bottom left shows "Ready".

# Exact Hands



# Preflop Equities



# Who's ahead on the flop?



# Turn



# River



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IAP 2016

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