



Stat198: Poker Theory & Fundamentals

Ak	AKs	AQs	AJs	ATs	A9s	A8s	A7s	A6s	A5s	A4s	A3s
AQs	KK	KQs	KJs	KTs	K9s	K8s	K7s	K6s	K5s	K4s	K3s
AJo	KQs	QQ	QJs	QTs	Q9s	Q8s	Q7s	Q6s	Q5s	Q4s	Q3s
ATo	KJs	QJo	JJ	JTs	J9s	J8s	J7s	J6s	J5s	J4s	J3s
A8s	KTo	QTs	JTs	TTs	T9s	T8s	T7s	T6s	T5s	T4s	T3s
A7s	K9s	Q9s	J9s	T9s	99	98s	97s	96s	95s	94s	93s
A6s	K8s	Q8s	J8s	T8s	98s	88	87s	86s	85s	84s	83s
A5s	K7s	Q7s	J7s	T7s	97s	87s	77	76s	75s	74s	73s
A4s	K6s	Q6s	J6s	T6s	96s	86s	76s	66	65s	64s	63s
A3s	K5s	Q5s	J5s	T5s	95s	85s	75s	65s	55	54s	53s
A2s	K4s	Q4s	J4s	T4s	94s	84s	74s	64s	54s	44	43s
A1s	K3s	Q3s	J3s	T3s	93s	83s	73s	63s	53s	43s	42s

Hosted by
Poker at Berkeley.



Lecture 1: Course Overview





Enrollment

Make sure you're available for this class: Wed & Fri 4–6pm, Birge 50.

We'll be combining the 3 sections this year & capping enrollment at 75 students.

Reminder this is a 2 unit decal.

Auditors are welcome.



Grading

Lecture Attendance + Playing Session Attendance: 25% + 15%
= 40%

- Attendance is tracked using an Attendance Deck system.
- Playing sessions take place on a PokerNow club.

Homework: 25%

- Released weekly on Fridays, due the following Friday at 11:59pm
- Material covers prior week's lecture material/vocab

Final Project: 35%

- 2 analyzed hand histories explained using concepts discussed throughout class

Grade format is Pass/No Pass, Requires a 70% in the course and completion of the final project to receive a passing grade.



Super deepstacked 0.05/0.10 game, 500bb effective 4-handed

Preflop:

Hero UTG with Jh9h opens to 40c

Button calls, SB folds, BB 3-bets to 1.80

Hero calls, button folds

J9s is a good hand to open very deep among 4 players, and facing a 3-bet in position, I can call it down often with a 12:1 spr.

Flop: 4h2hTs, pot 4.05

Villain leads (continuation bet) for 2.5, around $\frac{1}{3}$ pot

Hero calls

I call the c-bet with my flush draw and one overcard, as villain will be continuing for a double barrel with much of their range even if a flush makes it, giving myself implied odds for a call. Because of my draw, I can raise as a bluff with some frequency, but I would prefer to do that out of position, as I can instead wait for barrels.

Turn: 3h, pot 9.05

Villain barrels for 6.5 ($\frac{2}{3}$ pot)

Hero calls

This sizing for the barrel is really interesting as it polarizes villains range. They likely have overpairs here with a heart, and even AK or AQ with one heart can continue after picking up draw equity. However, there are many combos of better flushes that villain makes here (I don't believe they would 3-bet a low suited Ace or King often enough), but there are around 6 combos of suited broadways that have me beat. For that reason I purely call.

River: 7s, pot 22.05

Villain bets 16.00

Hero raises all-in, to 36.97

Villain calls and shows 10h8h for a lower flush

The 7 of spades here is a brick on the river, and while it solidifies my flush, it means that Villains bluffs on the river also miss. This is where I think I made a big mistake in the hand, which is reraising villain's 16.00 bet. While in this case I was lucky V had a wider range preflop to 3bet a suited 1 gapper like a 10, I don't get any value by worse calling on this reraise besides a set of tens. An overpair like aces with the ace of hearts could occasionally call to catch bluffs, but I do mostly run into villains value range and I do believe a flat call on this river would get better value and save myself from trouble.

The text to the left includes a hand history, essentially a written log that goes over every detail of a poker hand, and an analysis of each decision by the player.

It's probably pretty confusing right now, but the way that professionals improve their game is by analyzing interesting hand histories in depth, which we will learn to do.



Topics Covered

6-Max No Limit Hold'em Cash Games:

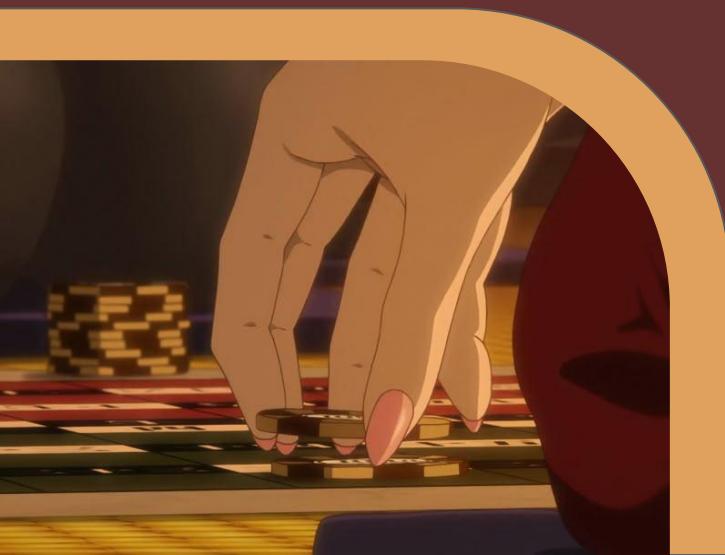
- Basic rules
- Actions on each street
- Betting strategy
- Range construction

Game Theory Optimal concepts:

- Frequencies, deviation
- Exploitation:
 - Behavioral exploits
 - Small leaks



Class structure:



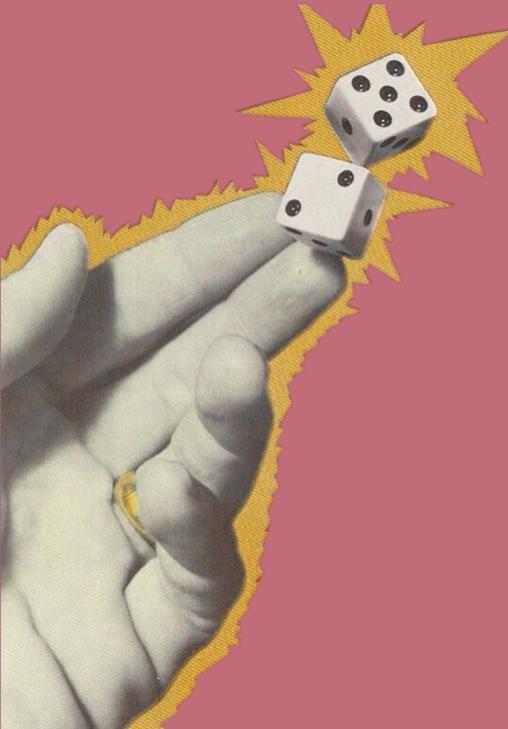
Instruction starts Berkeley time
45-minutes to an hour of lecture
10-minute break / attendance
decks are passed out @ ~ 5pm
45-minute playing session on
PokerNow

Disclaimer

Due to university guidelines, we will never be encouraging you to gamble or wager any real money. At no point will we play for money during the course, nor will any student have to wager their own money.

This course is mainly for an understanding of the game from an educational and analytical perspective.





about us!

maysa, jones, & mete.



maysa

3rd (ish) year majoring in poker who
also happens to study econ + ds

head facilitator for stat 198, Poker@Berkeley executive board,
Berkeley's IPA team (Intercollegiate Poker Association)

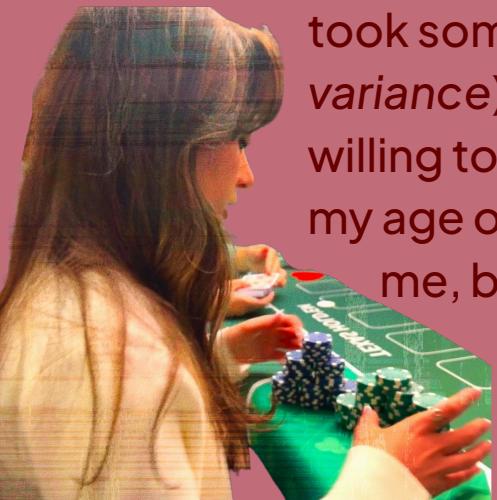
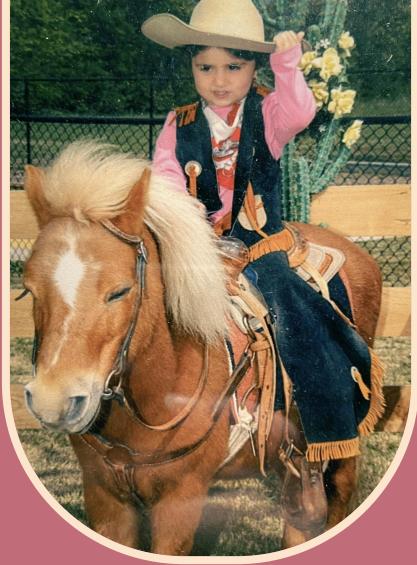
understand you are taking advice from someone who will open with
the changed diaper (it's the dirty diaper but suited) from *any position,*
any stakes, any variant, any stack depth ANY time i am dealt it. (*and no,*
i do NOT have executive function.)



i'm originally from dallas, TX 😎 cut my teeth mostly playing 1/2 in texas & oklahoma.

Do as I say not as I do!

I love love love the game. I am not the most studied, I have many leaks and am continually learning/improving my game. I have however, a lot of experience. been playing live for nearly a decade (yes, u heard that right, do not ask a woman her age.)



took some time off school (no, not to go pro, just experienced *life variance*) and have returned after many years dealing with said variance. willing to flip I am probably older than most of y'all here (do not ask me my age or i will fail u). anyways, I suck at public speaking so bear with me, but I promise I am an extremely approachable person one on one. feel free to speak to me about literally anything guaranteed i won't shut the hell up!



POKER AT BERKELEY

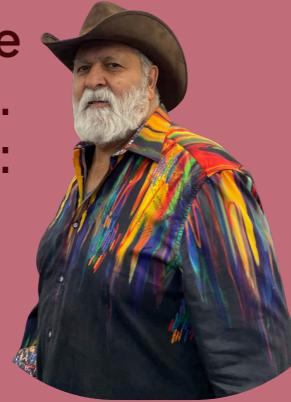
maysa (+milly)

my hobbies: backgammon,
hanging out with my dog (solver
approved, she is my world <3), &
punting.



also understand I fear nothing, (except public speaking) as this is the man who taught me poker along with billiards when i was 12. basically how to be a professional degen but in texas style font:

I'm a fish at pool and snooker tho, and unfortunately cannot navigate my way around both felts. i have astigmatism (my excuse) this world knew i would be too powerful if i could do both, but instead i can do neither! (kidding)



again, i love the game. but there is a necessary red pill one must swallow: this game can be extremely unforgiving.

had some friends who went pro, had some friends who went broke. the friends who went broke have 7 figure career live tournament earnings, the friends who went pro don't even have a hendon mob.

poker is deceiving, that's why so many continue the perpetual cycle of destruction without realizing it. will get both perspectives to make it out here and guest speak this semester.

mete

Junior studying Applied Mathematics and Statistics

From NYC (still waiting for the Knicks comeback)

3rd Semester teaching DeCal

Poker Background: Home Games

Hobbies

- Playing PLO DBBP (Best Poker Variant)
- Over analyzing my Fantasy Football Teams
- Catan
- Donating money to sportsbooks



jones

3rd year studying mathematics

professional candy eater (~~give me candy and I'll pass you~~)

hates climate change, master of asian squat toilets, allergic to cats and dogs, on p@b board

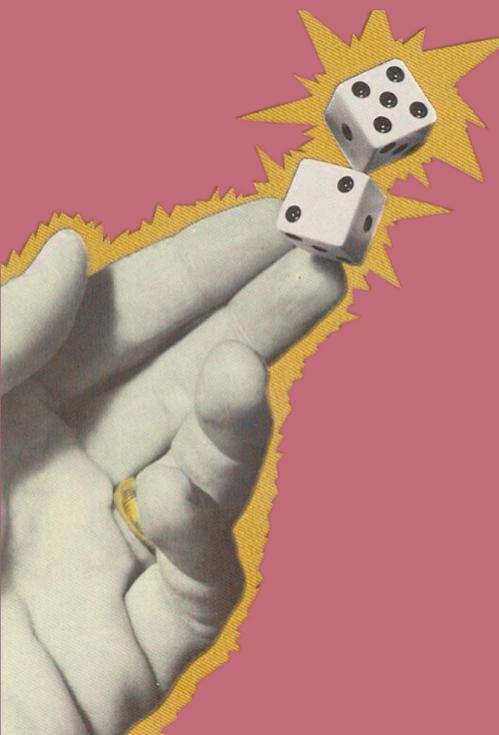
has a super awesome girlfriend (~~my sugar mommy fr she stakes all my games and pays for all my clothes~~)

guess I play lots of poker - Asian Poker Tour

music: no words pls I only like sleepy time music

hobbies: poker duh, ~~stinky~~ league, 5d chess, and traveling





(for reference
maysa asked their
gf's to fill out their
slides for them
since they only had
a single bullet point
and one of them
misspelled their
major)



Our history: The DeCal was originally started in 2003 by UC Berkeley undergraduate David Daneshgar, who went on to win a WSOP bracelet in 2008.





What to take away:

We're not pros:

- We have a good understanding of the game and study it frequently
- If we knew everything, we would(n't) drop out to play poker
- We hope to give a very fundamental understanding of the basics of poker strategy
- Because we are experienced players, we will mention terms that you will not understand. Please, interrupt us if a vocabulary comes out that is in any way unclear.

At the end of the course, you'll:

- Be able to crush your home game with high school friends
- Hopefully understand poker on a deeper level as a good basis to expand on, as you'll soon find out poker is extremely complex!

how 2 contact us

Email is okay! Discord is okay! Messaging on bCourses once it's set up too is also okay!



For discord, we will be granting all students who are enrolled with the student role for fall 2025. Auditors will receive a fall 25 role as well to access our private channels for this semester. (there's over 500 people on there now, we'd prefer if you guys had most of your discourse in the dedicated spaces for this semester. Discord will function as a ed stem/place to review hands/set up tables on pokernow.

Course expectations:

- Attendance is **mandatory**
- Homework is to reinforce class concepts
- **BE INVOLVED AND ASK QUESTIONS!**
 - No one here should judge since many are beginners
 - If you are the select few that know a lot already, help the people around you and better yet, consider reaching out to become a facilitator if this topic peaks your interest



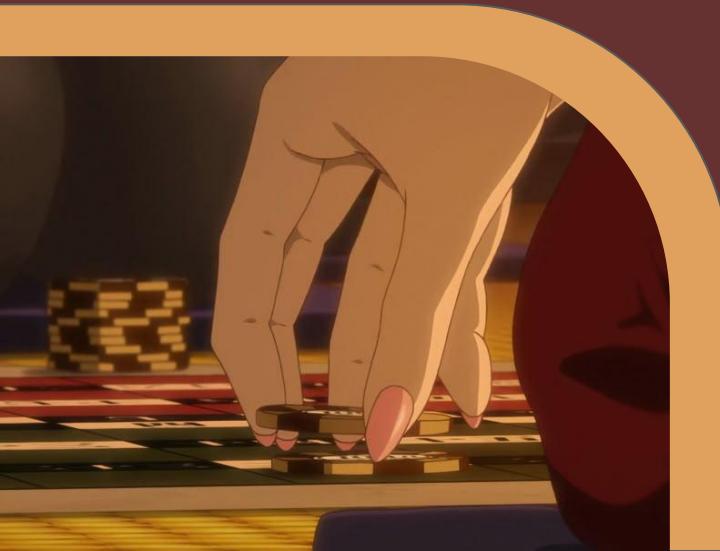
Understand What Type of Player You Are

In my experience, it is important to categorize your relationship with poker into three main sections:

- Playing for fun - “I treat my poker buy-ins like concert tickets”
- Playing for competitiveness - “I want to play as close to GTO as possible”
- Playing for money - “I want to fund my lifestyle through poker”

There is no right answer which is the beauty of poker but this will help you manage your relationship with REAL MONEY POKER (assumption).

Cash Games Vs. Tournament Poker



Cash Games:

- Players can buy in with real money and leave at any time.
- The chips represent real currency.
- Blinds are fixed.

Tournament Poker:

- Players buy in for a fixed fee and receive tournament chips.
- Blinds and bets increase at set intervals.
- The goal is to outlast opponents and earn prizes.

Nash Equilibrium/Game Theory Optimal Strategy

- Mathematician John Nash famously won the Nobel Prize for his research on Game Theory.
- General Definition: A situation where no player can gain an advantage by changing their strategy
 - Nash equilibrium = Finite number of possibilities
- Application: a nash equilibrium exists if and only if players are playing GTO
- GTO is (like all Nash Equilibriums) completely unexploitable, no weaknesses.
- This strategy does not win the most by exploiting our opponents.



Nash Equilibrium Example: The Prisoner's Dilemma

A very popular setup for a Nash Equilibrium problem goes as follows:

- Prisoners A and B are each brought into interrogation rooms separately and asked to confess.
- If they both confess, it is a terrible outcome for both, and they each get 5 years.
- If they both stay silent, they each only get 2.
- If one confesses and the other does not, they only serve a 1 year sentence!

		PRISONER B	
		Remain silent	Confess
PRISONER A	Remain silent	A gets 2 yrs B gets 2 yrs	A gets 8 yrs B gets 1 yr
	Confess	A gets 1 yr B gets 8 yrs	A gets 5 yrs B gets 5 yrs

What does GTO for Poker look like?

Our top goals when playing poker should probably be:

- (i) Put our opponents in tough situations
- (ii) Avoid getting put in tough situations with weak hands
- (iii) Conceal as much information as possible about our hand

These imply that the GTO strategy is **very aggressive, plays only stronger hands, and bluffs frequently.**

Our goal is to be as balanced as possible. Our opponent should have no clue what we have, feel under constant pressure and unable to return any pressure on us.

Expected Value

- Expected Value is the real currency of poker decision making
- EV is defined as the amount of money we gain or lose on average in the long term due to our poker actions
- We try to maximize it with every choice we make in a hand
- How it is calculated:
 - $EV = [\%W \times \$W] + [\%L \times \$R]$ where $\$R$ = how much \$ you must risk, $\$W$ = how much \$ you stand to gain
 - The sum of the probabilities of each possible outcome multiplied by its payoff

Variance

While a GTO strategy always makes the best decision, it is not guaranteed to profit over any period

Poker in the short term is heavily based on luck

Then what makes poker different from other forms of gambling?

Over the long term, it is possible to approach a positive expectation for return

Law of large numbers

Play around with

<https://www.primedope.com/poker-variance-calculator/>



Common Misconception

“If you study solvers, you will play true GTO.”

Human brains are simply not capable of the computational precision, massive decision trees, memory, and randomization of solver output.

Because Hold'em has an unbelievably large number of possible game states $>10^{150}$. it is impossible for us to know the true optimal strategy, only to approximate it.

We must rely on approximations and mental shortcuts, which inherently deviate from GTO. Solvers learn from infinite iterations and stimulate millions of games, countless possible decision nodes, and future board runouts. We are prone to errors, biased in decision making, and constrained in memory.

Common Misconception

“You can’t beat the house in poker.”

Unless you’re playing at a casino/card club with a rake, there’s no “house”

Players can be +EV/-EV in different levels of poker (a +EV player on \$0.1/\$0.2 tables may not necessarily do all that well on \$2/\$4)

We’ll get to long-term PnL under a rake at a later lecture.



What Makes Poker Different

Unlike games like Roulette where you bet against the house (and the house always wins) you bet against other players and can be profitable.

Poker has a large amount of variance – winning players can lose for long stretches of time due to bad luck, and losing players can win big.

This is what makes Poker lucrative: **The swings of variance prevent many losing players from realizing that they are losing.**

Nobody gambles on chess because the better player wins almost every time.

Common Misconception

“Poker is entirely based on math, you have to be a genius, top players are doing 15 calculations in their head at once.”

In most games you will have at most 60 seconds to decide, not nearly long enough for even complex computers to calculate what to do.

Poker pros primarily use heuristics: problem solving approaches that are practical + sufficient for reaching a *short-term estimation*.

Math is a significant part of decision making, but you can memorize the probabilities/payouts for any situation very easily (*almost all pros do to save time*). While our heuristics will have a mathematical basis, they should not dictate your decision, especially for live poker.



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Common Misconception

“Poker is a psychological game where you try to look your opponent in the eyes and read their mind/body language.”

Tells and reads should be a very small part of a strong player’s repertoire, and mostly under-utilized without strong poker fundamentals.

The most important psychological aspect of poker is by far keeping focused and energized with a level head during play.

Most high stakes poker play occurs online, where tells are nearly non-existent (caveat).

You don’t need to wear a hoodie and sunglasses, professionals don’t

2 hole cards dealt to each player
are **private information**

Over the course of 3 streets (and 4 rounds of betting), Five community cards are dealt as **public information**

Objective: Make the best **5-card** hand out of the 7 available (2 private + 5 public) among the players competing for the pot.

Hold'em can be played with anywhere from 2–9 People. We will be focusing on the most common variant, with 6 players, 6-max.

Game Basics: Rules



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Hand Rankings



We are allowed to use any number of cards in our hand, as long as it is a total of 5.

Specifically, we can either use:

- 2 from our hand and 3 from the board,
- 1 from our hand and 4 from the board, or
- 0 from our hand and 5 from the board.

Hand Rankings: Tiebreaks

Something that can confuse new players is how hands of the same strength are tiebroken: If we both have a pair, who wins? If we both have a straight, who wins?

Tiebreaks are settled by rank, not suit. A pair of 2s loses to a pair of As; A Straight 56789 loses to a Straight 6789T.

Ranks:

weakest



strongest

Suits: All Equal



Order of Play



Blinds in Poker

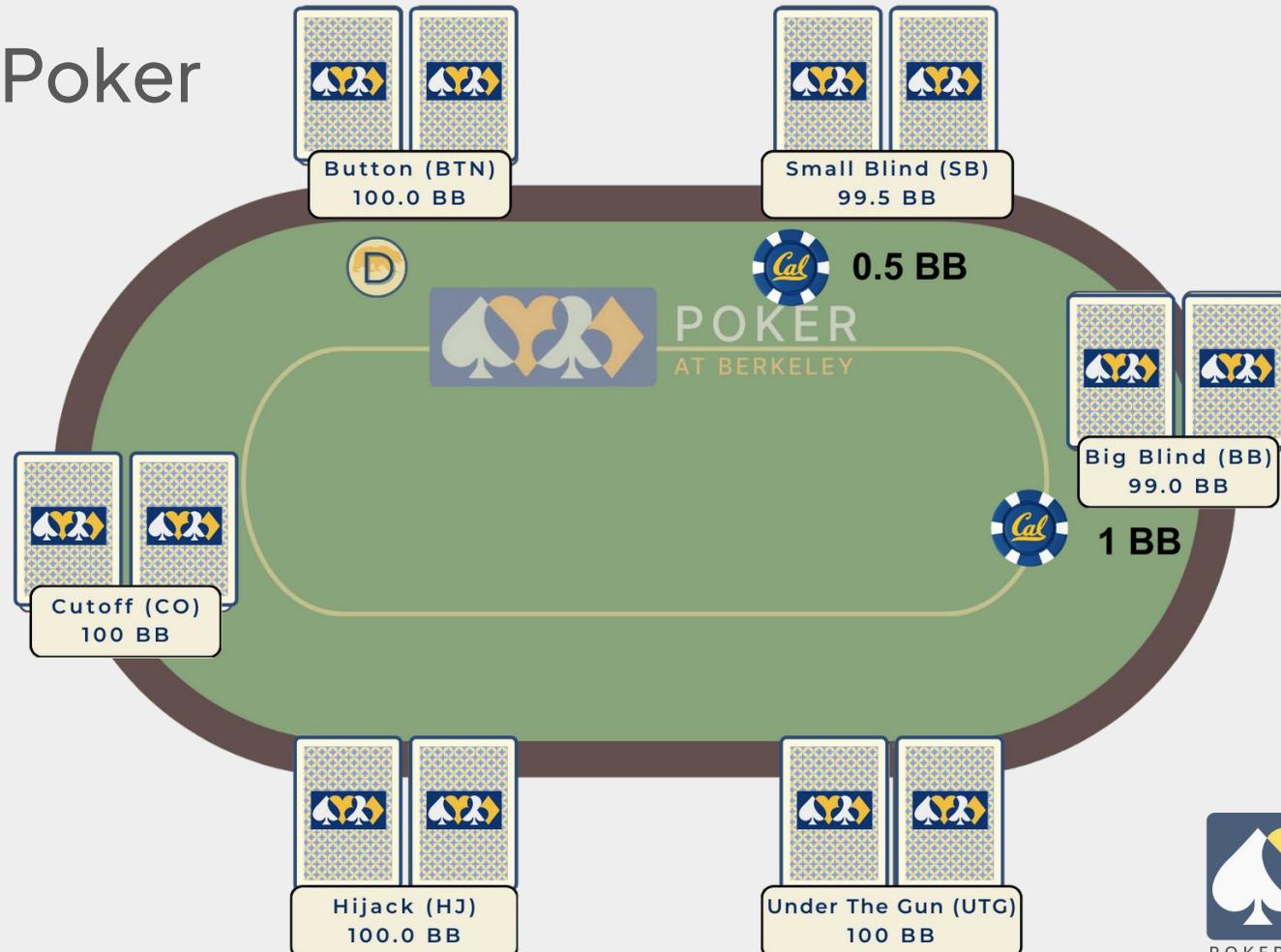
- Stakes are typically denoted as Small Blind/Big Blind
1/\$2 means the small blind is \$1 and the big blind is \$2
- Stack sizes can vary, but we typically assume them to be 100BB. At the \$1/\$2 stake, this means a player has $\$2 \times 100 = \200 in their stack.
- You will commonly see the notation of stakes be abbreviated to “NL200”, “NL100”, etc. This is widely used by cardrooms and in online poker. It simply denotes what a typically 100BB buy-in would be at that the stake level.
- Ex.) “NL2” would be a microstakes game with blinds of \$0.01/\$0.02
 $\$0.02 \times 100BB = \2 buy-in

Blinds in Poker

- At the start of each hand, the player to the left of the Dealer position posts the Small Blind, meaning they are forced to make a bet of one small blind before the cards are even dealt. This player is known as the Small Blind or SB.
- The player to the left of the Small Blind posts the Big Blind, again meaning they are forced to bet one big blind before cards are dealt. This player is known as the Big Blind or BB.
- From here, players are each dealt two cards and the hand begins.



Blinds in Poker



Betting in Poker

When you are first to act or are facing a check, you have 3 options:

- Check, Fold (not advised), or Bet

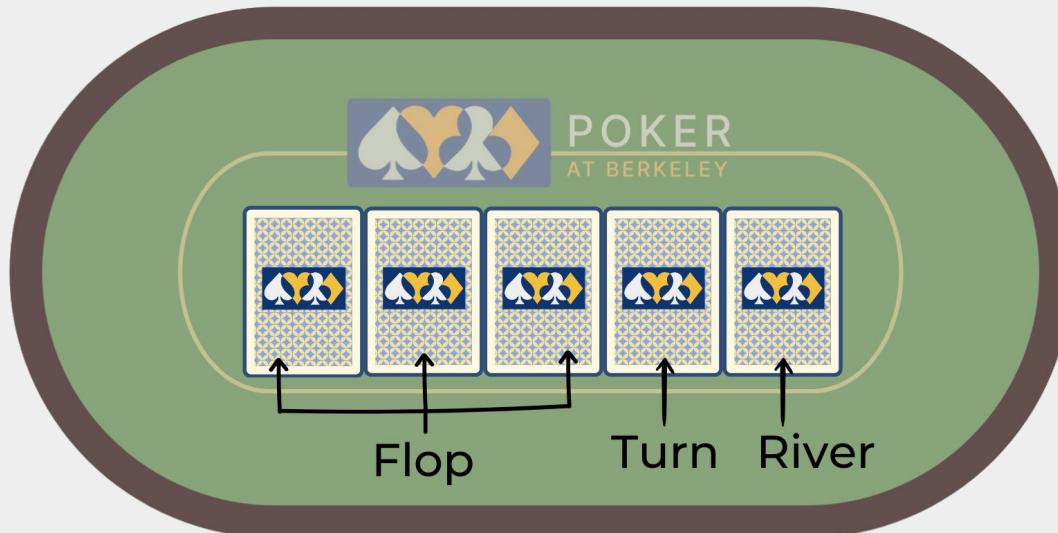
When you are facing a bet or raise, you have 3 options:

- Call, Fold, or Raise



Rounds of Betting

1. Preflop: after hole cards, betting starts from player left of BB
2. Flop: three community cards are dealt, betting starts from player left of BTN
3. Turn: one community card is dealt, betting starts from player left of BTN
4. River: one community card is dealt, betting starts from player left of BTN



Let's walk through an example of how a hand plays out.



Preflop

Action begins with the Under The Gun (UTG) player to the left of the BB who has the option to call the existing bet, raise, or fold.

Action proceeds clockwise, with each player facing the same options.

The Big Blind closes the action:

- If the Big Blind calls/folds to a bet that every other player has already had the opportunity to call/raise/fold to, the preflop betting round ends and the flop is dealt.
- If the Big Blind folds, the player to his right (the Small Blind) now closes the action, and so on.

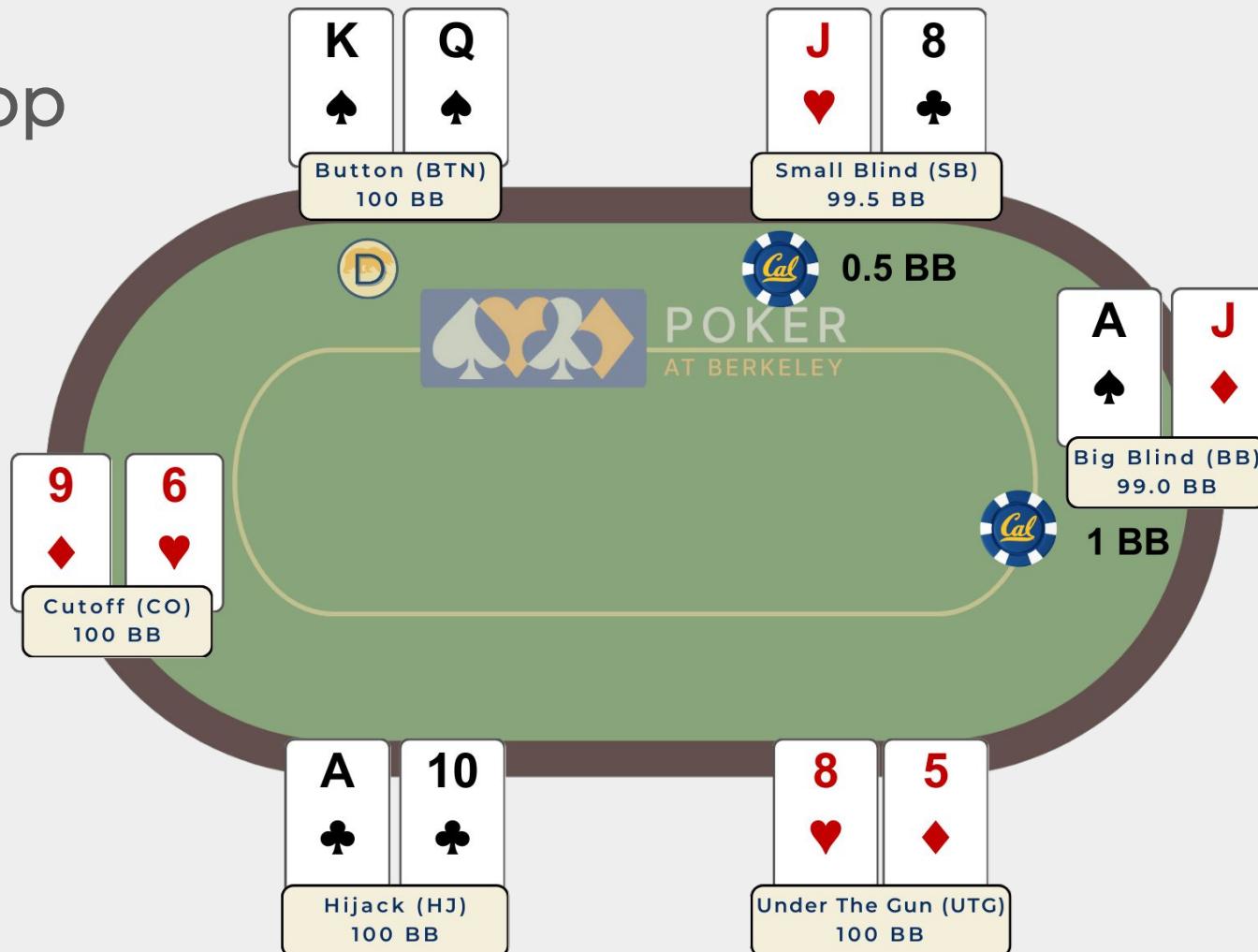
Each bet gets added to the pot, the money the player who wins the hand will get.

Preflop

6 players are dealt hands, SB and BB post blinds.



Preflop



Preflop

Action begins with UTG; folds.



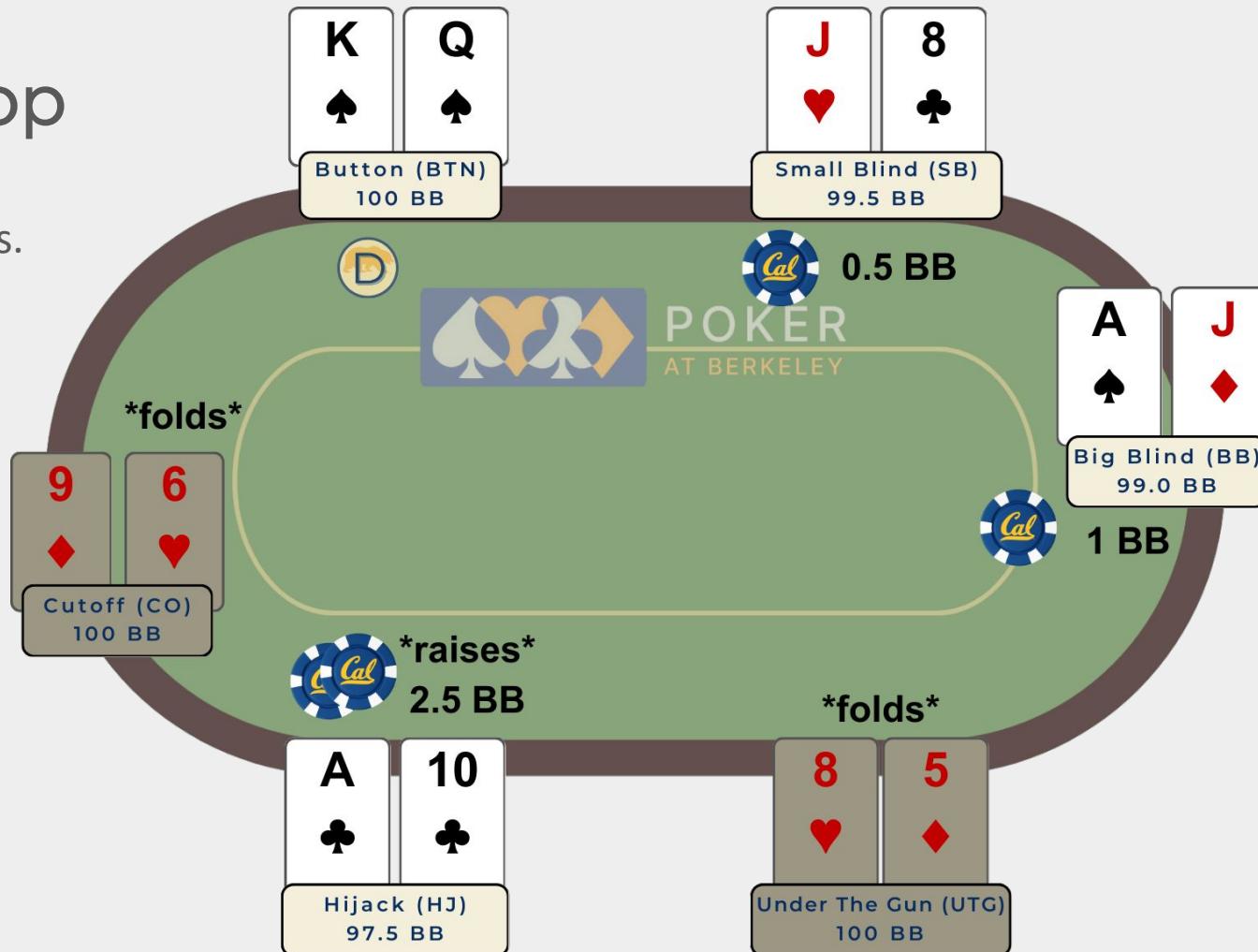
Preflop

Action now on HJ;
raises to 2.5 BB.



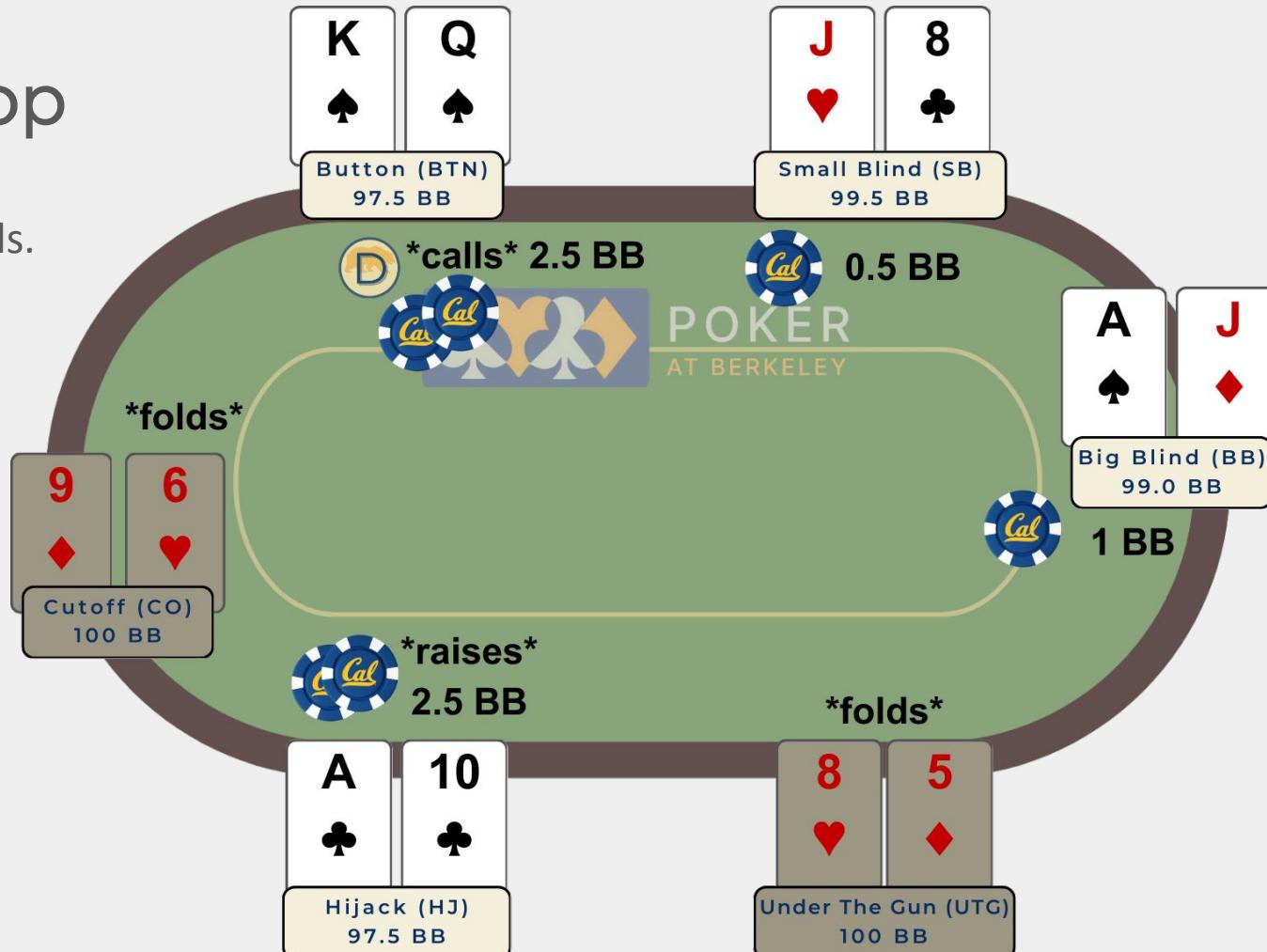
Preflop

CO folds.



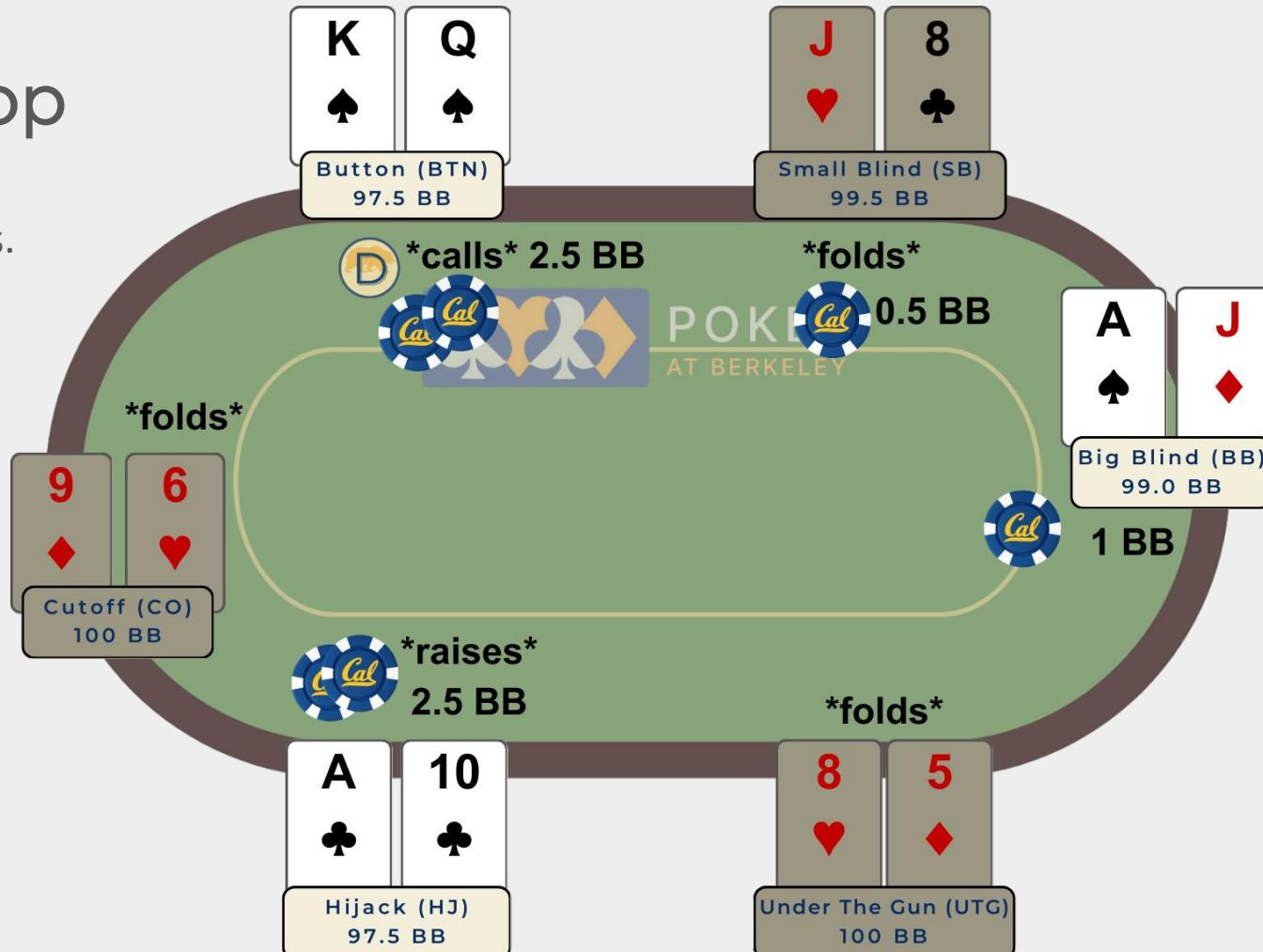
Preflop

BTN calls.

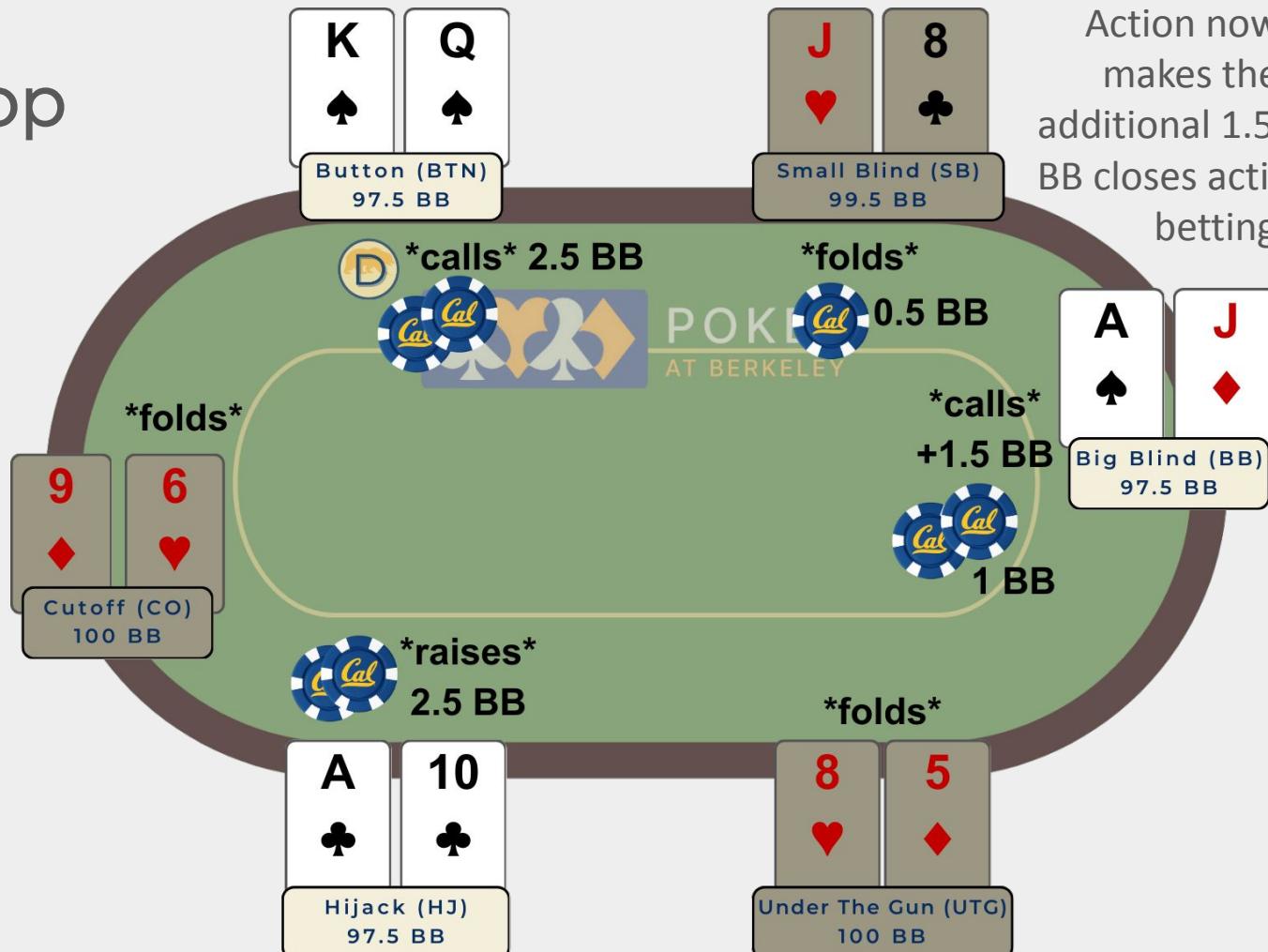


Preflop

SB folds.



Preflop



Preflop



Post Flop

Three face-up community cards are dealt onto the board, the Flop.

Action now begins with the Small Blind, not the Under the Gun player. If the Small Blind has folded, it begins with the player to the left of the button.

This time, the bet starts at 0.0 BB, meaning there is no standing bet.

Players then have the option to Check, and pass the action clockwise, as well as to Raise the bet, or Fold. If a player decides to bet, players can no longer Check and must either Call/Raise/Fold.

Action then proceeds in the same way as preflop, but now the Button is the one closing the action instead of the Big Blind.



Post Flop



Post Flop



Post Flop

Action begins
with BB; checks.



Post Flop

Actions now on HJ
who bets 3 BB.



Post Flop

BTN calls.



Post Flop

BB calls & closes action.



Turn

An additional face up community card is dealt, the Turn.

Action now proceeds identically as it did on the Flop.

This is a good time to say that if at any point Preflop, on the Flop, Turn, or River, if all but one player folds, that player wins the pot.



Turn



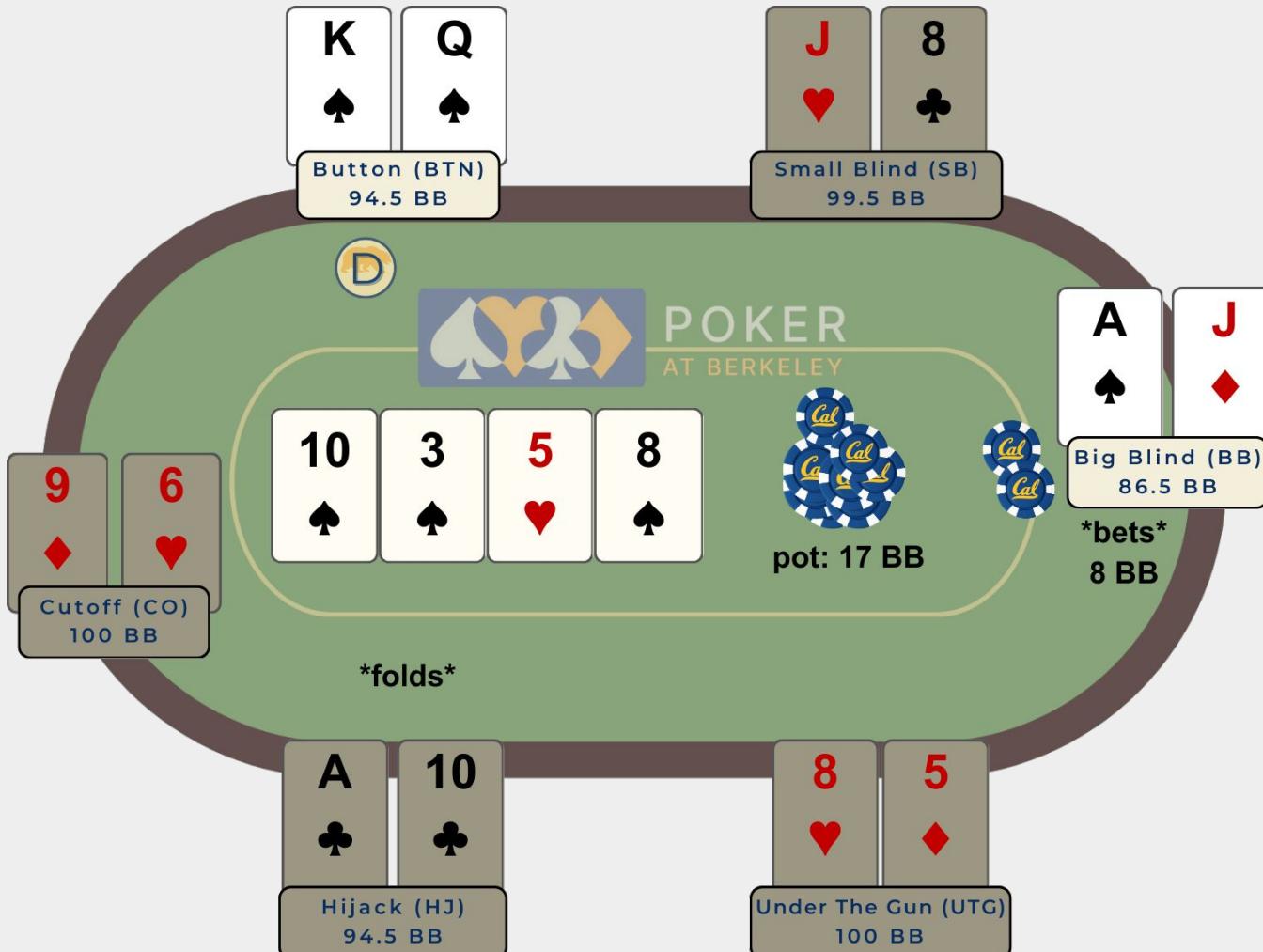
Turn

BB bets.



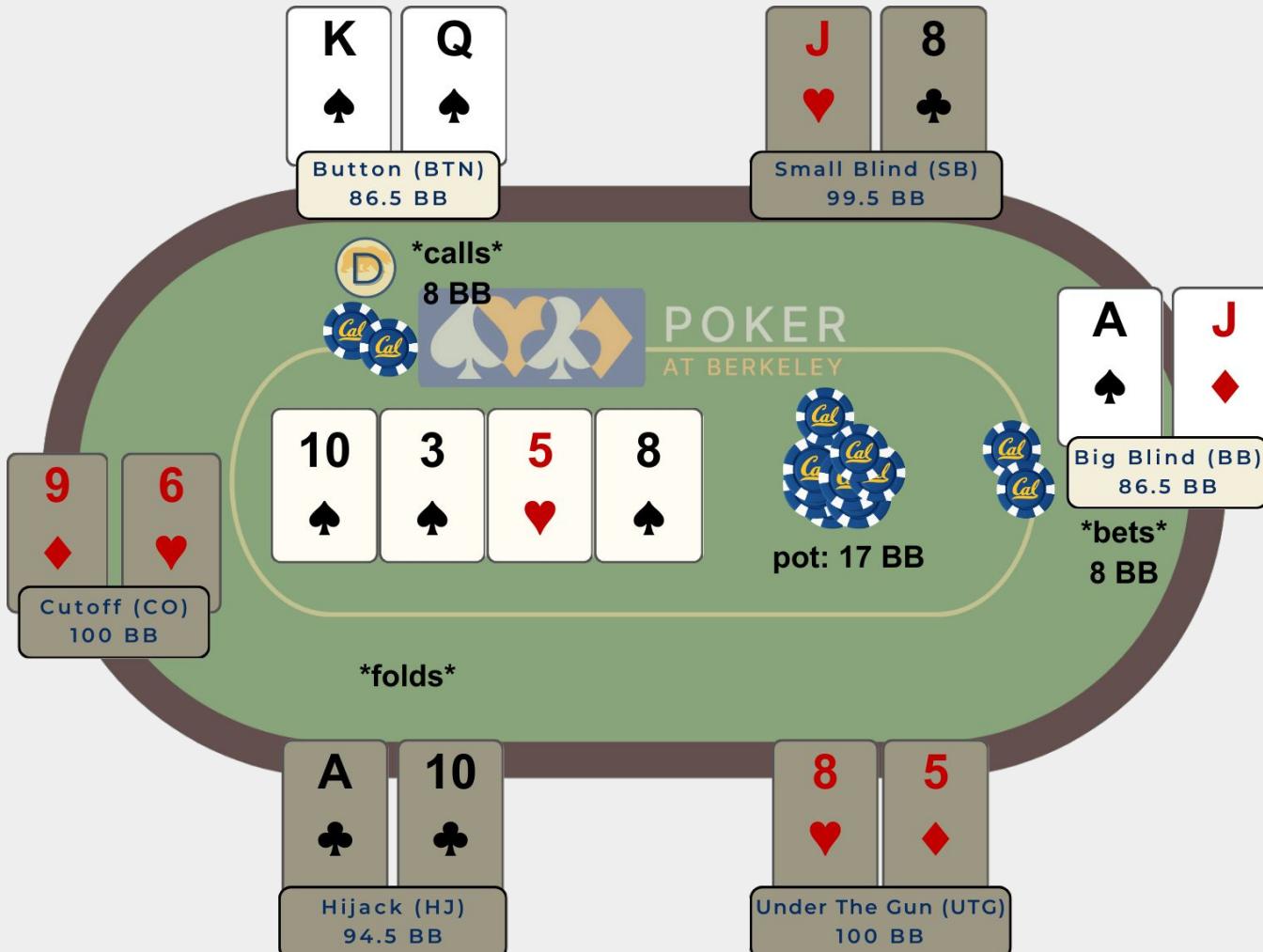
Turn

HJ folds.



Turn

BTN calls.



River

The final community card is dealt, the River.

Action proceeds identically to on the Flop and Turn.

In addition to winning by getting everyone to fold, players can win by having the best hand at showdown, which occurs once the River betting round ends.

Players show their hands (There are specific rules on when you/don't need to show we don't really care about for this class) and whoever has the highest hand strength wins the pot

If players have identical hands, they split the pot evenly.



River



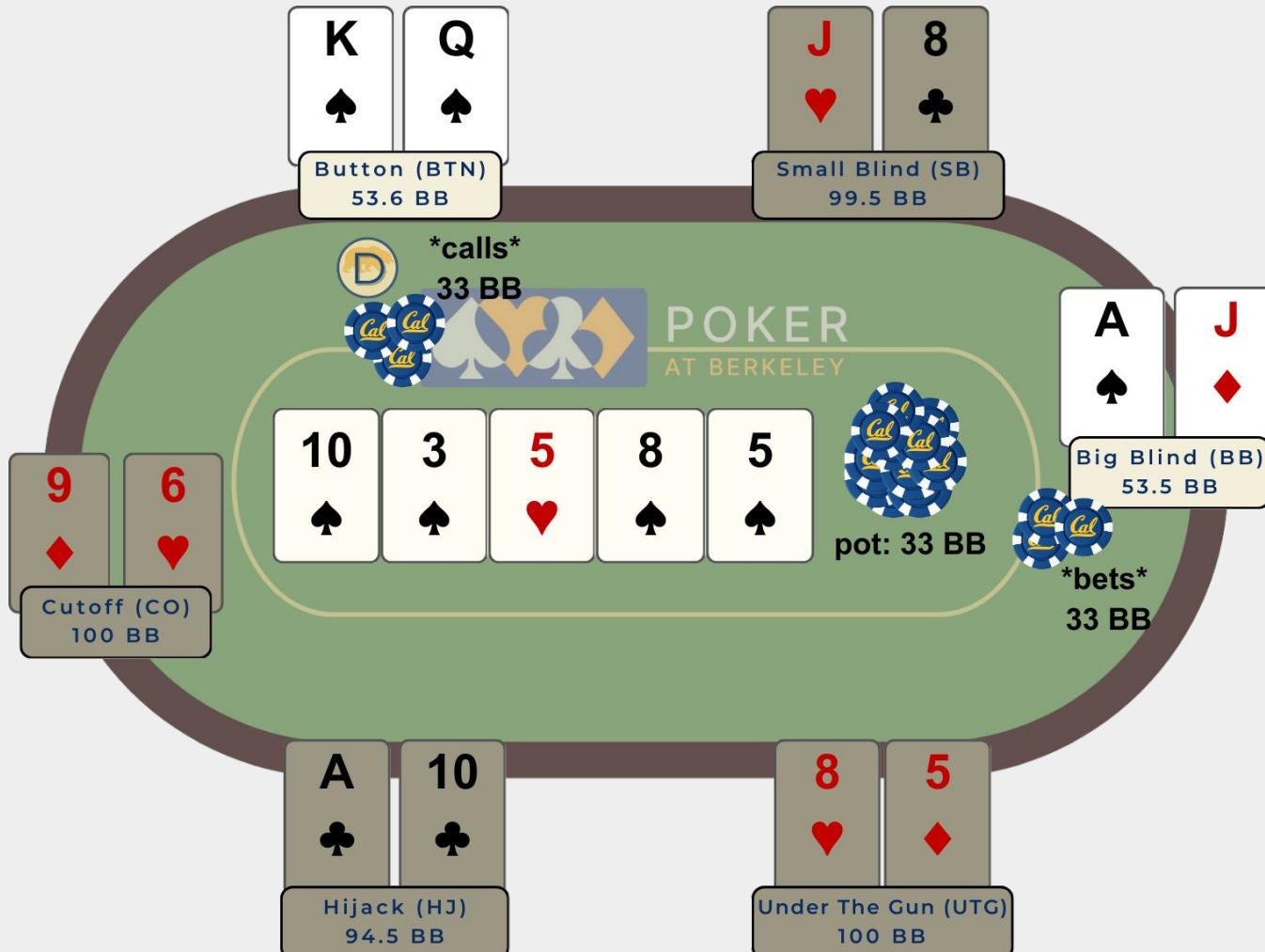
River

BB bets.



River

BTN calls.



River

BB wins the pot.



Hero vs. Villain in Poker

In poker, we use the term *Hero* to refer to the player whose perspective we're analyzing—typically “you” in a given hand. The *Villain* refers to any opponent(s) *Hero* is facing in the hand.

Throughout this course, when breaking down hands, *Hero* will represent the player making decisions, while *Villain* will represent the opponent(s). This terminology helps simplify discussions by clearly identifying roles in the hand analysis.



So why is it important to understand which position you are in when playing?



POSITION PROVIDES INFORMATION!

Having position on more players gives you more information about their hole cards (hands) as you observe what they are doing with their hand.

We will go much more in depth about position in later lectures, but for now understand that:

- In Position (IP): refers to the player who acts after the other opponent(s) during each postflop betting round. Acting last allows you to see what your opponent does (check, bet, size of their bet) before you make your decision.
- Out of Position (OOP): refers to the player who acts before the other opponent(s) during each betting round. Acting first means your opponent has the advantage of seeing your decision before they act.

All about practice

The best way to learn the rules of poker
is to play and watch poker!

Don't worry if it doesn't make complete sense right now.

Understanding basics of how the game is played is essential for further parts of this course. We will be covering a lot of nuanced strategy and it will be difficult to learn if you're still shaky on the rules.



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Terminology Review

Game Terminology:

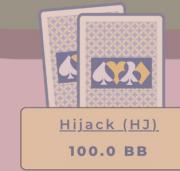
- Nash Equilibrium
- Game Theory Optimal (GTO)
- Unexploitable/Balanced
- Exploits
- Expected Value
- Variance
- Heuristics
- Position

Player Terminology:

- Under The Gun (UTG)
- Hijack (HJ)
- Cutoff (CO)
- Button (BTN)
- Small Blind (SB)
- Big Blind (BB)
- Hero
- Villain
- In Position (IP)
- Out of Position (OOP)



POKER
AT BERKELEY



Hijack (HJ)
100.0 BB

Under The Gun (UTG)
100.0 BB

Street Terminology:

- Preflop
- Flop
- Turn
- River



POKER AT BERKELEY

Join the Discord

We will primarily release announcements and HW through bCourses for posting slides and homework.
We'll use discord for hand histories/discussion.



Todays playing session will be linked on discord.

Scan to Add Music to Our Collaborative Spotify playlist For Our Playing Sessions:



Scan to join our pokernow club!

