Poker Strategies

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CSE87: UCSD Freshman Seminar on

The Science of Casino Games: Theory of Poker

Spring 2006

References

- Getting Started in Hold'em, E. Miller
  - excellent beginner book
- Winning Low Limit Hold'em, L. Jones
  - excellent book for non-beginners
- The Theory of Poker, D. Sklansky
  - advanced concepts (non-Texas Hold'em specific)
- Illustrated Guide to Texas Hold'em, D. Purdy
  - good exercises that develop understanding

What to Consider

- Your cards
- Your position
  - relative to button
  - relative to other players
- Your investment
- Number of players
- How your opponents play

Your Cards

- Pocket pairs
  - Big: A-J; Medium: T-7; Little: 6-2
- Big cards
  - A-J, suited or unsuited
- Connectors
- Suited aces and kings

Pocket Pairs

- Play big pocket pairs aggressively: raise
- Play small pocket pairs carefully
  - When the pot is big (lots of players)

Big cards

- Play big cards aggressively: raise
- Aces >> kings
- Suited >> unsuited

Connectors

- Cards that are separated in rank
    - No-gap, one-gap, two-gap
- For "drawing hands"
- Straights, and flushes when suited
- Outside vs. inside straights

Suited Aces and Kings

- Aces >> kings
- Kings > queens
- Kicker is important!

Your Position

- **Early position**
  - 3 players left of blinds (+ blinds)
- **Middle position**
  - Next 2-3 players
- **Late position**
  - Next 2 players (button and cut-off)

Early vs. Late Position

- Early
  - Little/no information: Play conservatively!
  - But, play strong hands aggressively
- Late
  - Lots of information: Can play much looser

Position Relative to Players

- Sit to left of unpredictable players
  - So you can see what they do
  - Aggressive players
- Sit to right of predictable players
  - Count on them doing what you would do
  - May give you "last action"
  - Loose-passive players

Your Investment

- The more raises, the stronger your hand needs to be

- Lots of raising reduces "implied odds"

- Consider raises that will come behind you

Number of Players

- Hands that do well against small number of players, e.g. 2-3
  - Big pocket pairs, big cards
- Hands that require large number of players
  - Drawing hands (suited cards)
  - Small pocket pairs

How Your Opponents Play

- Look for patterns: predictability
- "Calling stations"
- Loose-passive vs. loose-aggressive
- Playing Behind a Raiser
  - Jones: "I'm looking for a reason to get out of this hand"
- Raises after you call or raise

Odds and Pot Odds

- Odds: what you expect to win vs. what you bet
  - 4 to 1: you expect to win 4 times your bet
- Pot odds: odds the pot is offering
  - $30 in pot, your bet is $5: 30 to 5 = 6 to 1
    - Pot is offering better odds, take it
  - $21 in pot, your bet is $7: 21 to 7 = 3 to 1
    - Pot is offering worse odds, don't take it

Some Odds

- 220 to 1: specific pair (e.g., aces)
- 16 to 1: any pair
- 3.3 to 1: two suited cards
- 7.5 to 1: flop a set, given pocket pair
- 2.1 to 1: flop A or K, given AK
- 4.2 (1.9) to 1: flush given flush draw
- 4.9 (2.2) to 1: straight given straight draw

Implied Odds

- Consider
  - You have a flush draw, one card to come
  - 4 to 1 underdog to make flush
  - $16 in pot, your opponent bets $6
- What do you do?

Implied Odds cont'

- Pot odds: 3.7 to 1
  - $22 in pot, and you are to bet $6
  - Odds of making flush are 4 to 1: FOLD
- Suppose you are sure your opponent will call your $6 on river
  - Pot will then eventually contain $28
  - Implied odds are 28 to 6 = 4.7 to 1: CALL

Implied Odds cont'

- $22 in pot, you bet $6
- On river, you make the flush
  - You're sure additional $6 bet will be called
  - Yes, you put in an additional $6, but it doesn't matter: you will win $28
- On river, you don't make the flush
  - You fold: so you lost your $6
  - Therefore: 28 to 6

Pre-Flop Pot Equity

- How often will your hand win if all cards are dealt out?

- Assuming you know nothing about your opponents' cards

  - n opponents, you hand must have odds better than n to 1

- Big cards, big pocket pairs

Early Position Strategy

- Raise
  - AA-JJ (reraise)
  - AKs-AJs (reraise, except AJs)
  - AKo, AQo
- Call one bet
  - TT-99, KQs, KJs
  - ATs, KQo if 3 beyond big blind
  - If 5+ players, call with any pocket pair

Raising and Calling Pre-Flop

	EARLY	MIDDLE	LATE
RAISE	AA KK QQ JJ TT	99	88
	AKs AQs AJs ATs KQs	A9s KJs	A8s KTs QJs
	AK AQ	AJ KQ	AT KJ

CALL	99 88 77	66 55 44 33 22	
	KJs	A9s A8s A7s	A6s A5s A4s A3s A2s
	QJs	KTs QJs QTs JTs	K9s QTs Q9s JTs J9s
			T9s T8s 98s 87s
	AJ KQ	AT KJ	

Top 50 of 169 Pocket Hands

			11-20		21-30		31-40		41-50	
1.	AA	86%	99	55%	JT	40%	J9s	28%	A7u	10%
2.	KK	75%	KQs	55%	QTs	39%	66	26%	A8u	10%
3.	AKs	69%	88	52%	KQu	39%	A3s	21%	A6u	9.9%
4.	QQ	69%	ATs	51%	T9s	38%	55	21%	98s	9.8%
5.	AKu	67%	AJu	49%	ATu	34%	KJu	21%	J8s	9.8%
6.	AQs	65%	KJs	45%	A7s	34%	A2s	20%	A4u	9.6%
7.	JJ	64%	QJs	44%	A4s	31%	K9s	20%	K8s	9.5%
8.	TT	61%	A8s	42%	A5s	30%	Q9s	19%	T8s	9.5%
9.	AQu	64%	KTs	41%	A6s	30%	A9u	17%	A5u	9.4%
10.	AJs	59%	A9s	41%	77	39%	Qju	17%	JTu	9.4%

From The Illustrated Guide to Texas Hold'em, D. Purdy

Post-Flop Strategic Advantages

- Position
- Drawing hands
  - Suited cards
  - Connected cards
- "Information advantage"
  - Given what you have, what do you know about other hands?
  - Pocket pairs, drawing a set

Post-Flop Strategies

- Determine pot equity advantage
- Bet/raise if you think you have best hand
- The larger the pot, the more risks you can take
- Fold weak hands that miss flop
- Save pots, not bets

The Information/Cost Curve
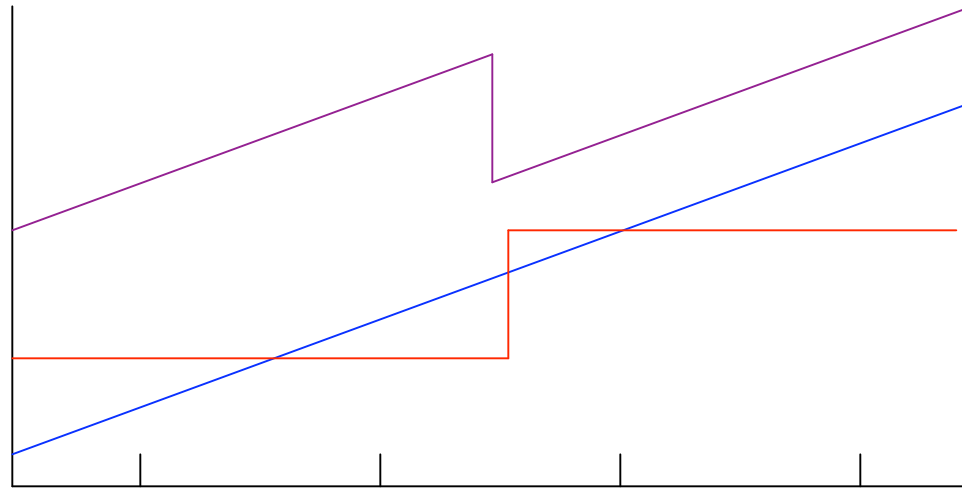
- With each round, information goes up
- Cost doubles for turn and river betting
- Post-flop bet: max of info/cost curve

Bluffing and Game Theory

- Consider following simple game
- You are dealt one card (hidden from your opponent)
- Black wins
- Red loses (unless opponent folds)
- You can either bet $10 or fold
- If you bet, your opponent can call or fold

Decision Tree for Black/Red

Black   Red

You $10 Fold $10 Fold

Opponent $10 Fold $10 Fold

Result 10+P P -P -(10+P) P -P

Decision Tree for Black/Red

Black   Red

You $10   Fold $10   Fold

Opponent $10   Fold $10   Fold
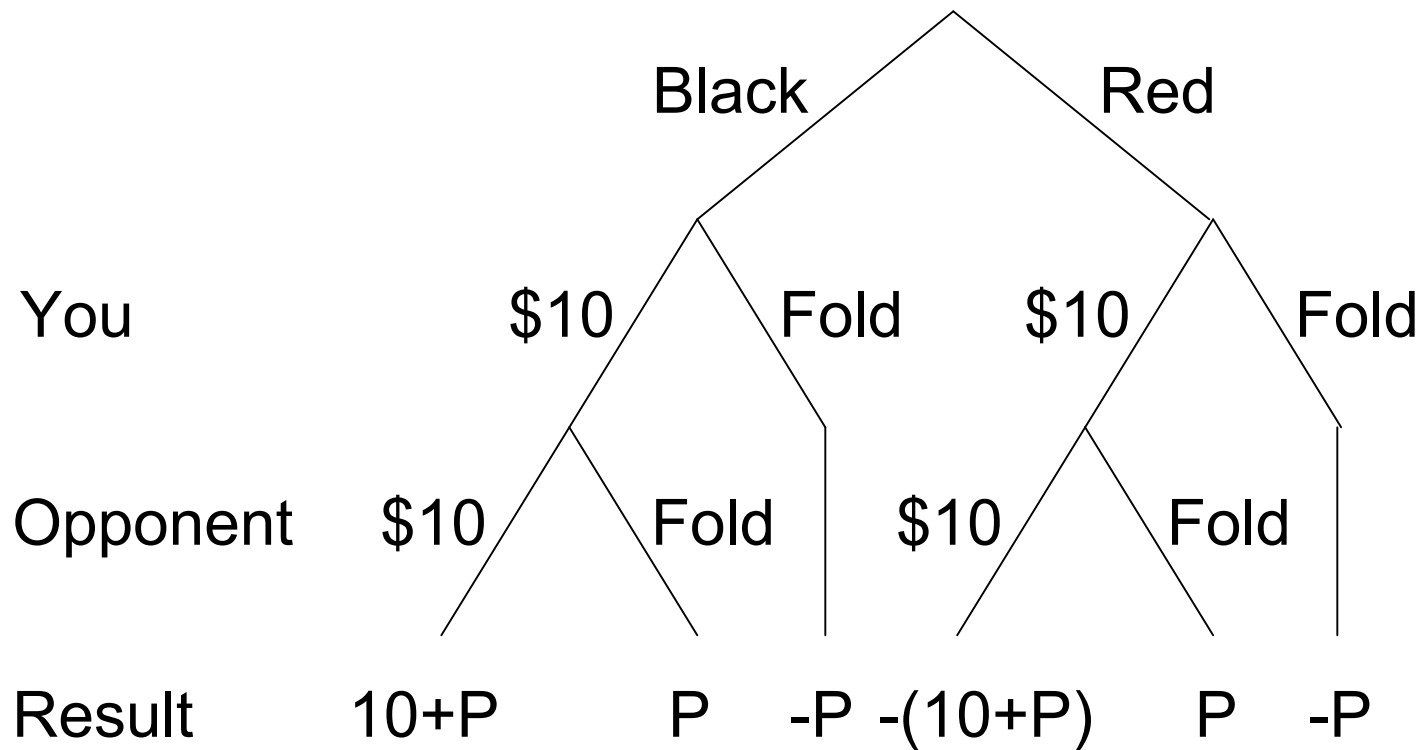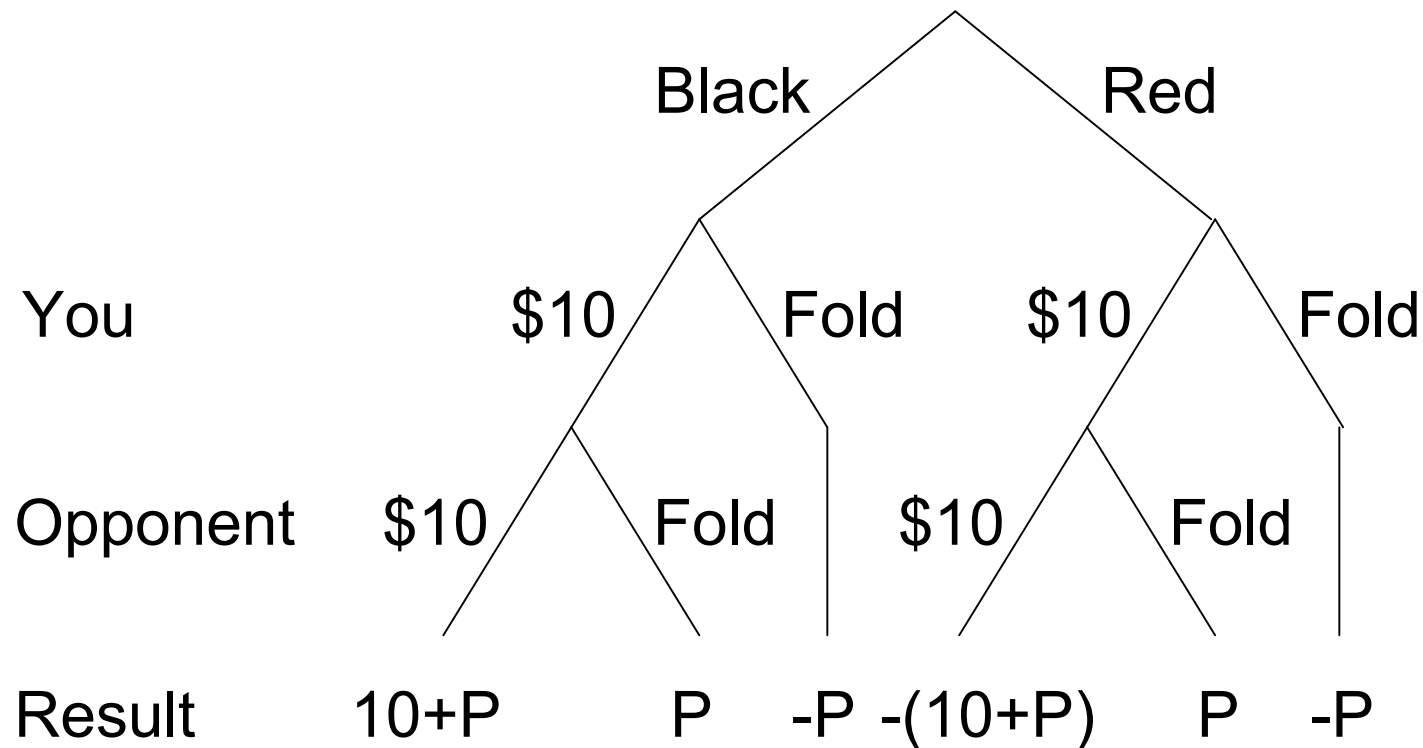
Result   10+P   P   -P -(10+P)   P   -P

If you always play Black and fold Red and your
opponent "always" calls, result = 10+P-P = 10

Decision Tree for Black/Red

Black   Red

You $10   Fold $10   Fold

Opponent $10   Fold $10   Fold

Result   10+P   P   -P   -(10+P)   P   -P
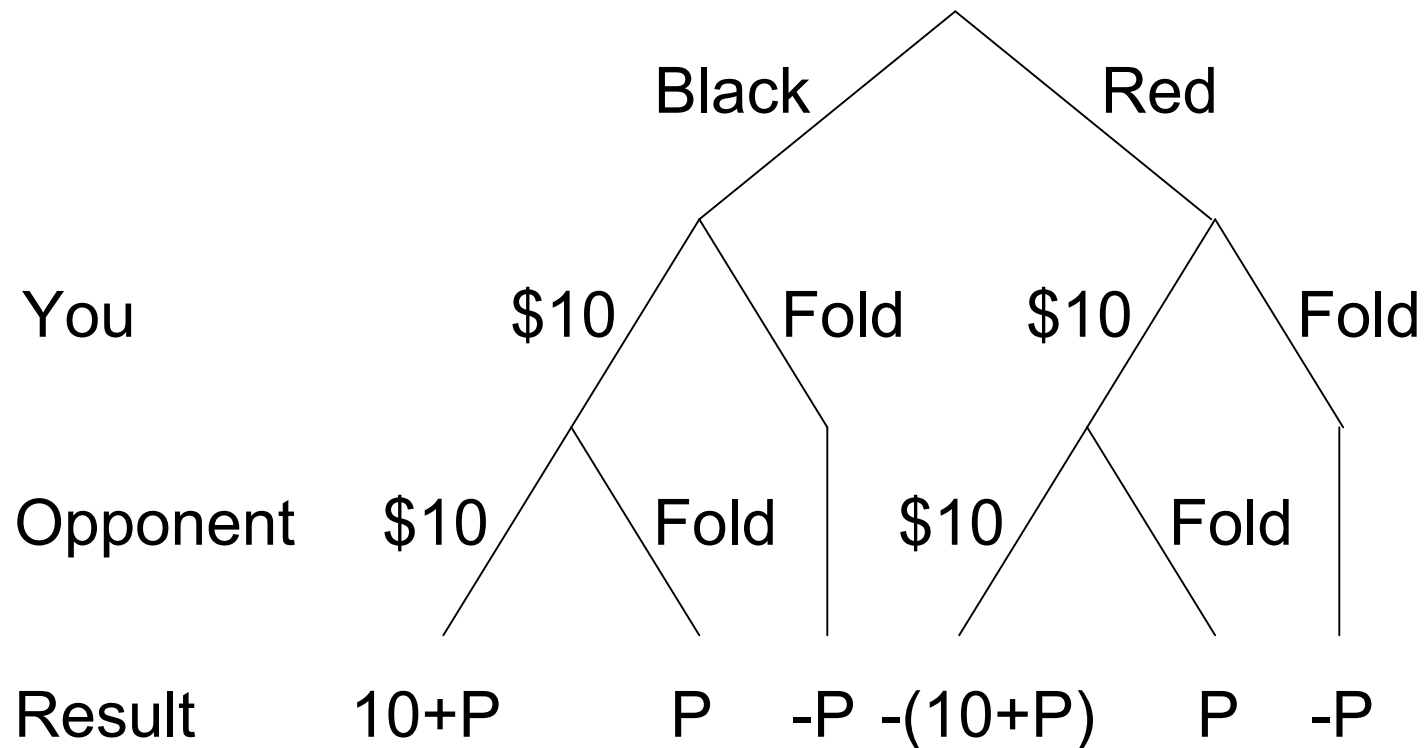
If you always play Black and fold Red and your
opponent is smart (always folds), result = 0

Decision Tree for Black/Red

You $10   Fold $10   Fold

Opponent $10   Fold $10   Fold

Result   10+P   P   -P   -(10+P)   P   -P
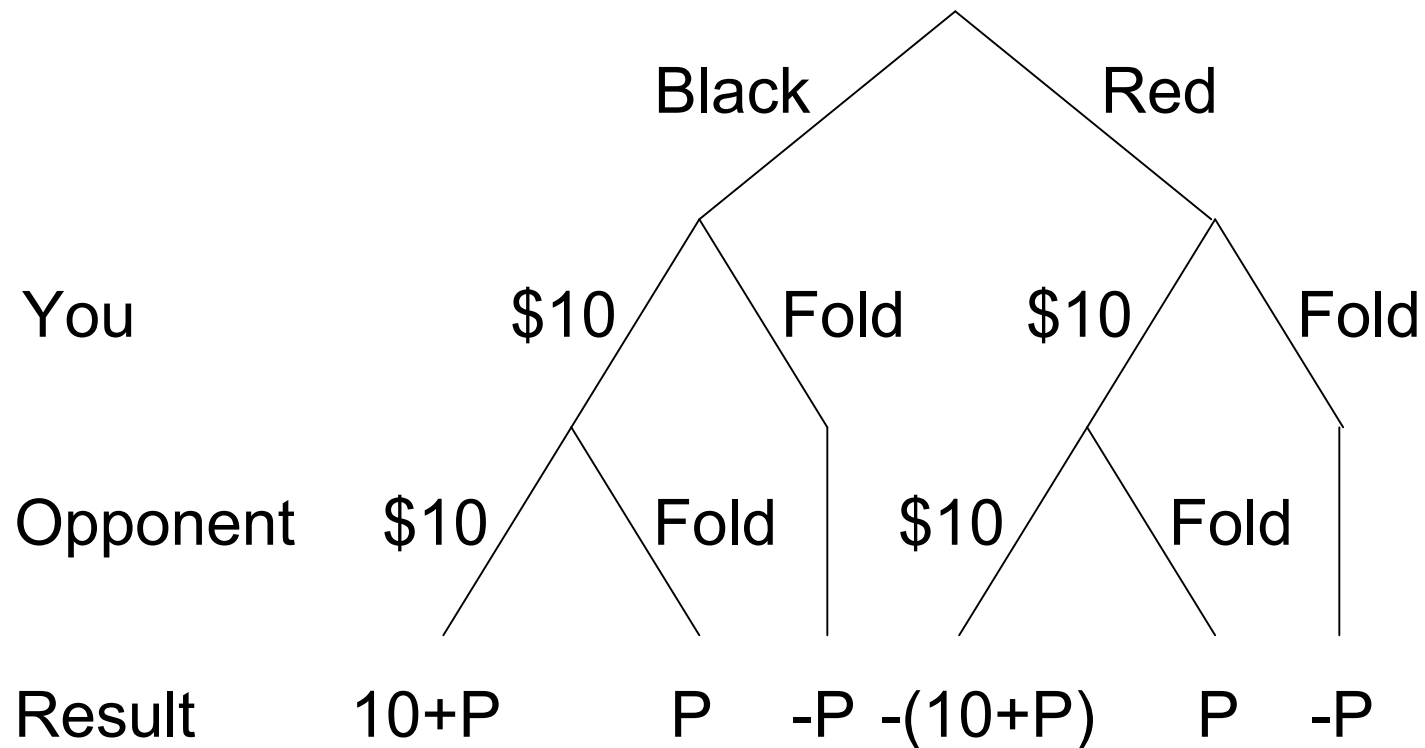
If If you always bet (Black or Red) and your opponent "always" folds, result = P+P = 2P

Decision Tree for Black/Red

Black   Red

You $10   Fold $10   Fold

Opponent $10   Fold $10   Fold

Result   10+P   P   -P   -(10+P)   P   -P
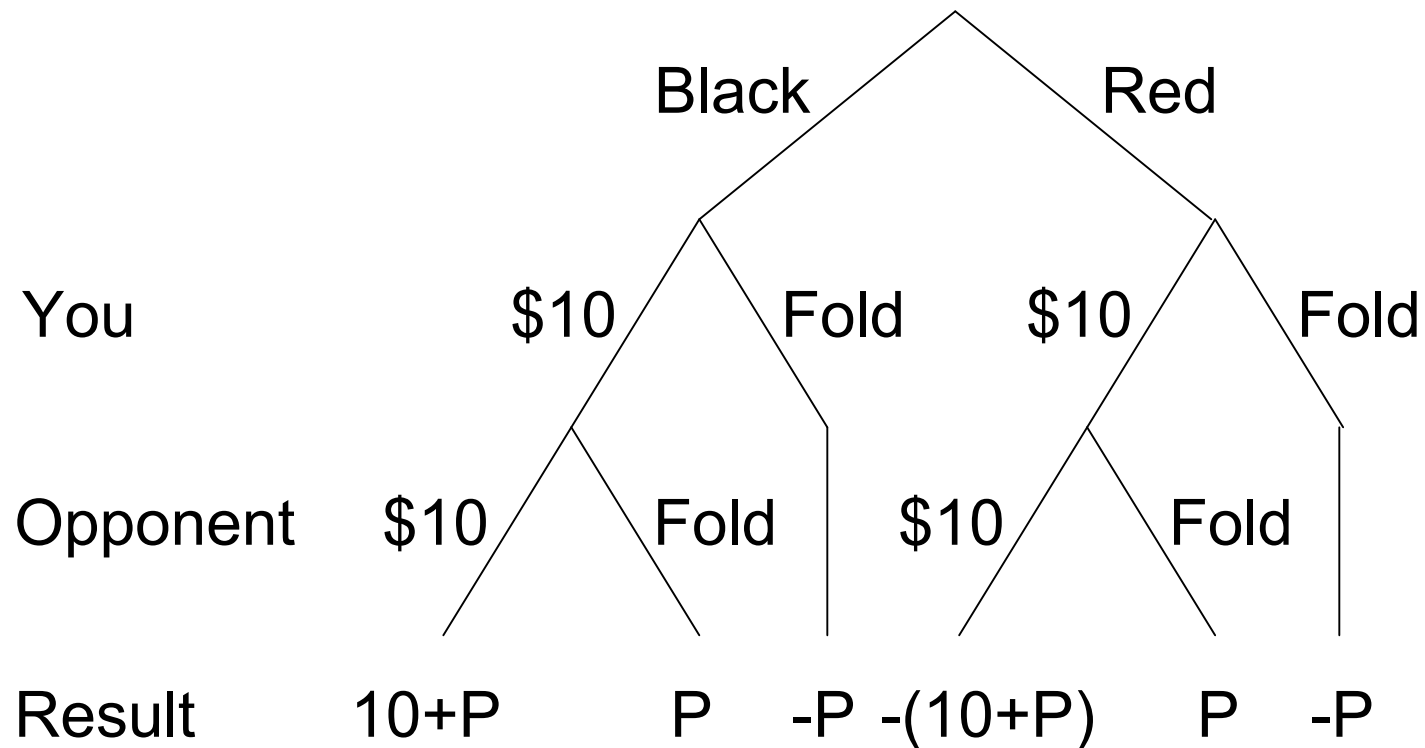
If you always bet (Black or Red) and your opponent is smart (always calls), result = 0

Decision Tree for Black/Red

Black   Red

You $10   Fold $10   Fold

Opponent $10   Fold | $10   Fold

Result   10+P   P   -P -(10+P)   P   -P
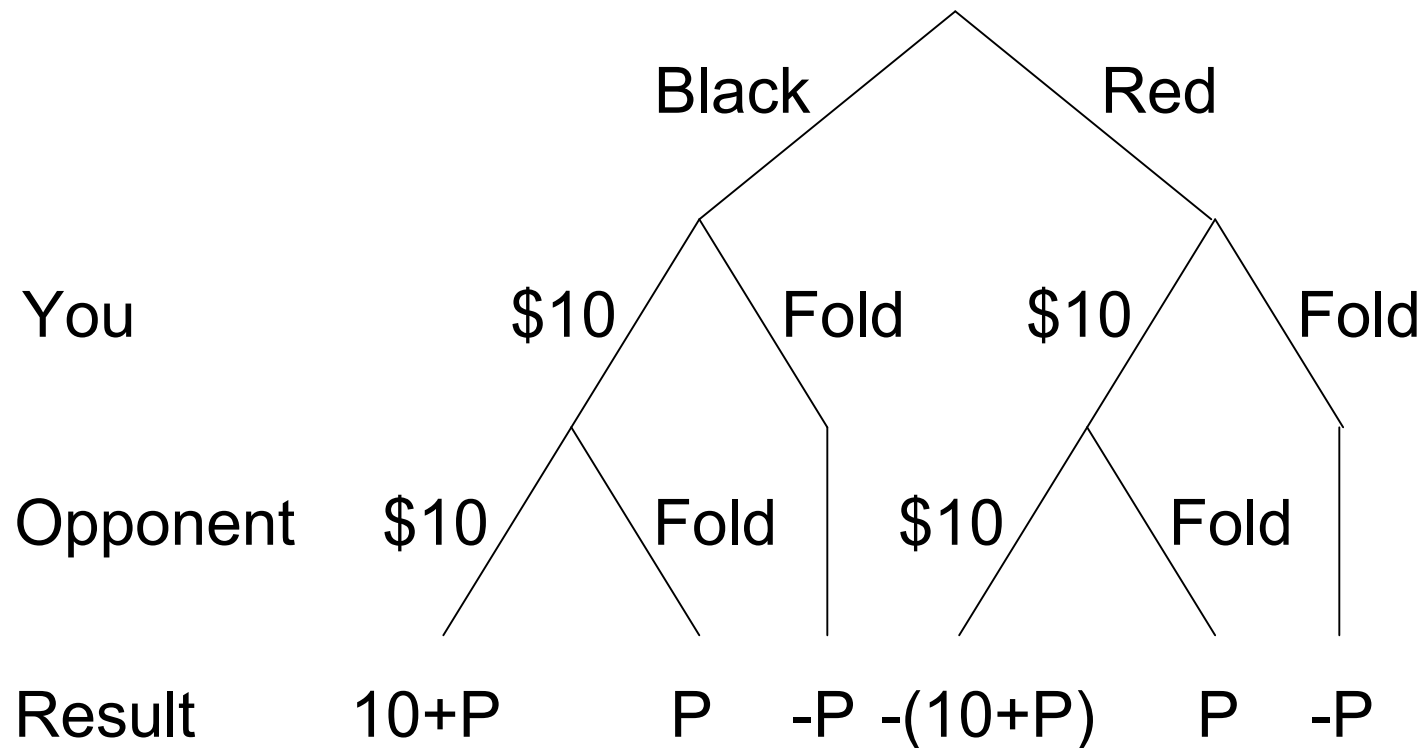
What if you always play Black, sometimes play Red?

Analysis

- You
  - Given Black, always bet $10
  - Given Red, bet $10 with probability x

- Your opponent
  - Always bet?
    - $(10+P) - x(10+P) - (1-x)P$
    - $10 + P - x10 - xP - P + xP = (1-x)10 > 0$

Analysis

- You
  - Given Black, always bet $10
  - Given Red, bet $10 with probability x
- Your opponent
  - Always fold?
    - $P + xP - (1-x)P$
    - $P + xP - P + xP = x2P > 0$

Opponent's Best Strategy

- You
  - Given Black, always bet $10
  - Given Red, bet $10 with probability x

- Your opponent
  - Bet with probability y, fold with prob 1-y

Analysis

- You
  - Given Black, always bet $10
  - Given Red, bet $10 with probability x

- Your opponent
  - Bet with probability y, fold with prob $1-y$
    - $y(10+P) + (1-y)P - xy(10+P) + x(1-y)P - (1-x)P$
    - $y10 + yP + P - yP - xy10 - xyP + xP - xyP - P + xP$
    - $y10 - xy10 - 2xyP + 2xP = y(10 - 10x - 2xP) + 2xP$

Analysis

- You
  - Given Black, always bet $10
  - Given Red, bet $10 with probability x

- Your opponent
  - Bet with probability y, fold with prob 1-y
    - $y(10 - x(10 + 2P)) + 2xP$
  - Select $x = 10/(10 + 2P) = 5/(5 + P)$
    - Result = $10P/(5+P) \geq 0$, no matter what y is!

Analysis

- You
  - Given Black, always bet $10
  - Given Red, bet $10 with probability x

- Your opponent
  - For $x = 5/(5 + P)$, you win $10P/(5+P)$
    - If $P = 0$, result = 0
    - If $P = 10$, result = 6.67
    - If $P = 100$, result = 9.52

No Limit Hints (Amarillo Slim)

- Play the players more than the cards
- Choose the right opponents
- Play tight (few hands) and aggressive
- Be observant, watch opponents for tells
- Diversify your play
- Play slow in fast game, and vice-versa

Finally

- Poker is a game of information
  - the more you know, and
  - the less your opponents know
  - the better you will do
- Knowledge is POWER: Study …
  - the strategy, the math, your opponents
- Have fun!

Some Exercises

- Adapted from The Illustrated Guide to Texas Hold'em, by Dennis Purdy

Exercise 1: $3 pot

A♠ A♣
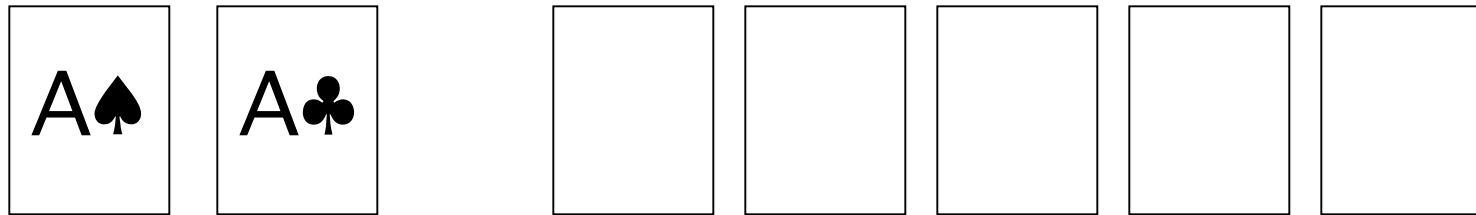
- [$1, $2], YOU, X, X, X, X, X, X, X
- Fold, call, or raise?

Exercise 1: $3 pot

A♠	A♣						
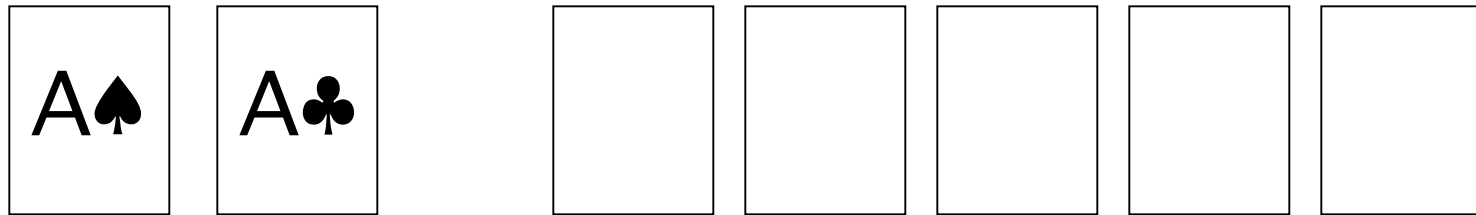
- [$1, $2], YOU, X, X, X, X, X, X, X
- Raise
- Strong hand, but many other players
- Chase them away
- Alternatively: Call to make pot bigger

Exercise 2: $7 pot
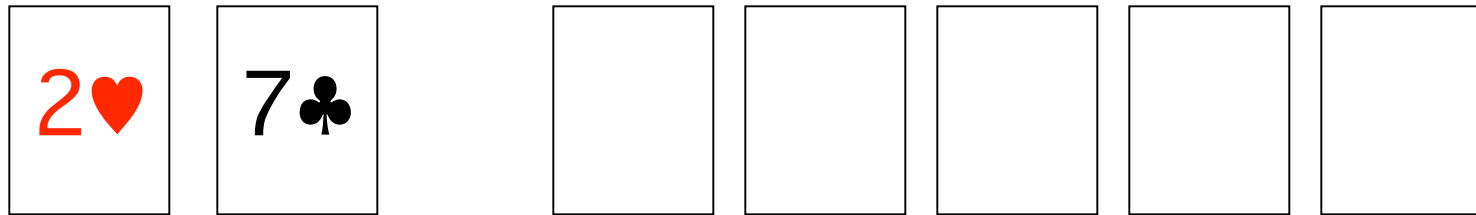
- [$1, $2], F, $2, F, F, $2, YOU, X, X
- Fold, call, or raise?

Exercise 2: $7 pot

2♥ 7♣
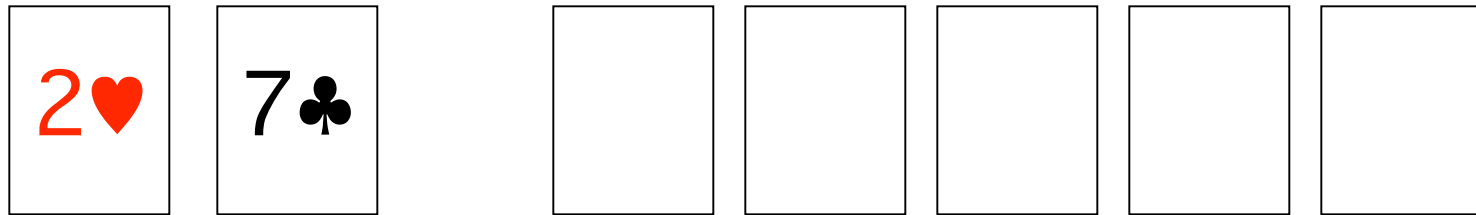
- [$1, $2], F, $2, F, F, $2, YOU, X, X
- Fold
- Weakest possible hand

Exercise 3: $20 pot

2♥ 7♣
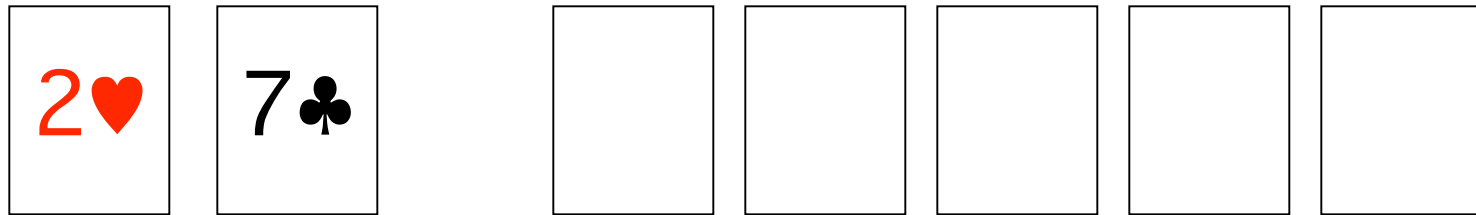
- [$1, $2 (you)], $2, $2, $2, $2, $2, $2, $2, $2, $1, YOU
- Fold, check, or raise?

Exercise 3: $20 pot

2♥ 7♣
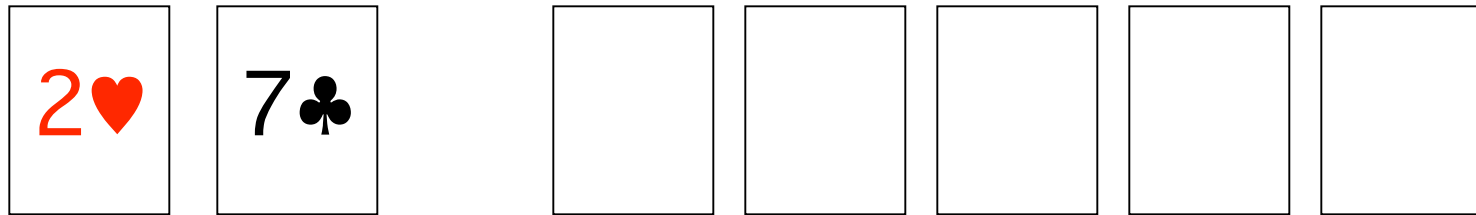
- [$1, $2 (you)], $2, $2, $2, $2, $2, $2, $2, $2, $1, YOU
- Check
- Costs you nothing
- Hope for 2-3 7's, 2-3 2's, or a 2 and 7

Exercise 4: $3 pot

9♣ T♣
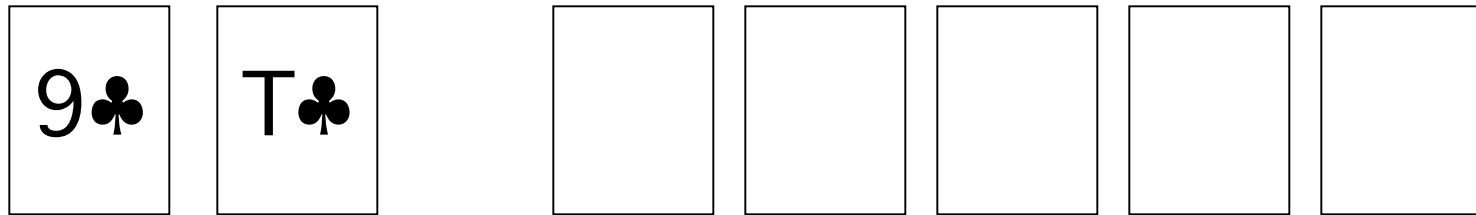
- [$1, $2], YOU, X, X, X, X, X, X, X
- Fold, call, or raise?

Exercise 4: $3 pot

9♣ T♣ ☐ ☐ ☐ ☐ ☐
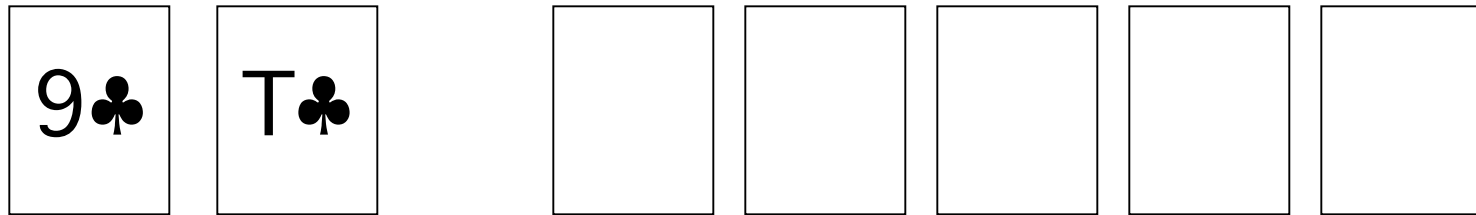
- [$1, $2], YOU, X, X, X, X, X, X, X
- Fold
- Too weak for early position

Exercise 4: $23 pot

| 9♣ | T♣ | | | | | |
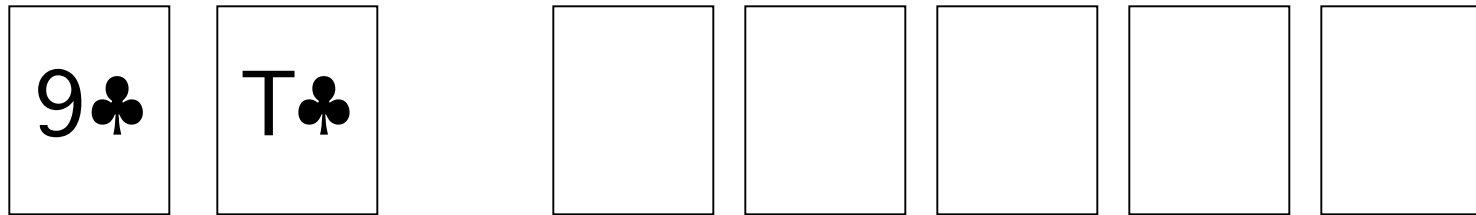
- Say you called
- [$1, $2], $2 (you), $4, $6, $8, F, F, F, F, F, YOU
- Do you now call ($8)?
- Of course not!

Exercise 5: $17 pot

9♣ T♣ ☐ ☐ ☐ ☐ ☐
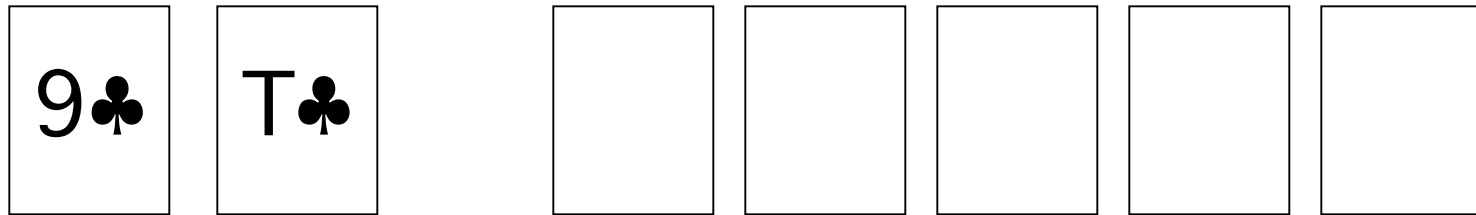
- [$1, $2], $2, $2, $2, $2, $2, $2, $2, YOU
- Fold, call, or raise?

Exercise 5: $17 pot

9♣ T♣ ☐ ☐ ☐ ☐ ☐
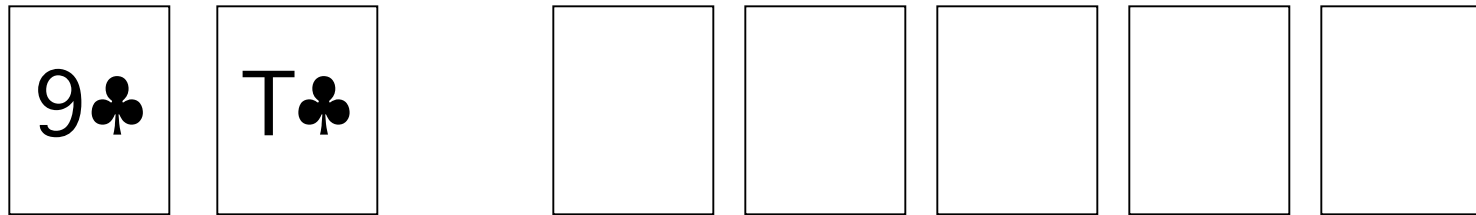
- [$1, $2], $2, $2, $2, $2, $2, $2, $2, YOU
- Call
- You may get T's or 9's, or a flush draw, or a straight draw
- Position matters!

Exercise 6: $12 pot

| J♠ | 6♥ | | | | | |
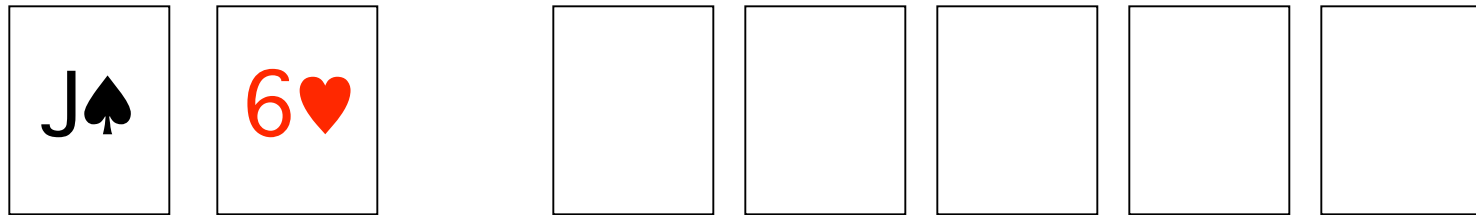
- [$1, $2 (you)], F, $2, $2, F, F, $2, $2, F, $1, YOU
- Fold, check, or raise?

Exercise 6: $12 pot

J♠ 6♥ ☐ ☐ ☐ ☐ ☐
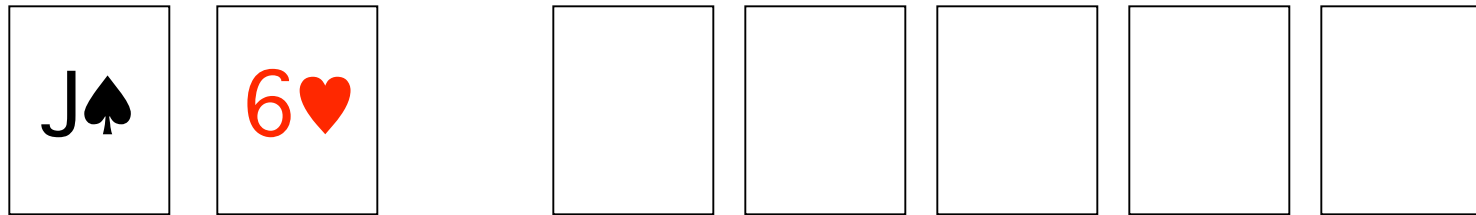
- [$1, $2 (you)], F, $2, $2, F, F, $2, $2, F, $1, YOU
- Check
- Poor hand, but costs you nothing
- You must hit flop to stay in

Exercise 7: $3 pot

K♠ Q♠
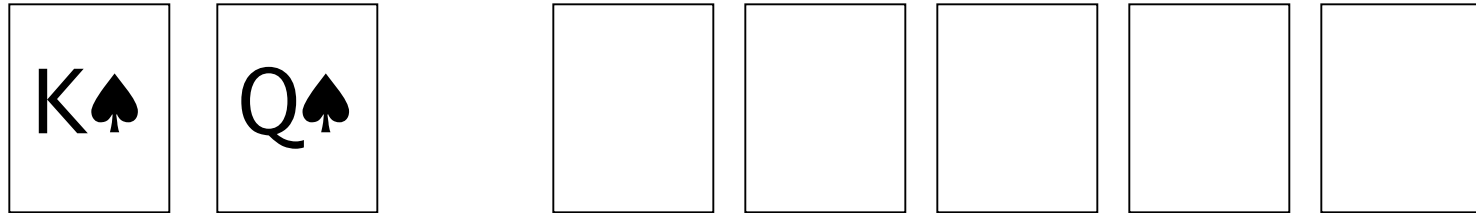
- [$1, $2], YOU, X, X, X, X, X, X, X
- Fold, call, or raise?

Exercise 7: $3 pot

K♠	Q♠					
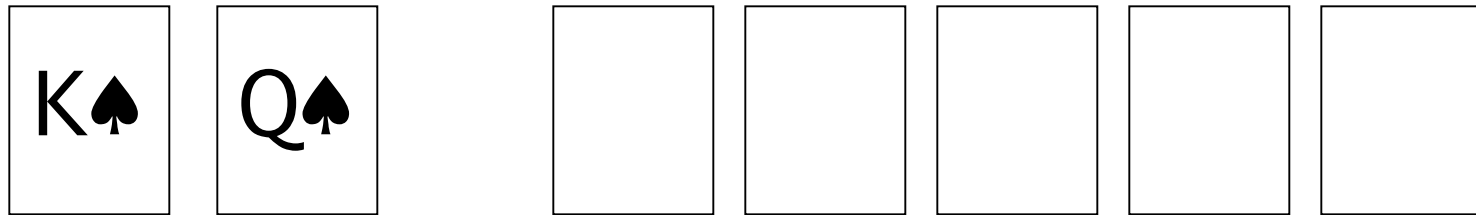
- [$1, $2], YOU, X, X, X, X, X, X, X
- Call
- Looks strong, but weak in early position
- Even a pair of 2's beats this hand!

Exercise 8: $3 pot

K♠ J♠
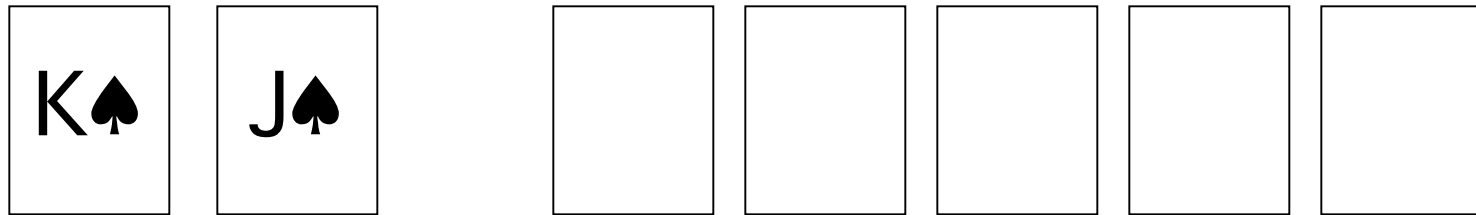
- [$1, $2], YOU, X, X, X, X, X, X, X
- Fold, call, or raise?

Exercise 8: $3 pot

K♠ J♠ ☐ ☐ ☐ ☐ ☐
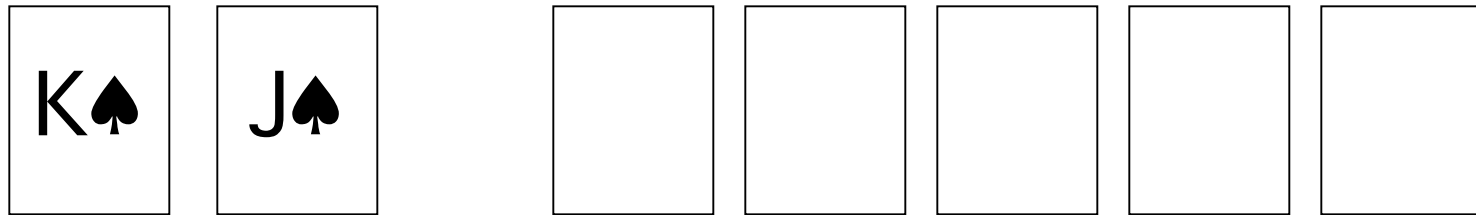
- [$1, $2], YOU, X, X, X, X, X, X, X
- Call
- Weakest playable hand in early position

Exercise 9: $7 pot

K♠ Q♣ ☐ ☐ ☐ ☐ ☐
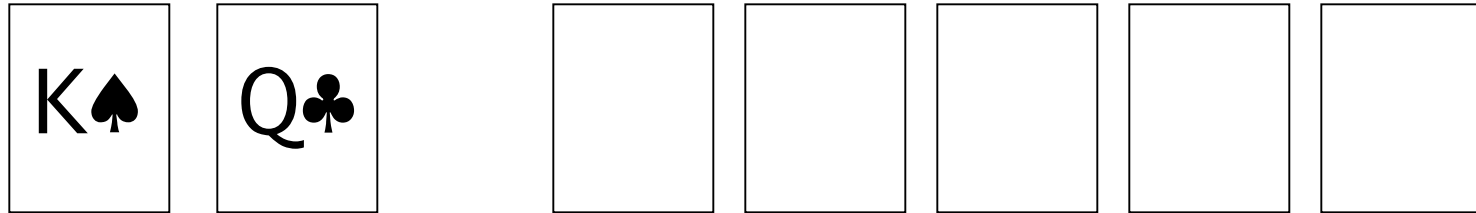
- [$1, $2], $2, $2, YOU, X, X, X, X, X
- Fold, call, or raise?

Exercise 9: $7 pot

K♠ Q♣ ☐ ☐ ☐ ☐ ☐
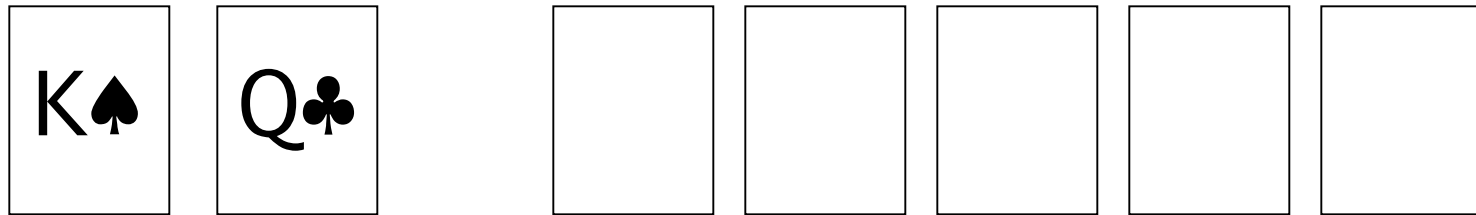
- [$1, $2], $2, $2, YOU, X, X, X, X, X
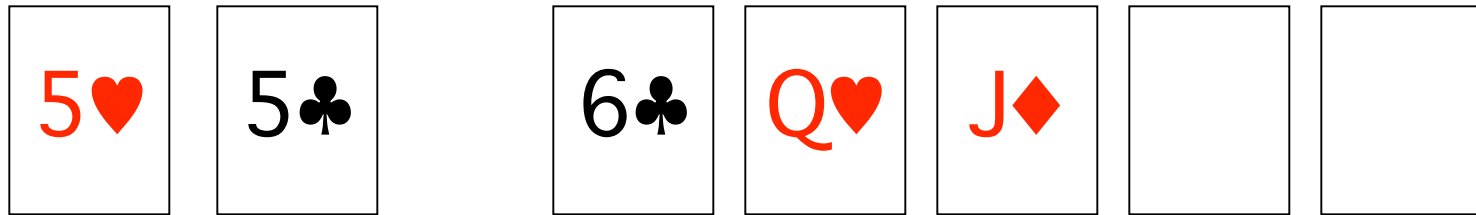- Fold
- Need to be 3 beyond BB to call this

Exercise 10: $7 pot

5♥ 5♣
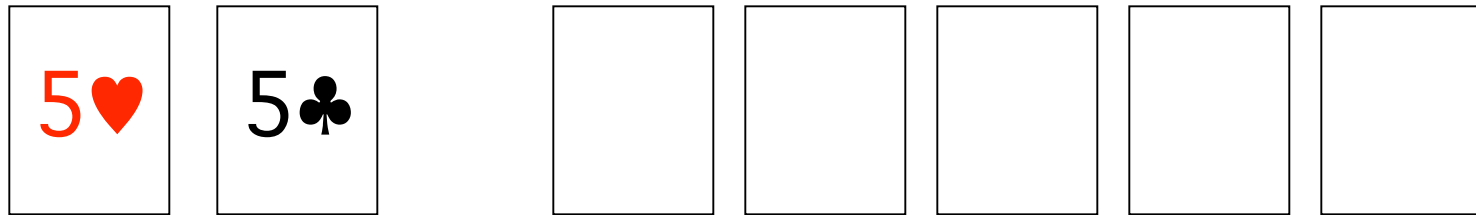
- [$1, $2], $2, $2, F, F, F, F, F, YOU
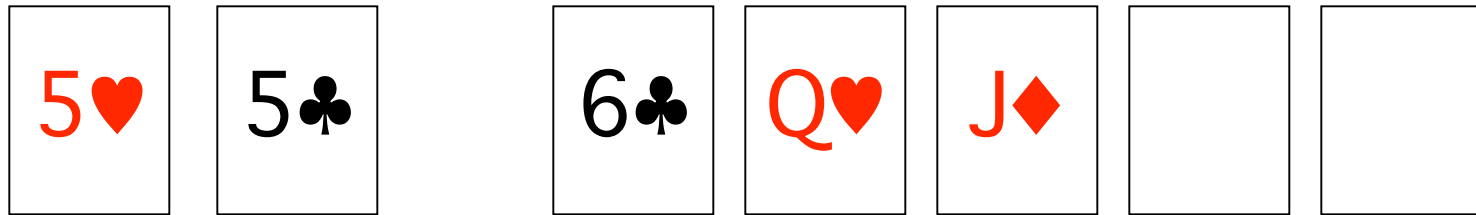- Fold, call, or raise?

Exercise 10: $7 pot

5♥ 5♣ ☐ ☐ ☐ ☐ ☐
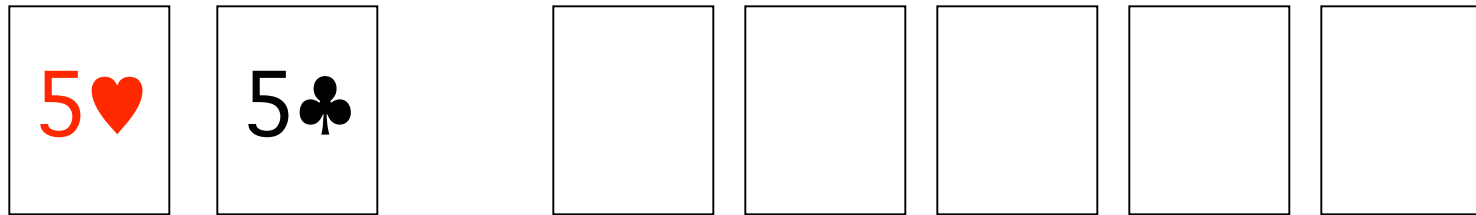
- [$1, $2], $2, $2, F, F, F, F, F, YOU
- Call
- You are last to act, pocket pair of 5's
- Pay to see the flop

Exercise 10: $11 pot

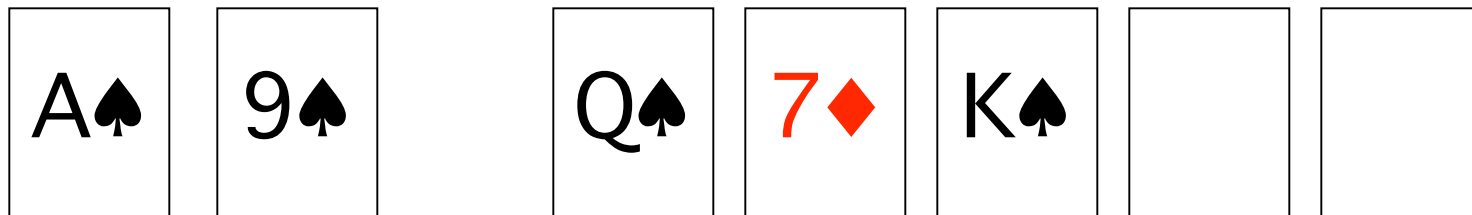5♥ 5♣   6♣ Q♥ J♦ □ □

- After flop: F, C, $2, F, YOU
- Fold, call, or raise?
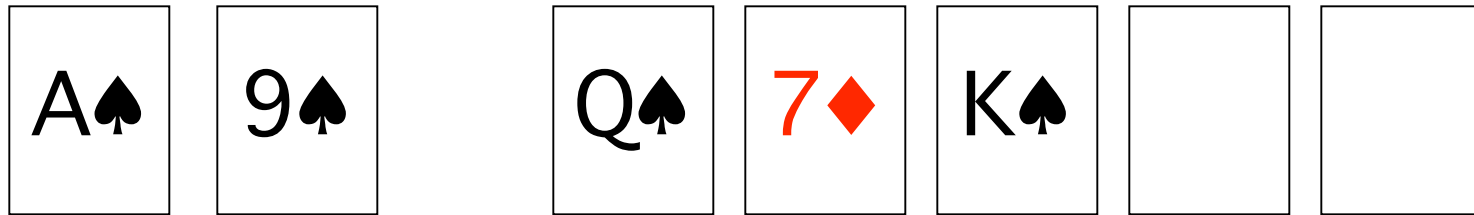
Exercise 10: $11 pot

5♥ 5♣ 6♣ Q♥ J♦

- After flop: F, C, $2, F, YOU
- Fold
- You missed the flop!
- Say another player has a 6, Q, or J
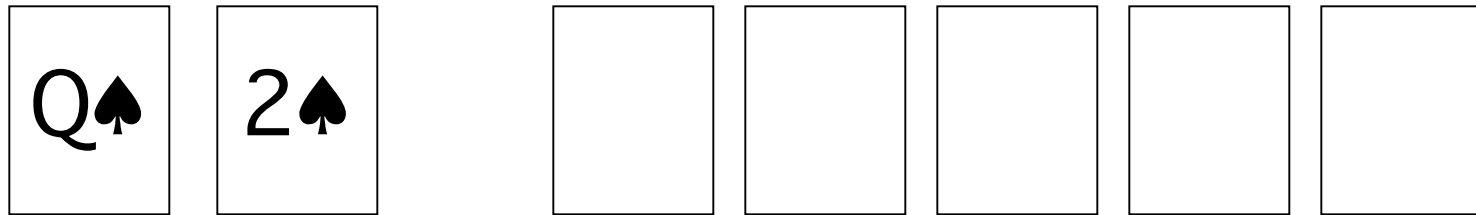- You need a 5: 22.5 to 1 (2 out of 47)

Exercise 11: $9 pot

A♠ 9♠   Q♠ 7♦ K♠ ☐ ☐

- [$1, $2 (you)], F, F, F, F, $4, F, F, F, F, $2 (you)
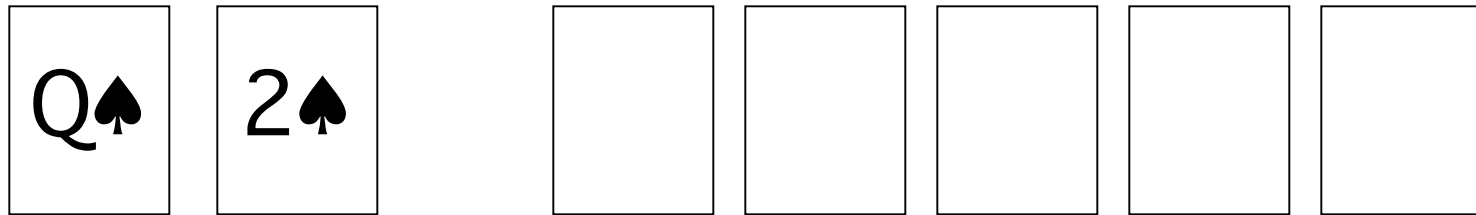- Post-flop: Fold, check, or bet?

Exercise 11: $9 pot

A♠ 9♠   Q♠ 7♦ K♠

- [$1, $2 (you)], F, F, F, F, $4, F, F, F, F, $2 (you)
- Bet
- If you check, you give opponent control
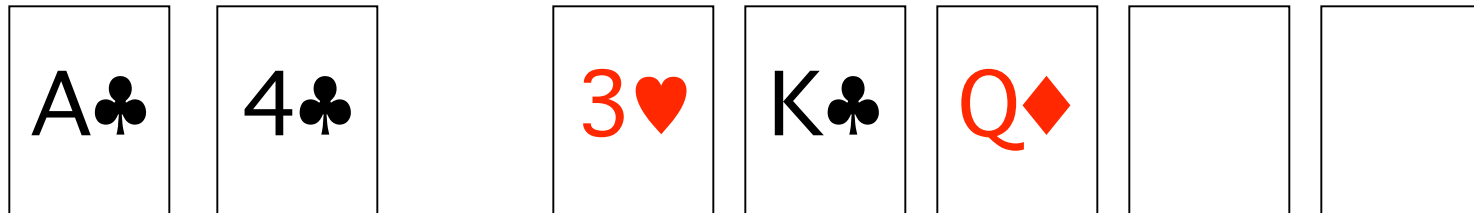- By betting, you are getting info cheaply

Exercise 12: $5 pot

Q♠ 2♠

- [$1, $2], $2, YOU, X, X, X, X, X, X
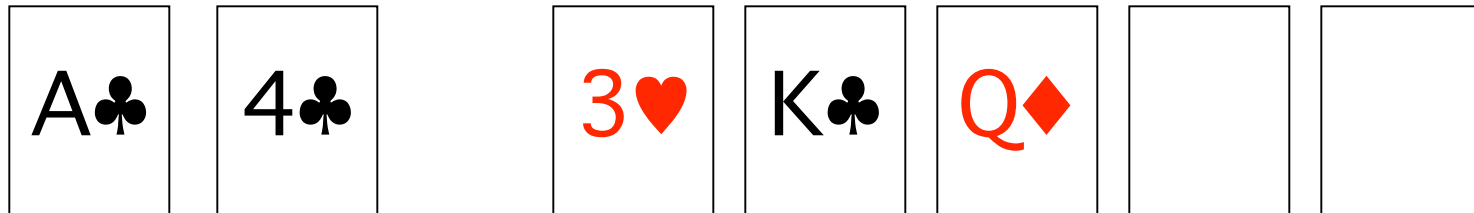- Fold, call, or raise?

Exercise 12: $5 pot

Q♠ 2♠

- [$1, $2], $2, YOU, X, X, X, X, X, X
- Fold
- Too weak, too many players behind you
- What if on flop: A-Q-9, or Q-J-8
- What if A or K on turn or river?

Exercise 13: $18 pot

A♣ 4♣   3♥ K♣ Q♦ ☐ ☐

- [$1, $2], $2, $2 (you), F, $2, F, F, $2, F, $1
- Post-flop: $2, $2, $2, YOU, X, X
- Fold, call, or raise?

Exercise 13: $18 pot

A♣ 4♣   3♥ K♣ Q♦ ☐ ☐

- [$1, $2], $2, $2 (you), F, $2, F, F, $2, F, $1
- Post-flop: $2, $2, $2, YOU, X, X
- Fold: you missed the flop
- You need 2 clubs: what are the odds?