

# Reading Complex Waits

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Adapted from the work of  纯全三色对对和

## Introduction

In mahjong, it is notoriously difficult to quickly and accurately determine what tiles a closed full flush hand is waiting on. There is an apparent lack of a detailed, comprehensive guide for how to read such waits in English. This article attempts to fill this gap.











In terms of application, full flushes are rare in Japanese Modern mahjong, occurring in around 1% of hands, with closed, complex shapes diminishingly rare compared to even that. Despite this, some players find complex shapes interesting and worth studying on their own. Players of other variants of mahjong, such as Sanma and SBR, may find themselves applying this knowledge more often, as these games give full flushes a more enticing effort-reward ratio.

Most of the content is translated and adapted from “多面听分析” by 纯全三色对对和 (<https://www.bilibili.com/read/readlist/rl119817>), with some changes to sectioning and formatting to aid comprehension, minor edits for accuracy, and some additions for basic knowledge the original author omitted.



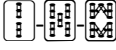
## Preliminary Material

### Basic Wait Patterns

There are five basic wait patterns in mahjong:

Name	Description	Example	Waits On
Open wait	Two consecutive tiles, waiting for another tile on either end.		
Closed Wait	Two tiles with a difference of 2, waiting for a tile in between.		
Edge Wait	12 waiting for 3, or 89 waiting for 7.		
Pair Wait	Two identical pairs, waiting for a third copy of either.		
Single Wait	With four complete sets, waiting to match the last tile.		

### Suji

Tiles with a difference of 3 are said to share a *suji*, loosely translated as “interval”. For example,  is a *suji*, as is . Depending on context, three tiles like  may be considered a single *suji*, or two *suji* that share a tile. For reading complex waits, the first definition is more useful, and will be used throughout this article.

## Extending Waits

Wait patterns can be **extended** if they are adjacent to completed sets in specific ways. Such extensions are the basic building blocks of complex waits.

A **completed sequence** extends **any wait** along a *suji* if **one end of the sequence overlaps the wait**.

Shape	Waits	Extension	Extended Shape	Extended Waits

\*These are usually interpreted as simple open waits. The examples show how they can be considered extensions instead.

A **single wait** can not only be extended by a sequence whose end overlaps the wait as seen above, but also along a *suji* by a **sequence adjacent to the wait**, in which case the extended wait is also a **single wait**. In addition, a **single wait** can also be extended to outside its *suji* by **any triplet 1 or 2 numbers away** from it.

Shape	Waits	Extension	Extended Shape	Extended Waits

The above shows **single waits can be extended in more ways** than other wait patterns. This means when counting waits of partial hands as an intermediate step to counting waits of the whole hand, **it is important which waits can be considered single waits**.

Finally, a **pair wait** can be extended along a *suji* by **two adjacent identical sequences**. This occurs far less often than any of the above and is included for completeness.

Shape	Waits	Extension	Extended Shape	Extended Waits

## The Method

From the above, a systematic method can be devised to read the waits of complex shapes:

- Separate one completed set (usually a sequence) from the hand.
  - Sometimes, it helps to separate a pair instead.
- Compare the resulting partial hand with a list of memorized **core shapes**.
  - If a memorized shape matches, proceed to the next step.
  - If no memorized shape matches, separate another completed set, and try again.
- List the waits of the core shape. **Note which waits can be considered single waits.**
- Add the separated sets back to the hand. If this extends any existing waits, list the new waits.
  - Repeat until all separated sets are added.
  - Sets can be added in any order.

There are two caveats to this method:

- Some memorization is required. The speed and accuracy of the method depends on how many and how accurately core shapes are memorized. While most core shapes can be broken down using the method itself to obtain even simpler shapes, it's probably best to memorize at least a few frequent core shapes to speed up the process.
- When separating completed sets from the hand, care must be taken to avoid missing other possible ways those tiles could be used. Much of this article focuses on how to avoid such misses. In some cases, a hand must be subdivided more than once, each by separating different sets, to be counted thoroughly.



















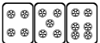



Shortcuts exist to speed up this method after it is learned. The most obvious is to memorize more core shapes. Other shortcuts include recognizing when multiple completed sets can be separated without missing those tiles' other uses.




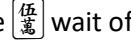
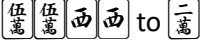















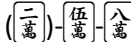



## Core Shapes

**Single waits** are listed in parentheses, to emphasize their importance.

### Basic Core Shapes

























These shapes occur frequently and should be memorized.

-  waits on () -.
  -  extends the  **single wait** to -.
-  waits on () .
  -  extends the  **single wait** to .
-  waits on --.
  -  extends the  wait of  to .

-  waits on .
  -  extends the  wait of  to .
-  waits on .
  -  extends the  **single wait twice** to .
  - This example shows where one sequence can extend a wait along a *suji*, two consecutive sequences extend it twice along that *suji*.
-  waits on .
  -  extends the  **single wait** to .
  -  extends the  **single wait** to .
  - This example shows **extensions of single waits are not always single waits**.
-  waits on .
  -  extends the  **single wait twice** to .

## Independent Core Shapes (7 tiles)

These shapes cannot be simply reduced to any shape seen above by separating a sequence. While it is still possible to apply the counting method to analyze them, it's less effort overall to memorize them as their own core shape.

-  waits on .
  - Separating  shows the  wait.
  - Separating  shows the  wait.
-  waits on .
  - Separating  shows the  wait.
  - Separating  shows the  wait.
-  waits on .
  - Separating  shows the  wait.
  - Separating  shows the  wait.
-  waits on .
  - Separating  shows the  wait.
  - Separating  shows the  waits.

- waits on ().
    - Separating shows the waits.
    - By **symmetry**, the shape also waits on .
- waits on ().
    - Separating shows the waits.
    - By **symmetry**, the shape also waits on .

The following shapes include a concealed four-of-a-kind, and thus occur far less often. Memorizing them is optional.



- waits on ().
    - extends the **single** wait to .
    - extends the **single** wait to .
- waits on ().
    - extends the **single** wait to .
    - extends the **single** wait to .
- waits on ().
    - extends the **single** wait to .
    - extends the **single** wait to .


## Derived Core Shapes (7 tiles)

These shapes can be reduced to a simpler shape by separating a sequence. Memorizing them speeds up the counting process but is not required.

- waits on ().
    - Separating shows the waits.
    - extends the wait to .
- waits on ().
    - Separating shows the waits.
    - extends the wait to and extends the **single** wait to .
    - This example shows how the same sequence can extend more than one wait.



-  is a **single-quad** hand from the low end, and a **triplet-triplet** hand from the high end. **Single-quad** hands are easier to read, so  is a **single-quad** hand.

It is possible for there to be 0 copies of the second-outermost tile.  is a **pair-none** hand, not a **pair-pair** hand.

The category a hand belongs to dictates how it should be counted to avoid missing any waits. The remainder of this article explores each category in depth, in increasing order of difficulty:

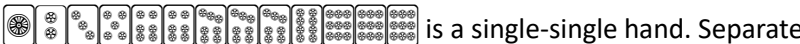
- Single-single, single-pair
- Pair-(any)
- Single-triplet
- Triplet-single, triplet-pair, quad-single, quad-pair
- Single-quad
- Triplet-triplet, triplet-quad, quad-triplet


## Single-Single and Single-Pair Hands

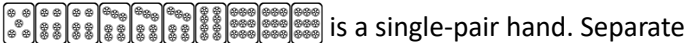

For these hands, the main counting method can be used without further consideration. For reference, the method is:

- Separate one sequence from the end of the hand.
- Compare the resulting partial hand with a list of memorized **core shapes**.
  - If a memorized shape matches, proceed to the next step.
  - If no memorized shape matches, **and the remaining hand is still a single-single or single-pair hand**, separate another sequence and try again.
- List the waits of the core shape. **Note which waits can be considered single waits.**
- Add the separated sets back to the hand. If this extends any existing waits, list the new waits.
  - Repeat until all separated sets are added.
  - Sets can be added in any order.

Example: 

-  is a single-single hand. Separate .

The hand is now .

-  is a single-pair hand. Separate .

The hand is now .

-  is a single-pair hand. Separate .

The hand is now .

4. waits on  $(\begin{smallmatrix} 1 & 1 \\ 1 & 1 \end{smallmatrix})$ .
5. Add back to the hand. extends the wait to . waits on  $(\begin{smallmatrix} 1 & 1 \\ 1 & 1 \end{smallmatrix})$ .
6. Add back to the hand. extends the **single** wait to . waits on  $(\begin{smallmatrix} 1 & 1 \\ 1 & 1 \end{smallmatrix})$ .
7. Add back to the hand. does not extend any waits.
8. waits on  $(\begin{smallmatrix} 1 & 1 \\ 1 & 1 \end{smallmatrix})$ .

Note that Step 2 resulted in a derived core shape. If was memorized, steps 3 and 5 become unnecessary.

Example:

1. is a single-single hand. Separate . The hand is now .
2. is a single-single hand. Separate . The hand is now .
3. is a single-pair hand. Separate . The hand is now .
4. waits on  $(\begin{smallmatrix} 1 & 1 \\ 1 & 1 \end{smallmatrix})$ .
5. Add back to the hand. extends the **single** wait to , turning the existing wait into a single wait, so waits on  $(\begin{smallmatrix} 1 & 1 \\ 1 & 1 \end{smallmatrix})$ .
6. Add back to the hand. extends the **single** wait to . waits on  $(\begin{smallmatrix} 1 & 1 \\ 1 & 1 \end{smallmatrix})$ .
7. Add back to the hand. does not extend any waits.
8. waits on  $(\begin{smallmatrix} 1 & 1 \\ 1 & 1 \end{smallmatrix})$ .

Note that a shortcut applies for this hand. Since separating sequences revealed that the hand has **no pair wait** and **no concealed triplet**, the whole hand can wait on at most one *suji*. If and are





# Pair-(any) Hands

The outer pair can be used as the head, or as part of two sequences. Thus, two cases need to be considered:

- Assume the pair belongs to two sequences.
  - If the two sequences are missing more than one tile, the pair can only be the head.
  - If the two sequences are complete, separate them and count the rest of the hand.
  - If the two sequences are missing one tile, the hand waits on it if the rest of the hand is complete.
- Assume the pair is the head.
  - With a confirmed head, the rest of the hand tends to be easy to read.

Adding the waits from these two cases together gives all of the hand's waits.

Example:

1. Assume is part of two sequences.
  - a. Separate resulting in .
  - b. waits on ().
  - c. Add back to the hand. extends the **single** wait to .
  - d. , assuming is part of two sequences, waits on ()-.
2. Then, assume is the head.
  - a. Separate resulting in .
  - b. waits on (). Out of these, completes a triplet, so it can form a pair wait with an existing head. In this case, is the existing head.
  - c. , assuming is the head, waits on ()-.
3. Adding the two cases together, waits on ()- ()-.

Example:

1. Assume is part of two sequences.
  - a. Separate resulting in .
  - b. waits on ().
  - c. Add back to the hand. extends the wait to .

d. , assuming is part of two sequences, waits on ().

2. Then, assume is the head.

a. Separate resulting in .

b. waits on . This completes a triplet, so it can form a pair wait with an existing head. In this case, is the existing head.

c. , assuming is the head, waits on .

3. Adding the two cases together, waits on ( .

Example:

1. Assume is part of two sequences.

a. Separate resulting in .

b. waits on ().

i. This is a seven-tile independent core shape. If not memorized, it can be analyzed as if it were a hand.

c. Add back to the hand. extends the wait to .

d. , assuming is part of two sequences, waits on .

2. Then, assume is the head.

a. Separate resulting in .

b. waits on (). Both complete a triplet, so they can form a pair wait with an existing head. In this case, is the existing head.

c. , assuming is the head, waits on .

3. Adding the two cases together, waits on .

Exercises:

# Single-Triplet Hands

Single-triplet hands can be simplified to pair-(any) hands by separating the outer sequence, with the following caveats:

- The hand may also have a single wait on its outermost singleton.
- After analyzing the pair-(any) partial hand, its waits may be extended by the previously separated sequence.

Example:

Although this is a single-single hand, separating does not reduce the remainder to a known core shape, nor does it become another single-single or single-pair hand. It must be analyzed as a single-triplet hand.

1. The hand has a single wait on ().
2. Separate and resulting in .
3. waits on .
  - a. This is a basic seven-tile core shape and should be memorized.
4. Add back to the hand, which doesn't extend any waits.
5. waits on ( ).

Example:

1. The hand does not have a single wait on .
2. Separate resulting in .
3. Assume is part of two sequences.
  - a. Separate resulting in .
  - b. waits on ().
  - c. Add back to the hand. extends the single wait to , and extends the wait to .
  - d. , assuming is part of two sequences, waits on ().

4. Assume  $\begin{bmatrix} 3 \\ 3 \end{bmatrix}$  is the head.
  - a. Separate  $\begin{bmatrix} 3 \\ 3 \end{bmatrix}$  resulting in  $\begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix}$ .
  - b.  $\begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix}$  waits on  $\begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix}$ .
  - c.  $\begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix}$ , assuming  $\begin{bmatrix} 3 \\ 3 \end{bmatrix}$  is the head, waits on  $\begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix}$ .
5.  $\begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix}$  waits on  $\begin{bmatrix} 2 \\ 2 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 8 \\ 8 \end{bmatrix} \begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix}$ .
6. Add  $\begin{bmatrix} 2 \\ 2 \end{bmatrix} \begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix}$  back to the hand, which doesn't extend any waits.
7.  $\begin{bmatrix} 2 \\ 2 \end{bmatrix} \begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix}$  waits on  $\begin{bmatrix} 2 \\ 2 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 8 \\ 8 \end{bmatrix} \begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix}$ .

Step 3 can be simplified by recognizing  $\begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix}$  as the seven-tile derived core shape  $\begin{bmatrix} 3 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix}$  with an additional  $\begin{bmatrix} 3 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix}$ .

This example shows that even when a single-triplet hand does not have a single wait on its outermost singleton, it may still wait on that tile via other parts of the hand.

Example:  $\begin{bmatrix} 1 \\ 1 \end{bmatrix} \begin{bmatrix} 2 \\ 2 \end{bmatrix} \begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 8 \\ 8 \end{bmatrix} \begin{bmatrix} 8 \\ 8 \end{bmatrix} \begin{bmatrix} 9 \\ 9 \end{bmatrix} \begin{bmatrix} 9 \\ 9 \end{bmatrix}$

1. The hand has a single wait on  $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ .
2. Separate  $\begin{bmatrix} 1 \\ 1 \end{bmatrix} \begin{bmatrix} 2 \\ 2 \end{bmatrix} \begin{bmatrix} 3 \\ 3 \end{bmatrix}$  resulting in  $\begin{bmatrix} 1 \\ 1 \end{bmatrix} \begin{bmatrix} 2 \\ 2 \end{bmatrix} \begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 8 \\ 8 \end{bmatrix} \begin{bmatrix} 8 \\ 8 \end{bmatrix} \begin{bmatrix} 9 \\ 9 \end{bmatrix} \begin{bmatrix} 9 \\ 9 \end{bmatrix}$ .
  - a.  $\begin{bmatrix} 1 \\ 1 \end{bmatrix} \begin{bmatrix} 2 \\ 2 \end{bmatrix} \begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix}$  waits on  $\begin{bmatrix} 1 \\ 1 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 9 \\ 9 \end{bmatrix} \begin{bmatrix} 9 \\ 9 \end{bmatrix}$ .
    - i. This is a seven-tile independent core shape. If not memorized, it can be analyzed as if it were a hand.
4. Add  $\begin{bmatrix} 1 \\ 1 \end{bmatrix} \begin{bmatrix} 2 \\ 2 \end{bmatrix} \begin{bmatrix} 3 \\ 3 \end{bmatrix}$  back to the hand, which extends the  $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$  **single** wait to  $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$  (already counted), *and* extends the  $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$  wait to  $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ .
3.  $\begin{bmatrix} 1 \\ 1 \end{bmatrix} \begin{bmatrix} 2 \\ 2 \end{bmatrix} \begin{bmatrix} 3 \\ 3 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} \begin{bmatrix} 6 \\ 6 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 7 \\ 7 \end{bmatrix} \begin{bmatrix} 8 \\ 8 \end{bmatrix} \begin{bmatrix} 8 \\ 8 \end{bmatrix} \begin{bmatrix} 9 \\ 9 \end{bmatrix} \begin{bmatrix} 9 \\ 9 \end{bmatrix}$  waits on  $\begin{bmatrix} 1 \\ 1 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \end{bmatrix} \begin{bmatrix} 9 \\ 9 \end{bmatrix} \begin{bmatrix} 9 \\ 9 \end{bmatrix}$ .

Exercises:



# Triplet-Single and Triplet-Pair Hands

For triplet-single hands, the triplet is either a triplet, or the head plus part of a sequence. Both cases must be examined separately.

Example:

1. Assume is a triplet.
  - a. Separate and resulting in .
  - b. waits on .
  - i. This is a seven-tile independent core shape. If not memorized, it can be analyzed as if it were a hand.
  - c. Add back to the hand, extending the **single** wait to .
  - d. Add back to the hand, extending the **single** wait to .
  - e. ), assuming is a triplet, waits on .

2. Then, assume is the head.
  - a. Separate and resulting in .
  - b. waits on .
  - c. Add back to the hand, extending the wait to .
  - d. ), assuming is the head, waits on .

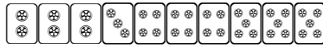
3. Adding the two cases together, waits on .

Example:

1. Assume is a triplet.
  - a. Separate and resulting in .
  - b. waits on .
  - i. This is a seven-tile independent core shape. If not memorized, it can be analyzed as if it were a hand.
  - c. Add back to the hand, extending the **single** wait to .
  - d. Add back to the hand, which doesn't extend any waits.
  - e. ), assuming is a triplet, waits on .



Exercises:



## Quad-Single and Quad-Pair Hands

These hands simplify to triplet-single hands (or triplet-none hands, which are counted the same way) after separating an outer sequence. Count the resulting triplet-single hand, then add any extended waits from the separated sequence.

## Single-Quad Hands

Attempt to simplify single-quad hands to triplet-single or triplet-pair hands by separating the outer sequence, with the following caveats:

- Not all single-quad hands can be simplified this way. If the hand cannot be simplified this way, still separate the outer sequence, then refer to the next section.
- The hand may also have a single wait on its outermost singleton.
- After analyzing the triplet-single or triplet-pair partial hand, its waits may be extended by the previously separated sequence.

Example:

1. The hand does not have a single wait on
2. Separate resulting in which is to be analyzed as a triplet-single hand.
  - a. Assuming is a triplet results in which waits on ( ) , the **single** wait being extended by for a total of ( ) .
  - b. Assuming is the head results in which waits on and forms a pair wait with for a total of .
  - c. Overall, waits on ( ) .
  - d. (if unsure how this result is obtained, refer to the Triplet-Single Hands section).
3. Add back to the hand, which extends the **single** wait to .



4. waits on - ().

5. Discard the empty wait. waits on - ().

Exercises:

## All Other Hands

The following hand types have not yet been covered:

- Triplet-triplet
- Triplet-quad
- Quad-triplet
- Quad-quad (cannot exist in 13-tile mahjong)

These hands contain too many permutations to be analyzed using the main method, but hands where *both* ends are this complicated are so rare, there's only 6 of them (in 13-tile mahjong) excluding slides and reflections. They can be memorized if desired.

1. waits on -, empty wait on ().

2. waits on - (), empty wait on ().

3. waits on - (), empty wait on ().

This is equivalent to .

4. waits on -- (), empty wait on ().

This is equivalent to Case 2.

5. waits on - (), empty wait on ().

6. waits on - ().

This is equivalent to .








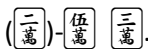


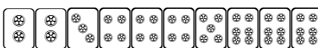





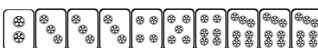


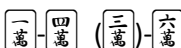

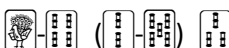
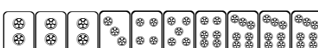
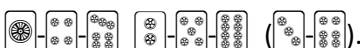

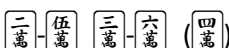
# Closing

This article presents a systematic algorithm to read complex waits that applies to all hands. No guesswork is required at any stage. With practice, it can be very fast, to the point of reading most possible hands in a few seconds, and there's always more room to improve.

I would like to thank the original author 纯全三色对对和 (<https://space.bilibili.com/8158016>) for writing this article's source material. If you can read Chinese, their other works are definitely worth reading too.

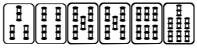
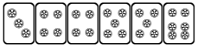


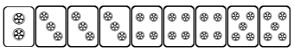
## Extra Section 1: 10-Tile Core Shapes

Players who have mastered the main counting method may improve their speed further by memorizing additional, 10-tile core shapes. The following is a non-exhaustive list of the most frequent ones:

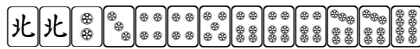
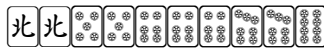
-  waits on .
-  waits on .
-  waits on .
-  waits on .
-  waits on .
-  waits on .
-  waits on .
-  waits on .
-  waits on .
-  waits on .
-  waits on .
-  waits on .
-  waits on .

## Extra Section 2: Multiple Sequences

Being able to separate more than one sequence at a time is one key to reading hands quickly. Some combinations of multiple sequences don't look like such at first glance and are worth learning.

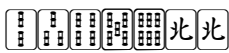
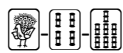

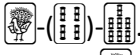



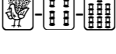
-  is two sequences.
-  is two sequences.
-  is three sequences.
-  is three sequences.
-  is three sequences.













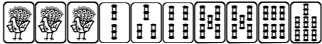




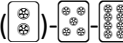

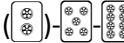
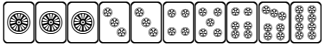
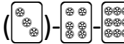






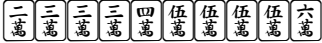

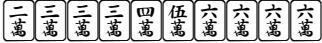



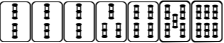
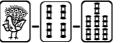
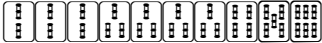
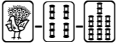
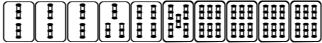
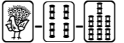








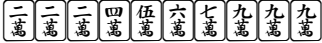

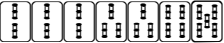



Exercises: quickly separate sequences and determine the wait.




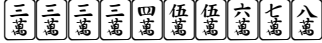

## Extra Section 3: Common Extensions

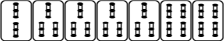







Some shapes are extended by nearby completed sequences and/or triplets often enough that the shape plus extension can be considered a core shape on their own. At the same time, some other shapes look like extensions, but don't gain any additional waits. The following is a non-exhaustive list.


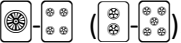

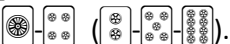






- Base shape:  waits on .
- Variation:  waits on .
- Variation:  waits on .
- Variation:  waits on .

- Base shape:  waits on .
  - Variation:  waits on .
- Base shape:  waits on .
  - Variation:  waits on .
  - Variation:  waits on .
- Base shape:  waits on .
  - Variation:  waits on .
  - Variation:  waits on .
- Base shape:  waits on .
  - Variation:  waits on .
  - Variation:  waits on .
- Base shape:  waits on .
  - Variation:  waits on .
  - Variation:  waits on .
  - Variation:  waits on .
  - Variation:  waits on .
  - Variation:  waits on .
- Base shape:  waits on .
  - Variation:  waits on .
  - Variation:  waits on .
- Base shape:  waits on .
  - Variation:  waits on .
  - Variation:  waits on .
- Base shape:  waits on .
  - Variation:  waits on .
- Base shape:  waits on .
  - Variation:  waits on .

- Base shape: waits on ().
  - Variation: waits on ().
  - Variation: waits on ().
- Base shape: waits on ( ).
  - Variation: waits on ( ).
  - Variation: waits on ( ).
- Base shape: waits on ( ).
  - Variation: waits on ( ).
  - Variation: waits on ( ).
  - Variation: waits on ( ).
- Base shape: waits on ( ).
  - Variation: waits on ( ).
  - Variation: waits on ( ).
  - Variation: waits on ( ).
  - Variation: waits on ( ).
  - Variation: waits on ( ).
  - Variation: waits on ( ).
- Base shape: waits on ().
  - Variation: waits on ().
  - Variation: waits on ().
  - Variation: waits on ( ).
  - Variation: waits on .
  - Variation: waits on ().
  - Variation: waits on ( ).
  - Variation: waits on ( ).
- Base shape: waits on ( ).
  - Variation: waits on ( ).
  - Variation: waits on ( ).
  - Variation: waits on ( ).
- Base shape: waits on ( ).
  - Variation: waits on ( ).
  - Variation: waits on ( ).

- Base shape:  waits on .
- Variation:  waits on .
- Variation:  waits on .
- Variation:  waits on .

- Base shape:  waits on .
- Variation:  waits on .
- Variation:  waits on .
- Variation:  waits on .

- Base shape:  waits on .
- Variation:  waits on .
- Variation:  waits on .
- Variation:  waits on .
- Variation:  waits on .