

# Chapter 9:

## *Inferring Leaves*

Many Scrabble skills can be easily compared to other popular games. While the comparison to other word games is obvious, and the comparison to other board games (such as go or chess) makes sense when you compare board dynamics, Scrabble also shares something in common with a seemingly surprising relative: poker.

In poker, one of the main objectives is to decipher your opponent's cards based on their previous betting patterns. Several pieces of information are used in this mission, including their physical tics, betting amounts, and the way that they've played previous hands. Using this information, people try to narrow down a group of hands their opponent might hold in a process called *range finding*. The goal of range finding is to find a group of possible hands (a range) that your opponent could have (including bluffs) such that their actions make sense, given rational behavior and/or history. Given this information, players then decide whether or not to call their opponent.

A very similar action occurs in Scrabble, albeit with a different goal: players try to figure out their opponent's leaves given their prior play. This is useful information, as it allows players to figure out which spots to block and which spots to leave open. Unlike poker, in Scrabble the challenge is made more complex by the fact that players draw new tiles. However, when executed correctly, you can often prevent your opponent from scoring well using information about their rack acquired from their previous plays.

Range finding obtains information about your opponent's leave by assuming that your opponent's last play is optimal and using that assumption to deduce which tiles your opponent likely does and does not have. Positive leave inference deduces what tiles your opponent has on their rack, while negative leave inference deduces what tiles are *not* on your opponent's rack.

With this information, you can make setups or block the board as necessary. Range finding allows you to exploit bad leaves or protect against strong leaves. The effectiveness of range finding depends on your opponent's skill level, as it is easier to draw information from stronger opponents since they have a more consistent thought process and are less likely to miss plays.



To figure out what your opponent is holding, you need to play detective, hunting for clues and solving the mystery that is your opponent's rack. To accomplish this, you need to look for evidence, such as the following:

- *Your opponent's skill level:* Leave inference works best against strong predictable opponents who find the best play consistently. It is not a good weapon against the weak, or against sly, chaotic players who play unconventionally.
- *Time taken:* Quick plays indicate your opponent had few alternatives last turn, whereas deliberate plays indicate your opponent had several options to choose from. Quick plays are signs of good leaves or heavy duplication.
- *Background Check:* What has your opponent done recently? Your opponent's last move often leaves behind a paper trail, giving you information on the tiles that remain (known as positive leave inference), as well as allowing you to eliminate possible tiles from consideration (known as negative leave inference).
- *Check their story:* Quick plays indicate your opponent had few alternatives last turn, whereas deliberate plays indicate your opponent had several options to choose from. Quick plays are signs of good leaves or heavy duplication. Think about whether their story make sense: if someone plays off AWA for 25 immediately, it makes a lot of sense that they have a third A: however, if they took 4 minutes to do so, the idea that they have a third A makes a lot less sense.
- *The Silent Interrogation:* Often, suspects give away their tiles by their physical tics and body language, especially as they draw tiles or search for plays on the board. Deliberate movements or improvements in posture are often signs of a strong rack (such as a blank), while worse posture or disinterest are often signs of a weak rack. Players often gaze at spots they are going to use, although some players will consciously look at every spot \*except\* the spot they plan to use.
- *Suspicious behavior:* Rapid and dramatic changes in behavior often mean that your opponent's rack is polarized: either extremely good or extremely bad. Sporadic shuffling often indicates a blank, while players who separate their rack into sets of three or four tiles often have a bad rack with clunky tiles.

## Positive Leave Inference

Many times players make setups or fishing plays that give their opponents a very clear idea of what they are holding. Some examples are listed below:

Diagram 1:



Last play: LET n12 (15)

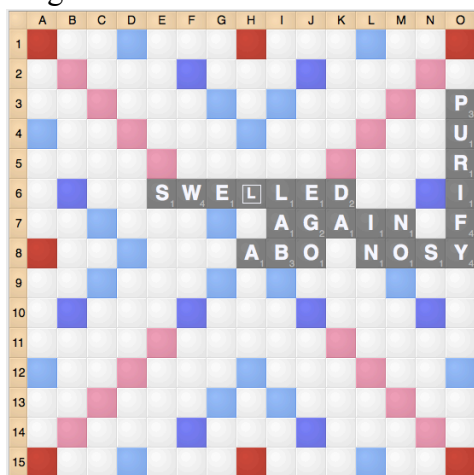
Diagram 2:



Last play: OI n13 (6)

In Diagram 1, your opponent plays LET for 15 points, creating an S spot, and indicating an S on their rack. This type of situation happens very often in Scrabble. In Diagram 2, your opponent plays OI, creating a spot for an L that is difficult to block.

Diagram 3:



Last play: PURIFY

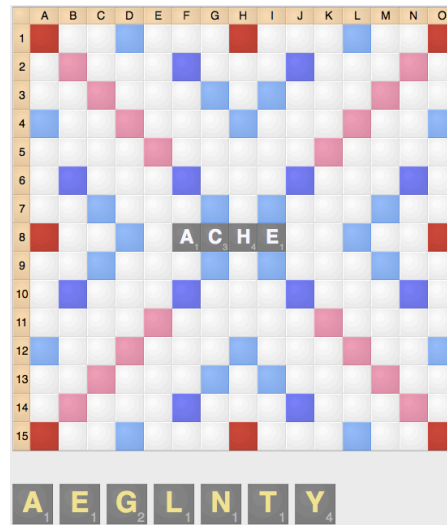
Diagram 4:



Last play: URD 4k (10)

In Diagram 3, it is less clear what your opponent is setting up: either the X spot at n4 or the PURIFY extension, but it is very likely at least one of those plays is imminent. In Diagram 4, your opponent plays URD instead of PUD, which allows you to infer two different things: a second R for RAI and an S hook for URDS.

## Negative Leave Inference



Last play: ACHE

Negative leave inference uses the process of elimination to deduce which tiles your opponent does NOT have given their previous play. For example, on the opening play, your skilled opponent has played ACHE. This may seem like a benign play that gives you little information, but upon further inspection, it can tell you quite a lot. First, let's analyze which tiles your opponent cannot have. The following tiles cannot be in your opponent's rack because the word sitting alongside each tile would be a better play.

B: BEACH	C: CACHE	D: ACHED	F: CHAFE	G: GACH	H: HAH
J: HAJ	K: HACEK	L: LEACH	M: MACHE	N: HANCE	P: PEACH
R: REACH	T: TEACH	V: HAVE	W: CHAW	Y: ACHY	Z: CHEZ

Therefore, it is unlikely that any of these letters are in our opponent's rack. The tiles remaining are AEIOSUX?. In addition, other letters and combinations are unlikely: for instance, your opponent often doesn't have an X (HEX/AXE/HOAX), I (CHIA), O (ECHO/HAO/CHIAO), or U (EAU/HUE/SAUCH) but they will some of the time.

Meanwhile, tiles like the E and A are extremely likely as duplicates, along with a consonant, which by the process of elimination is probably an S or a blank, since most 3 vowel leaves would elect to exchange.

This demonstrates the power of range finding: you can find out a lot of information from as little as one play. In the above position, range finding can lead you to make a more defensive play, such as GEY i7 (13). In other positions, you can make a setup, feeling somewhat confident that your opponent did not keep tiles that can use that setup.

Range finding is a powerful weapon, especially later in the game when your opponent has used few tiles. By using range finding, you can obtain information about your opponent's remaining tiles and defend against them.

Diagram 1:



Score: 219-225

Choices: EDAPHIC 15a (54),

PORCH j6 (50), AG 2n (18)

Opponent's last play: SHARK 1j (12)

Diagram 2:



Score: 173-172

Choices: AXONES 14i (60), OX b1 (38)

Opponent's last play: EVIL

In Diagram 1, your opponent has just played SHARK. Although only one S remains, you can safely conclude your opponent has the S. Thus, the best play is AG, inhibiting column o and limiting your opponent's setup.

In Diagram 2, OX and AXONES have a similar valuation. OX heavily relies on line a being available; if you think that your opponent will block column a, then you should play AXONES. However, if your opponent had an S, they would have played VISE at a12 for 46 points. Since you know they did not have an S on their rack last turn, you should play OX as column a will rarely be blocked.

Diagram 3:



Choices: AVENGER 7i (72),  
ENGRAVE 9i (71)  
Last play: PHEW

Diagram 4:



Choices: YEH 6b (31), DYE 9g (30)  
GREEDY n5 (21), GEY 6b (25)  
Last play: FA 7c (14)

In Diagram 3, you must choose between two bonuses that leave a dangerous opening along column o for your opponent. You are given a valuable piece of information: you can assume that PHEW must be the best play for your opponent. From this, you can draw conclusions about your opponent's rack that can help you figure out your best play.

Your opponent cannot have an E or L (WHEEP or WHELP). You can also conclude the E is the only vowel in their rack. (Your opponent is not keeping another vowel over E, and if they have another vowel, they would have played WHAP/WHIP/WHOP/WHUP.) Therefore, your opponent doesn't have a vowel.

You can narrow the rack ever further. Your opponent does not have a W (WHEW), or J (JEW), etc. However, tiles like the blank and R are a very real possibility: not because they did anything to set those tiles up, but because there are so many tiles that cannot be in your opponent's rack.

Because of these inferences, you can conclude that hanging an R is much less dangerous than an E. Thus, you should hang the R in column o by playing AVENGER.

In Diagram 4, you can conclude that your opponent has bonus prone tiles since they played FA for 14. If your opponent had weaker tiles, they would have played more than two tiles last turn. Because of your opponent's strong rack, you should close down the last good bonus line by playing GREEDY, turning their bonus-prone tiles into a mediocre rack.

Diagram 5:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Red			2LS				Red				2LS			Red
2		2WS			3LS				3LS					2WS	
3			2WS			2LS		2LS					2WS		
4	2LS			2WS			2LS				2WS			2LS	
5					2WS					2WS					
6		2LS				3LS			2LS					2LS	
7			2LS				2LS		2LS				2LS		
8	Red			2LS				☆				2LS			Red
9			2LS			2LS			2LS				2LS		
10		2LS				3LS				3LS				2LS	
11					2WS						2WS				
12	2LS			2WS			2LS				2WS			2LS	
13		2WS				2LS		2LS				2WS			
14	2WS				2LS			3LS					2WS		
15	Red			2LS				Red				2LS			Red

S<sub>1</sub> T<sub>1</sub> O<sub>1</sub> M<sub>3</sub> A<sub>1</sub> T<sub>1</sub> E<sub>1</sub>

Opponent's last play: Exch. 1

Diagram 6:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Red			2LS				Red				2LS			Red
2		2WS			3LS				3LS					2WS	
3			2WS			2LS		2LS					2WS		
4	2LS			2WS			2LS				2WS			2LS	
5					2WS					2WS					
6		2LS				3LS			2LS					2LS	
7			2LS				2LS		2LS				2LS		
8	Red			2LS				☆				2LS			Red
9			2LS			2LS			2LS				2LS		
10		2LS				3LS				3LS				2LS	
11					2WS						2WS				
12	2LS			2WS			2LS				2WS			2LS	
13		2WS				2LS		2LS				2WS			
14	2WS				2LS			3LS					2WS		
15	Red			2LS				Red				2LS			Red

L<sub>1</sub> O<sub>1</sub> C<sub>3</sub> K<sub>5</sub> I<sub>1</sub> N<sub>2</sub> G<sub>2</sub>

Opponent's last play: Exch. 1

In both racks, your opponent has exchanged one tile. Because of their previous play, you know that your opponent is close to a bonus.

Your opponent will not have bad bonus tiles after exchanging 1. Thus, you can eliminate tiles such as the B, F, G, J, K, U, V, W, and Y from your opponent's range, since very few people would keep these tiles on their rack.

Against better players, you can eliminate other tiles from your opponent's range. After exchanging one tile, good players only keep tiles with strong bonus potential. Good players also probably don't have the blank in their rack, since with a blank it is likely that they already have a bonus in their rack. Average bonus tiles such as the D, H, O, and P are far less likely.

In Diagram 5, you should consider playing STOMATE 8b, setting up the O-STOMATE hook. Most opponents' racks after a one-tile exchange do not contain an O. By playing STOMATE at 8b, you give yourself a good scoring spot for next turn, as you will draw an O more than half of the time.

In Diagram 6, you should consider playing LOCKING at 8b, setting up the B, C, and F hooks. Your opponent is unlikely to have any of these hooks since they exchanged one tile last turn. While they might have kept the C, it is unlikely since there are only 2 Cs, and your opponent will rarely retain the B or F after a one tile exchange.

In both diagrams, you would not take this risk unless it was after an exchange, since you will be ahead after your bonus and your opponent could annul your bonus by simply hooking your bonus. However, because your opponent's last play gave you information about their rack, you can afford to take these risks, especially with your opponent's impending bonus looming.



Diagram 7:



Score: 143-155

Choices: EURO 14a (19), ORLE 10b (20)

ROULE 10a (21), OUT e11 (15)

Opp. takes 3 minutes to play AQUA e6 (15) Last play: HAWK 111 (32)

Diagram 8:



Score: 112-90

Choices: YEA m12 (33), AYE m11 (32),

YEAR m12 (35)

Last play: HAWK 111 (32)

Diagram 7 features several plays with comparable point-leave combinations. ROULE can be ruled out quickly (since you have an R and that R is far better for your opponent than you) and OUT can be ruled out as well since it keeps to Rs and seems slightly inferior to ORLE. However, comparing EURO and ORLE is a bit trickier.

While OR? is a much better leave, the E at 14a is scary to leave open since your opponent could use column a to score or play a very high-scoring bonus. In this example, you can use the amount of time they took as an indicator of their rack strength.

Since your opponent took so long to play, it is likely they have a rack of complete junk. Since there is nowhere else for AQA to play, and AQUA was only 15 points, it is likely that they were deciding between AQUA and other lousy plays or exchanges with bad tiles, such as AEIP or AINN.

If your opponent played AQUA in 30 seconds, your decision would change. While your opponent might play AQUA with a leave such as ANRS, it is unlikely your opponent would have taken so long, since there is no realistic alternative. Since there were alternatives and AQUA scores so few points, your opponent often has a weak rack.

Because your opponent often has weak tiles, EURO is a much better play than ORLE because of the better leave, and because the E at 14a is unlikely to be used for a big score by your opponent. Your opponent might leave the E for you to use next turn.

In Diagram 8, many players incorrectly infer an S. While your opponent is more likely than normal to have an S, it is still likely that they don't have one. If you knew that your opponent had an S, then YEAR may be the best play, but since your opponent likely does not have the S, you should play AYE or YEA.

When using positive leave inference, it is important to realize that sometimes positive leave inference is probabilistic: while a player might be likely to have a specific tile, they can still have plenty of leaves which don't contain the tile that you are inferring.

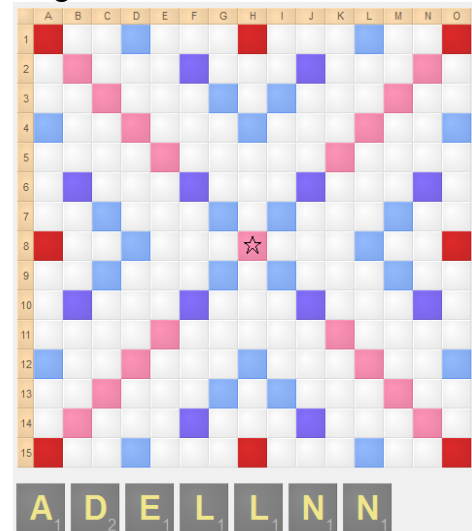


Diagram 9:



Choices: JOT i8 (10), GATER m3 (32),  
GNAT 10f (24)  
Last play: RAD l4 (25)

Diagram 10:



Choices: LAND 8g (10), LEND 8g (10),  
Ex. 3 (ADEN), Ex. 2 (ADELN)  
Last play: Exch. 2

In Diagram 9, JOT appears to be a strong fishing play. However, the strength of the AEGNRT leave depends on whether the JOT-A hook stays open, since many bonuses do not fit on this board if that hook is blocked. AEGNRT is a strong leave, forming a bonus with A, D, E, F, I, L, M, N, O, P, R, S, U, W, and Y, but if the JOTA hook is closed, only bonuses with the D, E, F, I, O, and S will fit on the board.

However, there are two major drawbacks to JOT. One drawback is that JOT looks like a fishing play, meaning that your opponent is more likely to block the JOTA hook whenever possible. Since JOT only scores 10 points, your opponent can conclude that you have a strong bonus rack.

The second drawback is that your opponent's last play implies the A. If your opponent had other high point consonants or vowels, they would've made another play (such as DAY, RID, or READ). There are few racks your opponent might have which make RAD the correct play, and nearly all of those racks contain an A in their leave. Therefore, JOT is not a very strong play: both GNAT and GATER are better.

In Diagram 10, your opponent has exchanged two tiles, indicating a strong bonus leave. However, you have no good blocking play available. Since you have a decent rack, your best option is to exchange and two tiles, keeping the ADELN leave.

Exchanging minimizes the odds of your opponent playing a bonus, since they must have a seven letter word in their rack. Even if your opponent plays a bonus, their bonus allows you seven (presumably good) tiles to play an 8-letter word through, so you will often respond with a bonus yourself.

## Puzzle Break #9

Find the best play using leave inference. Answers on page 217.

Diagram 1:



Score: 210-314

Choices: SCrIEVE o3 (104),  
VESICIE o1 (108), VESICaE o1 (108)  
Last play: JUTE 6b (27)

Diagram 2:



Score: 352-348

Choices: ANOA 6g (19),  
LAUAN 14d (14), Exch. 7  
Last play: CUT n1 (24)  
Pool: ABDEEIIIMNOPRRSTVX

Diagram 3:



Score: 34-5

Last Play: ECU h7 (5)

Diagram 4:



Score: 114-108

Last play: HIT 12i (12)