55*, AJo+ JJ, QQ(87) kq!! alr

LET THERE BE RANGE!

Crushing SSNL/MSNL No-Limit Holdem Games

TRI ‚SLOWHABIT' NGUYEN AND COLE ‚CTS' SOUTH

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NONTRANSFERABLE

Table of Contents

▌▌ Chapter 1: Introduction

Who is the best player in the world?

The obvious answer to this question is a superuser. For those who don't know what a superuser is, it is a player who can see other players' cards. Naturally, to become the best player we must figure out a way to acquire this skill. Since the majority of us don't have parents who are shady executives at poker sites, it is impossible for us to be blessed with such greatness. The next best thing we can hope for is to make educated guesses what holdings an opponent may have. Our goal is to transform ourselves into pseudo-superusers. We hope by the last page you'll have enough knowledge to reach that status.

We will use position, bet sizing, combinatorics, and different lines to help us define our opponent's hand range. Once we have an idea of what Villain's hand range is, it's easy to express our creativity in situations where we want him to fold, call, or raise. You may be thinking that poker cannot be this easy; otherwise, everyone would be playing nosebleeds already. You're right. The thing is, the best players in the world estimate hand ranges better than you. Their guesstimates are more accurate and, thus, they are closer to achieving pseudo-superuser status than the playing field.

Chapter 2: The Fundamentals

No, it is not the fundamental theorem Sklansky came up with. It is the variables that you should take into consideration before making a poker decision. These variables are hand range, pot equity, and fold equity.

Hand range is a set of holdings your opponents may have based on their positions and actions in a given hand. **Pot equity** is your share of the total pot. **Fold equity** is the percentage of the time you win the pot without a showdown. Lastly, your **expected value** (EV) is the average win or loss on a specific hand.

Whenever high stakes players talk about a hand they use these variables and combinatorics, which will be discussed in the following chapter. These players employ a free program called PokerStove that computes your hand's equity against your opponent's estimated hand range. Naturally, you should continue in hands where your equity is high and typically fold in situations where your equity is low. Equity should be the first thing you think about before you decide to check, bet, or fold.
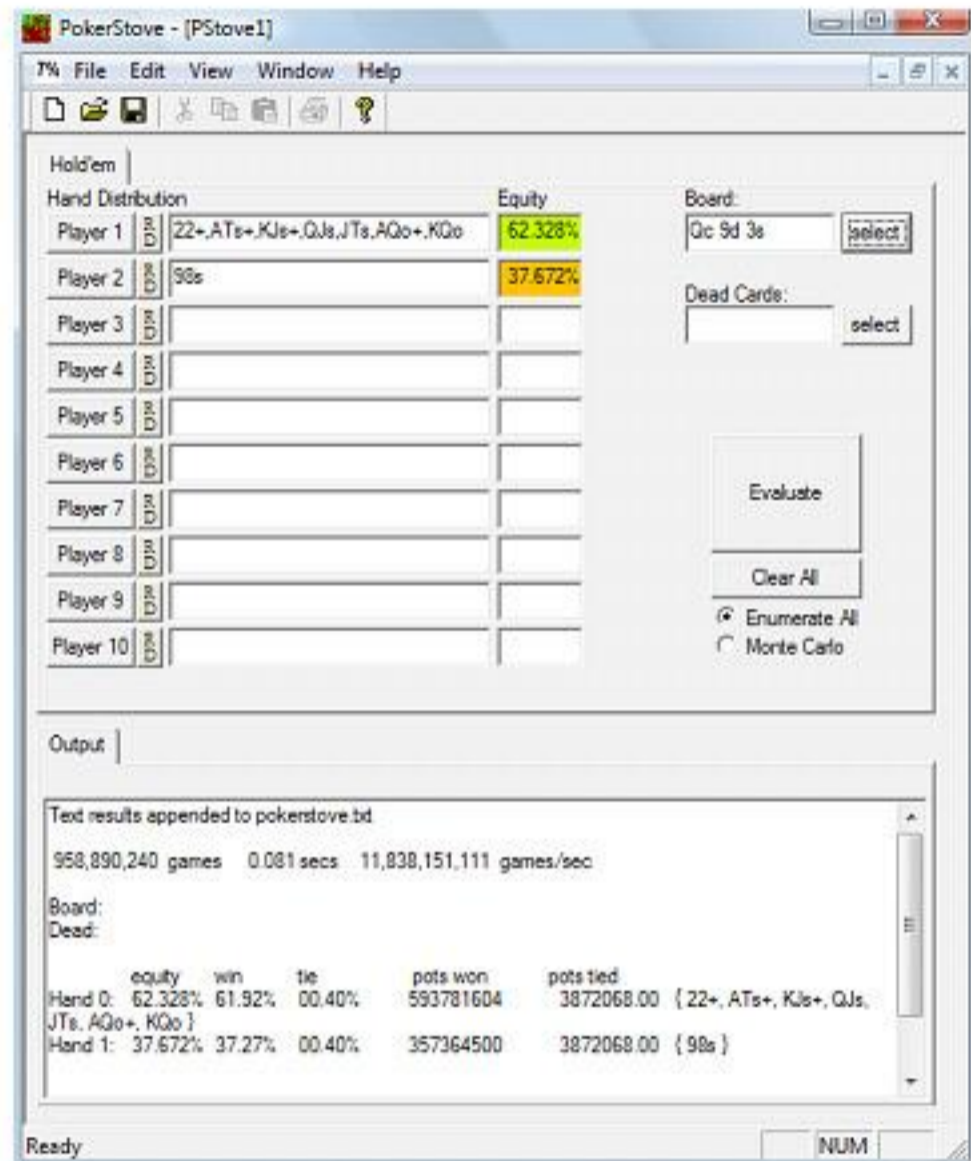
Figure 2.1: An example of a player analyzing his equity verses his opponent's range.

Folding equity can be solved using basic algebra. Below is the formula that shows how often an opponent has to fold in order to make a bet or push +EV. If you are too lazy to solve simple algebra problems, you can visit DailyVariance.com, click on FE Equation, and plug in the numbers.

Fold Equity Formula

X = Breakeven Folding Frequency   P = Current Size of the Pot

L = Maximum Loss   W = Maximum Gain

V = Villain's Equity   H = Hero's Equity

$$0 = XP + (1 - X)(-LV + WH)$$

▐▌ Chapter 3: Combinatorics

Don't let the title discourage you. Combinatorics in this context basically means combinations of hands. In hold'em, there are 1,326 possible hand combinations; because there's no difference among the six possible combinations of AA or the sixteen of 72o preflop, the number of hand combinations can be reduced to 169.

Suppose a really tight player opens UTG with 10% of his total hands in a regular 6-max game. Assuming he's opening with the top 10% of his hand range, Poker Stove reports his possible holdings as {77+, ATs+, KTs+, QJs, AJo+, KQo}. Let's enumerate these holdings to see how often he's opening with a premium hand.
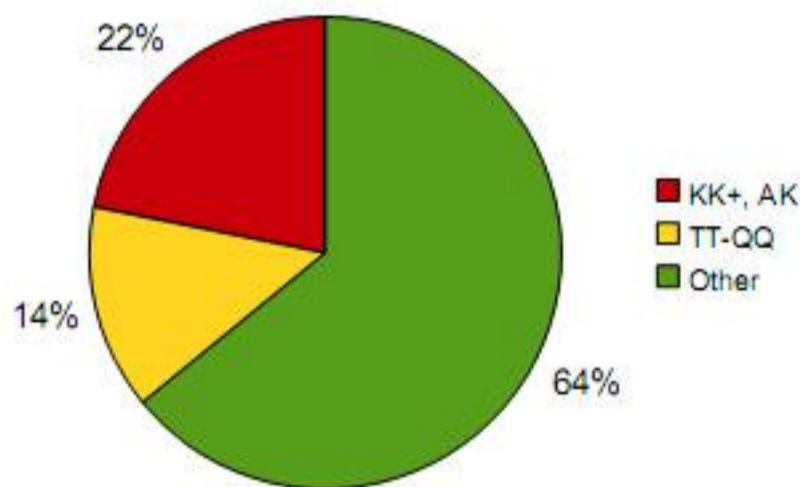
As you can see, despite opening with such a tight range, Villain will only have JJ+/AK about one-third of the time; two-thirds of the time he has unpaired hands. Thus, when Villain opens UTG and folds everything excluding TT+/AK, he's folding 82 out of 128 times. That's a lot of folding.

Figure 3.1: Graphical representation of UTG's opening and continuing ranges.

Premium Pairs	Medium Pairs	Large Unpaired	Large Suited
AA – 6	TT · 6	AK · 16	ATs · 4
KK – 6	99 · 6	AQ · 16	KJs · 4
QQ – 6	88 · 6	AJ · 16	KTs · 4
JJ · 6	77 · 6	KQ · 16	QJs · 4
		Total:	128 hands

JJ+, AK = 40 hands   Unpaired: 80 hands

Figure 3.2: Data table of UTG's opening range and their related combinations.

Example 3.1: $2/$4 6-Max
UTG opens to $14.
We re-raise his bet to $48.

In Example 3.1, we risk $48 to win $20. This means Villain has to fold 70.5% of the time for us to break even. We determined 70.5% by 48 / [20 + 48]. Considering that he will fold 82/128, or about 64%, this is almost enough fold equity to make this an EV neutral play. However, we haven't accounted for the times he may call with a big hand preflop, only to allow us to make a better hand or take it away post-flop.

Although this is a trivial example with a few assumptions regarding Villain's preflop play, it illustrates the simple concept of combinations. Now, how do we use the concept of combinations to hand read? Here is a simple example that should get you a little excited.

In Example 3.2, we open on the button and a particularly aggressive player three-bets us from the small blind. If we know he's the type to fire 100% of his range on a Kxx flop, we should call a lot in position and min-raise (or a little more than min-raise) his continuation bet. Here's why.

On a Kxx flop, the number of combinations Villain will bet/fold is more than the number of combinations that gives Villain a pair of Kings or better. On a Kxx flop, there are six combinations of AA, three combinations of KK, twelve combinations of AK, and twelve combinations of KQ. He'll re-raise with KJ about half the time, so that's six combinations. So on a Kxx flop, he can continue with 39 [6+3+12+12+6] hands. Before you think that is a lot, think of how many combinations are in his re-raising range. If he's re-raising KQ and KJ, he's likely to re-raise with TT+ and AJ+ as well. That's 50 [6+6+6+16+16] premium hands that he'll have to fold if we raise. We haven't accounted for the random suited connectors or small pocket pairs in his hand range yet!

Thus, because Villain is likely to continue only with a static set of hands, as his range widens the profitability of raising him increases.

Example 3.2: $3/$6 6-Max
SB: $800
BB: $203
UTG: $612
MP: $175
CO: $715
Hero (BTN): $620

Preflop: Hero is BTN with 7♣ 8♣
3 folds, Hero raises to $24, SB raises to $77, *1 fold*, Hero calls $53

Flop: ($160) K♣ 6♥ 4♠ (2 players)
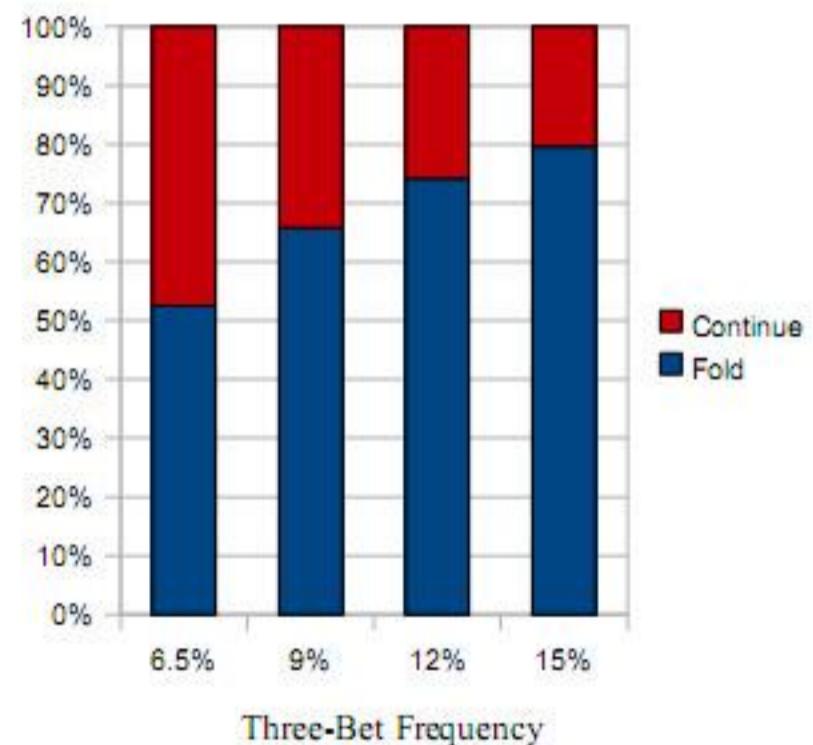SB bets $115, Hero raises to $230, SB tanks ...

Figure 3.3: Illustration of the high frequency with which aggressive three-bettors will need to fold to a flop raise.

Let's take a closer look at the EV calculation behind Example 3.2. After Villain makes a continuation bet, the total pot is $275. Thus, we only need to be successful 45.5% of the time to break even (230 / [275+230]). Since Villain will fold 50 hands and call with only 39 hands, we show an instant profit. Again, the 50 hands don't account for his non-premium holdings, such as suited connectors and small pocket pairs. We also haven't accounted for the times he has 66, 44, or 75 and won't fold. However, if you include those hands in his range, then the number of combinations that he will fold increases dramatically. That's because he will likely re-raise with hands such as 33, 55, 77, 89, 9T as well.

Exercise 3.1:

Record how many times the blinds check on K and A high flops after three-betting preflop. How often BTN checks behind on the same boards after three-betting a MP or CO player?

What if Villain is smart and starts shoving against our flop raise? One thing you should keep in mind is if Villain is smart, he wouldn't be continuation betting on Kxx flops with a 100% frequency in the first place. There's a large divide between what people actually do and what they should do; otherwise, poker wouldn't be as profitable.

But for the sake of discussion, let's assume Villain is smart and will recognize we won't have Kx that often and might re-bluff us. With such reads, we should consider shoving over his continuation bet or raise to an amount where Villain knows we are committed. Every time Villain calls, we have 24.5% equity since we have a gutshot and a backdoor flush draw. Under this scenario, how often does Villain have to fold for our bluff-raise to be profitable?

$$EV = X \text{ (pot size)} + (1 - X) \left[(-L \times \text{Villain's equity}) + W \times \text{Hero's equity)} \right]$$
$$0 = X(275) + (1-X) \left[-.755 (543) + (275+543) \times .245 \right]$$
$$0 = 275X - 210 + 210X$$
$$0 = 485X - 210$$
$$\mathbf{X = 43.25\%}$$

For our shove to break-even, Villain has to fold 43.25% of the time. If Villain is betting with 100% frequency on such flops, we should consider shoving every time. You might get some extra fold equity if you raise high enough that you've committed yourself to calling it off. This type of raise size may give the illusion that you want to lure Villain into the pot.

The decision to min-raise or to shove depends on two criteria: stack sizes and type of opponent. For 100BB stacks, the decision to min-raise or to shove shouldn't matter too much since Villain needs to fold the same percentage in both situations. Thus, if Villain is aggressive enough to re-bluff, we should be more inclined to shove over his flop bet. If not, we can use the min-raise (or slightly bigger than min-raise) as a cheap bluff. As stack size increases, we should use the min-raise more since it's cheaper than shoving over Villain's continuation bet.

Another adjustment we can make if Villain starts shoving against our flop raise is to tighten up our preflop range and min-raise his flop bet with our monsters until he adjusts. As you improve, you will notice poker is all about adjusting. It is like a game of rock-paper-scissors, and whoever adjusts the best wins. Fortunately, the majority of low to mid-stakes players don't adjust or they over-adjust, which is basically the same thing.

How To Find Combinations

Unpaired Hands

Step 1: Find total number of cards

Step 2: Multiply available cards

Step 3: Add each product

Example: How many combinations of AK and AQ are there on an A 2 5 flop?

Solution:
(3 Aces)(4 Kings) + (3 Aces)(4 Queens)
12 AK + 12 AQ
24 combinations

Paired Hands

Step 1: Find total number of cards

Step 2: Solve $\dfrac{C(C-1)}{2}$

Step 3: Add each quotient

Example: How many combinations of 22 and 55 on an A 2 5 flop?

Solution: $\dfrac{3 \cdot 2}{2} + \dfrac{3 \cdot 2}{2} = 6$

Putting It Together

Here's an example where we use combinatorics to analyze a hand.

Villain is a solid 21/17/2.5 type opponent. Hero probably has the same image and a 35% stealing frequency. When Hero opens on the button, Villain usually re-raises from the SB with AK, sometimes raises with KQ, and rarely raises with KJ/KT. When Villain check-raises the flop, he's representing a big king, 88, or 44. Villain's range also includes flush draws and occasionally a gut-shot.

It's not often he's check-raising this flop with KQ, KJ, or KT. The reason is if he's the type of player who check-raises this type of flop with these holdings, then he's the type to re-raise preflop with these hands as well. Players who check-raise with hands like KQ, KJ, and KT on this board understand their image well enough to know that they will get called lightly or played back against. It's suicidal for a nit to check-raise these hands on this flop because he ends up overplaying his hand. That's why you hear a lot of nits cry "that's the bottom of my range" whenever they get called and lose. That's the thing: When people call, they are hoping you are at the bottom of your range. Otherwise, they wouldn't have called.

Example 3.3: $10/$20 6-Max

SB: $3287

BB: $1484

UTG: $2020

MP: $2262

CO: $2994

Hero/Tri (BTN): $2670

Preflop: Hero is BTN with A♣ 8♣

3 folds, Hero raises to $80, SB calls $70, *1 fold*

Flop: ($180) K♣ 8♥ 4♥ (2 players)

SB checks, Hero bets $135, SB raises to $415, Hero calls $280

Turn: ($1010) 6♣

SB bets $750, Hero calls $750

River: ($2510) Q ♠

SB goes all-in, Hero calls all-in

As for the hand, since he doesn't have a pair of kings often, what else is he check-raising with? We don't have the A♥ so that increases the chances Villain check-raised with the nut flush draw. Holding an ace also decreases the chance that Villain might slow play AK preflop since there are only nine combinations of AK. We also hold an 8 so there's only one combination of 88 left. There are three combinations of 44.

Now let's estimate the number of hands Villain is representing: four combinations of sets, very rarely will he have a king, and a lot of flush draw combinations. We can estimate his flush draws as {A♥ X♥, J♥ T♥, Q♥ T♥, 9♥ T♥}. So Hero called.

On the turn, Villain bets again. The six strengthened Villain's hand range in that he might have turned a pair of sixes to go with his combo draw on the flop. He might have turned a straight draw to go with his flush draw. Or he might have picked up the flush draw. Using PokerStove, against a range of {88, 44, A♥Q♥, A♥J♥, A♥T♥, A♥5♥, A♥4♥, A♥3♥, A♥2♥, K♥Q♥, Q♥J♥, Q♥T♥, J♥T♥, J♥9♥, T♥9♥, 7♥6♥, 6♥5♥, KQo} our equity is 47%. If we remove KQ from his range our equity rises to 60%. Getting two to one, Hero called.

On the river, his hand range remained the same. He might be a sick player who's shoving a pair of queens on the river as a bluff and for thin value. However, this is rare since most Villains think a pair of queens is good on the river and want a cheap showdown instead.

When Villain shoved, he either had the nuts or a busted draw (oh that sounds familiar). He might have AK. Against the hand range we gave him earlier, we're good about 38% of the time while getting two to one. Considering that he could have played his draws in this manner, plus the chance that he only plays KQ like this some of the time, Hero called. I won when he showed me A♥J♥.

Example 3.4 demonstrates another common situation. Consider a rainbow board composed of one high card and two low cards, such as {Q 2 4, K 3 8}. In these situations, do you see how narrow his range is if we hold A4 or A8? Unless he's the type to flat AA, KK, and AK preflop occasionally, we should continue playing the hand, especially if Villain has a tendency to check-fold on the turn if we call his flop check-raise. If you don't know whether he does or not, call his check-raise next time and see what he does. How else are you going to know?

Example 3.4: $3/6 NL 6-max – 6 Players

SB: $660

BB: $770

UTG: $676

MP: $100

CO: $721

Hero (BTN): $640

Preflop: Hero is BTN with A♠ 4♠

3 folds, Hero raises to $24, 1 fold, BB calls $18.

Flop: ($51) K♦ 8♥ 4♣ (2 players)

BB checks, Hero bets $43, BB raises to $120, Hero raises to $234, BB folds