Riichi mahjong strategy

Nemata & Fukuchi Makoto

translated by anon

Introduction

This is a translation of a html book by Nemata[1], Buddhist priest, ramen reviewer, and author of 現代麻雀技術論 (Modern Mahjong Strategy Theory), edited by Fukuchi-pro[2]. Since Riichi Book 2 by Daina Chiba probably never, I started translating this one, since it's extremely comprehensive and detailed and has both abstract theory and many examples. It's by no means a word-for-word translation: I've added examples to make some points clearer, and omitted some passages that were redundant or unclear. If you can into moon runes, definitely read the original at `http://yabejp.web.fc2.com/mahjong/tactics.html`.

So why this book and not some other one by a more famous contemporary pro? There are several reasons. First of all, this is the book I personally used to get into tokujou. It's about 12 years old, and some of the meta concepts have changed since then, but it's still a good base. Second, I think it fills an important gap between books for beginners and books for mahjong addicts who already know the standard plays. You need to learn the standard plays somewhere. But if you're new to mahjong and haven't read RB1 yet, go read that one first, because it introduces many important concepts in a more accessible way.

Who is this book for? It's for people who want to git gud, but can't into moon. If you don't care about gitting gud, you'll probably find this book dry and boring. It's also not for brainlets: there are many passages where you have to think hard, and if anything I've cut down on the explanations instead of expanding. But don't worry: even if you understand only half, you'll notice a big difference once you start playing. You just start thinking about the tiles differently after a while.

The book is heavily focused on tile efficiency, with a highly digital (analytical) way of thinking. All of the later material about push-fold judgment and discard reading is based on good tile efficiency. People often claim they know tile efficiency, yet they can't solve simple WWYD problems. I'm a Tenhou 6d and among the higher IQ gaijin players, but I still have trouble with (say) G. Uzaku's problems. Tile efficiency is hard.

I have not proofread the book so please (you) me in the thread or PM me on IRC (sjaalman) if you spot an error. Desu I just want to help everyone git gud, because I'm a tryhard and I think it's more fun that way.

t. attention whore

[1] `https://twitter.com/nemata1632`

[2] Previously this book was credited to Fukuchi-pro, but this is incorrect.

Contents

0.1 Outline of mahjong skills

> "*The nature of mahjong is repetition of choice and lottery.*"
>
> —Kihara Kōichi
>
> In these lotteries, the will of the players plays no role. That is to say, they are completely random.
>
> **Through choices, it's possible to make the lottery more favorable. Only there is there space for mahjong skill to enter. Afterwards, one can only wait for the result of the lottery.**

Now, what kind of skills are required to win at mahjong (maximize expected income per hanchan)? We'll categorize them as below, and consider the optimal strategy for each in turn.

(1) Skills directly related to discard decisions in themselves

– *Tile efficiency* (includes score efficiency, yaku composition techniques, whether to call riichi with a head start, calling judgment)
The skill to maximize (win rate × average score) + (expenditures when we don't win)

– *Folding*
The skill to minimize (deal-in rate × average deal-in score) + (opponent tsumo rate ×average opponent tsumo score)

– *Choking and rolling*
So to speak, the skill of tile efficiency when considering opponents' interaction with discarded tiles. (When they're not in tenpai for choking and when they are for rolling.) A kind of in-between strategy between pure efficiency and folding.

(2) Push-fold judgment (including riichi and calling judgment when an opponent is in tenpai)
Judging which of the three strategies in (1) is best.

(3) Point situation assessment
(1) and (2) essentially aim at maximizing expected income from a single round. But in mahjong, final placement is also important, making round expected value ≠ hanchan expected value. These skills complement this disparity.

(4) Reading skills
Mahjong is a game of imperfect information. While (1), (2) and (3) tend to be based on known information, these skills aim to complement them with deduced unknown information to increase their accuracy.

– *Wall reading*
Assists with tile efficiency in (1).

– *Wait reading*
Assists with (2).

– *Yaku and hand progress reading*
Assists with (2).

(5) Improvement methodology
The four previous skills are used in actual play. This skill is about how and how much to practice them and how to use them successfully in practice.

0.2 How to get good

- Knowing strategies is important, but being able to successfully put them into practice is just as important.
- The single most important strategy is **deciding whether to attack or to defend**.
- Beginners should focus on either completely attacking or completely folding depending on their push-fold decision. Intermediate strategies are less important to master and much more difficult.
- It's important to **use all available information** (own hand, discards, dora, opponent's calls, point situation, round etc.), but this information is not all equally important.
- Reading hidden information should only be attempted by players who already understand the rest.
- We should always **play with a concrete goal in mind**. Goal ⇒ push-fold decision ⇒ discard.
- There are many strategies, but it's best to learn the most important ones first.
- The most important strategies other than push-fold judgment are tile efficiency of good hands, whether to call riichi, how to fold, how to deal with opponents' calls, how to evaluate score differences.
- It's important to practice in order to **make less mistakes**, but it's impossible to never make any.
- In the same situation, **be consistent** and play the same move.
- It's good to work on skills we're good at because it's easier to get motivated.
- But it's better to **work on skills we're bad at** because it will improve our play more.
- To find out what we're bad at, we need to use long-term data.
- Watching strong players play can be good, but only if we focus on particular points that we're bad at.
- Once we know how to overcome a weakness, the best way to do it is to **play many games**.

- The **combination of real play and study** is the fastest way to learn.
- **Don't play differently just because we're on a losing streak**.
- **Always review the paifu** after a game.
- When running out of time too often, we should think about what to discard during opponents' turns.
- When making many careless blunders, we should think longer during our own turn.
- We should remember that **mahjong is a game of chance** and not get mad at unlikely events.
- If we still get tilted and start losing due to tilt, we should stop playing.
- When playing, concentrate on the game.
- Don't play when hungry, sleepy, sick, stressed or overworked if it means we can't concentrate.
- Take good care of our health and condition to be able to play in tourneys at inconvenient times.[3]

[3]This list is a short-form summary of chapter 5

Chapter 1

Tile efficiency

Principles of tile efficiency

We will first discuss the most important things we need to pin down.

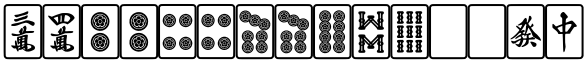
By tile efficiency, we mean the maximization of expected value at first without explicitly considering opponents attacking. (The decision what to do when opponents attack is called *push-fold*, the techniques for dealing tiles when opponents are attacking are called *choking*, *rolling* and *folding*.)

Maximizing win rate

The expected value for a round is

$$\text{win rate} \times \text{score} + \text{point expenditure when not winning}$$

Accordingly, we should maximize win rate, since it will increase both terms of the equation. What this is means in practice is, **when aiming for a big hand, don't overlook the compatible cheap hands**.

Example 

With this kind of hand, we want to stack the dragons and draw more pinzu, aiming for honitsu. Accordingly, we should break up  . However, breaking up the  first is unacceptable, because it's a better shape than  and the  acceptance enables us to make a quick cheap hand.

Leaving room for choice is usually not advantageous

Usually, when there is room for a choice, we simply want to not overthink it and take the best move. It's not necessary to be perfectly **consistent**, but for each situation we want to know the **basic move** and if needed adapt based on circumstances.

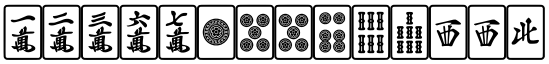
Often, when there is room for a choice, the difference between the alternatives will be very small. The typical example is a hand with several ryanmen waits where we need to break one up. It's usually best not to hesitate and pick one. It might backfire, but true skill finds its application elsewhere than in this kind of choices.

Example 

Here, we want to make 123 sanshoku and break up either  or  . We might cut  , draw  the next turn and get tilted. However, we should reevaluate the situation coolly and cut next, with the possibility of 234 sanshoku.

How to think about effective tiles

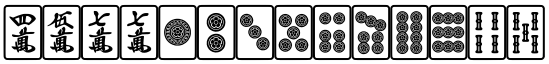
When deciding what tile to cut, we should consider what tiles are the *effective tiles* of each tile. A tile is called effective when, if we would draw it, we'd keep it and discard something else. If we'd discard it, it cannot be called effective, though it may appear so.

Example 

Here, the  can be used with  or  to create a group candidate. However, the resulting shape would be worse than anything we already have, so the tile is useless.

There are several degrees in tile effectiveness (can make a joint, can make a group, can make a joint into a better joint etc.).

However, among effective tiles, there is a clear difference between the ones which move the hand closer to tenpai and the rest. We say they reduce the *shanten*. In general, **reducing the shanten is greatly preferable**. (The number of tiles that reduce a hand's shanten is called the *tile acceptance*. The tiles that do not reduce shanten but still improve the hand are called *upgrades*. We will use these terms throughout.)

Example  → cut 

When we draw the backfire  , we can cut  and make a wider iishanten. (Although tile acceptance-wise, there is no difference with )  is bad, because sanshoku is too far away and we lose ittsuu.

Important factors in point expenditure

There's a huge amount of factors one needs to consider when comparing possible discards (how easy it is to complete groups and joints, how strong they will be when they complete (good wait, score), defensive power etc.) In practice, considering the most important factors will lead to the correct

decision most of the time. We can't simply make a list of all the factors and give them equal weight or we might get overwhelmed by the unimportant factors and make unbalanced decisions.

For example, when thinking of how to build our hand, **it generally doesn't matter that much what seat we are in**. It's true that as dealer we should emphasize speed, but this is mostly because of renchan and tsumo payments.

This factor only becomes important when thinking about whether to push or to pull, because the probability of getting a renchan or getting tsumo'd depends tremendously on the opponents. Especially in the early game, we should rely more on other factors (the hand itself) in deciding how to build our hand, with only a small bias toward speed. There is really no difference between North, West and South seats.

The old saying goes that the North seat shouldn't call to not give the dealer more draws, but it's questionable how much one extra tsumo increases the expected point loss. (It also makes South and West get less draws which further balances the effect.)

However, we should keep our own seat wind until last, and shift the haitei away from the dealer when multiple opponents are in tenpai. The effect is small, but unlike withholding calls, comes at no cost to ourselves.

Since round expected value $\neq$ hanchan expected value, according to the point situation there are situations to prioritize win rate (emphasizing defense with a hand that looks difficult to win) and situations to prioritize score. However, in most situations (enough rounds left, no one close to busting out), it's not really necessary to be conscious of these, and we can ignore the scores and play normally.

Iishanten peak theory

When thinking what the next draw will be, being likely to draw manzu because it's cheap in opponents' discards is theoretically correct, but having drawn one, thinking that we'll draw another manzu because we have the "manzu momentum", or on the contrary that we'll draw a pinzu or souzu to "even out" is a grave error. The same can be said not just of suits, but of numbers, sequences and pairs.

The probability of advancing the shanten with a single tsumo p is

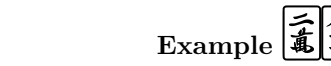
$$p = \frac{\text{tile acceptance tiles left in the wall}}{\text{tiles left in the wall}}$$

with the average number of draws to advance being $1/p$. Accordingly, **the marginal value of tile acceptance increases the lower tile acceptance is**.

That's why, from the point of view of isolated tiles, **play to maximize the tile acceptance when they form joints**, and from the point of view of joints, **play to make the bad shapes complete more easily**. In general, **play to maximize future tile acceptance rather than**

immediate tile acceptance, because there are less effective tiles closer to tenpai.[1]

Fundamental rule of tile efficiency
Play to maximize future tile acceptance closer to tenpai rather than immediate tile acceptance.

Example  → cut  or 

Cutting  gives the biggest tile acceptance *right now*, but it's the easiest tile to make a good shape with.

Example  → cut 

Example With >5 blocks, break the weakest block completely.

The advantage of winning first

Mahjong is a game about scoring the most points. There are generally two strategies for this type of games, namely **scoring points** and **preventing opponents from scoring points**. In mahjong, both are a factor, but the methods of preventing opponents form scoring points are limited. We can not deal in, but this doesn't prevent opponents from self-drawing or dealing into each other. There is only one way to prevent those, namely by **winning first**. In mahjong, scoring a win directly prevents opponents from scoring and even lowers their score. Folding completely (*betaori*) is generally not that good when we are close to winning ourselves. Therefore (and we draw a clear line from what is commonly called tile efficiency by the public), **it is indispensable to learn tile efficiency to a high degree of precision**.

1.1 Tile logic

Discard choice method

To win, we need **four *groups* and one *head* (pair)** (we do not consider chiitoitsu, kokushi musou, nagashi mangan). To efficiently create four groups and a head, it's good to divide the hand into groups and *group candidates*.

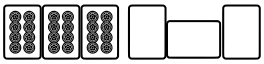
Classification of hand components

From most to least complete:

(1) Groups (面子, `mentsu`)

Sequences (順子, `shuntsu`): 

[1] TN: This one of the reasons why I don't recommend the Euophrys efficiency trainer.

Sets (刻子, `kōtsu`): 

(Kans) (槓子, `kantsu`)

(2) (Simple) joints [2] (搭子, `tātsu`): become a group in one move

Penchan (辺張): 

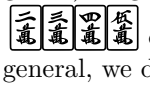
Kanchan (嵌張):  ,  become ryanmen with one tile type and are called *outer kanchan*,  ,  become ryanmen with two tile types and are called *inner kanchan*.

Ryanmen (両面) 

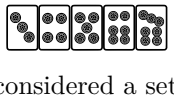
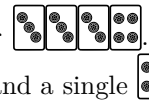
The ryanmen is commonly called **good shape**, the other two **bad shape**.

(3) Pairs (刻子, `toitsu`) 

One of these is necessary to form the head. With two and up, they can be considered joints for sets.

(4) Isolated tiles (floating tiles) Single tiles which can become a joint in one move and a group in two. Includes shapes like  or  that combine a group with a floating tile, which we'll discuss later. In general, we don't include these under the term *group candidates*.

(5) Complex joints A type of joints, consisting of a joint and a floating tile, such as  (*penchan pair*),  (*kanchan pair*),  (*ryanmen pair*),  (*ryankanchan*),  (*a type of ryanmen pair*). We'll discuss their many possible types in detail later.

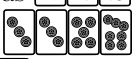
(6) Complex groups (many-sided waits) These are actually a type of joints. We use this name to refer to complex clusters of tiles where the division into groups, joints, pairs and single tiles is ambiguous. Examples are  or  . However, if there is already another pair, the latter will usually be considered a set and a single  . We will analyze this shape later.

[2] TN: I have chosen to use this term instead of "protoruns" like Daina Chiba for the following reasons:

- It's much shorter (1 syllable versus 3).
- They consist of two or more tiles *joined* together.
- (Complex) joints can be used to form sets, not just runs/sequences as "protorun" would suggest.
- It fits into the metaphor of a mahjong hand as a body with four limbs and a head. A joint is necessary to form a limb.

Block theory

Groups, group candidates and the head are generally referred to as *blocks*. In mahjong, we must create 5 blocks. If we have 4 groups or group candidates, the candidates are *sufficient*, if we have 3 or less, they are *insufficient*. If more than 5 exist in the hand, we have too much (*overrun*).

There may be multiple ways to divide a hand into blocks. For example, we can analyze  as  + or as + . The analysis of a tile cluster can depend on the rest of the hand. For example  is + or + or + if we have another pair, but if is our only pair, only the first analysis is valid.

However, reading as + instead of + , or as + instead of + , decomposing complete groups or expressly analyzing the joint as weaker is not done. [3]

Discard choice patterns

With the components of the hand falling into the framework described above, we can divide possible moves as follows:

1. Cutting an isolated tile
2. Cutting 1 tile from a complex joint
3. Dropping a joint or pair
4. Dropping a group

We will usually have to decide between 1, 2 and 3. When deciding between moves of the same class, we can construct an order of precedence of shapes and choose the best shape, unless there is some connection to yaku or dora.

For comparison between different classes, or identically good shapes, or when several possible ways to break up a complex shape exist, we'll have to establish different criteria.

In this strategy guide, we hope to create an all-encompassing classification of comparison criteria to enable us to find the best move.

Isolated tiles and simple joints

In mahjong, we must discard the tile we think is least useful every turn. We will now investigate the basic order of precedence of isolated tiles and joints. We will operate under the assumption that we don't want to call and don't care about the hand value.

[3] Unless counting fu.

To reiterate: we define as n-shanten[4] a hand which requires n draws to achieve tenpai. Including chiitoitsu, n is always at most 6. [5] For a group shape, n is at most 8. [6] Since achieving tenpai is a prerequisite for winning, and achieving 1-shanten is a prerequisite for tenpai and so on, we will as a general rule play the move that reduces shanten.

There are in general 3 kinds of moves that reduce shanten (for a group hand):

1. Making a joint from an isolated tile
2. Making a group from a joint
3. Making the head from an isolated tile

On the contrary, there are 3 kinds of moves that increase shanten (*shanten return*):

1. Dropping a joint with insufficient group candidates
2. Dropping a group (except for cutting  from  in an otherwise headless hand)
3. Dropping the only pair

While 1 is sometimes efficient to replace a weak joint with a better one, 2 and 3 are generally inefficient and constitute a loss. Because a head is easier to create than a group, 3 is more common than 2.

From the above, the combined order of precedence for hand composition is **isolated tile << joint <<< only pair <<< group**.

Note on inequality signs:

<<<	almost always worse than
<<	generally worse than, with the converse being true in limited exceptions
<	a difference exists, but it's subtle; there will be many cases where the rest of the hand or the discard piles will lead to the converse

Comparison of isolated tiles

Guest wind < 1·9 << 2·8 << 3 to 7 <<< 3445 or 3456

Taking the aka dora into account, **3·7 < 4·5·6**, since 4 and 6 can make an aka ryanmen, while 5 always makes an inner kanchan.

When considering calls and yaku, a yakuhai pair is better than ryanmen. Isolated terminals can't make a ryanmen, but 2 and 8 can, and more easily than a yakuhai pair can be made from a single

[4] The values of n are pronounced *ii*, *ryan*, *san*, *suu* etc. In practice, shanten counts below 3 are rarely used.
[5] Where n = 6 - #pairs
[6] Where n = 8 - 2×#groups - (1 if there is a head) - min(4, #joints, not counting the head)

yakuhai. Therefore in general, **1·9 < isolated yakuhai < 2·8**, but this depends on the rest of the hand (with many bad shapes, the value of yakuhai rises).

Comparison of simple joints

Penchan << outer kanchan << inner kanchan <<< ryanmen.

Taking the aka dora into account, **35·57 < 46**, **13·79 < 24·68**. But waits closer to the outside are easier to win on, so with no aka the ranking is reversed.

Taking the aka dora into account, **23·78 < 45·56 < 34·67**. Without aka dora, **45·56 < 34·67 < 23·78**.

Inner kanchan and ryanmen contain middle tiles and are clearly better than isolated middles. A penchan is similarly clearly better than an isolated 2·8, but the comparison between penchan and isolated middle tiles is not so clear. In general, **3 to 7 < penchan**. (In theory, an isolated middle tile will create a group faster than a penchan given at least 12 draws, but even in the very early game we should prefer the low shanten number allowing us to pressure opponents. However, this can change with discards or through the influence of other shapes.)

Comparing pairs and bad shape joints

Since at least one pair is required to win, we only have to compare pairs with other components when we have at least two.

Two pairs

The tile acceptance is 2 types, 4 tiles, so similar to a bad shape joint. Let's call honors and terminals A-class pairs, 2s and 8s B-class pairs, middle tiles C-class pairs. These classes have respectively 0, 1 and 2 upgrades to a ryanmen, so the total amount of upgrades is equal to the sum of the parts. Furthermore, when such an upgrade occurs, the resulting shape is a ryanmen pair, which is stronger than a simple ryanmen. There are also upgrades into kanchan or penchan pairs. With 1 pair, these upgrades can't occur.

Accordingly, the order of preference is **penchan < 2×A < outer kanchan < A and B < inner kanchan < 2×B = A and C < B and C < 2×C**. Often, **preserving the two pair shape is good**.

Three pairs

When dropping one of the 3 pairs, the loss is only 1 type, 2 tiles, which is less than a penchan. Even an isolated middle tile is better. But because it has more upgrades than a bad shape joint, a 3rd pair is better than a bad shape with only 2 tiles left. When deciding which pair to break, choose the one that has been discarded the most and is difficult to turn into a set. If there is no difference, retain the ones with the best upgrades. (The case where the pairs are part of a complex shape will be discussed later.) Often, **breaking up the three pair shape is good**.

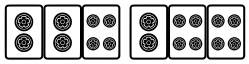
Four pairs

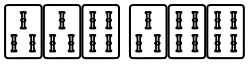
The tile acceptance is low, but because it's 2-shanten for chiitoitsu, **break up bad shape joints first**, especially when the group shanten is high and there are many bad shapes. When going for a group hand, the order of preference is similar to the 3 pair case. With 5 pairs, we usually go for chiitoitsu.[7]

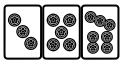
Complex joints I

Basic complex joints

Penchan pair 

Kanchan pair 

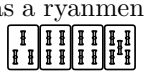
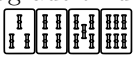
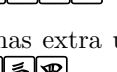
Ryanmen pair 

Ryankan 

Of these, only the ryanmen pair is called **good shape**, the rest are **bad shapes**.

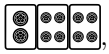
Comparison of basic complex joints

All of them except ryankan include a pair, so if the hand doesn't have another head, they don't work as joints.

However, even if we have no other head and a shape like  , we can easily get a head elsewhere, so the  is much stronger than a regular isolated  . It has a ryanmen upgrade on drawing a pair into *any* other bad shape joint, so it's about as strong as a  or  serial shape. However, a shape like  is not as good, since it only has extra upgrades into a bad shape joint. When we draw  , we can make the good shape  which can be seen as either a group or a pair + joint, so it's slightly better than a lone  .

A complex bad shape has a tile acceptance of 8 tiles (including another pair for the pair shapes), which is the same as a simple ryanmen. However, if it remains at tenpai, it has to be broken down into a simple bad shape, and is therefore weaker.

[7] These techniques stand in clear contrast to occult players like Tsuchida Kōshō, who often make conscious plays for chiitoitsu from 3 or even 2 pairs. This should under no circumstance be attempted by beginner and intermediate players who have not yet had time to develop their sense of flow.

The order of precedence of complex joints of the same type is similar to that of simple joints, with more central joints being better because they have more upgrades. When comparing  with  , the difference is small and the rest of the hand plays a large role. When deciding what to cut from  , when we draw  , we get either  or  . So when we want to create just a group, we cut  , but when we want a group and a pair, we cut  .

When comparing complex joints, we don't want to get rid of them entirely like when comparing simple joints or isolated tiles, but drop one tile and turn them into a simple joint. To get the optimal wait in the end, **drop one tile from the strongest shape** as a general rule.

However, when breaking up a complex joint that contains a pair, there are situations where we want to *fix* into a simple joint, and situations where we want to fix a pair. We will discuss the difference below.

With two pairs

Fix the bad shape into the head. With two ryanmen pairs, turn one of them into the head, depending on dora, yaku, discards etc.

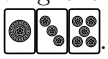
With three pairs

One complex joint **Drop the pair from the complex joint**.

Two complex joints If we have a ryanmen pair, **fix the ryanmen**. If both the complex joints are bad, **fix the one with the most ryanmen upgrades** as a general rule. However, in  , the simple pair has good upgrades, while the complex joints do not, so temporarily cut  , hoping to draw  . This is even more applicable if the simple pair is connected like  .

Three complex joints If all the complex shapes are bad, **fix the worst one into the head**. This gives a momentary loss of 2 tiles of tile acceptance, but creates a better shape later on once one of the joints completes into a group.

With one ryanmen pair, **fix the ryanmen**. With two ryanmen pairs, **fix the bad shape into the head**. With three ryanmen pairs, there is no big difference, so consider the usual suspects of discards and dora.

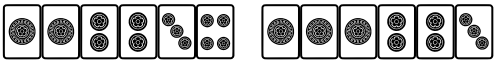
With ryankan and ryanmen pairs, **fix the ryanmen**. With two ryankan, try to fix one towards accepting an aka dora, cutting  from  , leaving the upgrade into ryanmen with  . Otherwise, try to create a suji trap by cutting  from  .

The comparison between ryankan and paired bad shapes is difficult. With a three pair shape, **fix the strongest kanchan**, hoping to draw a ryanmen upgrade. If already iishanten, the upgrade is less important and we can fix the ryankan into a desirable kanchan as above.

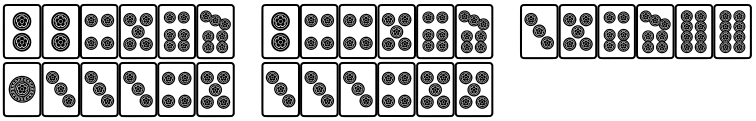
Complex joints II

When comparing complex joints, the presence of connected groups or pairs can create *extensions*. An extension is stronger than the original shape, but cutting a tile from the extension leads to a bigger loss. We therefore want to keep extensions alive as much as possible, an exception to the principle of fixing strong shapes. There are many kinds of complex joint extensions, with the following being the chiefest.

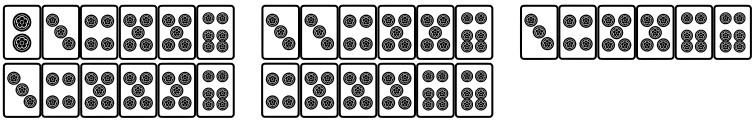
Penchan pair extensions



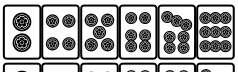
Kanchan pair extensions

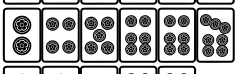


Ryanmen pair extensions

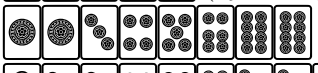


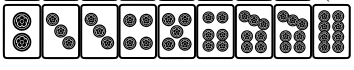
Ryankan extensions [8]

 (*long ryankan*)

 (*ryanmen kanchan*)

 (*ryankan pair*)

 (*long ryankan pair*)

 (*double ryanmen kanchan*)

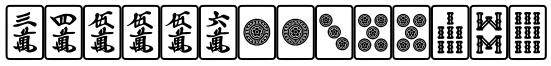
[8] These are really important and you should definitely memorize these, especially the first three.

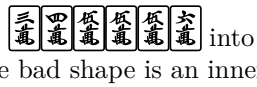
Using complex joint extensions

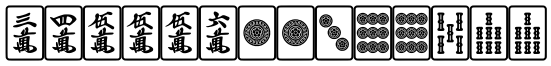
Like the ryanmen kanchan, complex joints can be difficult to notice if you're not used to them, so it's important to pay close attention. The ryanmen kanchan has the same tile acceptance as a ryanmen pair, but is guaranteed to produce a sequence, so we should prefer it over a ryanmen pair in a pinfu hand.

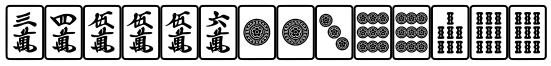
Bad shape extensions tend to have many upgrades into a good shape. We therefore want to preserve them. In a two pair shape, we fix the regular complex joint into the head, keeping the extended shape. In a three pair shape, we drop the pair from the extension.

With complex joints that contain 3 identical tiles, the ryankan pair and the double ryanmen kanchan, the loss from breaking them up is especially big, so we prefer to keep them. With multiple such shapes, we drop 1 tile from the one most likely to give a good shape.

Example  → cut 

In a three pair shape, the choice between fixing  into a good shape and dropping a tile from a complex bad shape is difficult. If the bad shape is an inner kanchan, we fix it and hope for ryanmen upgrades. Otherwise, we fix the ryanmen.

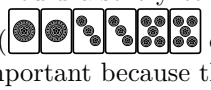
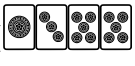
Example  → cut 

Example  → cut 

Adding to the loss that comes with breaking up extensions, they can easily progress into better extended shapes by drawing more tiles.

Example  → cut 

However, memorizing all these difficult shapes takes a lot of time and isn't really necessary. If we remember that joints become stronger when they're connected to groups or pairs, we can deal with most hands correctly.

If possible, we should also try to remember the shapes that lead to the strongest extensions by cutting one tile ( cut ) or by drawing one tile ( draw ). Especially the latter are important because they are easy to overlook.

As a general rule, to create strong shapes, we also want to keep their precursors, and the precursors of those precursors. This will later allow us to classify the relative strength of simple joints and isolated tiles depending on their surroundings.

Ultra bad shape joints and furiten joints

So far we have not considered what tiles have been discarded yet. We will now discuss the most important influences of discarded tiles on tile efficiency, namely depleted tiles and furiten.

Ultra bad joints (bad shape joints with 2 tiles or less left)

Since the marginal value of tile acceptance increases when it's low, the difference between 4 tiles and 2 tiles is rather big. When in tenpai, it's quite painful to have an ultra bad shape left (a head start riichi in the mid game with such a wait will deal in more often than win). We prefer a 3rd pair over such a joint. We also prefer an isolated middle tile (or even a 2 or 8 if the depleted joint is a penchan), breaking the depleted joint and trying to build another.

However, a bad shape joint with 3 tiles left is not that bad. Also, we prefer a ryanmen with 4 tiles left over a bad shape with the same amount of tiles left, since we know opponents don't want to use those tiles.

An extra pair of which the other two tiles have been discarded can be treated as a floating tile, so it's also not as bad as a depleted joint, especially if it's a middle tile.

Unless 3 or 4 tiles of the same type have been cut, discards don't really matter for comparing isolated tiles, since the difference in ease of creating a good shape between a 1, 2 and 3 is more important.

We should also consider upgrades of bad shapes that have become depleted. For example, if  has been cut 3 times,  becomes difficult to turn into a ryanmen, and a ryankan with  is also disappointing.

All these make it that remembering to look at the discards has a rather big impact on results.

Furiten joints

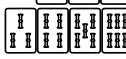
We can't ron while in furiten. But this only matters in tenpai, and a furiten good shape has a win rate not much lower than a regular bad shape. Accordingly, we should prefer furiten ryanmen over bad shapes. Furiten bad shapes are bad, and we'd rather have an isolated tile. (Unless it's already the end game and we want to collect no-ten payments.) Similarly, an isolated tile that can make a furiten joint is worse than one of the same class, but better than one of a lower class. When choosing how to break up a complex joint for riichi, we usually pick the wait that isn't furiten, even if it's narrower.

For example, cutting  from  and drawing  , we should keep it and go break up a bad shape (that's why we usually **break bad joints from the outside**). Cutting  from  and drawing  or  , we keep it and cut  .

Comparing components of the same class

The interaction of tiles

Apart from neighboring tiles being heavily discarded or being furiten, isolated tiles and joints of the same class can still be better of worse through the presence of other components (especially joints) that have an *overlap* with them. This means that their tile acceptances or upgrades compete for the same tiles, weakening them, or that they will compete for tiles once an upgrade occurs. For example, in  , the two isolated tiles compete for  and  .

We can also have *combos*, which are shapes that have the same tile acceptance as a regular joint or isolated tile, but are easier to upgrade or have upgrades to a superior shape. For example, the  in  is stronger than a regular isolated  , because when we draw  , we get the strong  shape.

There are also cases where an overlap and a combo exist at the same time. In general, **if there's an overlap, the shape is weaker than usual even if a combo exists**. A typical example is a  shape which has an overlap on the  , but creates a strong combo once we draw it. An exception to this general rule are shapes where the overlap is for a bad shape-creating tile and the resulting combo is a better shape than normal: for example,  and  both become stronger than usual in a  shape, since we can draw  for ryankan.

When comparing overlaps and combos, their quantity and quality are both important, but in the case of an overlap and combo existing at the same time and weakening the shape, **quantity > quality** since we want to draw the combo as soon as possible.

In general, we also prioritize overlaps and combos that exist right now, rather than those that will be created when an upgrade occurs.

Diagram of component precedence

We can roughly summarize preference between components (joints and isolated tiles) of the same type as follows:

Compare overlaps in the tile acceptance
↓
Compare the strength of the shapes that are created when a tile is accepted
↓
Compare overlaps in the upgrades
↓
Compare combos with other components

Like this, we get the following order: **overlap in tile acceptance < overlap in tile acceptance,**

but once the tile is accepted, the shape is stronger than normal < weak overlap in tile acceptance < overlap in upgrades < overlap after an upgrade < normal < combo after an upgrade < weak combo < strong combo.

A weak component of a class can be compared with a component of a lower class (weak 3 versus 2), a strong component with one of a higher class (strong outer kanchan versus inner kanchan).

By understanding what joints are weak and strong, we can understand what isolated tiles are good or bad at making strong joints. We'll therefore first compare joints, and continue with isolated tiles.

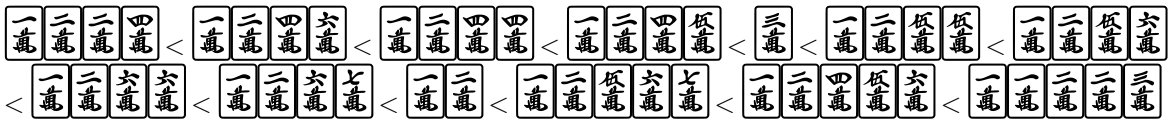
In the following sections, there are some points of attention to keep in mind.

- We'll assume that comparison of joints to joints takes place in an overrun situation (>4 joints), that of isolated tiles to joints in a non-overrun situation. We'll come back to overruns later.
- When not stated otherwise, assume we have a head elsewhere in the hand.
- There will be some shapes that give rise to iipeikou, put we will consider only efficiency and disregard the possible extra score.

As always, there are exceptions when overlaps and combos are difficult to analyze, but the above should be a good guideline. Now, because this theory can be quite perplexing when put into words abstractly, we'll put in it into practice on the most common shapes.

Penchan

Summary

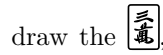


Tile acceptance overlap

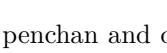
To make two groups here, we need to draw  twice, and we will commonly cut to create a  kanchan pair. The  is essentially useless, and we'll cut it over an isolated  .

It's easier than the above shape to make two groups, but still not desirable. By cutting  , we get the ryankan  . The  is not worth keeping over an isolated  , or even  unless the rest

of the hand is very bad.

Similar to the above shape, but if we draw the , the resulting  is a bit stronger than  , but because of the overlap (we can cut , draw and still end up with a group + floating), this shape is still weaker than just .

Drawing instantly, we get  group + ryanmen, which is a good shape. All of the above penchan are inferior to an isolated . In general, any bad shape joint with a tile acceptance overlap is worse than a floating middle tile.

No direct overlap, but if we drop the penchan and draw the backfire, we still get the kanchan pair  . The pair can also upgrade into the above shape.

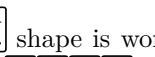
Upgrade overlap

Only overlaps for upgrading the penchan into  kanchan. Not a big difference from a regular penchan.

Compete for to upgrade into and  .

Post-upgrade overlap

When we draw  and upgrade, there is an overlap for the next upgrade with .

We might even say that a  shape is worse than a normal  , because we draw , then and get overlapping ryanmen  ... But that will almost never happen in practice.

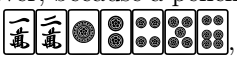
In general, when tiles are separated by at least 5, we can safely ignore their influence on each other.

Normal

Upgrade combo

Drawing  , the  shape has many upgrades into ryanmen.

Transforms into the above shape on drawing  .

However, because a penchan can't upgrade into a ryanmen directly, at 1-shanten, we should cut  from  , since we can draw the backfire  and make a furiten sanmenchan. This is a penchan-only exception, and from  we cut  .

Combo

Makes a complex joint when drawing any of  . (The  shape can be considered as  +  and will be discussed under outer kanchan.)

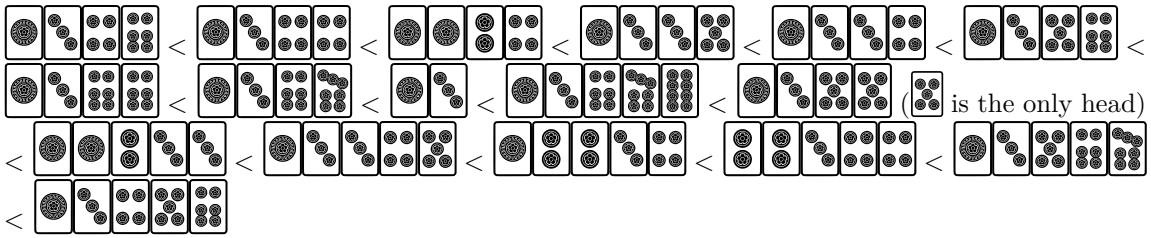
We will often want to drop a penchan to keep a floating tile. The following shapes make this especially effective:

Overlap for  to upgrade the penchan/complete a ryanmen, and for  to complete the group/complete a kanchan.

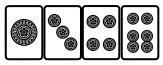
Overlap for  to make ryankan.

Outer kanchan

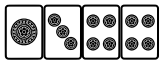
Summary



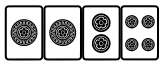
Tile acceptance overlap



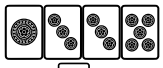
The hardest shape to make two groups in, we often want to slim this down to just  and make one group. We'll still keep the  much more often than the  in  .



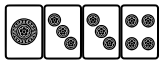
Similar to the above, but becomes a head + ryanmen pair if we draw another  .



Unlike the above, we can upgrade into a ryanmen by drawing  . In real matches, dropping the  and going for tanyao is common.

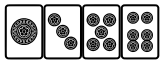


Cut  for kanchan pair or  for ryankan, a similar idea to  from  .



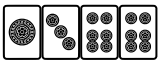
Instantly becomes good if we draw  . With all of the above, we'll often cut one tile and prefer a floating middle tile, similar to penchan.

Upgrade overlap

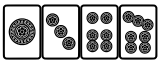


Overlap for ryanmen upgrade and group completion.

Post-upgrade overlap



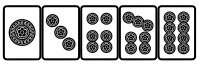
Kanchan pair with  .



Overlapping ryanmen with  .

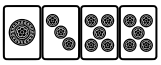
Normal

Upgrade combo

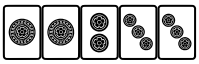


Easy to upgrade ryankan with  .

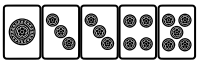
Combo

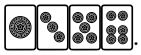
 ( is the only pair)

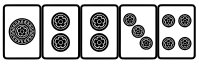
Ryankan pair with  . If we have another head, worse than a regular  , cutting  or  .

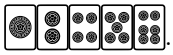


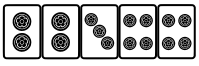
Strong kanchan pair with  , ryanmen pair with  .

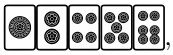


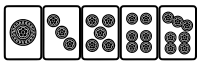
Upgrades into a complex joint with any of  .

 (*penkanchan*)

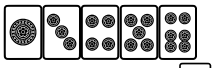
Upgrades into a complex joint with any of  .



Upgrades into a complex joint with any of  , with better shape post-upgrade than the last one.



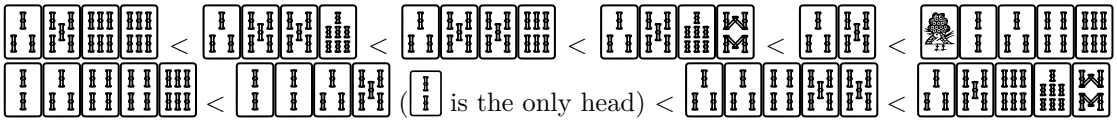
Sanmenchan with  , ryankan not only with  but also with  . Still not as good as an inner kanchan, which has 2 ryanmen upgrades.



Upgrades with  for ryanmen,  for ryanmen kanchan,  for sanmenchan,  for long ryankan. Clearly better than an inner kanchan.

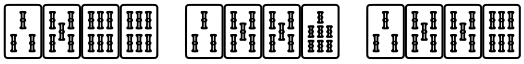
Inner kanchan

Summary



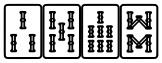
Since an inner kanchan is just an outer kanchan with one more ryanmen upgrade, the explanation has been omitted where similar to the previous section.

Tile acceptance overlap



The difference from the corresponding shapes with an outer kanchan is that these can become ryanmen, so it's common to keep these over a floating tile. Because they reduce tile acceptance, we will often drop these for a penchan or outer kanchan. (But when a good end shape is important, we'll keep these.)

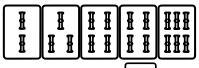
Upgrade overlap

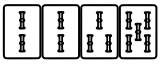


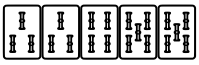
Normal

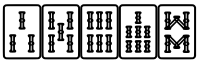
Combo


No extra ryanmen upgrades, but easier to make a paired joint.


Can draw  for good shape, so slightly better.

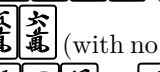
 ( is the only head)
Ryanmen upgrade not just on  , but also on  . Similarly, a  ryankan has an extra ryanmen upgrade on  . In general, tiles next to the only head become better once a head completes elsewhere in the hand.


Becomes a strong complex joint with  or  .


Very easy to upgrade into ryanmen.

Ryanmen

Summary

 (with no other head) <  <  < 
<  (with no other head) <  <  <  < 
<  <  < 

Because a ryanmen is so strong, the advantage or disadvantage of overlaps and combos is rather small. Accordingly, when comparing ryanmen, we should bear in mind that the importance of discards relative to the hand shape increases.

Tile acceptance overlap

 (with no other head)
An extremely unusual shape, since cutting  causes no loss in tile acceptance.

By cutting  or  , this overlapping ryanmen shape becomes a sanmenchan.

 (*double ryanmen*)

Double overlap on  . Cutting one tile gives a ryanmen pair.

Even with a bad overlap like this, the final wait when in tenpai will be good, so we prefer this kind of shapes over simple bad shape joints. Still, we prefer a ryankan over this shape.

Overlap on  . Drop this over another ryanmen.

 (no other head)

Cutting  is still salvageable when we draw  .

Normal

Combo

Drawing  or  , we get a complex joint that waits on  , but in practice it's harder to draw on vertically than a normal ryanmen.

The following are variations of the same shape that are somewhat easier to draw:

Can make a ryanmen kanchan with  .

 (*sanmenchan*)
The strongest possible 5-tile shape.

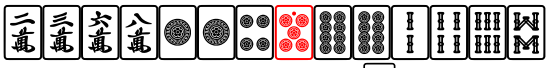
Pair dropping

We have touched on this topic in the section on comparing pairs and bad shape joints, but we can also compare pairs to each other.

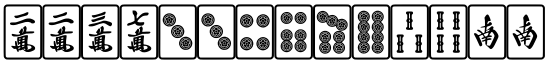
Pair dropping process

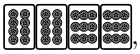
We usually think of dropping a pair when we have at least 2, and we have seen earlier that in a hand with exactly 2, dropping a bad shape joint instead is common.

However, in a hand with few groups and ryanmen and many bad shape joints, there are cases when dropping one of the 2 pairs is preferable over dropping a joint. The reason is that in a high-shanten 2-pair hand, the probability of drawing a 3rd pair before tenpai is high, creating an undesirable 3-pair shape, which we would try to break by cutting a pair from a paired joint. Therefore, instead of waiting for that to happen, we drop a terminal pair in advance, hoping to create a superior 2-pair shape later on, following the theory of emphasizing tile acceptance closer to tenpai over immediate tile acceptance.

Example  dora 
→ instead of slimming down souzu, drop  and start forcing tanyao

With 3 pairs, we usually want to break a pair and return to a 2 pair shape. However, if we're certain the future 2 pair shape will be sufficiently good and don't need any further improvements, we can preserve the 3rd pair to maximize tile acceptance right now.

Example  → confidently cut  [9]

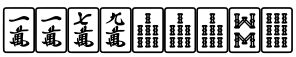
In 3-pair hands, if we have *flying pairs* like  or  , we should preferentially cut 1 tile from these, to preserve the horizontal tile acceptance. However, if we have at least 4 pairs, we should preserve this shape since it's a many-sided wait and can gives us iipeikou. Whether to

[9] These examples were not present in the original, I added them to illustrate the idea more clearly.

cut the inside tile or the outside tile from this kind of shapes has been discussed earlier: if we are content with a group, cut the outside; if we need a group + a pair, cut the inside.

If we don't have any flying pairs, we should break the pair that has the weakest upgrades into a joint, so usually the most outside pair, comparing the pairs the same way we compare isolated tiles. However, from  , we should definitely cut  , since we can draw  for a ryankan pair. We will discuss the relative worth of isolated tiles next.

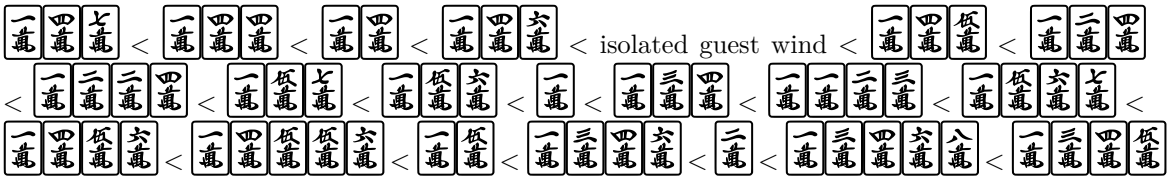
Ukase-uchi

Up until now, we have discussed dropping the most unneeded pair from the hand entirely. There's another kind of pair dropping, where we cut only one tile from a (preferably middle) pair, downgrading it into a floating tile and hoping to stick tiles to it horizontally. This is a special move called *ukase-uchi*. We use it when we want to upgrade to a sticky shape, or when the remaining joints are all too weak to make a decent hand. We can also use it when we have sufficient ryanmen joints, to create yaku, or in shapes like  (1  left) where a shanpon wait would be extremely painful.

Isolated 1 and 9

We can compare isolated tiles using the same method we used to compare joints, considering overlaps and combos. However, because there many more possibilities to draw up to a group, there will often be many possible overlaps and combos in different future shapes, making comparison more difficult. It will be good to consider these sections more as a general outline that can be complemented by information from discards and desired yaku.

Summary



Tile acceptance overlap

Even after we draw for  , there's still overlap between and , so is unnecessary.

Can make a complex joint  or  , so weaker than just  . Even if  is the

only head and we can try to make a group with the 一萬, it's still clearly weaker than a normal 一萬.

一萬四萬

The famous shape with an overlap for 二萬三萬. Even though we can draw towards 一萬二萬三萬四萬, a good wait in a headless shape, it's still clearly weak.

一萬四萬六萬

Ryankan on 二萬, ryanmen + floating tile on 三萬. The loss from missing out on 一萬三萬四萬六萬 doesn't really hurt.

With all of the above, we prefer to keep an isolated guest wind because of its defensive power (especially if we can draw a pair).

一萬四萬伍萬

Drawing 二萬 or 三萬 creates an overlapping shape. But the loss from missing out on a 一萬三萬四萬伍萬 is quite big.

一萬二萬四萬

Overlap on both 二萬 and 三萬, but can draw the 一萬二萬三萬四萬 serial shape, which is better than the above, especially when we have no head.

一萬二萬二萬四萬

As discussed earlier, it's usual to see this as 一萬 + 二萬二萬四萬. But we can miss out on the 一萬二萬二萬三萬四萬 shape which is slightly better than the above.

一萬伍萬七萬

Only overlaps on 三萬 for ryankan, which makes it better than all of the above.

Post-upgrade overlap

一萬伍萬六萬

After drawing 三萬, 一萬三萬伍萬六萬 has an overlap for 四萬.

Normal

Combo

Has many possible overlaps and combos, so difficult to compare. When there is no head, the  shape is valuable, so in that case it's somewhat better than a lone .

 (*aryanmen*)[10]

Group + head with or , connected shape with or .

The kanchan with has better upgrades than normal.

As above but better.

Can draw for ryanmen kanchan.

From here on, if aiming for a closed hand, it's common to to keep these over a single yakuhai.

Makes a ryankan with . In the above shape, cutting and drawing still gives a ryanmen, while here we get a simple kanchan which is a bigger loss.

It's usual to see this as + + , but drawing creates a strong kanchan.

[10] Do not confuse with the Aryan Men local yakuman ()

From here on, the value is higher than an isolated 2.

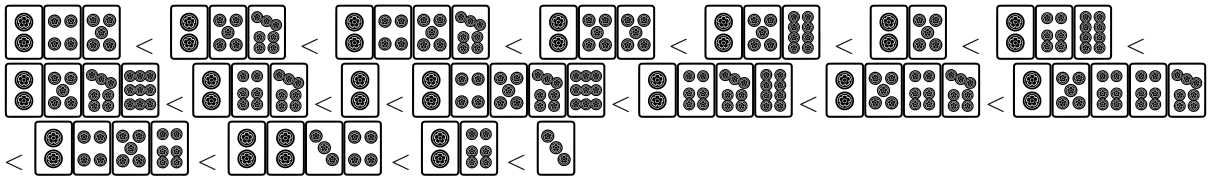
Can make a ryankan (quasi-good shape) with  or  , while a lone  can only make a ryanmen with  .

Ryanmen with  , strong kanchan with  , clearly better than a lone  .

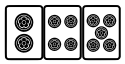
(we'll analyze the  shape as  +  in a later section.)

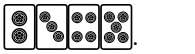
Isolated 2 and 8

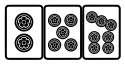
Summary



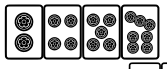
Tile acceptance overlap



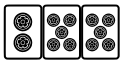
Overlap on  , but we can miss out on  .

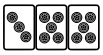


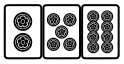
Overlap on  and  , but we can miss out on the  ryanmen, so stronger than the above.



Similar to  .



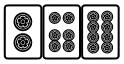
Similar to  , but weakens the  since the kanchan pair  is stronger.



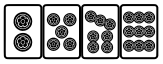
Same logic as  < . But because it can make a ryanmen, it's better than the  in  .

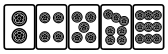
Overlap on  and  .

All of the above are usually considered weaker than an isolated yakuhai.

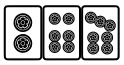


Overlap on  , but not on  .



Appears to have an overlap, but the  shape is not that bad.

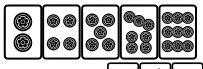
Post-upgrade overlap



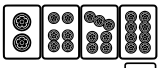
After drawing  , has an overlap on  .

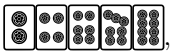
Normal

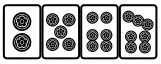
Combo



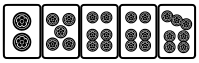
Same as  .



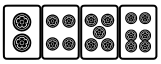
Can draw  for  , which gives a sanmenchan with  and ryankan with  .



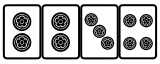
Strengthens the kanchan with  .

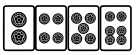


Ryanmen kanchan with  .



Sanmenchan with  , strong kanchan with  . Still not as good as a middle tile with 2 upgrades into ryanmen.

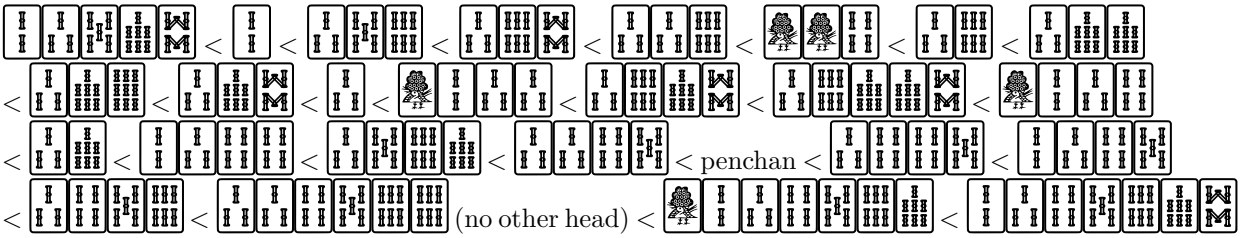


Easy to connect shape. Much stronger than a  shape. While  makes it easy to create a kanchan, this one makes it easy to create a pair. Depending on what we want (how much pairs we already have), either can be better.

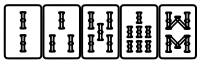
Ryankan with  . Still not as good as a middle tile.

Isolated 3 to 7

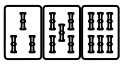
Summary

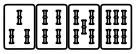


Tile acceptance overlap



Has an overlap on both sides. Pretty much the only case where a middle tile is worse than a 2.

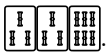


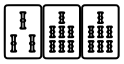
Overlap on the  , but misses out on the  shape.

Overlap on  for ryankan and  for ryanmen upgrade.

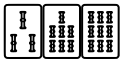
Overlap on the  and  for a complex joint.

As above, but the possible complex joints are not as good.

Overlap for simple joints, so not as bad as  .



Overlap on  for kanchan pair.



Overlap on  for ryankan.

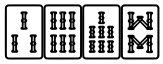
Post-upgrade overlap

Similar to  .

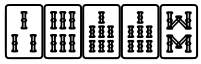
Normal

Combo

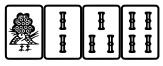
Easy to make a serial shape.



Strong kanchan with  .

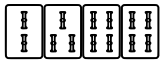


Ryanmen kanchan with  .

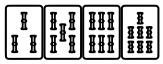


Serial shape.

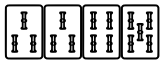
Ryankan with  .

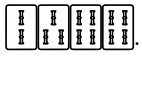


Easy to make a serial shape.

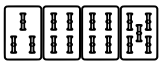
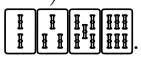


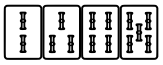
Sanmenchan with  , strong kanchan with  .

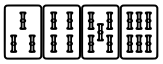
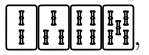


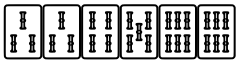
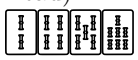
Easy to make a serial shape, more likely to give good shape than  .

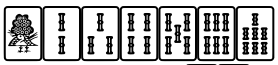
The patterns from here on make it extremely easy to create good shapes, and are **much stronger** than any other floating tiles. They are often better than a penchan, and comparable to an outer kanchan.

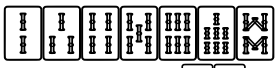
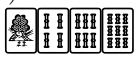
 (*nakabukure*)
Ryanmen with any of  .

 (*connect 4 shape*)
Ryanmen with  , sanmenchan with  , strong kanchan with  .

 (*connect 4 shape*)
Even better than  , makes sanmenchan on  .

 (no other head)
Makes a ryanmen with any of  and is easy to extend further.

 (*connect 7 shape*)
Ryanmen with  , sanmenchan with  and can give ittsuu. We will often cut a tile from ryankan or a kanchan pair to try and extend this shape.

 (*connect 7 shape*)
Ryanmen with  , sanmenchan with  and can give ittsuu. The best possible floating tile.

Joint dropping

So far, we have discussed that there are four possible discard choices in a mahjong hand:

1. Cutting an isolated tile
2. Cutting 1 tile from a complex joint
3. Dropping a joint or pair

4. Dropping a group

Of these, dropping a group is a special move that only makes sense when chasing value, so we will not discuss it here. We have already considered comparisons between moves of the same type, as well as (in part) comparisons between 2 and 3. From now on, we will discuss comparisons be that fall into the remaining cases.

When deciding to drop a simple joint, we do not only have to decide which joint to drop, but which of its tiles to cut first. We will now examine this question.

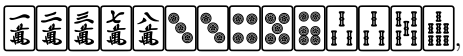
Joint dropping process

It's often easy to decide what tile to cut first when dropping a joint. When we don't have enough group candidates, we want to keep the tile that has a chance of making a good joint while isolated. That's why we usually cut joints from the outside in. When we have sufficient group candidates, we can also consider the added value from yaku or dora that the tile we keep allows us to create. Finally, there's the defensive value of the remaining tile. In general, outside of mid -late games where the end is in sight, **upgrades are more important than defensive power**.

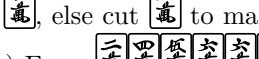
There are some difficult situations where cutting a tile while leave a complex joint, and there are several different complex joints we can choose to retain.

The example of  has already been discussed.

From  , we can make a ryankan or kanchan pair. If completing the ryankan would give us pinfu, we should prefer it. Otherwise, we'll choose the shape with the most upgrades into ryanmen. If we are able to call, we should keep the kanchan pair to call pon.

Even in pinfu shapes like  , we should take the kanchan pair if the head has many upgrades into a ryanmen.

Problem  → cut  or ?

In a pinfu shape, cut , else cut to make iipeikou. When calling, cut . (With tanyao pinfu cutting is not bad.) From  and , we clearly cut .

  (*sankanchan*)

 (*suukanchan*)

These shapes are not that difficult, but can turn into more complex shapes like  (*sankanchan pair*).

Though we can analyze them as complex joints, as a whole they form exceptional shapes that we have not analyzed yet. (Cutting a tile from in a non-overrun increases the shanten.) Let's try to compare their strength to other types of components.

A sankanchan has no overlaps, but if we cut one tile from it we end up with a ryankan, so it's easier to break up than an outer kanchan. A  shape can upgrade into a ryanmen with  , and we prefer it over an isolated middle tile, but cutting a tile from  to keep a floating tile can be done. A suukanchan is stronger than a sankanchan, about on the same level as an outer kanchan, but worse than an inner kanchan.

Sankanchan and suukanchan pairs

The author considers this not as important and refers to the following blog post (日本語): `https://chirno.hatenadiary.org/entries/2008/05/18` [11]

Comparing simple and complex joints

The general rule of tile efficiency is to **maximize tile acceptance close to tenpai**. Often, cutting a tile from a complex joint will maximize the immediate tile acceptance, but narrow the shape down the road. Accordingly, in an overrun (>4 joints), we should break a simple joint completely. Obviously, we should pick the weakest one. We should not ignore the possible benefits of leaving one tile (the *surplus tile*) when deciding which of the tiles to cut first.

There are the following exceptions:

The complex joint is lower class than the weakest simple joint

For example, when we have the simple joints are all ryanmen and we have a kanchan pair. Since we want to keep the ryanmen, we should cut a tile from the complex joint, in such a way that if it completes, we get the most desirable result. (For example, cutting from  .) But in a hand like  , we cut  .[12]

The shape we get when the weakest joint completes is very strong

Because it gives us yaku or dora. With yaku, we can often cover the loss in speed by calling.

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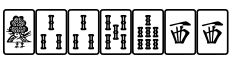
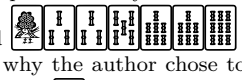
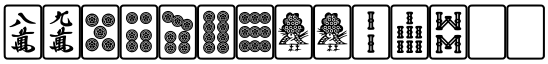
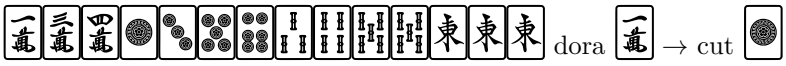
[11] In general, these are slightly better than a regular shape but not by much. For example  accepts 1 more tile type than  , and  accepts another 1 type more.

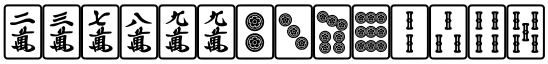
[12] This is an exception to the exception, I don't know why the author chose to include it. It's the correct move because the ryankan pair on manzu is strong, we can cover  with a ryanmen kanchan, and we preserve 345 sanshoku.

Example  → cut 

In an overrun, we will often compare simple joints with floating tiles. Since dropping a joint doesn't reduce shanten, we will often want to keep a good floating tile instead of a joint. (Whether to keep a safe tile over a joint is difficult.)

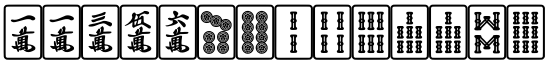
For example, we'll keep a floating middle tile over a penchan, and a serial shape over an inner kanchan. We will sometimes even drop ryanmen to keep dora or create yaku. In a headless overrun, we'll often drop bad shape joints over aryanmen like  and not care too much about the head.

Example  dora → cut

Example  → cut 

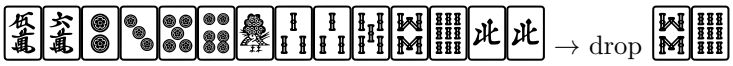
At iishanten, whether to take the straightforward shape or to drop a joint and try to get a better wait from a floating tile is difficult.

Example  dora  → cut  or 

Example  dora  → cut 

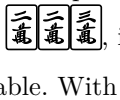
We have enough ryanmen, so the advantage of drawing  is small.

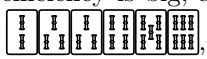
In an overrun, we prefer to cut 1 tile from a joint in such a way that the surplus tile forms a complex joint, like from  . But we still want to emphasize tile acceptance close to tenpai:

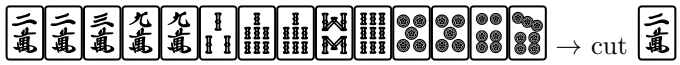
Example  → drop

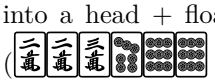
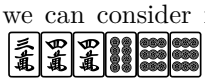
Comparing isolated tiles and complex joints

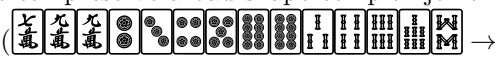
Cutting a tile from a complex joint and keeping a floating tiles with insufficient group candidates makes the joint a bit more difficult to complete, but makes it possible to create another group candidate with the floating tile, increasing the win rate. It is nearly always limited to fixing a ryanmen pair into a ryanmen, or a bad shape paired joint into the head (other cases are more often than not inefficient).

Since it's usually more difficult to make a group from a joint than joint from an isolated tile, we only do this when the loss from the floating tile is very big. Also, a ryanmen pair can often end up as two groups. (Especially drawing  into  is very big.) With  , it's easier to form two groups than with an isolated  , but an isolated  is still preferable. With  and up,

the loss in efficiency is big, and it's good to keep the extra tile over isolated tiles. In shapes like  or  , the gain from completing a set is smaller and we will often slim down these shapes to keep floating tiles.

Example  → cut

There are also situations to fix the head. When fixing a ryanmen turns a bad shape paired joint into a head + floating tile, we can consider if it isn't easier to create another group elsewhere ( → cut  ,  → cut ).

When we have a floating tile in a nakabukure or connect 4 shape, we'll often fix a ryanmen to preserve it. Still, we'll often preserve a bad shape complex joint. We'll only cut from one when it moves us towards yaku ( → cut ) or to preserve a connect 7 shape.

These decisions will change a lot depending on yaku and dora, so we'll want to give special thought to those in later chapters.

Complex groups (many-sided waits)

Using complex groups

A shape like  can be used a 3-sided wait if it contains the head, but if we already have a head, it's more likely to be seen as  and a weakened  that is more difficult to make a sequence with.

With this shape, we can have the decision at iishanten whether to take the irregular wait or to take a very wide headless iishanten. We will return to this topic in the chapter on iishanten efficiency.

It's not really necessary to think about the relative desirability of complex groups, but it can be difficult to see what the actual wait is. Difficult waits come up rarely, but being able to solve them quickly is directly tied to good results. [13]

Classification of waits

1 tile  waiting on  tanki

4 tiles

With 0 sets

[13] When not playing with tips like a middle schooler :^)

 waiting on  penchan

 waiting on  kanchan

 waiting on  shanpon

 waiting on  nobetan

 waiting on  aryanmen

 waiting on  ryanmen

With 1 set

 waiting on  penchan tanki

 waiting on  penchan tanki

 waiting on  kanchan tanki

 waiting on  ryanmen tanki

7 tiles

With 0 sets

 waiting on  sanmentan

 waiting on 

 waiting on  sanmenchan/piano wait

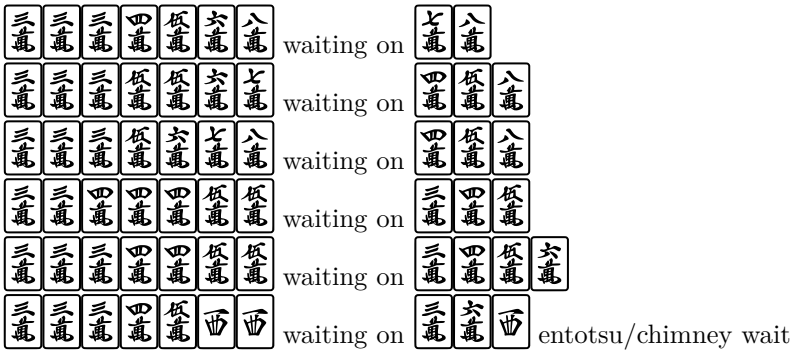
With 1 set

 waiting on 

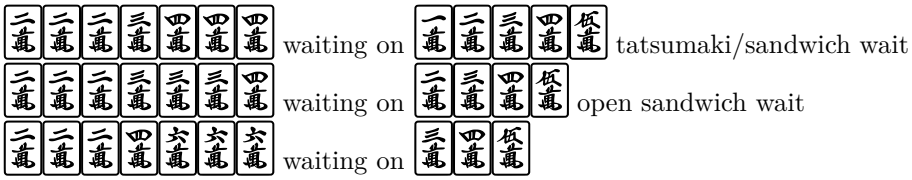
 waiting on 

 waiting on 

 waiting on  the famous 5-sided wait

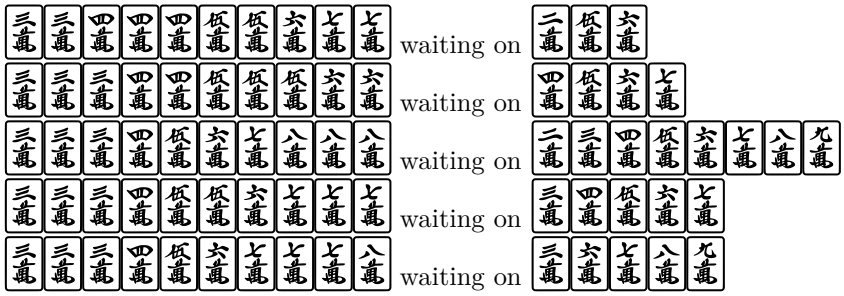


With 2 sets

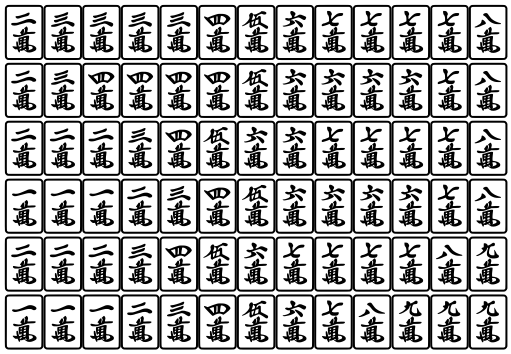


Using 4 tiles

10 tiles



And as a bonus, here are some 13 tile shapes that wait on any tile in a suit:



Solving many-sided waits

Tha author refers to very a long blog post by someone else at `http://ameblo.jp/010101/entry-10514689527.html`. The best way is of course to practice, for example with `https://www.gamedesign.jp/flash/bamboo/bamboo.html`, the chinitsu problem book by Baba Hirokazu or actual tiles.

In the following chapters, we will discuss

- Efficiency taking into account score and calls
- Riichi and calling judgment, to understand the balance between score and speed
- Details of yaku and dora usage, ditto
- What tiles to keep for calling and yaku, how to choose discards with the above knowledge
- Iishanten efficiency

1.2 Head start tenpai judgment

Understanding tenpai efficiency

This isn't really tile efficiency, but we'll take a look at whether to take head start tenpai. (Head start means we are the first player to tenpai.)

The reasons for including this in the tile efficiency section:

- By understanding the strength of head start tenpai (riichi), we can recognize the importance of tile efficiency to make fast tenpai.
- By understanding in what situation to take head start tenpai, we can understand what moves we need to make to make this possible, which is not the same as maximizing tile acceptance. (Tile acceptance that leads to a tenpai which it's better not to take can't be considered tile acceptance.)
- By understanding what tenpai is strong (cheap good shape versus expensive bad shape etc.), we can understand how to balance speed and value in tile efficiency before tenpai.

Head start riichi judgment

Head start closed tenpai is usually instant riichi. Please pin this down first. Then, in what kind of cases should we go dama (or break tenpai)?

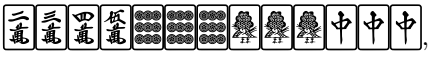
When to go dama

Going riichi or dama will have no effect on final placement For example in the following kind of cases:

- In all last, in the lead with a yaku-having tenpai (with yakuless tenpai, riichi is the correct decision unless falling under one of the cases discussed later).
- In all last, and even with riichi (tsumo or direct hit and ura 1), the final placement would not change (for example a pinfu dora 1 tenpai when behind a non-dealer by over 16000, but being able to secure 2nd place with dama)
- In the round before all last (South 3 in a hanchan), and winning with dama would give us enough points that no one can overtake us in all last even with haneman tsumo.
- Another player is close to busting out, and tsumo or direct hit on that player would let us finish 1st.

Situations where the point standing influences the riichi decision are mostly confined to South 3 onwards and an opponent being close to busting. (Although there are exceptions, the factors below become more important.)

Dama is expensive enough, so that the point increase from riichi is inefficient

- Confirmed dama baiman and up
- Confirmed dama haneman, except with a good wait in the early game
- 3 han 60+ fu hands (example:  , riichi tsumo and dama ron are both mangan)

Dama mangan

[long discussion of a simulation and Totsugeki Tōhoku's book, with the main points being]

- Good shape riichi wins about 50% of the time. Dama only increases this by about 5%, so riichi is good.
- With bad shape, go dama from the 12th turn onward.
- However, if there is a possible improvement to the bad shape, going dama early is good.
- With bad shape 5200 dama, riichi if there is no possible improvement outside of the late game.
- Riichi good shape has a higher win rate than dama bad shape.

Additionally

- Ryanmen dama mangan
  - Dama from the 13th turn (if about 1.5 players are attacking, riichi except just before a draw)
- Ryanmen dama 6400
  - Dama from the 10th turn
- Bad shape dama mangan
  - If about 1.5 players are attacking, dama from the 13th turn
  - If 1 player, mostly dama
- Bad shape dama 5200
  - If about 1.5 players are attacking, dama from the 14th turn
  - If 1 player, dama from the 8~9th turn
- Bad shape dama 6400
  - If about 1.5 players are attacking, dama from the 11th turn
  - If 1 player, always dama (However, bad shape 6400 is often chiitoitsu dora dora or a san'ankou with improvement to suuankou so dama is already quite probable.)

Win rate maximizing damaten

There are some situations where it's good to dama even medium-scoring hands (good shape 4 han 30 fu and up, bad shape 3 han 40 fu and up) outside of the late game.

Situations where winning is much more important than the added points from riichi from a point standing perspective

Essentially, this refers to having a decent lead in South. (In East, you usually still want to push for more points even when in the lead).

Example: South 1 or 2, 1st place and ahead by 12000 points, tenpai for dama mangan with good shape Getting a dama ron here will create a 20000 point lead, which is safe even against baiman tsumo or haneman tsumo when dealer. Direct hit on 2nd place creates an even bigger lead.

Example: South round, 4th place, 1st place has an overwhelming lead, and dama mangan ron would get us 2nd place

Situations where the win rate difference between riichi and dama is extremely large

Example: Chiitoitsu dora tanki on a terminal or honor A difficult to use dora will flow out easily. On the other hand, a middle tile dora will not come out easily, so with a middle dora tanki riichi is relatively effective. Chiitoi dora dora with a non-dora honor wait is similarly also a good situation to riichi.

When it's clear that our target tile is unneeded by at least two other players Concretely, players that have already cut it, are going for a single suit hand in a different color, are going for kokushi or chanta-type when the target is a middle tile etc.

When our own discard pile is especially easy to read, and it's clear that our target tile is unneeded by at least one other player

Defensive damaten

This is the case where we don't riichi to avoid losing points.

When we're first to tenpai, cases like this are quite rare, but they do exist. We will examine a few situations where we might be prone to hesitate.

All last, 1st place, yakuless tenpai

Unless there are plenty of opportunities to create yaku (including calls that lower value), **riichi**.

Exception From the mid game on, when we only need to avoid the dealer and have enough of a lead (at least 4100) or in the endgame when a draw seems likely.

All last, when riichi would lower our rank

Here too, if we're first to tenpai, the general rule is head start riichi. However, if any of the other two opponents are already tenpai, it's better to dama.

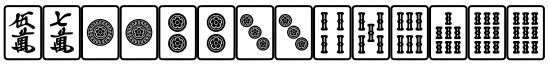
Furiten

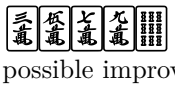
For win rate, furiten ryanmen riichi ≈ bad shape riichi < furiten sanmenchan riichi < ryanmen riichi. (Furiten ryanmen has a slightly lower win rate than bad shape.) However, furiten ryanmen riichi is always menzen tsumo, so it's worth more points. Therefore, we should riichi with furiten ryanmen about as often as with a bad shape. On the other hand, furiten bad shape is extremely bad.

With an open hand, furiten ryanmen < bad shape. This is because it's harder to pressure opponents into folding. If everyone goes betaori, then the disadvantage of furiten essentially disappears. Therefore, with an open hand, we should take a bad shape that avoids furiten.

Extremely bad wait (less than 2 tiles and not an honor wait)

The so-called ultra bad shape. When calling riichi on the 10th turn, this shape has a 14% win rate and a 19% deal-in rate, so we should dama everything other than yakuless dora 3. However, on the 6th turn, deal-in rate is high, but win rate is around 30%, so riichi even with 5200 is good.

Example  dora 

If  has already been cut twice, it's not only  but also  that improve the wait. When the original hand is bad, the quality and quantity of possible improvements increases. Accordingly, with an extremely bad shape tenpai from the mid game on, stay dama and try to improve the shape and riichi, or aim for formal tenpai if the shape stays bad.

Bad shape non-dealer riichi only, in the mid-late game

If we're dealer and can't improve the wait easily, we want to riichi and attempt to renchan (a renchan is worth about 650 points on average).

In the mid-late game, riichi only as non-dealer is sketchy. The expected value is close to zero, so the riichi decision will depend on the situation. We should especially avoid riichi when leading in South, when someone has made a threatening call and appears close to tenpai, or when there are less than 3 draws left.

Wait improvement judgment

Trying to improve the wait ("hand change") when already in tenpai means we have to delay riichi, and is basically a loss. It's better to aim for improvement before tenpai, because there are usually more ways to improve. Waiting for improvement while in tenpai is only worth it when there are **many** tiles that will improve the hand. The following is based partially on simulations by Totsugeki

Tōhoku, which however do not account for the fact that having the initiative over opponents is an advantage, so the limits have been made stricter.

Requirements for hand change

- Early game (4th turn): **6** types to double value, **9** types to improve the shape. (assuming 4 tiles per type, so 2 types of 2 tiles each count as 1 type)
- Mid game (7th turn): Respectively **7** types and **11** types.
- Mid game (10th turn): Respectively **9** types and **11** types.
- Late game (13th turn): **Don't bother**. At this stage, it is often better to dama or fold when the hand is very bad.

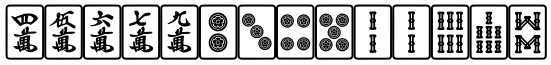
These counts include the winning tile. [14] However, it's often easier to hand change if we break tenpai.

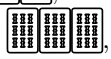
There are often situations where a tile will multiply value by 3 or 4. However, with hand change **quantity > quality**.

So let's look at some examples where we would still want to wait for a hand change.

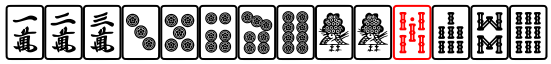
Hand change patterns

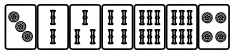
A Double serial shape Each serial shape ( or ) creates 4 possibilities for good shape, so 8 in total.

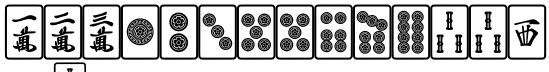
Example  dora  → cut 

The point increase is very large, so we hand change even in the mid game. If the  was  , we only gain pinfu instead of pinfu tanyao, so we riichi in the mid game. If the  was  , we riichi even in the early game.

B Serial shape + floating tile which is dora or gives yaku

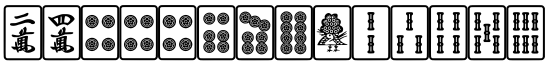
Example  dora  → cut 

[14] TN: Dama tsumo into furiten riichi is sometimes playable, for example with doraless   cutting  for mangan or haneman. At least that's what I think he's referring to. See zeRo's book for a discussion of this play ("absolute pinfu damaten").

Example  dora  → cut  and dama to make sanshoku with  or ittsuu.

C Tanki shape Complex waits and tanki waits are the easiest to hand change. If we have a good tanki, we can riichi.

Example With chiitoi, hand change to an honor, walled off tile, dora, difficult to use tile etc.

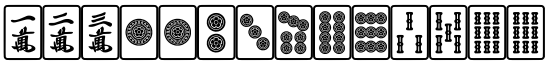
Example  dora  → cut 

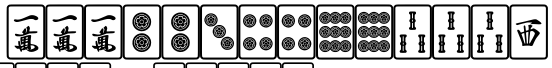
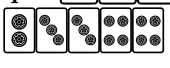
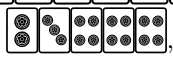
D Callable shape Being able to call effectively increases the amount of available hand changes. Especially common is changing a cheap call into a single suit hand.

Example  dora → drop

E Few types change, but the point difference is striking These don't fit into the framework described above, but are still notable.

Example  → drop 

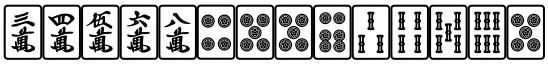
Example  → cut 

Example  → cut  and dama.
With  or  , riichi.

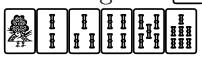
Exceptional hand change waits

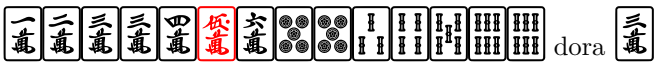
Usually, we want to either riichi immediately, or break tenpai to maximize the probability of a hand change as a general rule. Outside of late game hands with bad shape and many changes (tanki etc.) where a draw is likely, or expensive hands (over 5200) with a yaku that have a hand change to better shape, there are some situations that don't fall under this.

Cheap hands with yaku, going dama versus breaking tenpai

Example East 1, East seat, 7th turn  dora 

→ cut  and dama

Cutting  and breaking tenpai gives the most hand changes, but because  is dora, dama tenpai with  gives change on  (for sanshoku) and a win on  , which is better than the hand change on  on cutting  . The advantage of being able to win on  for 3900 or 2000 all is bigger than hand change in souzu. If  wasn't dora, cutting it for hand change would be good.

Example West seat, 5th turn  dora

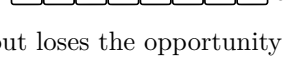
→ cut  and dama

Cut  gives hand change on  , cut  on  (with tanyao) and  . We can't ron, but the mangan tsumo on  shifts our preference to the latter.

When the hand changes in iishanten and tenpai are comparable and the loss from not being able to win is big, it's often better to take dama tenpai.

When to break tenpai even though dama has many changes

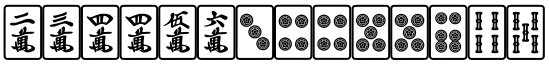
Example  dora  → cut 

The provisional tanki shape (cutting  or ) has the most changes, but cutting  gives ryanmen tenpai on  and can upgrade to tanyao and/or sanshoku. Cutting  confirms tanyao, but loses the opportunity of drawing another  for takame sanshoku.

When two triple waits (here  and ) remain and there is an upgrade in score (tanyao, sanshoku), breaking the tenpai excels over provisional tenpai.

Example  → cut  or 

Cutting  only gives pinfu, so it's not worth the loss in speed.

Example  → cut  or 

Taking the tenpai is good, but if we really need mangan, we can cut  .

Wait choice

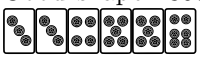
Which wait to take when in tenpai.

Of course with two equally wide waits, we take the more expensive one, and with two equally expensive waits, the wider one. With two equivalent waits, we take the one that's easier to win. From  , we take the  wait over the  wait as it's closer to the outside. Between kanchan and shanpon, we take shanpon. (If the shanpon has one tile less but includes a terminal or honor, it's still preferable. If it's two tiles less, take kanchan unless the shanpon is on a live honor. However, the read of the table is arguably more important.)

So we'll consider the situations where one wait is expensive and narrow and the other is cheap and wide.

With riichi

Point values are for ron with no ippatsu or ura.

- Good shape 1300 > bad shape 2600. This is often with a  where  is dora or a  shape. The tile next to the dora and the iipeikou shape tend to be harder to win on.
- Good shape 2000 < bad shape 5200. But from  cut  for the triple wait.
- Good shape 2600 > bad shape 5200. Similar to the first one, but between ryanmen riichi dora and shanpon riichi dora 2 or 3, choose the latter.
- Good shape 2600 < bad shape 8000.
- Good shape 3900 > bad shape 8000. The gain from ippatsu and ura is maximal at this score. But from  , cut  for a suji trap.

With calls

- Good shape 1000 > bad shape 2000. Neither has a big enough influence on placement (it's an "interrupting hand"). This is not the same as pinfu only riichi (also 1000 versus 2000), since pinfu riichi with ippatsu, ura and/or tsumo is worth about 3500 on average, while the win rate reduction is less than half.
- Good shape 2000 > bad shape 3900.
- Good shape 2000 < bad shape 5200.
- Good shape 2600 < bad shape 5200.
- Good shape 3900 > bad shape 5200.

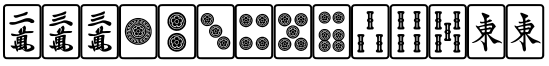
- Good shape 3900 < bad shape 8000. This gets close in the mid-late game. Also, between ryanmen yakuhai aka dora and yakuhai aka dora tanki, the former is better because dora is difficult to ron.
- Good shape 5200 > bad shape 8000.
- Good shape 8000 > bad shape 12000.

With all of the above, if the bad shape is a wait on the dora, the good shape is better.

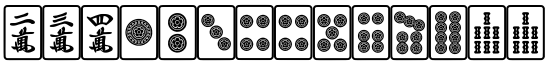
This can get even more complicated when taking into account takame-yasume situations and the possibility of going dama.

Takame-yasume

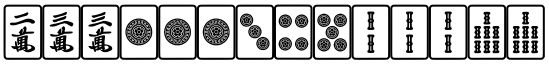
The basic rule is: without any dora, take the takame-yasume. As the number of dora increases, the preference goes to win rate and confirmed yaku.

Example East round, East seat: 

→ With 0 to 1 dora, shanpon riichi. With 2 dora and up, ryanmen riichi. (If  is dora, shanpon riichi.)

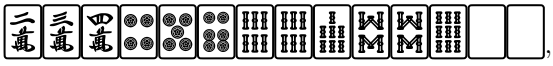
Example 

→ With 0 dora, cut  and riichi. With 2 dora, cut  and riichi. With 1 dora, it's close, depending on how likely  appears to come.

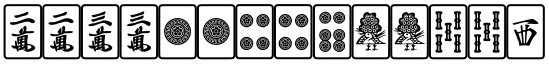
Example 

→ With 0 dora, it's sketchy. If the shanpon would be on an honor or we really needed points, shanpon riichi. Otherwise ryanmen riichi. With 1 dora and up, always ryanmen riichi.

Same number of tiles, score versus win rate

Example  , with cut once

→ Take the shanpon riichi, even though it's slightly cheaper.

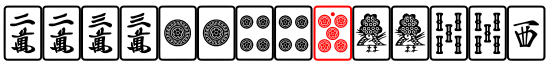
Example  dora  ,  is a guest wind

→ Dora tanki riichi

→ With  , tanki riichi

→ With  dora, dora tanki riichi and dora tanki dama are both good

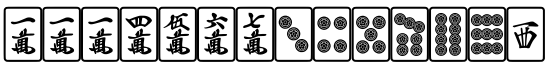
→ With  and  dora, dora tanki dama is quite good

Example 

→  tanki riichi

→ With any other dora,  tanki riichi. (However if the wait is cut twice, riichi on the other one. Don't hell wait.) [15]

Case where the wait with less tiles left has a higher win rate

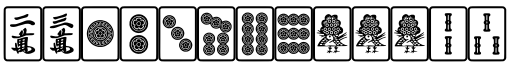
Example 

→ In the very early game (around the 3rd turn) when opponents are not yet done discarding lone honors,  tanki riichi. Otherwise nobetan riichi.

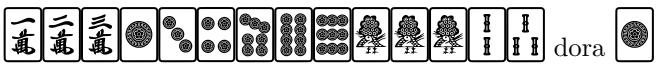
Yasume-takame good shape versus expensive bad shape

Outside of all last where we need a big hand for placement, riichi with the good shape. **Good shape riichi > bad shape dama**.

Some exceptions:

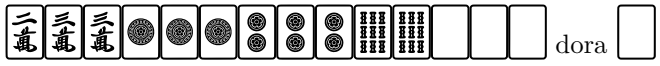
Example 

→ When  is dora, riichi makes it very hard to come out.

Example  dora

→ Cut  and dama (with  not dora,  riichi is good).

[15] TN: Heresy. Believe in the flow!

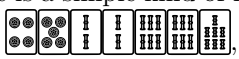
Example  dora

→ Cut  and dama (without dora, riichi).

1.3 Calling efficiency

Calling tile logic

So far we've discussed closed hands that aim for riichi. We'll now take a look at hands where we have called or have the option to call.

Going for closed tenpai every time is a simple kind of mahjong, but it won't bring home the bacon. Even with a perfect iishanten like  , it'll take between 6 and 7 rounds on average to reach tenpai. Getting a closed tenpai means we got lucky.

That's why calling effectively is extremely important. Since we'll need at least 1 han from yaku to be able to win, we'll discuss tile efficiency that takes yaku into account.

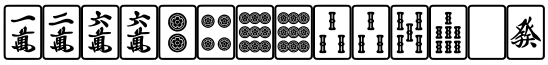
Each call we make can help the shanten advance by 1. Since advancing the shanten is harder when closer to tenpai, it will often be most effective to call when close to tenpai.

That's why, with an early game hand that's far from tenpai, we will more often **try to plant the seeds of a yaku instead of focusing only on tile acceptance**. Yaku building is not just a skill to create big scoring hands. Rather, it's also effective to **bypass the 1 han limit and increase the win rate**.

Now, what are the concrete ways in which tile efficiency changes when considering calling?

The value of isolated yakuhai increases

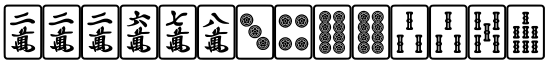
Usually better than a terminal that can't connect to yaku or dora, but when winning closed looks tough and we have several single yakuhai, there are cases to prefer them over bad shape joints or floating middle tiles.

Example  → cut , going for yakuhai, open tanyao or rarely chiitoi.

To the extent that we want to keep these single yakuhai and stack them, **it's standard to open the hand for yakuhai pon**. **Confirming a yaku is just as good as advancing a weak spot**. From an efficiency standpoint, it only makes sense to ignore a possible yakuhai pon when a fast and expensive closed hand is in sight.

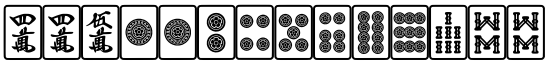
The preference for paired joints increases

Since we can call both pon and chii.

Example  → cut 

Also, in callable hands, a bad shape joint is preferable to a floating tile since it can be chii'd.

In callable hands, we'll often want to fix a bad shape complex joint that gives yaku and reinforce elsewhere. In a closed hand, fixing a bad shape joint is rare.

Example  → cut 

With too much joints, dropping the weakest one and reinforcing the remaining ones is common. However, there are also cases where we can keep a tile that creates yaku. When going for a single suit hand, we'll often drop a joint (rarely, an entire group) of a different suit and hold on to several floating tiles.

There are many people who hesitate to call when far from tenpai, but **it's exactly because the hand is far from tenpai that we must try to call**. Cases where we'll call and then decide to fold will not be uncommon. If we get into a situation where we can't win no matter what, it's not too late to defend, but there are many point losses that can be avoided with a quick win. **Attack is the best defense**.

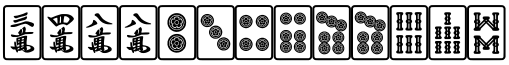
Calling judgment

With calling, as with any skill in life (?), there are three main skills to know:

1. When to call
2. How to make easy to call shapes
3. How to make yaku for calling to work

When to call

Much can be said about deciding whether to call or not, but the fundamentals are **speed and value**. We always have to think of the difference between the shape after we would call or not call. We can't compare a 1000 point bad shape open hand to a riichi pinfu tanyao we couldn't possibly have gotten with the hand. If the closed hand would be fast enough and expensive, we can ignore the calling opportunity, but if it would be slow and not that much more expensive, we'll call aggressively.

Example  dora  → chii or pon into tenpai from the 8th turn on. Yep, even with this delicious mentanpin dora 0. If an opponent looks like he's already tenpai or we're the dealer, it's good to call even earlier.

With a 1- or 2-shanten hand with a bad shape and a confirmed yaku, we'll want to call even more. Yakuhai are usually already 1 call down, so same story.

As a general rule, **once we've called, it's no problem to advance the hand with more calls**. It makes the hand faster while not making it cheaper.

Example  → chii into tenpai

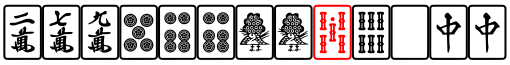
However, calling decreases the number of available tiles, and when we don't have sufficient shape, it weakens the rest of the hand, making it harder to reach tenpai and easier to end up with a bad shape. It also becomes harder to integrate yaku and dora. Thanks to these factors, there will be some exceptional situations where we'll refuse to call even with an open hand. To say it in other words, calling further is no problem if we can already concretely envision the 4 groups and the pair.

What about calls where the yaku isn't confirmed, or leaves the possibility of *kata-agari* (when only part of the wait has yaku, a.k.a. atozuke)?

Indeed, just like it's better to complete bad shapes first and end up with ryanmen, it's better to confirm the yaku first. But here also, we must compare the speed and value difference between calling and not calling. Thoughtlessly hating kata-agari is nonsense. **With a hand that would be too slow to finish closed, call from anywhere; with a difficult to finish hand call only the weak spots, confirming yaku or eliminating a bad shape**.

Example opening hand,  dora  → insta-call 

This is a pretty bad haipai, but if the  comes we'll pon it and cut  . In the distant future, once our isolated tiles form joints, we'll be able to call them. If a  comes out after, we'll ignore it as the shape has no completed groups yet.

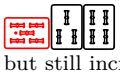
Example 4th turn,  dora  → pon  cut 

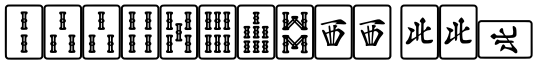
We have enough group candidates and pairs, but no group yet. Consequently, the loss in efficiency from calling shrinks. Furthermore, if we don't call, the hand will likely become too slow.  is obvious, but we'd call anything else cutting  , not caring about the obvious atozuke.

Kuikae and kuinobashi

These plays[16] are commonly hated, but getting extra value or improving to a good shape in 1 turn is great value. We should proactively use these techniques when calling.

Example Kuikae nashi rules, West seat, dora 

[16] Kuikae refers to calling chii on ryanmen, then discarding a tile that would also have completed it, for example  cut  . It's illegal in many common rulesets. Kuinobashi refers to any call that doesn't advance shanten but still increases score or improves the wait, especially a call while already in tenpai.



→ pon  and cut 
→ chii  and cut 
→ chii  and cut 
→ chii  with  and cut 
→ chii  and cut 

Planning yaku for calls

Which is the best yaku for calling?

Getting to tenpai closed is possible at most once in every four hands. With most hands, **closed is too slow**.[17] In practice, about half of all wins are open.

Since calling requires a yaku, we must try to somehow create one when a closed win seems difficult to pull off. Now, what yaku should we prefer for calling with an average hand?

Diagram of open yaku preference
based on ease of making, score and ease of using dora

Rank	Yaku
A+	open tanyao, yakuhai
A	honitsu (chinitsu)
B+	toitoi
B	sanshoku doujun, ittsuu
B–	chanta (junchan)

It's okay to never win the other open yaku (doukou, honroutou, shousangen, etc.) in an entire lifetime :⌒) [18] If a rare hand where they're possible appears, we can consider going for them.

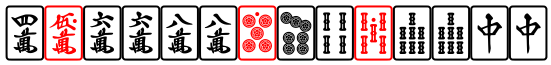
Even **a low-ranked yaku is a priceless treasure** if we can't see a higher one. Although we tend to keep chanta and friends at a respectful distance because they're difficult to make and cheap when open, we should go for them if we can't see another yaku. To repeat: we can't compare them to a mentanpin that would be impossible anyway.

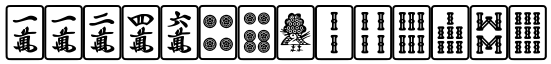
[17] As the level of play increases, so does the average tenpai speed. In Houou South, the median speed for declaring riichi is already on the 8th turn, and open hands are usually even faster! ざわざわ。。。 (Source: `https://blog.kobalab.net/entry/20180118/1516202840`)

[18] maicry.png

Prefer confirmed (easy to confirm) yaku

If it's easy to confirm, it's easy to make, simple as that. If we can avoid kata-agari, we should go for it, unless there's a difference in score.

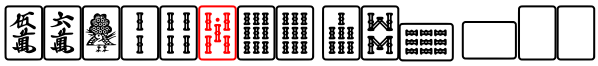
Example  → cut 

Example  → cut 

Cutting  gives the two alternatives of sanshoku and ittsuu, but ittsuu is one tile closer and so we should cut  according to the "mentor theory".[19] Furthermore, if the pair of  was a middle pair, we should go for the superior pairing of sanshoku and open tanyao and cut  .

Dora

Dora has the best cost-performance of any yaku, but doesn't count for the 1 han limit. In other words, once a yaku has been confirmed, there is nothing more powerful than dora. **1 han call + dora 3 for mangan is the win with the best cost-performance**. With mangan in sight, we should prioritize speed, but to create mangan and above, it's no problem to make even quite painful calls.

Example  dora  → cut  ignoring honitsu

Example  dora  → pon  and dora tanki

How to make open yaku

We'll explain the tricks to making each of them one by one.

Tanyao

The indispensable linchpin of calling. An ace that's fast and can use aka dora easily. Always be conscious of it.

Example  → cut

When there's no special difference in tile acceptance, aim for tanyao right away. It fits closely with the principle of tile efficiency that closer to the inside is better.

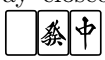
Because kuitan is an extremely convenient yaku (especially with many dora), making calls that don't advance the shanten but confirm tanyao are seen frequently. Let's memorize the following kind of play:

[19] It said メンター理論, I have no idea what this means but it sounds cool.

Example  dora → chii or , cut

Yakuhai

1 han in just 3 tiles, an important yaku together with tanyao.

Keeping single yakuhai in a faraway closed hand is more effective when we have several. The probability of stack one pair with  is bigger than completing a ryanmen (9 tiles versus 8). We can also combine them with other yakuhai, toitoi, honitsu, chanta etc. to increase both value (especially from 3 to 4 han) and speed. Keeping these single yakuhai over bad shape joints or floating middle tiles is done **to increase our own chances of winning and our score to the utmost, and not for choking opponents**. There are many players who keep these while narrowing their hand **"for some reason"**.

Single suit

An excellent yaku that's comparatively easy to make and can count on a high score. If we have gathered enough group candidates for the 4 groups, it's fine to aim for it.

In a closed hand that looks slow and cheap and doesn't have enough group candidates, we can sometimes try to force a single suit. In this case, even the humble single guest wind can become a group candidate. On the other hand, when a hand like riichi + α or yakuhai dora dora is in sight, we do not approve of discarding tiles in the other suit left and right. Though this can be said about any yaku, not making an obvious open hand because one is being choked out of useful tiles is nonsense. **No matter how much we get choked, open is still faster than closed**. Rather, we should think of it as slowing down the opponent's hand. To insist: we can't compare the open honitsu to a closed chinitsu that only exists in our dreams.

Toitoi

We often have to choose whether to go for toitoi or chiitoi. In what kind of cases is each of them good?

When to go toitoi

- **We have a closed set**
  With 4 pairs and 1 set, calling pon and going for toitoi is usually easier to win. Rather than chiitoi 1-shanten for 9 tiles, a callable 1-shanten for 6 tiles is often faster, even when the tiles are hard to call.
- **We can add yakuhai or honitsu for more points**
  According to the mangan theory, we should go for toitoi even with no set. Toitoi also often combines with yakuman :^)
- **Many easy to call pairs (honors, terminals)**

- **Needing to win a hand in all last**
  Calls are great here :^)

- **We can go for yakuhai aka or tanyao aka as mainline and make toitoi if we get lucky**

When to go chiitoi

- **We don't have a set**

- **We have no other yaku** Because we can increase the value of chiitoi with riichi.

- **We have an isolated dora**

- **The pairs are hard to call**
  No problem with chiitoi :^)

- **We can also see a group hand**
  Sometimes happens when we have many iipeikou-type shapes.

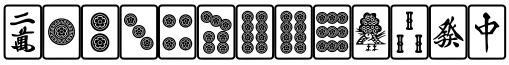
- **We have a big lead**
  For defense.

Sanshoku, ittsuu and chanta

We can get these with luck, but we won't specifically aim for these closed unless we really need an expensive hand. Their cost-performance is not that good, and chanta also prohibits aka dora.

However, in a hand that doesn't have any other yaku and is full of bad shapes, these three can be great for getting that 1 extra han. Strong players are fluent in taking these hands to the win. They don't advance shapes like  closed unreasonably. No way that completes closed.

We'll sometimes see hands where several of these yaku are possible at the same time ("balanced scales").

Example 

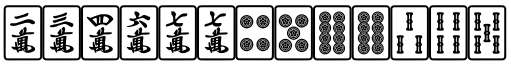
From this bountiful hand we can see pinfu, yakuhai, sanshoku, single suit, ittsuu and chanta. We can imagine many different alternatives as the hand advances.

Even without a confirmed yaku, if the hand is too slow closed, we should see the possibilities of different yaku and try to win using calls liberally.

Principles of calling

The majority of yaku should be called "whenever possible"

First of all, hands that are at least 5200 with calls, we usually call. With hands that score 3900 but are wide, it's usually still good to call from anywhere unless it's the early game and riichi is realistic. Then what about cheap hands that have the potential to be fairly expensive closed?

Example  dora  → call anything from the mid game on

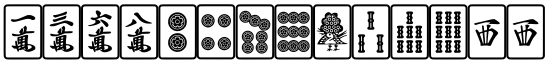
Even though this perfect iishanten for 6 kinds, 20 tiles can be mangan closed and becomes 1000 open, it's good to call from the 8th turn on. If an opponent looks close to tenpai, we can call even earlier. (However, if it's important to make a big hand to secure placement, there can be rounds where we'll ignore calling even late.) With a hand like this that **we want to finish closed if possible**, the conclusion is nevertheless to call for tenpai from the mid game on. With hands that are harder to complete closed (bad shape 1-shanten or ≥2-shanten), it's usually best to call if possible. However, that doesn't mean we can just call anything. If we can't see the possibility of a yaku, there's no choice but to advance closed.

Yaku aren't just important for score, but also for speed

Since yaku enable us to call, they make the hand as a whole able to accept more tiles. With pon, we can accept 4× as much tiles, and with chii, 2× as much. (In reality this will be less, because opponents will often need the same useful tiles and will sometimes even choke us.) Since putting priority on tile acceptance close to tenpai is the principle of tile efficiency, we should try to create opportunities for yaku in the early game, since the gain in efficiency if they pay off is enormous, especially in a hand that would otherwise be slow.

When deciding what yaku to go for and when to call, decide based on the current hand, turn and point situation

Of course, winning with an expensive hand is ideal, and ittsuu and chanta are harder to make than tanyao and yakuhai (and often cheaper when playing with aka). But in mahjong, we can't always go for the ideal hand, since 3 times out of 4 an opponent will have a better hand and we'll have to cope with a worse one. While chasing the weaker yaku for no reason is to be avoided, if we can't see another path to victory, we have to go for them. **If the hand is winnable, we should win it.**

Example 

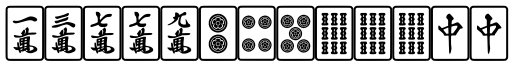
With a hand like this, not going for chanta and thinking pinfu is easier to make is a mistake. Rather, this hand has sufficient joints and is hard to win outside of chanta (+ sanshoku if we get lucky). Furthermore, not wanting to win a 1000 with 2 calls because we're behind by some points and persisting for riichi is not good. The probability of reaching closed tenpai fast enough with a hand like this is extremely low. We should call any of  with this hand immediately and only

keep it closed when behind in all last, or when we have a big lead and don't care about getting tsumo'd.

There's not really a need to think about our hand begin easy to read for opponents

Even with a hand like the above example, there's not really a need to refrain from calling to not let opponents know what yaku we're aiming for. Once we confirm a yaku, it's not really a problem to get choked since we can call from anywhere. It only makes sense to refrain from calling when the hand is close to riichi, and then being readable is a minor concern at best. Furthermore, calling with a faraway hand can put opponents on guard, causing them to weaken their hands (bluffing).

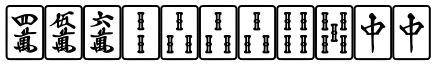
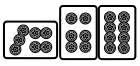
It might sometimes make sense to not call to not expose an obvious yakuhai atozuke, since those are very easy to choke, especially refusing a ryanmen chii, since those are the easiest to complete closed. However, this case will often be connected to the hand being either very slow (don't want to call to weaken the shape too much) or very fast (want to riichi instead). It's fine not to think about opponents reading our calls.

Example  dora  → chii  on any turn

Avoiding kata-agari

Obviously, we should avoid it if comes at no cost in speed.

Example With open tanyao, cut  from  .

Example  chii  → cut 

Though we can switch to tanyao if we cut  and later draw  , we **want the least amount of yakuless waits possible**.

However, just like with our hand being easy to read, it's not necessary to consider this an important factor when deciding to call or not. When we want to not call to avoid kata-agari, it's usually because we have insufficient group candidates or because we don't want to call from the strongest joint first.

It doesn't matter that our calls give some opponents more draws

However, it also gives ourselves less draws. If we have the opportunity to call, but the tile is marginal, and there are many other tiles we can use instead, it's often better to decline and hope to tsumo it.

Calling can only complete groups

Now, is it good to call anything with a slow hand that has a guaranteed yaku? It's not necessarily always the case. A call might advance the shanten without actually making the hand faster to complete. We have discussed the 3 ways of advancing shanten earlier:

1. Making a joint from an isolated tile
2. Making a group from a joint
3. Making the head from an isolated tile

With a call, we can only do 2, but by narrowing the hand, we make 1 and 3 more difficult. The principle of tile efficiency is that tile acceptance close to tenpai is most important. With a hand that has difficulty with 1 and 3, it becomes hard to get to tenpai early and we'll often end up with a bad shape. Furthermore, calling makes it harder to integrate extra yaku and dora.

However, in hands where the necessity of performing 1 and 3 is low (in a hand where tanki is fine, or we can make a nobetan shape like  , putting 3 off is fine), in other words in hands that have sufficient group candidates, if we have confirmed yaku, it's no problem to make one call after the other. To put it in another way, hands with sufficient group candidates can arrive at tenpai through calls only, without the need to tsumo. Not calling with a hand like that is limited to hands that are sufficiently fast and can make riichi (or semi-fast hands where we'll ignore ryanmen chii but call the bad shapes), or from the mid game on, hands that are too slow and would have a low chance of reaching tenpai and calling would make it difficult to defend.

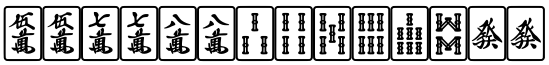
Even with insufficient group candidates, it's fine to call important joints that we would really like to complete (like yakuhai pairs) and postpone 1 and 3 for later. (We call these kind of joints *weak spots*.) Especially calls that confirm a yaku and allow us to call in the distant future are in agreement with the principle of tile efficiency. Even painful calls are fine if they allow us to confirm a yaku and go for an uncertain but expensive slow hand, especially if the hand would be painful to finish closed and we can still defend with an open hand.

Even with a riichiable hand, it's often better to call to improve the shape

Since it's good to call into tenpai from good shape iishanten with a confirmed yaku from the mid game on, we'll often play with an eye to keep the option to call. With a live pair of yakuhai, we'll try to play to leave a good shape once we call it, and going for a single suit hand, we'll drop joints of the other suits and keep single yakuhai.

Example  → cut 

Seeing pon tenpai,  or  tsumo. If  was  , we'd cut  . With no  left, cutting  for a suji trap is good, preferring the fast tenpai over the upgrade with  .

Example  → cut 

With  , becomes a ryanmen. If  was  , cut  .

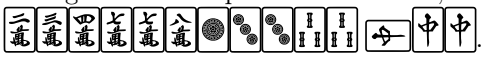
There are not many players who excel at calling and the construction of callable hands. (I don't consider myself one of them either.)

There are many different misguided ways of thinking about calling (however, there's something to each "misguided" way of thinking). There's the yaku supremacists who only make yaku to create big scoring hands and the menzen supremacists who detest ugly (yakuhai atozuke) calls. There's the defensive supremacists who are afraid of narrowing their hand too much with calling. There's the riichi supremacists who disdain yaku that are difficult to go for even in situations where going closed is even more difficult. And there's the nyaggers who'll call anything... Indeed, learning the skill of calling is difficult. But conversely, it's also a realm where one can show one's skill difference from other players.

Differences from closed tile logic

When calling (or considering it), the value of some joints and isolated tiles changes compared to closed hands.

The value of pairs rises

Compared to joints that don't contain pairs, because we can pon twice as much as we can chii. Even in a 3-pair shape, we'll often prefer keeping a pair. While compared to a bad shape joint, the tile acceptance is balanced (2×4 versus 4×2), once we pon, the 2-pair shape that's left is superior. We also insure ourselves against shimocha or toimen discarding our bad shape wait. Of course, we should still prefer a ryanmen over a pair, cutting  from  .

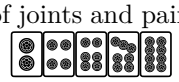
Bad shape joints become better compared to floating middle tiles

Through the influence of chii, the loss of 8 instead of 4 tiles of acceptance becomes bigger. Even in a joint overrun where we'd normally prefer a floating tile, we should keep the extra joint.

The value of terminal and honor pairs increases

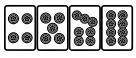
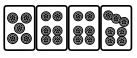
Because they're easy to call. In a closed hand, we prefer middle pairs to create ryanmen, but in an open hand, honors are the best. They're also easy to fold with if necessary. But when comparing a 2 to a 7, the ease of calling is similar, but the number of upgrades is double, so it's common to prefer the upgrades. Similarly, the **easiest to call** joints become preferable, but deciding which in fact is is highly dependent on the discards (especially kamicha's) so we should pay close attention to them.

Joints that have a combo become even more valuable

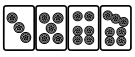
In a closed hand, combos play a role, but usually don't invert the basic ranking of joints and pairs. But in an open hand, bad shape joints with multiple combos into ryanmen like  or

 become very strong. We should obviously call these to improve them into ryanmen. This kind of call is called *kuinobashi* and is easy to overlook, so we want to pay attention to it.

Serial shapes become even more valuable

Chiiing any of  into  or any of  into  (still, we'll only rarely call  with this shape) creates a ryanmen instantly and is pretty damn strong. While bad shape joints also become stronger, this kind of shape is so good we should prefer it. Calling from an insufficient group candidate shape is often not very fast, but there's a big difference if shapes like these exist.

Aryanmen and floating tiles seperated by 1 from a sequence ("ikken hiraki") become more valuable

But not by as much as the above. From  , we can chii  for ryanmen, from  we can chii  . We can in theory also call any of  or  , but the remaining joint would be bad, and it's often better to ignore this not very effective call as we can draw a better tile, but if the turn is late and we want to rush tenpai, we can call. Because it has wider tile acceptance and it's easy to make pairs, the aryanmen is a bit better than the ikken hiraki. Their overall precedence over other isolated tiles is not much higher than in closed hands since only the chii into ryanmen is actually good.

In the next chapter, we'll look into general techniques to make specific yaku and use dora, centering on open hands but also considering closed hands for convenience.

1.4 Yaku composition techniques

Principles of yaku and dora

The most important things to remember about yaku and dora. In Japanese mahjong with riichi and its copious amount of dora, making an expensive hand without any yaku is easy. Accordingly, techniques pertaining to yaku are useful less frequently and have less of an impact on play than those pertaining to basic hand efficiency and dora usage. Therefore, when looking at the hand, instead of first thinking about what yaku to make, we should first think about where to make groups and whether going for riichi is realistic. (In Chinese mahjong, where riichi doesn't exist but a yaku is still mandatory to win, it makes sense to think about yaku first.) That's why in this strategy guide, we first discussed tile efficiency focused on **"where to make groups"**.

If creating yaku or using dora is the most efficient move, we should play it

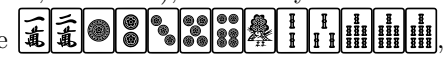
This really goes without saying. When comparing equally efficient (fast) alternatives, we should always prefer the any that gives dora or yaku. The problem is when yaku and dora are not optimally efficient, or when we have to compare them to each other. This chapter will center on such cases.

The value of dora and yaku changes depending on the existence of other dora and yaku in the hand, and is therefore relative

In mahjong, each han up to mangan doubles the value of the hand, but any han above that are inefficient. Accordingly, when we have no other dora or yaku, we'll consider them important, but when the hand is already a confirmed mangan, the added value of extra dora or yaku is small. (There will of course be cases where the point situation will make going for haneman and above important, but in the majority of situations, going for the fastest possible mangan is good.)

Aim for easy to confirm yaku

If both are equally easy, aim for the most expensive one (not just han value, but stackability).

This the principle of comparing yaku. Unless the score gap is big, easy to confirm yaku are preferable. This can also be said about comparing dora to yaku or yaku to speed. Chasing too hard to get yaku is rare, and so is breaking down yaku that have already been created. With "confirmed", for global yaku (tanyao, honitsu, toitoi) we mean that all the group candidates have been gathered. For partial yaku (yakuhai, iipeikou, sanshoku), we usually won't break them up if the groups have completed (except in hands like  , calling riichi when we draw or). Furthermore, hands where multiple mutually exclusive yaku are both reachable ("balanced scales", *ryōtenbin*) are often preferable, unless a wider or more expensive shape exists.

Play to make dora and yaku easy to confirm

For example, when there are multiple ways to call a tile, we should expose the group that confirms dora or yaku. From  where is dora, we should chii for  to leave  which can slide to accept another dora. Same idea without dora  but when chasing 345 sanshoku, because there is a small chance we might draw and prefer to cut for defense. By exposing the group which gives yaku, we make sure it won't get destroyed.

Often, dora is more important than yaku

Because it's easier to use. When deciding what yaku to aim for, the ease of using dora will often be a deciding factor. But when we have no other yaku, **yaku is more important than dora because it allows us to call**. In slow hands that are expensive even without using a particular dora, it's also better to go for a yaku that enables us to win.

When deciding whether to chase yaku, it's not just important how close it is, but how close another way of winning is

For example, since sanshoku requires 3 groups, in a hand with 2 groups already complete, we'll almost never go for it unless desperate for points. Conversely, when the hand is far from tenpai, it makes sense to consider even far away yaku. Keeping isolated tiles that create value, and dropping other joints when a tile sticks to them, all the time without decreasing shanten, is called *wataru-uchi*. In mahjong, since tenpai speed is the most important of all, the skill to chase yaku without straining (slowing down) the hand is important.

On the other hand, in a situation with insufficient group candidates, forcing a certain yaku by dropping a joint (*kime-uchi*) is usually not done, even if the rest of the hand is strong. However, we'll see some exceptions to this rule when going for tanyao and honitsu, two yaku that are exceptionally strong and allow us to call freely.

It's most important to be good at making common yaku

This chapter will therefore focus heavily on the most common ones. For rare yaku, we can deduce the kind of logical moves by analogy with more common yaku or by applying general rules.

Example In a far away hand, keep  in  for sanshoku.

Example Pinfu iipeikou riichi > bad shape ryanpeikou

Example Ryanmen honitsu yakuhai 2 > tanki honitsu shousangen. Without honitsu, we usually take shousangen.

Example With 2 kans down, we should make a 3rd one, but "going for" sankantsu is impossible.

Having discussed generally when to go for what kind of yaku, we'll give a brief sketch of when to go for each one in particular and the special moves for chasing them.

Tanyao

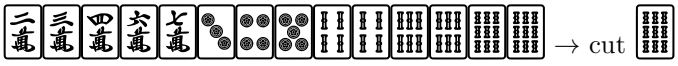
Extremely easy to make and callable without kuisagari, this yaku forms the foundation of mahjong together with riichi.

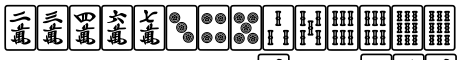
Isolated tanyao tiles become more valuable

In a hand where tanyao is achievable, **floating 2/8 >> single yakuhai**. Even if tanyao isn't confirmed, if we have no other yaku, playing towards the center is standard.

23 and 78 ryanmen become much weaker (obvious)

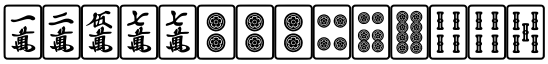
If we can confirm tanyao, we usually should

Example  → cut

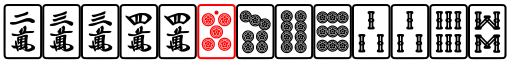
The exception is hands like  where to confirm tanyao we have to sacrifice a ryanmen riichi, similarly cutting  from  even if the rest of the hand is all tanyao.

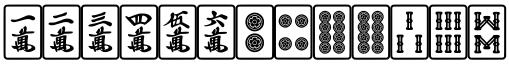
Even if it lowers shanten, we can drop a penchan and keep a floating middle if it confirms tanyao

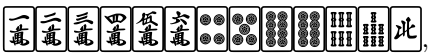
Since we can call, it doesn't just increase the score, but also makes the hand faster.

Example  → cut 

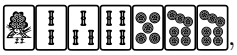
We can call without advancing shanten to confirm tanyao

Example  → chii any of 

Example  → chii any of  and cut 

But with  , we'll prefer riichi pinfu, unless leading in all last where score doesn't matter.

Similarly, when score isn't an issue, the following kind of big brain call is easy to overlook:

With the rest of the hand being  , cutting after the chii:

 → chii any of  → left with 

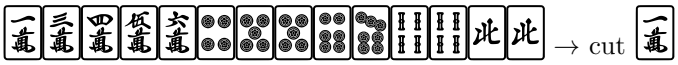
 → chii any of  → left with 

 → kanchan chii  → left with 

Pinfu

This is also the foundation of mahjong, but rarely something to aim for, more often just a bonus for playing efficiently.

Because pinfu means we have minimal fu, it's not as good for scoring as the other 1 han yaku. It's good to not worry about losing pinfu with an otherwise good play. It's common to prefer another benefit over pinfu.

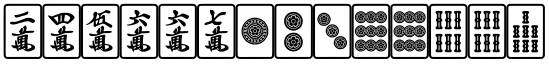
Example  → cut

Temporarily sacrifices pinfu, but the upgrades into good shape are more plentiful (honor tile shanpon is also strong). If we draw the  , we cut aiming for pinfu tanyao despite furiten.

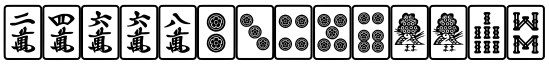
However, with ≥5 han, fu no longer matters. It's helpful to remember that pinfu tsumo + 4 han is one of the main lines to haneman.

Since a yakuhai pair invalidates pinfu, in hands where we have enough sequences and ryanmen **if we don't have a head, guest winds become slightly better than yakuhai**.

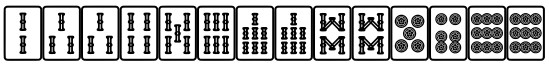
When pinfu is realistic, we'll sometimes fix a ryanmen pair into a ryanmen more often than efficiency alone would suggest. We'll also prefer ryankan over penchan/kanchan pair.

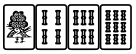
Example  → cut 

Identical acceptance to cutting  , but the ryanmen kanchan (remember?) guarantees pinfu.

Example  → cut 

Cutting  or  when the next group completes.

Example  → cut 

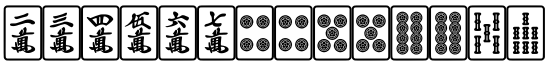
This creates a double ryanmen kanchan waiting on any of  (remember?)

Iipeikou

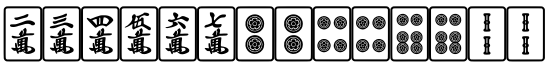
Like pinfu, iipeikou is another yaku that is rarely specifically aimed for but comes naturally as a reward for efficient play. The shapes that give rise to iipeikou like aryanmen and nakabukure are naturally easy to extend and should be preferred over regular floating tiles.

Since iipeikou is a 1 han yaku only, when all other joints are ryanmen, we'll drop a iipeikou-giving bad shape joint first. (As discussed earlier, good shape n han > bad shape $n+1$ han.) Since we already hold one tile of the wait, if another one gets discarded we end up with a painful ultra bad shape. In this case, it's often good to prefer a bad shape joint with 4 tiles left. (Again, a 2× difference in speed > 2× difference in value.)

We can often aim for iipeikou with a "flying pairs" shape, creating two groups from it. This is easy to overlook, so we should pay attention to it.

Example  → cut 

The tile acceptance is 2 tiles lower, but we cut  anyway (not  as drawing  is big here). Making it easier to end up with ryanmen is an important factor too (pinfu, easier to win).

Example  → cut 

Example  → cut 

This is slightly inefficient (3 pairs is bad) but leaves the tiles for iipeikou. If  was  (inner

kanchan), cutting 六萬 would be good (not 八萬 as we want to draw 伍萬 for ryanmen).

二萬 二萬 三萬 三萬 三萬 四萬 四萬 四萬　二萬 三萬 三萬 三萬 四萬 四萬 四萬 伍萬

The two complex waits above also give iipeikou on 二萬 or 伍萬. This can be very easy to overlook.

Yakuhai pairs

Giving 1 han (or 2 han with double yakuhai, *renfonpai*) with just 3 tiles, yakuhai have an excellent cost-performance value. This makes single yakuhai comparable to isolated number tiles, even though they're vastly harder to make a group with. There will even be hands where they are preferable to joints. For this reason, the use of single yakuhai is extremely difficult and forms a major obstacle to any systematization of tile efficiency. We'd like to acknowledge that this section will therefore be longer than those on other yaku and more theoretical. We'll start with the more straightforward discussion of paired yakuhai.

When to drop a yakuhai pair

Since we can call pon, a 2 pair shape of which one pair is yakuhai has an effective tile acceptance of 10 tiles (4×2 + 2). Though this will be slightly lower in practice as we'll not always be able to call, it's still comparable to ryanmen. The honor shanpon when in tenpai also has a win rate rivaling ryanmen. Therefore, it only makes sense to drop a yakuhai pair in the following kind of cases.

Confirmed pinfu iishanten But even here, if the advantage of keeping yakuhai is large, we should keep it.

Example 三萬 四萬 四萬 伍萬 伍萬 赤五筒 二筒 三筒 四筒 五筒 六筒 發 發 中 中 dora 二筒 → cut 發

A mangan even when called, and the shape after the call is very wide and guarantees a good wait. When aiming for haneman and up, cut 中.

Example 一萬 一萬 二萬 二萬 三萬 三萬 五筒 五筒 六筒 七筒 七筒 八筒 八筒 發 發 dora 北 → cut 五筒

Preserves the option of going for chiitoi. The 五筒 has a very slight overlap with 七筒, and we can draw 赤五筒 for chiitoi.

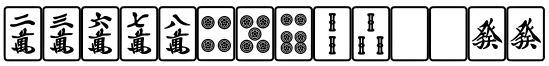
We can make tanyao without increasing shanten

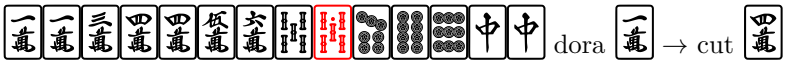
We can cross into a superior yaku From honitsu into chinitsu etc.

Example 一索 一索 一索 二索 二索 三索 四索 四索 五索 七索 七索 七索 八索 發 發 dora 四索 → cut 一索

But with a hand like this which is already expensive enough, and the difference is speed is large, it's better to take the straightforward win.

Conversely, there are also situations where dropping a ryanmen to keep a yakuhai pair is good.

Example  dora  → drop one of the ryanmen

Example  dora → cut

Taking tenpai even with  .

Should we 1-call yakuhai pon?

(By 1-call, we mean to open the hand and make the first call of the hand.) **Yes**.

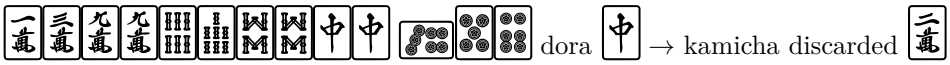
The exception is the following kind of cases:

- **We can expect a fast closed tenpai**, for example an early game iishanten with 2×ryanmen and a yakuhai pair, and calling would be cheap. We should especially not call if the closed tenpai would be expensive.
- **Chiitoi iishanten** (but if we can combine with another yaku for expensive toitoi, we can call)
- **The hand is so fucked it's better to go for kokushi musou**
- **Not fucked enough to go kokushi, but the hand has no head, group or dora and it's already mid game, and we're in the lead**.

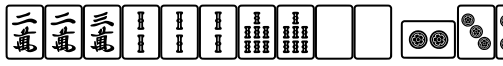
If the hand is very far away from tenpai, **we should still 1-call in the early game**. In the future, once we tsumo some joints, the advantage of being able to call will be very big and have a large impact on win rate. It's not very important to think about defense in the early game. If the tsumos are bad, we can start emphasizing defense from the mid game on.

Should we call for yakuhai atozuke?

When we have gathered enough group candidates

Example  dora → kamicha discarded

If we chii it, our atozuke's wait will become extremely obvious. Should we call? Our other options to make a less obvious to read tenpai are or  tsumo or  pon. 2 or 3 tile types is not nearly enough to wait for a hand change, and we should always chii.

Example  dora → kamicha discarded 

Totsugeki Tōhoku wrote in his *Scientific Mahjong*[20] that we should chii, but should we?

We'll apply the same theory as in the previous example. We get a less obvious shape with  tsumo,  pon and  chii. ( tsumo also open up sanankou, but this is so rare of a benefit it doesn't really matter.) Depending on how we estimate the ease of calling these, this is about 8 to 10 tile types, so we should chii from the mid game on.

Example  dora → kamicha discarded 

Adding to  tsumo and pon for a better wait, we have  tsumo for chanta,  tsumo for toitoi and the ultra spicy  tsumo for toitoi honroutou with a chance of sanshoku. We should also ignore this chii in the early game and call from the mid game on, unless we really want to score big. Furthermore, if  comes out, we should pon to assert dominance and cut  .

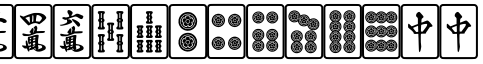
Because even in extreme cases like these, calling is good from the mid game on, it's no problem to call into yakuhai atozuke in cases where our yaku isn't obvious to opponents even from a high shanten. It's really necessary to worry about getting choked.

Even when we could get choked, **it's more important to consider the turn and the quantity and quality of improvements to the hand**.

When we don't have enough group candidates

We should obviously call the yakuhai, but calling the rest of the hand won't always make it faster. It's good to only call weak spots that would otherwise be especially hard to complete, like joints around the dora or with an overlap. Our judgment will often depend on the quality of the entire hand and the turn.

Example 1st turn,  dora → only call 

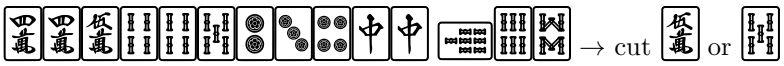
Example 5th turn,  dora → only call  or 

From the mid game on, call the rest too. (But  makes it harder to complete the head, so it's sketchy.)

[20] The famous and highly technical book which contributed significantly to the popularization of digital mahjong. It first came out in 2004 and is now (2019) in its 22nd printing.

It will also often depend on the discards and the opponents' speed.

Another thing to pay attention to when calling for yakuhai atozuke is that the yakuhai can't become the head.

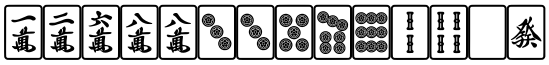
Example  → cut or

Preserving the **2 head candidate shape**. Pay attention to not cut  or  in this kind of shape.

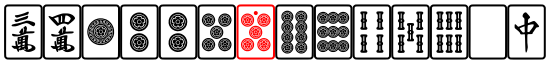
Single yakuhai

The value of single yakuhai

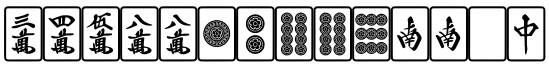
Usually, we think that **1 < single yakuhai < 2 < single renfonpai**, but the influence of the rest of the hand is big. The value of single yakuhai increases when the hand is difficult to win (bigger influence on win rate) and when they lead to a strong hand (honitsu, toitoi). They also have the advantage of often being safe when outpaced by opponents. Even with 1 tile discarded, we want to keep them if a closed win looks difficult.

Example 1st turn,  dora  → cut 

Even if we draw  quickly, the hand is still too slow and cheap, so we'll try to go for yakuhai or open tanyao.

Example 1st turn,  dora  → cut  or 

Even though the penchan shape is bad, this hand is already 2-shanten.

Example 1st turn,  dora  → difficult

Already 2-shanten, but with many bad shapes and expensive even open. There's also a possibility of going manzu honitsu. Whether to drop  , cut an honor or cut  as a compromise is difficult.

Single yakuhai discard order

Because it's good to deny an opponent the renfonpai (especially double East is scary), cut **round wind → dragons → seat wind**. Though this is highly debatable, from guest winds it's good to cut **shimocha → toimen → kamicha**. We want to prevent shimocha calling chii on our discards, while being able to chii from kamicha's fast hand is an advantage. There's also the advantage or disadvantage of extra draws. But when there's specific opponent we want to prevent from a quick win, it's best to cut his wind first.

How to keep single yakuhai

Single yakuhai become better when we have several Because it's easier to stack at least one. In a slow hand with 3 different ones that has many bad shapes and no other yaku, we should drop the weakest joint and keep the yakuhai.

Furthermore, when playing like this, **floating middle tile > penchan**. However, we'll still prefer a ryankan or inner kanchan over a single yakuhai, hoping to luck into drawing a sequence rather than more yakuhai.

It's often good to keep single yakuhai in faraway hands with too many joints

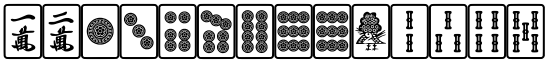
Single yakuhai become more valuable when we already have a yakuhai pair or set Because it's easier to go for honitsu and/or toitoi. We'll discuss this in the respective section on those yaku.

Sanshoku

Formerly known as the flower of the yaku, today we more often hear "don't force sanshoku" and "speed over sanshoku". Both old style players who chase for it too much and players who overemphasize speed even when they should go for sanshoku abound. (The same can be said for many other ≥2 han yaku.) We'll try to explain using ideas from tile efficiency when to see sanshoku and when to disregard it.

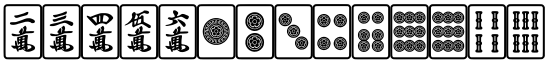
If we can see sanshoku without a real loss, we should obviously see it. When comparing floating tiles and joints of the same type, or when discarding  or  from  , it's important to verify the possibility of sanshoku.

Example  → draw  cut  , draw  cut 

Example  → cut 

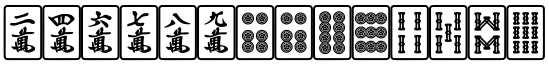
When comparing riichi pinfu and bad shape riichi sanshoku, the latter is preferable, especially in a hand like the example where sanshoku is confirmed and pinfu isn't. (We cut  over  to be able to accept  .) The score is higher, and since we can chii (and we should on any turn unless we need a big hand, since an iishanten with 2 bad shapes takes an average of 17 turns to tenpai), the speed is comparable.

If  were  , sanshoku is not confirmed but pinfu is, so dropping  is good, going for sanshoku only when needing a big hand and having no dora.

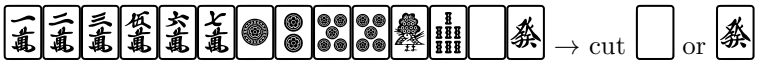
Example  → cut 

We can make confirmed 456 sanshoku, but the 3-sided wait and the amount of upgrades to ryanmen make going for pinfu a bit better.

In general, bad shape joints that confirm a 2 han yaku are preferable to ryanmen, especially when far from tenpai since they enable calling.

Example  → cut 

Similarly, isolated tiles that can create sanshoku also become stronger.

Example  → cut or

Since making sanshoku requires 3 groups, when we have 2 strong group candidates outside of the possible sanshoku, we disregard the possibility of sanshoku from isolated tiles. (The same idea holds for ittsuu.)

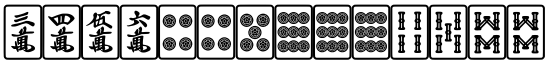
Example  → cut 

The  and  shapes are too strong to justify keeping  for uncertain sanshoku. While this example doesn't amount to it, returning shanten to chase sanshoku is almost never done.

However, with too much joints, the loss from keeping an isolated tile for sanshoku while dropping the weakest joint is small, even when being able to call.

Example  → cut 

Taking a shape that doesn't confirm sanshoku but leaves two alternatives is also often good.

Example  → cut 

This move foresees both 345 and 456, and is preferable to keeping the vertical acceptance for riichi only. If  were dora, the added score from sanshoku becomes weak and it's better to cut  and maximize speed.

Example  → cut 

While cutting  enables both 456 and 567, the difference in tile acceptance is very large and so this move isn't recommended. Cutting  for a very wide shape and a shot at 456 is better.

When considering WWYD problems about sanshoku, the following criteria will usually lead to the correct answer:

- **Ease of confirming**. In general, a sanshoku from an isolated tile is hard to confirm, while sanshoku from a bad shape joint is easier, but people often seem to prefer the former.

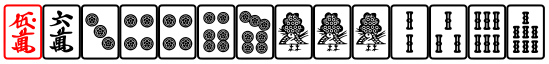
- When hard to confirm, **go for sanshoku when the loss in tile acceptance is small**. When close to tenpai, this loss becomes relatively bigger and sanshoku more difficult to make, while far away from tenpai the advantage of making sanshoku is big. Old style yaku supremacists tend to neglect the former, riichi supremacists the latter.

- In fast hands where the benefit of being able to call is small, **go for sanshoku when the marginal value of 2 han is large**. With a confirmed mangan, sanshoku usually doesn't matter, but with no other yaku or dora, it's very big. Here too, yaku supremacists tend to neglect the former and riichi supremacists the latter.

We'll now consider a few example problems based on these ideas.

Example  → with no dora cut  , else 

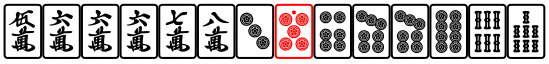
Sanshoku is not confirmed (requires double takame), but the difference in tile acceptance is only 4 tiles.

Example  → cut 

Sanshoku is not confirmed at all (requires triple takame), so we cut the weakest joint since we have too much of them.

Example  → cut 

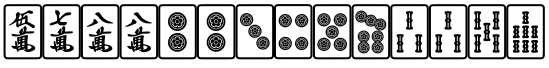
Requires both of  for sanshoku, and the shape on cutting  is much wider.

Example  → cut 

While we can cut  and go for both 567 and 678, losing out on mangan tenpai with  is painful. Cutting  for the easier to confirm 567 with  is better.

Example  → cut 

At this stage, cutting  which gives 678 or 789 is a no-go. The  move which preserves 2-shanten and a strong 2 pair shape is good.

Example  → cut 

This hand is far from tenpai, but since we'll commonly go for open tanyao making 567 closed will be rare. Unless we really need an expensive hand, cut 5m.

Ittsuu

The theory of ittsuu is similar to that of sanshoku. When 2 good group candidates outside of ittsuu have been gathered, we ignore it, but we prefer bad shape joints that guarantee ittsuu over ryanmen.

Example 1245689m 99p 45567s → cut 45s

Example 1256789m 99p 45567s → cut 12m

Similarly, an isolated tile that can create ittsuu is stronger. The 1m in 145689m is obvious, but even the 1p in the uncertain 14589p shape is easy to overlook.

Example 1246789m 45p 35788s → cut 1m

In this example, ittsuu is confirmed, but cutting 19m for (open) tanyao is more effective. Same as with sanshoku, it's often better to not chase it too much when tanyao is available.

While sanshoku and ittsuu are mutually exclusive, there will be some shapes where both are achievable depending on draws.

Example 1235789m 3p 123477s → cut 4s

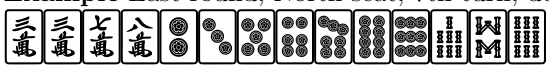
Example 345688m 3p 2345678s → cut 3p

The above example has a big difference in tile acceptance, so it's better to go for ittsuu or tanyao.

When we have to pick between sanshoku and ittsuu, we'll think about the following criteria. In general, it's better to pick the more flexible sanshoku which can stack with tanyao.

- Ease of confirming
- Strength of acceptance
- Score depending on other yaku or dora

We'll examine some example problems of this type now.

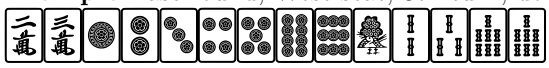
Example East round, North seat, 7th turn, dora 
 → cut  for sanshoku

This is an iishanten with confirmed pinfu. Sanshoku and ittsuu both give the same score, so we only need to find out which one's easier to make.

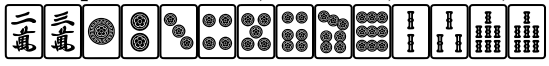
To make ittsuu, we need to drop  and draw both  and  in either order. While drawing  first gives a 3-sided wait, we still only get ittsuu on  .

On the other hand, dropping  for sanshoku only requires drawing  . If we draw it first, we can enter tenpai with confirmed sanshoku. Since sanshoku is easier to confirm, we should go for it over ittsuu.

When going for sanshoku, we could also drop  instead of  . However, the  wait is usually easier to win. Also, cutting  and drawing  later allows us to shift over to 678 sanshoku, which can stack with tanyao.

Example East round, West seat, 8th turn, dora 
 → cut  for sanshoku

Here, making sanshoku and ittsuu is about equally difficult, but going for sanshoku guarantees pinfu.

Example East round, West seat, 8th turn, dora 
 → cut  for sanshoku

At first sight, ittsuu is confirmed and sanshoku looks difficult to make. But even here, going for the more flexible sanshoku shape is better.

When going for ittsuu, we need to drop either of the ryanmen. If we draw  first, we get pinfu ittsuu, but if we draw the ryanmen first, we get ittsuu with a bad wait.

On the other hand, when we cut  , no matter which of  we draw, we can make pinfu takame sanshoku, since we can slide in pinzu to make either 123 or 234. Furthemore, with both  and  we get tanyao.

Toitoi

We usually start calling for toitoi when we have 5 sets or pairs. (Obviously, with 6 pairs we should take chiitoi tenpai.) With no other yaku, calling for toitoi from 4 blocks or less is painful, but if we

can combine with another yaku like yakuhai, tanyao or honitsu, this is no longer the case.[21]

Toitoi or chiitoi?

When to go toitoi

- **We have a closed set**
  With 4 pairs and 1 set, calling pon and going for toitoi is usually easier to win. Rather than chiitoi 1-shanten for 9 tiles, a callable 1-shanten for 6 tiles is often faster, even when the tiles are hard to call.
- **We can add yakuhai or honitsu for more points**
  Especially when we can still make a decent open hand even without toitoi. We can also hold one extra tile in a non-toitoi hand and transition to it when we draw a pair.
- **Many easy to call pairs (honors, terminals)** Even better when we can call a middle tile to start.
- **Needing to win a hand in all last**
  Calls are great here.
- **We can go for yakuhai aka or tanyao aka as mainline and make toitoi if we get lucky**
- **Suuankou iishanten** In general, we should call into mangan tsumo tenpai immediately from this shape and only force suuankou if behind by a lot.

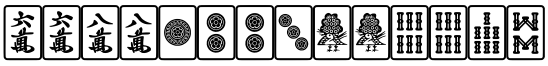
When to go chiitoi

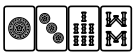
- **We have a pair that has been cut twice and can no longer become a set**
  In this case, we'll often break a set and force chiitoi.
- **We don't have a set**
- **We have no other yaku** Because we can increase the value of chiitoi with riichi.
- **We have an isolated dora**
- **The pairs are hard to call**
- **We can also see a group hand with iipeikou**

- **We want to play defensively**
  When in the lead, or there is an especially dangerous tile (daisangen threats etc.)
- **2 sets, 4 pairs** Breaking a set creates an extremely wide iishanten that guarantees chiitoi tenpai on almost any possible draw. But if circumstances for toitoi are good (yakuhai pair, early turn), we can attempt toitoi.

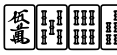
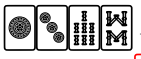
[21] In modern meta, it's common to force toitoi from 4 pairs 0 sets if it's still the early game, there's at least one other yaku, and most of the pairs are easy to call. (look up トイトイダッシュ for examples and more strategy)

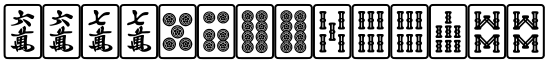
Example problems

Example  dora  → cut 

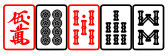
Whether to cut any of  for chiitoi or  for toitoi.

With chiitoi, the hand accepts 9 tiles for 6400 dama. With  , the hand accepts 6 tiles () for 2600 riichi and 4 tiles () for 5200 riichi.

While cutting  allows an upgrade to ryanmen with any of  , including  , it's still not as good as chiitoi. Also, dropping the dora onto the table constitutes a risk. We should cut the least likely of  to be left in the wall, but in the absence of information, cutting  allows us to cope with drawing  .

Example  dora  → cut 

This problem isn't easy. In practice, the two alternatives are  and  .

Cutting  emphasizes win rate. Calling for 3900 is the mainline, but adding aka, sanshoku or dora pon makes it easy to reach mangan. Going for 567 sanshoku closed is unexpectedly problematic as it requires letting go of a dora, so we should call any of  from the early game.

Cutting  preserves chiitoi iishanten with an outlook for a monster hand up to ryanpeikou.

While either is a correct answer, we recommend  . The main advantage of  is preserving chiitoi, but the wait becomes bad, and calling a lucky dora or aka makes the  shape heavy. We think a 3900 minimum with good shape is the main idea.

Example  dora  → cut 

Cutting  is fastest, aiming for  pon into perfect iishanten. This kind of fast move that ignores chiitoi is good when leading in all last. But it's very cheap. Cutting  is the choice of the menzen riichi faction, but it's quite slow and not much more expensive, so it's a bit lacking.

Dropping  is a move that aims for maximum upgrades into an expensive chiitoi or toitoi hand. After  pon, it's faster than cutting  and allows for a natural climb into toitoi.

While  preserves the chiitoi iishanten, forcing the  shape is a bit awkward, and breaking up the  ryanmen makes the iishanten worse, making this the least skillful move.

Especially when playing without aka, ignoring toitoi/chiitoi with yakuhai and no dora makes the hand very cheap. Dropping a ryanmen to preserve these yaku is an indispensable strategy in aka nashi rules. In aka ari, toitoi and chiitoi become weaker because they have trouble using aka, but even there  is the best move.

Example  dora → cut

With 1 set and 4 pairs, whether to keep the set or widen the chiitoi acceptance depends on the hand. Keep the set when

1. there is a yakuhai pair or tanyao
2. there are no dead pairs
3. the pairs are easy to call (honors and terminals)

and force chiitoi when

1. there's a floating dora (especially an honor dora)
2. toitoi would be 2600
3. there are many middle pairs

is the general theory.

In this difficult problem, whether to go for chiitoi or toitoi depends on personal preference, but having polled some strong players, cutting  and calling from anywhere seems to be popular. While the floating dora is cause for concern, the chiitoi acceptance is only 3 tiles lower, and toitoi hatsu is often easier to win than chiitoi dora tanki. But since toitoi has trouble defending, if defensive power is important, it makes sense to cut  . Toitoi is more proper to attack, as is chiitoi to defend.

Example  dora

This is either a very wide iishanten for chiitoi, or an iishanten for toitoi up to suuankou.

Here too, toitoi is preferable. While chiitoi gets to tenpai faster, it's not that easy to draw a good tile to wait on. It's better to pon into tenpai quickly.

The problem is whether to ignore pon and aim for suuankou. In online mahjong without special prizes for yakuman, it's recommended to pon from the 6th turn on. Suuankou is the easiest yakuman

to make, but drawing one of the 6 needed tiles and then tsumoing on of the remaining 4 before it comes out from an opponent is difficult, even more after skipping a possible pon. Since we can tsumo sanankou after calling, we think it's good to call here.

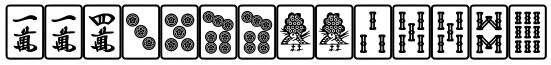
Chiitoitsu

For deciding between toitoi and chiitoit, see the previous subsection. This subsection will focus on deciding between chiitoi and a sequence hand.

Chiitoi or sequences?

When far from tenpai, not deciding for either and preserving both possibilities is usually good.

However, there are some exceptional cases where committing towards one shape is better. This is typically in hands where one of the two is difficult to achieve and can be safely ignored without a major loss, while the committing move significantly improves the win rate of the more realistic alternative.

Example  → cut 

This hand is already 2-shanten for chiitoi, while making a sequence hand is very slow. Breaking up  for chiitoi preserves a small chance of making 345 sanshoku.

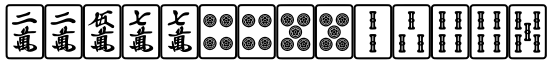
In a hand like this with at least 4 pairs where the chiitoi shanten is lower than the group shanten, and no possible draw can create a good group hand, committing to chiitoi is good, holding on to isolated tiles that look easy to draw or easy to wait on. While committing moves that pointlessly negate yaku just lower win rate, this kind of committing move improves speed close to tenpai and is therefore in accordance with the principle of tile efficiency. This isn't just true for chiitoi, but also for yaku like single suit or chanta, where breaking up a joint to keep a yaku-related floating tile is often good.

However, if there are sufficient joints for a group hand and we have a yaku that enables calling, it's often better to break up pairs and go for a normal hand. The loss from missing out on chiitoi will be small since we'll want to call in the majority of cases anyway.

When close to tenpai

The basic idea is to commit to groups when the group shanten is lower, make a mixed shape when the shanten is the same, and preserve chiitoi shanten while leaving the option for a group hand when the chiitoi shanten is lower.

Example  → cut 

Example  → cut 

While a group hand with tanyao is very realistic, breaking up the to preserve chiitoi is actually faster. If were , lowering shanten and cutting to commit to pinfu tanyao is good.

Example → cut

The group shape is not strong enough to commit to it, so we preserve chiitoi 2-shanten.

Example → cut

With tanyao, ending up with chiitoi will be rare, and the move that preserves chiitoi weakens the group shape by a lot. Fixing the aka ryanmen is better.

Example → cut

Preserving chiitoi 1-shanten while envisioning up to ryanpeikou with .

Example → cut

With the aka in souzu, breaking up the souzu would be painful. We cut seeing 456 sanshoku.

Example → cut or

Here dropping is also good, but if or is dora, aiming for open tanyao with is faster, creating a good shot at perfect iishanten with the next advance.

In the three examples above, we shouldn't cut manzu as this would narrow the tile acceptance towards a group hand too much.

Example dora , East round → cut

Since we can and should call from anywhere, we can ignore chiitoi and cut . If were a guest wind, we'd cut preserving chiitoi. We'd still call , but the other calls would depend on the circumstances.

Example → cut early and from the mid game on

When preserving 1-shanten is important, cut  , but returning to 2-shanten with  creates a better shape in the long term.

We should return a chiitoi 1-shanten into a group 2-shanten in the following cases:

- The loss from taking a mixed shape would be big.
- We can call from anywhere or we can easily return to group 1-shanten by drawing one of many ryanmen.
- The turn isn't too late. From the 10th turn on, it's good to preserve any kind of shanten, even if it's narrow.

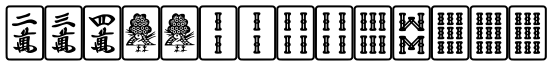
Single suit hands (honitsu and chinitsu)

Good cost-performance that can be expensive even open, it's common to force these when far from tenpai. That's why it's often hard to judge whether to go for single suit or not. In this subsection, we'll focus on hands where such a decision is difficult and try to establish some basic rules of thumb.

When to commit to single suit

We have at least 10 tiles of the desired suit, including honors that have been cut less than twice, and at least 4 blocks

We have no groups in another suit Unless a multi-suit hand would be cheap with a bad shape, and the single suit hand would be expensive and easy to call.

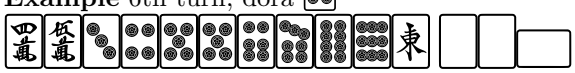
Example  → drop manzu

We have at least two strong blocks in the off suits With one off suit block, a single suit hand can still be made very naturally preserving shanten along the way, but with 2, going for single suit is often overdoing it.

Example  → cut

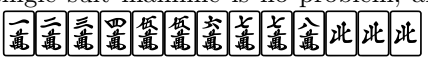
We'd rather go for junchan sanshoku here, even though we have 10 manzu.

We have another open yaku (especially yakuhai) but less than 3 dora When not going for single suit gives at least 3900 or mangan, not going for it is common, but we still should if speed isn't affected too much.[22]

Example 6th turn, dora 


[22] To quote zeRo さん: if we have a yakuhai pair, we should *always* take 2 seconds to think about honitsu.

Since we get 3900 without single suit, cutting  is good. But when we draw  or  later, we'd have to cut dora for 2000 tenpai, so at that point we'd revert to haneman iishanten by cutting from manzu. If the manzu were a bad shape, we'd drop them immediately in the example situation.

If a hand satisfies all four of these criteria, going for single suit mainline is no problem, and we should call everything to advance. (Except in hands like  which are very wide and would be too cheap open.)

However, these criteria are for **committing to single suit**. If the hand doesn't satisfy one of them, we should still play with an eye for single suit, hoping for good draws. How much to go for single suit in hands like that is more difficult. Let's call a hand state that can commit to single suit A, and a hand state that can safely ignore single suit B.

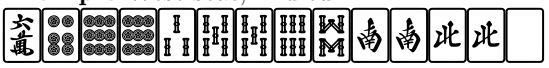
Consider the relative ease of achieving A and B

When we have many tiles of the single suit and one off suit joint, we get to B when we tsumo into the offsuit joint, and we get to A when we tsumo or call into any other block, which will also create a callable shape that can advance faster. In this kind of case, A will usually be much easier to achieve than B, and it will often be good to drop the the off suit joint while holding on to single suit floating tiles and live honors, calling into a single suit even without sufficient blocks. In a hand where the relative chances are more equal, it's often good to cut isolated honors without overcommitting to either A or B.

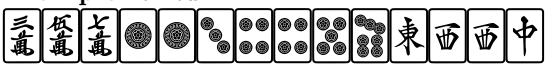
While the relative ease of A and B depends a great deal on the shape of the numerous suit, what many players fail to realize is that it also depends greatly on the shape of the offsuit. Especially in a bad early game hand, it's quite common to commit to even an uncertain single suit if no other yaku are in sight.

Consider the relative strength of A and B

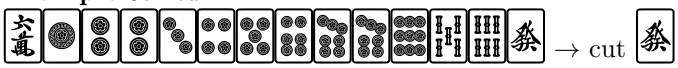
Simply put, this refers to their relative score. With 2 yakuhai pairs (or 1 yakuhai pair and 2 or 3 single yakuhai) or when holding a dora or aka in the single suit, it's easy to make mangan and we should call even more aggressively. On the other hand, when we already can make mangan even without single suit, or when we have an offsuit dora or aka, it's best to go for yakuhai + α and maybe single suit if we get good tsumos. We should especially keep single yakuhai when going for single suit is realistic.

Example West seat, 2nd turn
 → cut  or 

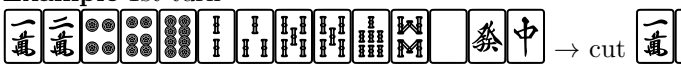
Honitsu mainline, with toitoi as a backup plan. It'll probably end up as honitsu only 2600 but since it's difficult to win otherwise we can't help it.

Example 4th turn
 → drop manzu

If we can make one more block in pinzu or honors, we're set.

Example 6th turn
 → cut

We have 10 pinzu, but drawing onto the offsuit is realistic and we can make other yaku, so we don't commit.

Example 1st turn
 → cut 

Choosing between yakuhai and penchan. If we can stack yakuhai, we can see mangan, so we want to keep this option open.

Example 8th turn
 → cut 

We have enough blocks for honitsu mangan, and we can also make toitoi mangan. Because it's a late turn, we shouldn't overcommit to either, but depending on the progress of the opponents we can settle for 1000 or 2000.

Single suit hands are powerful, but they are also easy to read for opponents. However, it's best not to worry about this too much. Making an expensive hand without opponents noticing is rare, while going for a single suit when the hand is bad can scare opponents and is actually an advantage. However, when we have completed the blocks for the single suit, it can be good to cut honors and tiles from the single suit to camouflage. Also, when committing to single suit, it can be good to discard tiles from the second most numerous suit first to make opponents uncertain about which suit we're aiming for, making it slightly easier to call.

Example  → cut

Since single suit hands often give rise to many-sided waits, it's good to know these (see subsection on many-sided waits). `http://hinakin.main.jp/mckonweb/index.htm` is also a good trainer for chinitsu (warning: 20 second timer, HARD).

Mahjong veterans' single suit criteria

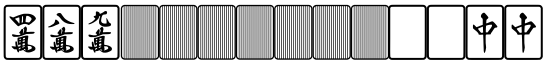
Though we've discussed some criteria of single suit commitment judgment, there will be many cases in actual play where deciding will be difficult, and play styles will differ even among strong players. We have therefore chosen to include the following blog posts (needs an account to view) by チルノさん and 氷室さん.

From チルノさん's "幽雅に咲かせ、無理染めの桜": [23]

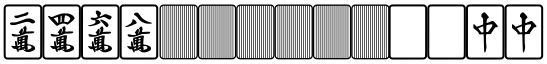
[23] Let them bloom nobly, the cherry blossoms of forced honitsu

I'm not really a single suit kind of player, but I'll try to find out the border ~~of life~~ of single suit, with normal hands in an equal point situation. In all examples, assume East round, South seat, 2nd turn, all yakuhai live.

2 yakuhai pairs and up (see blog for other hands, I might translate this in the far future)

Example 

If the other suits are all bad shape, this is about the border. If the isolated honors are dead, I have an offsuit ryanmen or a dora-related joint etc. I'd ignore single suit. Haipai with 2 yakuhai pairs usually means going for honitsu or toitoi.

Example 

Even with an offsuit ryanmen or dora-related bad shape, this is about the border of single suit. If I have an offsuit group or several good shapes, I'd try to balance.

For example:

Example  dora → cut

This could well become toitoi, but start with  .

Example  dora → cut

Comfiest mangan is when we draw a second  . The  feels useless but I'll start with honors.

Example  dora → 2000 is fine I guess

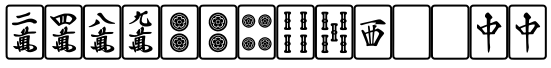
Example  dora → cut 

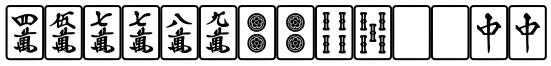
Maybe won't honitsu but starting with  has a good feel.

Example  dora → normal mode

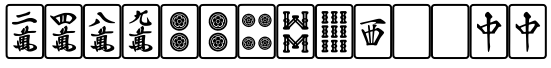
Example  dora → cut  I guess

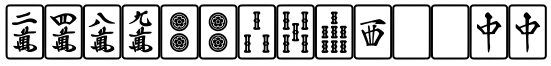
Example  dora → cut  ?

Example  dora  → perhaps not single suit

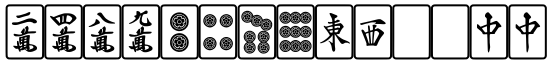
Example  dora  → cut 

Might drop  here, but it's hard...

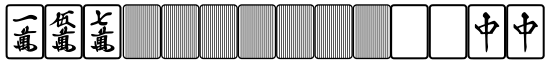
Example  dora  → honitsu looks good

Example  dora  → not in manzu

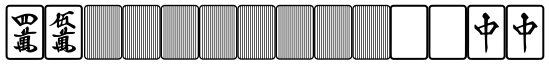
Maybe in souzu though.

Example  dora  → look at discards

Probably look at discards and see which honitsu looks easier to make.

Example 

Toitoi or honitsu with a pair from a different suit looks better, doesn't it?

Example 

Looks like something else will stick before honitsu.

For example:

Example  dora  → cut 

Example  dora  → sketchy

Example  dora  → cut 

Example  dora  → cut 

Example  dora  → sketchy

Example  dora  → cut 

Example  dora  → start with  ?

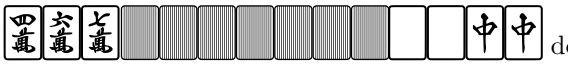
Example  dora  → cut 

Example  dora  → sketchy, doesn't look like honitsu

Example  dora  → doesn't look like honitsu

Example  dora  → nope

Example  dora  → cutting  feels okay

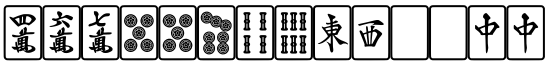
Example  dora 

With one more dora this gets good enough so don't want to force too much. Yakuhai 3 dora 1 also exists so single yakuhai become important.

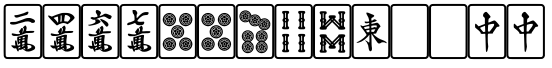
Example  dora 

This is still  but

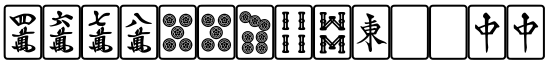
Example  dora 

Example  dora 

hands like these are  .

Example  dora 

Don't commit to honitsu but cut  .

Example  dora 

Same but still  →  →  .

From 氷室's blog:

1. **When the dora is an honor or in the suit we're considering** Honitsu suddenly becomes much stronger, and getting 3900–8000 is easy. Being aggressive and making the opponents wary is not bad. Even with a riichi to the face, holding out with some honor tiles is common. (By the way, when the pressure is strong like this, opponents won't riichi shitty hands, so you should pay attention.)

2. **When a closed advance would give a shitty wait for 1300–2600 but honitsu might give 2000–5200** The so-called forced honitsu from a shit hand. Honitsu stacks easily with other yaku, and can be freely called so it will even complete once in a while :^) However, with a bad haipai, 1000–2000 yakuhai isn't bad at all. There are many players who try to force honitsu to the bitter end without considering clearly faster opponents or the wider situation. The same can be said about defense. Being no-ten with a 2000 honitsu with 3 calls down should be avoided Especially when opponents can obviously see how cheap the hand is.

3. **When we have 2 yakuhai (or 1 yakuhai and some live honors)** Gotta go for honitsu, toitoi, dora and so on for at least 3900–8000. Getting 2000 with the rare double yakuhai starting hand is a tad wasteful.

4. **When we need at least 3900 at any cost, and the hand is shit** This occasionally happens in all last, and forcing honitsu there is quite good. (For some reason many people hesitate to do this.) With a shit hand, getting 3900 closed is hard :^)

And here are some special traits of my own style of going for honitsu:

1. **Focus on score over shape** This might be unexpected, but I don't care that much about how many tiles of the suit I have. Of course, that's doesn't mean I don't think about it at all... How high can I score with honitsu? How high can I score without honitsu? are more important questions when I'm deciding.

2. **Play confidently** When going honitsu is clearly better, it's normal to drop offsuit tiles and keep single honors. This isn't really a special trait... but when spectating I see a lot of people who undervalue single honors.

3. **Floating honors** This ties in with the previous point, but when holding several of them, I often think of what the shape will look like when one of them pairs up. This isn't really supported by statistics or anything, but with 3 of them drawing a pair happens pretty often.

4. **When the shape or score is meh, don't overcall and keep safe tiles** By the way, this isn't just for honitsu. But it's a pretty difficult skill I guess. You might miss the train, but you don't want to get run over by it :^) Especially with forced toitoi it's even easier to die.

Chanta, junchan, honroutou

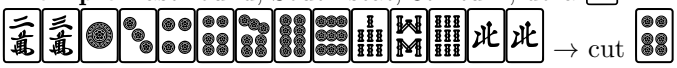
Similar to single suit in that it restricts the entire hand, but harder to make and worth less points. With a yakuhai pair and no dora going for honitsu gives 3900 or 5200, but with chanta it's only 2000 or 2600, which is a big difference. There will be many cases where a cheap hand which can be won comfortably will sacrifice speed for honitsu, but rather than going for chanta it's often better to

go for yakuhai only. The value of chanta only becomes apparent in mangan-class hands like yakuhai chanta dora 2 or junchan sanshoku dora.

That being said, if winning closed looks unrealistic, and we can go for a reasonable open chanta, we should. In general, **go for chanta when we have at least 4 blocks**. We shouldn't restrict ourselves to a closed hand, but **call from anywhere**.

Chanta is easy to combine with sanshoku, and there will also be many cases where we can go for either chanta or ittsuu. The idea for comparing the two alternatives is similar to comparing sanshoku and ittsuu (see above).

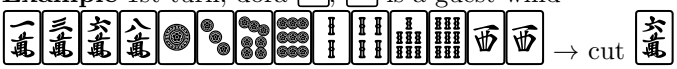
Example East round, South seat, 8th turn, dora 

 → cut

Going for chanta/pinfu good shape over ittsuu bad shape, this is a fairly straightforward problem.

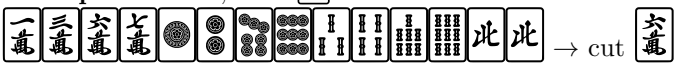
Honroutou can often be made by upgrading a chanta or toitoi, so it's not very important to pay attention to it specifically.

Example 1st turn, dora  ,  is a guest wind

 → cut or 

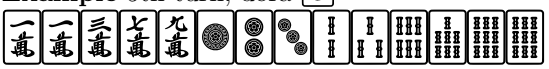
We've treated this example before. We cut  or  (to preserve sanshoku) and call everything. If in the West seat, we cut the same tiles to begin, but don't force chanta, going for West only and maybe chanta.

Example 1st turn, dora 

 → cut or 

Even with ryanmen we still go for open chanta. But in the West seat, it's faster to drop  and go for yakuhai.

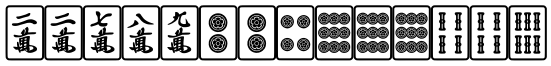
Example 5th turn, dora 

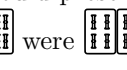
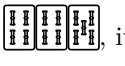
 → cut 

At this stage, riichi is not difficult and junchan isn't confirmed, but we can call anything except  . While the loss on drawing hurts, on drawing anything else next going for junchan is both faster and more expensive.

Sananko

While it can be scored with an open hand, it's a closed yaku in practice as the 3 sets must be entirely self-drawn. As it's difficult to make and undervalued at 2 han, the necessity of being aware of it is low.

Example  → cut  with no dora, else 

With a mediocre no yaku no dora hand, we should preserve the weak 3 pair shape if it can make sanankou. With any yaku or dora, or if  were  , it's good to cut  .

Example  → cut 

While  is widest, preserving iipeikou and sanankou gives a big difference in value. If we have two closed sets before tenpai, it's indeed good to be aware of sanankou.

While comfirmed sanankou can sometimes be upgraded to suuankou, if we have no other dora or yaku, the riichi increase from 3200 to 6400 is very big and the standard move is instant riichi. With dama 6400 we can wait for an upgrade.

Kokushi musou

With the exception of the coincidental yaku tenhou and chiihou, all the other yakuman except kokushi musou can be made by upgrading a normal hand (daisangen from shousangen, chuuren from closed chinitsu, the rest from honitsu or toitoi). Since we can aim for these yakuman by going for a lower hand and crossing over into them if we get lucky and draw the right tiles, and their appearance rate is extremely low, we won't explain any related techniques separately.

However, since kokushi musou requires us to completely give up any option of another hand, we'll consider it shortly even though it's rare.

Should we declare a draw?

Simulation results for kokushi chasing

Starting hand	draw rate	win rate	deal-in rate	opponent tsumo rate
13 types, 13 tiles	0%	99.812%	0.057%	0.048%
12 types, 13 tiles	2.834%	66.542%	10.637%	9.859%
12 types, 12 tiles	3.797%	55.718%	14.052%	13.162%
11 types, 12 tiles	11.049%	20.960%	23.977%	22.067%
11 types, 11 tiles	11.074%	19.749%	24.525%	22.381%
10 types, 11 tiles	15.024%	6.464%	27.919%	25.453%

From these stats, we see clearly that **going for kokushi from 11 is good**. From 10, it's sketchy. **From 9, declaring a draw is usually good**. Of course, this depends on the situation, but even

when safe from last place by mangan tsumo, declaring a draw from 9 is usually better. When the scores are especially close, it can be good to declare a draw from 10, even when trailing.

If a hand with 9 honors and terminals looks reasonably winnable as yakuhai, honitsu, chanta, honroutou etc. for about mangan, we can continue, taking these yaku as mainline unless we draw the 10th tile for kokushi very quickly. With multiple yakuhai pairs, it's difficult to commit to cutting a middle tile, so it's better to ignore kokushi and call from anywhere for yakuhai 2 + α. When going for kokushi mainline, it's ideal to keep a backup plan with one of the above yaku or chiitoitsu for when one of the necessary tiles dies, but it's often not possible to preserve this option. Unless we can go for another yaku early on, it's better to go for kokushi.

Example  → cut

When committing to kokushi, we cut the most dangerous tiles first, holding on to safe tiles. Since opponents will be able to notice the kokushi no matter what, we usually don't worry about disguise, but when starting with 10 types, 12 tiles, we can cut an unneeded tile early on to camouflage.

Nagashi mangan

The opposite of kokushi. When we have many honors and terminals, going for kokushi is usually better from a score and defense view, and we'll usually only consider nagashi in the late game when going for a normal hand but getting all bad draws. When we have enough honors and terminals for guaranteed nagashi, we should go for the win even if they are dangerous towards an opponent in tenpai. This is because a guaranteed nagashi mangan has a higher win rate than even a very good wait. If an opponent is going for nagashi, we shouldn't forget to call and break it up. Similarly, when committing to nagashi ourselves, we should cut the easier to call tiles first.

Dora in closed hands

Dora is amazing for value, and unless we need to emphasize speed in a situation where score doesn't matter, or when defense is especially important, we usually only want to **cut dora close to tenpai**. Of course, any blocks and floating tiles that can integrate dora become more valuable.

Since the value of dora depends greatly on the rest of the hand (if the hand is already mangan, the added value of dora is low, if we have confirmed tanyao, a terminal dora becomes fairly useless etc.), comparing dora to other components is very difficult. It's easy to make a WWYD problem by taking the most efficient discard and turning it into the dora. We'll leave the more difficult problems (1–2-shanten efficiency) for later and focus here on the easier to compare cases.

- Comparing components of the same class
- Assuming at most one other dora and at most pinfu as yaku, so each dora doubles the score

Sliding sequences

With dora , we should cut from  to accept the dora.

Ryanmen

We should of course keep dora ryanmen. Since there are 4 omote dora but only 1 aka dora, we should prefer a dora-accepting ryanmen to an aka-accepting one.

At 1-shanten, we commonly break up the overlap in  , but if  is dora and we have no other dora or yaku except pinfu, we can sometimes break up  and aim for pinfu dora 2. The difference in tile acceptance is only 4 tiles, but the difference in score is very large. (With 1 han elsewhere, it's better to go for speed taking riichi, tsumo, ura dora into account.)

Bad shape joints

If the difference is only 1 han, we prefer a ryanmen. When comparing bad shape joints to each other, the ones with dora are much more preferable, and the 1 han difference is far more important than the subtle variations in shape that we discussed earlier. With an overlap into dora, we should remove it unless we have no other dora or yaku as above.

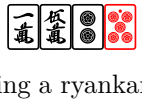
Complex joints

We usually prefer to fix into the shape with the most dora, even if inefficient.

Isolated tiles

Being able to draw a second dora for a dora pair is far stronger than being able to make a ryanmen. Of course, being able to make a dora ryanmen is also very good. In the general ranking of isolated tiles based on ease of making ryanmen, which is honors and terminals $<$ 2·8 $<$ middle tile $<$ serial shape, an isolated dora is one rank higher.

While dora neighbors are also stronger, it's not enough to rank them up against more efficient tiles. (Because a ryanmen is better than a bad shape with dora. But when comparing tiles of the same class, we especially prefer those next to the dora.) Of course, **1 tile away from dora $>$ 2 tiles away from dora**.

When holding the dora, the tiles 3 away (*dora suji*) becomes less valuable. After cutting  from  and drawing  , the loss is smaller. It's not 1 rank worse, but from  it's about bad enough to cut  . The tile 4 away also becomes slightly weaker, as making a ryankan with the dora at one side is not as advantageous. We cut  from  .

But when we don't have the dora, the dora suji becomes more valuable. With dora  , we should cut  from  . If we cut  , we might draw  or next, cut them, and draw dora later. It's a very subtle difference, but worth paying attention to since it's easy to discard the dora suji thinking it will become dangerous in the future.

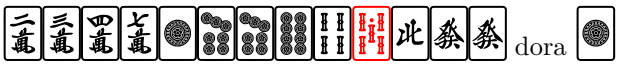
Dora in open hands

If we have already confirmed an open yaku which can't use the dora, we should of course get rid of it first, since it will be dangerous in the late game. But if we can draw in the vicinity of the dora to create a good closed hand or a different yaku, we should hold on to it by cutting a less useful tile first. In open hands, dora is even more important than in open hands for the following reasons:

- **Open hands have more control over completing groups than closed hands, so it's easier to use dora**.
- **Closed hands can use riichi, menzen tsumo, ippatsu, ura dora to score high without really paying close attention to it, while open hands can't use these yaku, making dora relatively more valuable**.

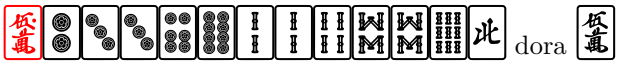
Yakuhai 2 becomes 8000 with honitsu or dora 2, quadrupling value. On the other hand, pinfu riichi has the same face value of 2000, but with tsumo, ippatsu and ura actually averages around 3500. Adding sanshoku or dora 2 to it only increases average value to 9000, which is only by a factor of 2.5, and adding value is also more difficult than with an open hand. The difference is big. There are many players who don't realize this and play with a fixed image of closed = big win, open = cheap and quick. There are many hands where this will be true, but from the viewpoint of expected value, **it's often important to emphasize dora and yaku with an open hand**. Please remember this.

An isolated dora becomes especially good when we have a yaku and enough blocks, allowing us to stack dora or aim for dora tanki tenpai. This is extremely good for both speed and score. (Especially when we have exactly 2 han elsewhere.)

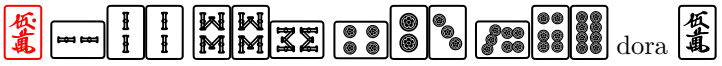
Example  dora

With a hand like this, it's good to call from anywhere, aiming for a mangan tenpai like the below. While this hand has trouble defending, it's not that bad to push against an opponent's riichi, so emphasizing speed is no problem.

Example  dora

Example  dora

With a hand like this we should call anything for open tanyao.

Example  dora

This is indeed a bit overkill, but making a sequence in manzu and drawing another aka is another way to mangan.

Atoatozuke

With confirmed yaku and enough blocks, we should usually call anything unless we're confident in a better draw (depending on the turn and the speed of the opponents). With no confirmed yaku, it's still often good to confirm a group and try to create yaku later on (atozuke). We've talked about these, but there's a surprising number of cases where calling is good.

For example, if we have only a single yakuhai, we can still consider calling to complete a group and try to draw a yakuhai pair later. Since this kind of calling is for an even less confirmed yaku than atozuke, we call it *atoatozuke*.

Of course, atoatozuke is not a good idea as often as atozuke. We can say it's effective in the following kind of cases:

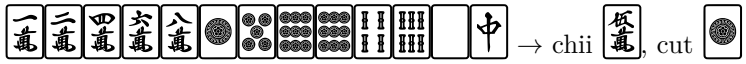
- The hand is slow and **a closed tenpai would be very difficult**. (With a reasonable riichi hand, calling like this would only make the hand harder to win.)
- The completion degree of yaku is low, but **we can see multiple possible yaku** to offset this.
- **Close 2nd in all last**, a **hand with dora 2** etc. where winning is guaranteed to be high scoring or wining is especially important.

For possible yaku, we need to see **at least 3 or 4**. We also want to avoid moves or calls that make some of these yaku become mutually exclusive (especially with open tanyao). Also, since the actual chance of winning is low, we should remember to consider defense from the mid game on.

Concretely, we mean the following kind of yaku:

- Yakuhai (1 yaku for each single yakuhai)
- Tanyao
- Single suit (with 3 blocks)
- Toitoi (with 3 pairs)
- Chanta (with 3 blocks)
- Sanshoku (needs 2 more tiles to confirm)
- Ittsuu (ditto)

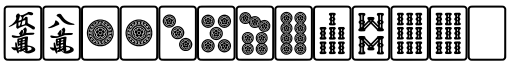
All of these examples are starting hands.

Example  → chii , cut

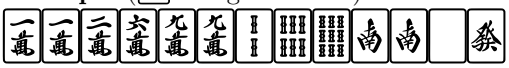
Ittsuu, 456 sanshoku, yakuhai.

Example  → chii  , cut 

345 sanshoku, tanyao, yakuhai.

Example  → chii  , cut 

Junchan, 789 sanshoku, ittsuu, yakuhai.

Example ( is a guest wind)
 → pon  , cut 

Honitsu mainline and toitoi, chanta, honroutou, yakuhai atoatozuke.

Formal tenpai

Since no-ten payments exist, it's sometimes good to call even with no yaku (formal tenpai, *keiten*). If opponents aren't explicitly attacking, **call from a good shape 1-shanten with about 16 tiles left and from a bad 1-shanten with about 20 tiles left** is a good criterion. When tenpai is especially important, like when trailing badly in the dealer seat with a bad hand, it's good to call into keiten even earlier, but when no-ten payments wouldn't change placement but winning would, it's good to try and win to the bitter end. Situations also exist where going for keiten with an upgrade to yaku is possible, and we should also call a bit earlier then.

In keiten, we can't win except for haitei, but we can still deal in, so we want the least amount of draws possible. Just before a draw, we should call if it allows us to avoid drawing a tile while keeping tile and dealing a safe tile.[24]

In the next section, we'll approach tile efficiency from yet another perspective, centering on complicated hands, especially those in 1-shanten.

1.5 Iishanten efficiency

The importance of being first to tenpai

The difficulty of comparing two alternatives of differing natures

When deciding between a ryanmen and a kanchan, it's always better to choose the ryanmen unless there's something special going on, so that there's nothing to hesitate about. The reason is that when comparing things of the same nature (joints), we can decide based on tile acceptance alone.[25]

[24] This is a simplified presentation of a very difficult subject. Entire books could be written about formal tenpai (look up 形テンの極意 by ASAPIN).

[25] In general, things of the same nature have the same qualities but in differing degrees insofar as they are similar, making it easy to choose that alternative which exhibits their common desirable qualities to a greater degree.

Conversely, we only waver when comparing two alternatives which differ by their very nature.

In mahjong, there are two great choices between things of a different nature. The first is between value (yaku and dora) and speed (tile acceptance, wait quality). The second is between hand components of different types (isolated tiles versus extra tiles in complex joints etc.). Though we have discussed both of these comparisons to some degree, when these factors enter the equation in a more complicated way, things can get very difficult. It's especially troublesome to choose the correct discard when there are many effective tiles.

Luckily, we can often deal with hands that are far from tenpai by applying the rules that have been briefly discussed until now about comparing isolated tiles and joints depending on their surroundings and the rest of the hand. The need for complicated comparisons is restricted to 1–2-shanten hands. As we will see, there is a limited amount of possible iishanten types that will make it easier to systematize this kind of decisions. (That being said, 2-shanten will be the stage where we'll most often have problems deciding.)

The advantage of head start tenpai

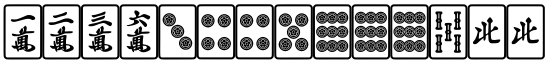
While we've already pointed out that emphasizing tile acceptance close to tenpai is a fundamental rule, this is because being in tenpai (especially as the first player) is a big advantage. Formerly, strategies that put the most emphasis on tile acceptance when in tenpai, that is wait quality, were the mainstream. The reason this strategy has changed is the following.

Until a few years ago,[26] getting into tenpai with a good shape (ryanmen or better) was considered especially important. This tendency can even be felt in Totsugeki Tōhoku's older posts. Since the step from tenpai to winning on average takes the most time of all, it was thought that aiming for a good shape tenpai even at the expense of tenpai speed increases win rate. This is also the reason why bad shape riichi was often unfairly undervalued.

However, because a hand with yaku can win from anywhere (a hand with riichi can be hard to ron, but by making opponents fold or roll, it increases the time available to win *relative to opponents*), **the #1 longest step is from closed iishanten to closed tenpai**, because we can only use the tiles we draw. (The actual win rate of bad shape riichi was also shown to be not that bad by statistical analysis.)

Accordingly, the strategy of **maximizing tile acceptance at iishanten and instantly calling riichi even with a bad wait** has recently become mainstream.

Of course, there are hands where it's better to prefer making a good end shape in iishanten. Together with the trade-off between speed and value, hands like these will form the subject of this section.

Example 

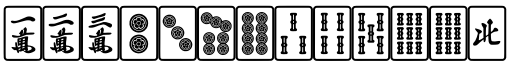
This hand is widest on cutting  (3 tiles more compared to  and ), but in practice this is never played, preferring the higher chance of a good shape and the score from possible iipeikou.

[26] roughly 2000–2005

Classification of iishanten

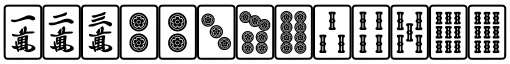
These are the basic types of iishanten. Since they differ by their inherent nature and have different advantages and disadvantages, it's often difficult to decide which of them to go for when several are available. For this reason, it's important to be aware of each of these patterns to be able to recognize them quickly.[27]

(1) 2 groups, 2 joints, 1 head: extra tile shape

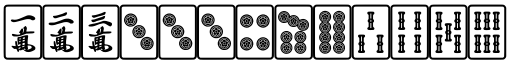
Example 

Characteristics: since the extra tile doesn't directly contribute to tile acceptance, the total tile acceptance is often low. However, the extra tile can be used as a safe tile, or to upgrade into a joint that makes for a more valuable hand.

(2) 2 groups, 1 complex joint, 1 simple joint, 1 head: no extra tile shape

Example 

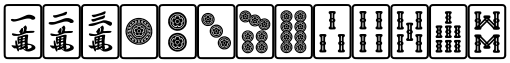
This shape consisting of a ryanmen and a ryanmen pair is called *perfect iishanten*.

Example 

This shape with a many-sided wait is also considered to fall under (2).

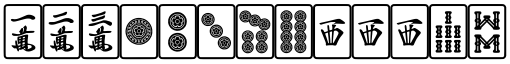
Characteristics: often wider than (1). Only hands like the second example can end up with a many-sided wait that isn't sanmenchan.

(3) 3 groups, 2 joints (or 1 joint and 2 isolated tiles), no head: headless shape

Example 

This shape has 2 joints, but the weaker shape with  instead of  also belongs in this class.

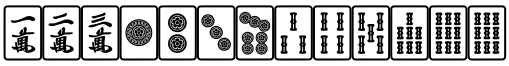
Characteristics: since we can get into tenpai when one of the joints turns into a group *or* into the head, it's wider than (2) if we have 2 joints. However, if we don't have a serial shape or closed set, we get a tanki bad shape if we draw a group.

Example 

This shape is called the *anko headless*. When we complete a ryanmen, we can downgrade the closed set into the head and end up with the other ryanmen as the end shape. Please remember this very strong shape.

[27] For a gentle introduction to the subject, see `https://youtu.be/mKEOEWEc5JE` (EN subs available)

(4) 3 groups, 0 joints, 1 head, 2 isolated tiles: sticky shape

Example 

Characteristics: since turning an isolated tile into a joint is much easier than turning a joint into a group, this shape is the widest of all. However, it can be easy to get a bad wait, unless we have a serial shape.

(5) 5 pairs: chiitoitsu iishanten

(6) Combination of (5) and (1) or (2)

(7) Kokushi musou iishanten

For these, see the subsections on chiitoitsu[28] and kokushi musou.

Quantitative comparison of classes

Table of tile acceptances for common iishanten shapes
acceptance into good end shape/total acceptance

iishanten class	2× bad	bad + good	2× good	good + ultra good
extra tile	0/8	4/12	16/16	19/19
perfect	0/12	4/16 or 8/16	20/20	23/23
headless	0/20	6/24	12/28	26/37
anko headless	0/20	10/24	28/28	37/37

	honor	terminal	2 or 8	middle	3445	3456
sticky	0/4	0/12	4/16	8/20	14/17	14/29

Includes half the 0/2 acceptance for drawing a set from the pair, so just take the sum of the two isolated tiles, for example  accepts 4/16 + 8/20 = 12/36 tiles.[29]

Extra tile shape

In a shape with 2 groups, 1 head and 3 joints, we have to decide which joint to break. As discussed before, we should use the criteria for comparing joints. If there is no difference in tile acceptance or value, we should drop the joint whose backfires have an overlap.

Example  → cut

Drawing  upgrades the hand to tanyao.

[28] The material on chiitoi in this book is quite thin. I'll try to remedy this once I'm done.

[29] This table wasn't present in the original, I hope this will convince people more clearly that wider shapes are in fact strong and by how much

However, when comparing simple joints in 1-shanten, there's one thing to keep in mind. Although more central joints have more upgrades, more outside joints are easier to win with, so we need to balance the relative frequency of cases where we draw an upgrade and those where we complete a group. When comparing an outer and inner kanchan, the win rate disparity is not that big, so we should prefer the inner kanchan's double upgrade. But when comparing a pair of 2s and a pair of honors, the latter is significantly easier to win with, so we'll usually prefer it. The opponents' discards also play a large role. When not in 1-shanten, drawing an upgrade will happen a lot, so we should generally prefer upgrades.

When deciding which extra tile to keep from a situation other than the 6-block one above, we should keep an extra tile that is most valuable in some way.

What should be kept in mind is that at 1-shanten, an upgrade that overlaps with another wait can't be considered an upgrade and we can only perform it by refusing tenpai, so we should ignore it unless declining tenpai is for some reason very advantageous.

Example  → drop 

While the  theoretically has more upgrades than  , drawing  already puts the hand in tenpai. Accordingly, choosing the easier to win  wait is better.

What to keep as the extra tile

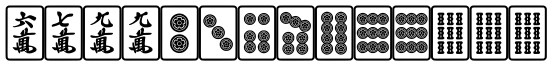
There are several different ends towards which the extra tile can be used:

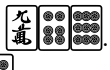
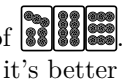
- A tile which is useless but serves to confuse opponents (rarely, if no better option is available)
- Safe tile
- Floating tile to make a ryanmen
- Floating tile next to the head (can advance into a wider headless or sticky shape if the sequence completes)
- Tile to create value from yaku or dora

In the early and mid game in a normal situation, the options are ranked from worst to best. Dealing in with the extra tile doesn't happen that often so we can emphasize our own hand, and upgrading to double value is often preferable to upgrading the end shape. When both joints are already good, keeping a safe tile is better than a tile which creates ryanmen or a tile which can advance the hand to a wider iishanten class (unless this would be very advantageous somehow). If tiles that create value appear dangerous from the mid-late game on, we should also get rid of them first and keep a safe tile. In a shape like  where the dora can be immediately used to enter tenpai with a good draw, we usually don't get rid of it.

With a bad shape, we don't keep a safe tile. Since the difference in win rate with an effective extra tile is significant, increasing the deal-in rate a little still has better expected value. Since getting outpaced with a hand like that will usually result in folding completely anyway, dealing in with the extra tile will happen rarely.

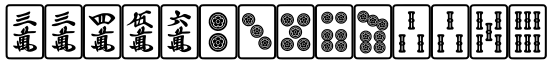
The comparison of extra tiles can be done using the material discussed above. (When keeping a safe tile, keep the safest one, or one that's safe against a player we especially don't want to deal into from a points standing perspective.) It's easy to disregard this kind of comparison as opposed to comparison of joints, so we should pay attention to this.

Example  dora  → cut 

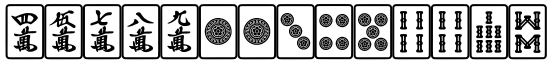
The three options which preserve the shape are  . Cutting  has no added benefit. Cutting  helps create ittsuu with  , but cutting  and aiming for junchan is best, with an upgrade on any of  . While it returns to a bad shape and the yaku isn't confirmed, with a potential mangan it's better than a ryanmen riichi only.

Ukase-uchi

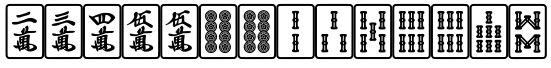
In a shape with 2 groups, 2 joints and 2 pairs (14 tiles total), it's usually best to break up a bad shape joint, or to break up a pair if both joints are ryanmen. When deciding which pair to break up, there is an opportunity for ukase-uchi, breaking one pair into a floating tile with upgrades into better ryanmen than the hand already has. Otherwise, it's best to emphasize safety.

Example  → cut 

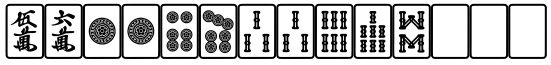
Can draw a sanmenchan or a ryanmen that confirms tanyao.

Example  → cut 

The floating  can be used to make sanshoku.

Example  → cut 

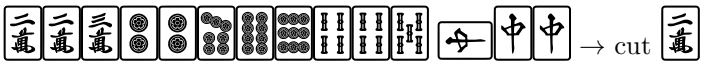
Aiming to create a sanmenchan or non-overlapping ryanmen.

Example  dora  → cut 

Can draw a dora ryanmen. We can also cut  if we suspect  would be too dangerous later on.

Perfect iishanten

The basic idea when comparing different perfect iishanten is to compare the complex joints, focusing on fixing those that have good shape and fixing shapes that create value. When there's no big difference, we should emphasize an easy to win (on the outside) end wait.

Example  → cut

While the  is easier to win with than  , the  is easier to call pon on than  . While this is a difficult decision that is influenced by the table situation, fixing the good end wait is usually better. Though this is in contradiction with the iishanten peak theory discussed earlier, the improvement to the win rate from tenpai is more important here than the improvement to tenpai rate.

The fact that makes iishanten peak theory work is that winning is possible from any player, while entering closed tenpai requires a good tsumo. (There is also the advantage of riichi pressuring opponents to fold) With closed perfect iishanten, the effective acceptance a is 20 tiles from 1-shanten to tenpai, and $b = 4{\times}8 = 32$ (slightly lower in practice) from tenpai to win. Since the expected number of draws from 1-shanten to tenpai is $1/a$ and the expected number of discards from tenpai to a win is $1/b$, a marginal improvement in a is more valuable than one in b when $a < b$. However, with a wider class of iishanten, $a \approx b$, and iishanten peak theory no longer works as well. Similarly, for an open perfect iishanten, $a = 4 \times 4 + 2 \times 16 = 48$ while b is still only $4{\times}8 = 32$, making iishanten peak theory unreliable.[30]

Extra tile versus perfect iishanten

Since perfect iishanten is wider, when there's no specific reason it's simply better. For the same reason, a headless or sticky iishanten is better than a perfect one.

Don't break perfect iishanten to keep a safe tile

The difference in win rate is too large to justify a small reduction in deal in rate. This move only makes sense in hands like  where  is dora and  have been cut twice.

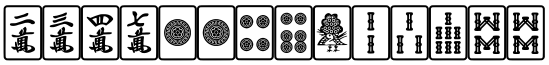
In the following examples we'll mostly consider 2-shanten with 2 groups, 1 head, 1 complex joint, 1 simple joint and 1 floating tile, with the option to take either an extra tile iishanten by cutting a tile from the complex joint, a perfect iishanten by cutting the floating tile, or to stay in 2-shanten by doing something else. In all hands, assume East 1, 7th turn, dora  . From the 11th turn on, it's usually better to take perfect iishanten, considering no-ten payments.

When the good shape is complex

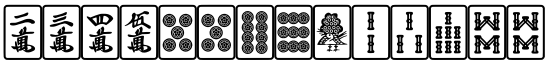
Example  → cut

[30] Paragraph added by me to explain this fact more clearly.

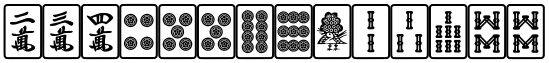
Sacrificing 4 tiles of immediate tiles acceptance for 8 tiles worth of ryanmen upgrade isn't worth it. However, if any of  were dora, it's good to cut , since there would be many upgrades for better value. However, with no dora, we should also cut  if we want to avoid a riichi only with a bad wait. When playing with aka dora, this is often the case.

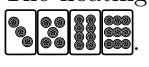
Example  → cut

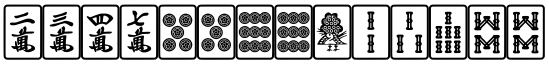
Here the inner kanchan has the same amount of ryanmen upgrades as the floating tile, so it's clearly better.

Example  → cut

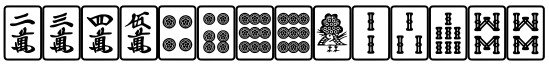
But here, there are 14 tiles for upgrade into ryanmen versus 4 tiles of immediate acceptance, so  is good. If  were  , we would consider cutting  and returning to 2-shanten with better shape.

Example  → cut

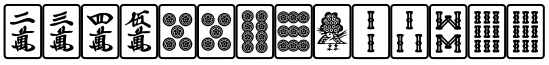
The floating tile next to the head is very strong, allowing us to make a good shape with any of  .

Example  → cut

The immediate loss in tile acceptance is only 2 tiles, while the amount of upgrades is very high. This is a typical example of the theory that breaking up a 3rd pair is good.

Example  → cut  or 

Even on cutting  , there are still 8 tiles of upgrade to ryanmen. The difference is subtle and either of  and  can be good.

Example  → cut 

Here, we think the return to 2-shanten with  is strong. This play is generally good in the following kind of cases:

1. Advancing shanten makes a cheap hand with a bad wait likely
2. There are many tiles that revive the hand into a better 1-shanten ( in the

example)

3. It's still the early game (6th turn or earlier)

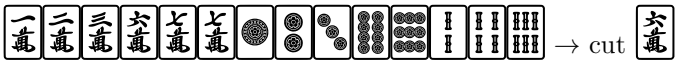
When there is a possibility to upgrade into a better shape even when advancing, the criteria become stricter. On the other hand, if the upgrades don't just improve the wait, but also increase value, they become looser. Furthermore, in the above example cutting  or  as a kind of compromise is not a good plan, since a cheap hand with a bad wait remains likely if the manzu fail to extend.

Example  → cut

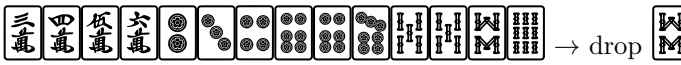
This hand is even narrower than the previous example, so declining 1-shanten is also good.

Example  → cut

While taking the 3 pair shape and hoping to draw  or  is good, cutting  is also playable.

Example  → cut

While this straightforward move into 1-shanten makes a cheap bad wait hand very likely, cutting  into 2-shanten has very little promising upgrades and we would most likely end up with an equally bad hand anyway.

Example  → drop 

While this is big step backwards in shanten, confirming tanyao creates value and allows us to call, compensating for the immediate loss in speed. (As mentioned in the subsection on tanyao.)

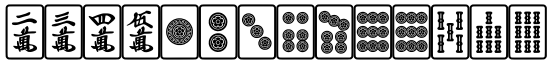
Example  → cut

Since we can call pon, the loss from cutting  would be bigger. Since we have a yaku, we can maximize immediate tile acceptance without waiting for an upgrade.

With a serial shape, a tile next to the head, a middle tile that creates value (or even a non-middle tile if it's guaranteed to produce a lot of value) we prefer an extra tile shape. If we want to avoid a no dora no yaku bad shape riichi, we can keep even a regular middle tile. If the bad joint has a tile acceptance overlap, breaking it up and returning to 2-shanten is often good (this depends a lot on the turn, but in the early game we should return). If the bad shape joint is easy to upgrade, perfect iishanten can be fine. With a 3 pair shape, we can take an extra tile even if it's a regular middle tile. But when calling is effective, the loss from not being able to call pon is big, so we should only refuse perfect iishanten for a big increase in score.

If both our joints are bad, it's often not a good plan to aim for an upgrade, since even with an upgrade the end shape will be bad 2/3 of the time (because a good shape is easier to draw). Taking the perfect iishanten to maximize tile acceptance can't be helped.

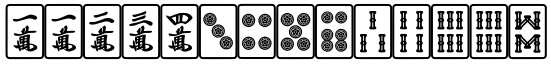
When the bad shape is complex

Example  → cut 

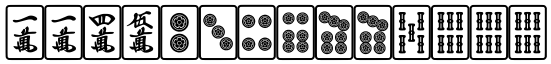
Since keeping the complex bad shape joint gives a bigger chance at a good end shape, we prefer it over a connect 4 shape.

Example  → cut 

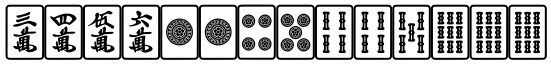
But the connect 7 shape is so strong we can break up the ryankan (also seeing 567 sanshoku).

Example  → cut 

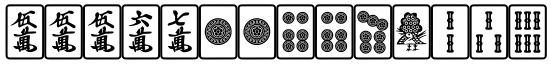
Here, there are also upgrades to tanyao and 234 or 345 sanshoku.

Example  → cut 

The upgrades to a much more expensive () hand are big. If  were dora, the value is fine but we still want these upgrades for calling into open tanyao, so  is still good.

Example  → cut 

Here, doubling the probability of sanshoku is big. While it also enables calling, a kata-agari is not that great so if  were dora, we should cut either of  .

Example  → cut 

Since the loss from cutting  is only 2 tiles, chasing even a far-off sanshoku is better. We can also use the floating  to make pinfu. If we draw another manzu for a complex shape, we should cut  since the difference in tile acceptance will ber very large.

With hands like these, holding an extra tile is only worth it when it has many upgrades for better shape and also adds value. However, if an upgrade would double the value, we'll often try to preserve it, especially with hands that would only be worth 1300–2600 otherwise. If a hand is already worth 3900 or more, it's often best to maximize speed (a 3900 hand with riichi is actually worth about 6300 on average). Only an upgrade to haneman would be worth sacrificing a lot of speed for, and

this is quite rare.

When we have to cut dora

A closed hand with a floating dora that can cut it to make perfect iishanten or keep it for an extra tile iishanten.

Middle tile dora In a hand worth 2600 without the dora it's better than a serial shape, in a hand worth 5200 it's worse. In hands worth something in between, use discretion.

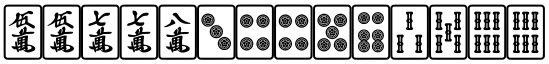
Dora is 2 or 8 If we can see 5200 and up without it, cutting it is good.

Terminal or guest wind dora Usually cut. If we have no other dora or yaku, we can keep it depending on the point standing. If any win is fine, we cut it. If we want points, but a riichi only hand is okay, we hold on to it as an extra tile. If we absolutely must win an expensive hand, we should return to 2-shanten by breaking up a bad shape joint.

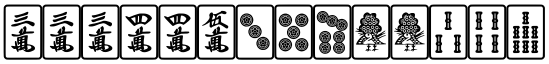
Yakuhai dora The risk of opponents calling it is big. We should especially avoid discarding it if opponents have made threatening calls. If no such calls have been made, we should cut it with $\geq$2600 good shape or $\geq$5200 bad shape. With a cheaper hand, we should hold it as an extra tile unless we don't care about score. With two bad shapes, discarding a yakuhai dora for such a bad hand is problematic, so we'll often return to 2-shanten and aim for riichi with a dora pair or dora tanki.

Dora at 2-shanten and before

As opposed to 1-shanten, keeping a floating dora while narrowing the shape doesn't really decrease win rate that much at $\geq$2-shanten. We'll usually keep it until 1-shanten, and discard it only if nothing sticks to it and another tile becomes more valuable. Conversely, when choosing between a 2-shanten with an extra tile dora which we would most likely discard anyway later, and a 2-shanten which would lead to a clearly wider 1-shanten, we should prefer the latter. We mean a hand with multiple complex joints, none of which we want to break up.

Example  dora  → cut 

The loss from holding the dora close is small. (Since we have tanyao, we don't really care about losing out on chiitoi.)

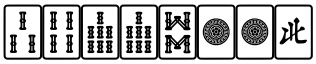
Example  dora  → cut 

Cutting anything else is too much of a loss.

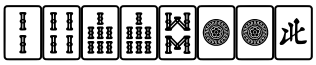
Cheap open hands

We mean hands that are worth 1000–2000 without holding on to the dora. Drawing a second dora is a huge increase in score, but using only one is not as However, it's easier to make dora tanki since

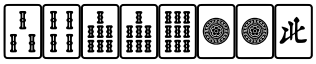
we can call. For this reason, it doesn't matter as much as in closed hands how easy it is to make a sequence with the dora (a dora tanki is easier to win with if the dora is difficult to use). In these examples, we'll take dora  .

Example  → cut 

Since the loss from not being able to call pon is big, we cut dora. If we need a big hand, we can cut  .

Example  → cut 

If we need a big hand, drop  .

Example  → cut any of  depending on situation

While dora is more important in open hands, the loss from not taking a perfect shape is also bigger.

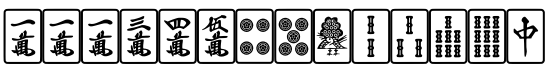
Understanding tenpai chance

A not very enlightening theoretical article reiterating many points discussed earlier, including

- Since the marginal value of tile acceptance is higher when it's low, tile acceptance differences are less important with wider iishanten.
- This makes it more important to emphasize end shape and value.
- When comparing speed and value, speed is often more important.
- With a wider shape, playing ~~by feel~~ according to circumstances becomes more important compared to theory.
- Not understanding the importance of tile acceptance and not understanding its relativity is both bad. It's important to balance these two. But chasing a balanced course for its own sake without thinking of the optimum course is also foolish. Often, the optimal move will be extreme while a compromise will be worse.

Headless iishanten

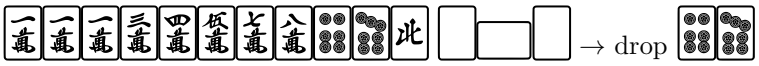
Can either have 1 joint that can complete into the head or into a group or 2 joints. The shape with 2 is much wider so we should almost always prefer it, unless a very good isolated tile is preferable.

Example  dora  → cut 

With 2 aka, cut  . With 1 aka, use discretion, depending on the point standing.

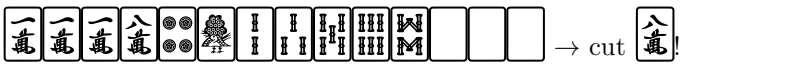
Example  dora → cut

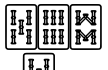
Since the difference in tenpai chance is very big.

Example  → drop

The difference in score is very large.

With a 1 joint shape, we should pay attention to keep the isolated tile which makes it easier to create a head:

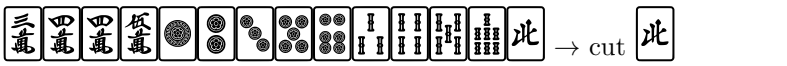
Example  → cut !

While the  in  is usually weaker than a normal  , this time drawing  creates a good wait and drawing  also gives tenpai.

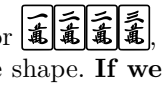
Similarly, even before 1-shanten, if we don't have a head, number tiles in shapes like these become slightly stronger.

Example  → cut

But if a more central tile exists that it's easier to make ryanmen with, we should still prefer it. Similarly, in a 1 joint headless iishanten, we should prefer a middle tile to a safe tile.

Example  → cut

Extra tile versus headless

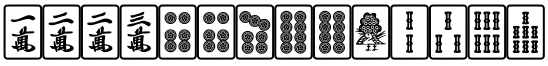
With a shape like  or  , fixing a group can give a headless shape, or fixing into the head can give an extra tile shape. **If we have a closed set or a serial shape, we should prefer the headless shape**. This is because they increase the tile acceptance for ending up with a good wait.

Example  → cut

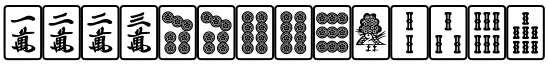
Example  → cut

Example  → cut

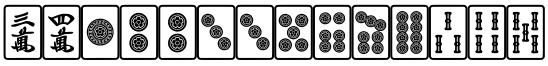
Example  → cut

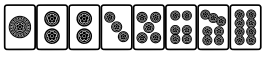
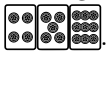
Example  → cut 

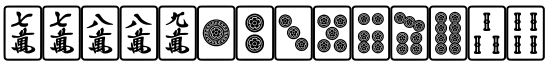
But with a serial shape like  , it's actually harder than usual to make a head, so it's better to fix the head.

Example  → cut 

There is no benefit to drawing  so we keep  for safety.

Example  → cut 

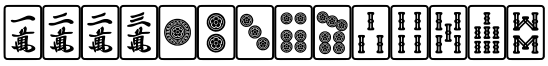
Aiming for tanyao and/or 345 sanshoku. The  shape completes with any of  .

Example  → drop 

Hoping to extend pinzu into a better shape.

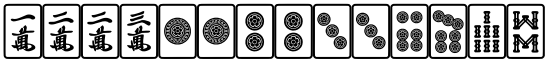
Without a serial shape

With all ryanmen and no serial shape, the headless shape has a wider tile acceptance, but the extra tile shape has a wider tile acceptance *towards a good wait*. This is a famous shape where it's easy to hesitate.

Example  → cut  or  ?

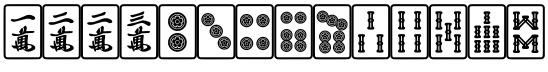
We should decide depending on the discards, choosing the option with more tiles left. If the hand is too cheap to attack with a bad shape, taking the guaranteed good shape iishanten is recommended. Keeping an extra tile can also be advantageous for other reasons (see above).

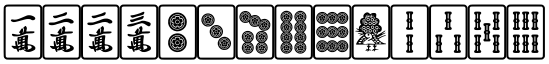
If any of  is dora, dora tanki riichi is not bad, so the headless shape is stronger. If we have a dora in one of the sequences, we can draw another one and turn it into the head if we are in the headless shape, so it also becomes slightly stronger.

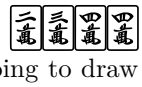
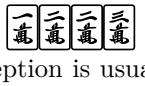
Example  → cut 

With a yaku, tanki riichi is fine.

But if we can make yaku, we should of course prefer that shape:

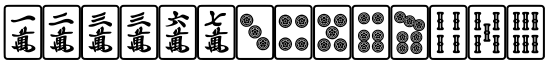
Example  → cut 

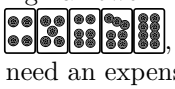
Example  → cut 

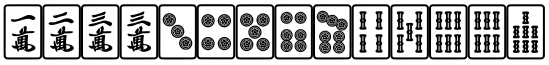
With at least one bad shape joint, taking the headless shape is better. If we have a  aryanmen shape, we can break up the weak joint to make an extra tile iishanten, hoping to draw a better shape headless iishanten later. The same can be done with a  nakabukure if the turn is still early. When not in 1-shanten, fixing a  shape into a group is usually good since it's easy to draw a head elsewhere. The exception is usually only when we would have to discard dora.

When a shape that would allow us to exploit a headless shape effectively (closed set, serial shape etc.) exists or upgrading into a headless iishanten would in another way be good, it's often good to keep an extra tile next to the head in an extra tile iishanten. Otherwise, it's better to keep a safe tile.

Serial shape versus score

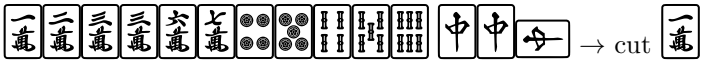
Example  → cut 

Acceptance is 19/19 with  versus 26/37 with  . But cutting confirms tanyao, doubling score, so it's better despite being narrower. If we draw  afterwards, we should cut and go headless. If the pinzu shape was  , the problem is more difficult. We should still cut  in the early game or when we need an expensive hand.

Example  → cut 

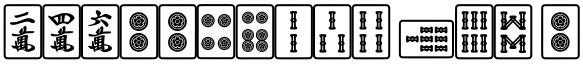
Acceptance is 18/18 with  versus 42/42 (!) with  . With a double serial shape, the difference in tile acceptance is overwhelming. Unless we absolutely need at least 3900 to increase placement,  is better.

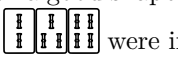
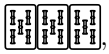
Open hands

Example  → cut

Since calling with a headless shape always results in a tanki, taking the extra tile shape is better here.

Example  comes → don't call pon

Example  comes → calling pon is playable

Calling pon will increase the tile acceptance in both examples. However, we also give up a tsumo and make the hand shorter, making it harder to defend. Since in the first example calling makes it slightly harder to end up with a good shape, it's better to not call, while we should at least consider calling in the second one. If  were instead  , we should call and cut  for a clearly better anko headless shape, also being able to stick a ryanmen to  .

Perfect versus headless

We'll center on hands with a many-sided wait. While the headless shape will be wider, the perfect shape will have the advantage of leaving a many-sided wait. As always, assume 7th turn in East 1 and dora  .

Example  → cut 

If we want to keep the 3-sided wait, we'd have to break up either of the ryanmen. We call the shape on cutting  the *fixed form*, on cutting  the *flowing form*. The tile acceptance for the flowing form is 28, and 22 for the fixed form, of which 8 tiles give a 3-sided wait. However, the difference in win rate between a 3-sided wait and a 2-sided wait is smaller than between a 2-sided and a 1-sided wait, so we should simply prefer the tile acceptance.

Example  → cut 

Here we have a 4-sided wait, with 24 tiles accepted in the fixed form, of which 8 give a 4-sided end wait. While this is a lot closer than the previous example, a 1/3 chance at getting an improved end wait is not that great, so the flowing form is slightly better.

Example  → drop a ryanmen

Here, the two forms have the same acceptance, but the fixed form offers an excellent 5-sided wait. We should look at the discards and drop the worse ryanmen.

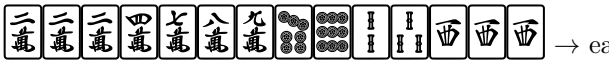
Example  → cut 

Here, taking the flowing form leaves the possibility of a bad wait (10 good/24 total). But cutting  (we can draw  and cut  then) gives a tile acceptance of 22/22, which is a lot better.

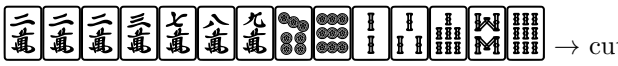
Example  → cut 

The flowing form has 0/20 acceptance, the fixed form (we cut from the outside, hoping to draw a ryanmen upgrade, and we prefer to preserve the  as it has the same amount of upgrades but is easier to win with) has 4/18 acceptance, with the 4 being for a 3-sided wait. Here also, emphasizing

the end shape is better.

Example  → early game cut  , else 

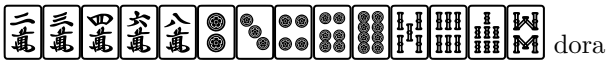
The flowing form has 10/24 acceptance, the fixed form 18/18. This is a difficult problem. This difference in total tile acceptance is the difference between an average of 5.5 and 7.5 turns to tenpai. Especially from the mid game on, this difference has a big effect, so we should cut  early and  later.

Example  → cut 

Here we no longer have a closed set, but cutting  anticipates sanshoku. Since the possible increase in score is very large and the difference in speed is smaller than between a ryanmen and a kanchan, it's better to aim big. When choosing between the fixed form and flowing form, **choose the one with acceptance towards a big hand**. However, if we already had dora 2, the added value from sanshoku becomes inefficient. **With a confirmed mangan, it's better to emphasize speed**.

Example  → cut 

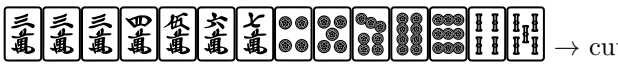
Similar to the example with  above, but the manzu shape is easier to extend.

Example  dora  → cut 

Since breaking a bad shape joint when we have two will often lead to bad wait tenpai anyway, and the  wait for 6 tiles is not great, it makes no sense to keep the serial shape. We maximize tile acceptance and can accept another dora to make 678 sanshoku.[31]

In short, if the flowing form guarantees a good wait, we should take it unless we miss out on a very good many-sided wait. Since a 2-sided wait is already good enough from a win rate perspective, it's often better to emphasize the speed of getting to tenpai.

However, there is often not a big difference, so if one option is clearly more expensive, we should prefer that. We can also use information from discards to emphasize the suits that look easier to draw or come out from opponents.

Example  → cut 

If one of the joints in the flowing form would be bad shape, we should prefer the fixed form by a wide margin. However, there are some cases where we can take the flowing form if the bad shape joint creates value or is particularly easy to upgrade. On a late turn, we should also emphasize pure

[31] This example feels out of place, yeah

tile acceptance to get into tenpai as fast as possible.

Problem East 1, 6th turn, dora  Source: Japan Mahjong Organization[32]

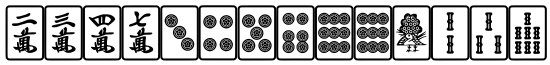

Tsumogiri  , keeping the widest shape with tanyao and sanshoku. When drawing  or  , enter provisional tenpai for tanyao and try to improve the wait. When drawing  , ignore tenpai and tsumogiri.

With two bad shape joints, the reasoning is similar to two good shape joints, taking the fixed form only when the many-sided wait is strong. The same ideas about value and the turn as above apply.

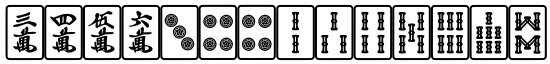
Sticky iishanten

This shape is the widest of them all, and especially in the late game where raw tile acceptance into tenpai for no-ten payments is important, we'll rarely prefe another shape.

When comparing isolated tiles, we should be aware that unlike at pre-1-shanten, we don't care about making ryankan, so we should *not* cut  from  , but one of the other two since they overlap.

Example  → cut 

While usually being able to draw  for an easy to upgrade kanchan is an advantage, here it's actually an overlap since we can use it to widen the shape even if we discard  .

Example  → cut 

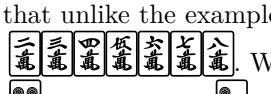
While  is widest at 35 good/60 total,  gives 39/46. While it's only 4 tiles of good wait versus 14 tiles of acceptance, if the hand is this wide, it's better to emphasize end shape. We can also see 345 sanshoku.

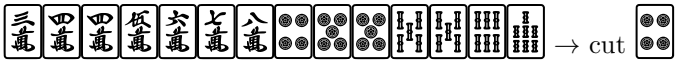
Example  → cut 

While  gives an acceptance of 45, only 20 of those give a good shape.  gives 40 tiles of which 26 good shape, so it's even better than in the previous example. We can also see 456 sanshoku. While  can give both 456 and 567, it reduces tile acceptance to 23/23 and is therefore not recommended.

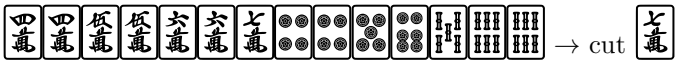
[32] Tsuchida Kōshō-chaired organization that disbanded in 2010

Example  → cut

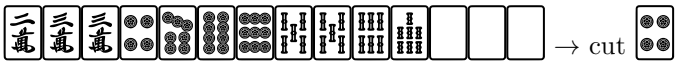
Cutting  gives tile acceptance 30/50, cutting  gives 30/41 which is strictly worse. The cause is that unlike the examples above, this hand doesn't have a 3-sided shape like  or  . While cutting  appears to give 345 sanshoku, we'd need to get either or  together with  , which is rare (7/41).

Example  → cut

This hand also doesn't have a 3-sided shape. The acceptance with  is 28/41, with 25/36. is clearly better. In general, a nakabukure is difficult to turn into the head, so fixing a head is often good.

Example  → cut

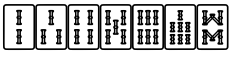
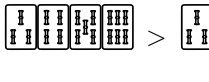
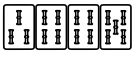
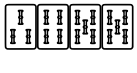
 gives 23/37,  gives 27/43,  gives 26/38. All of these are super wide and likely to give a good wait, but the  which confirms iipeikou and enables sanshoku and ryanpeikou is a lot better for score.

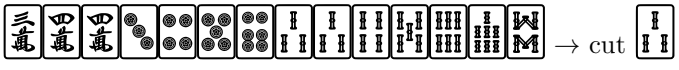
Example  → cut

Better because it's isolated (23/33 versus 19/41 for ).

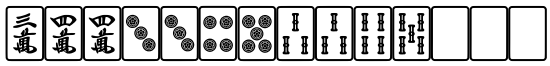
To recap what we have seen so far:

- 3-sided serial shape + 2-sided serial shape + ryanmen pair ⇒ cut from the 2-sided serial shape
- serial shape + isolated tile + ryanmen pair ⇒ cut isolated tile
- 2×serial shape + ryanmen pair ⇒ fix pair, even more effective with a kanchan or penchan pair

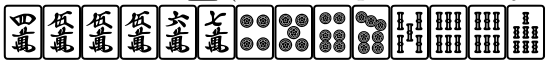
The relative strength of serial shapes goes as  >  >  

Example  → cut

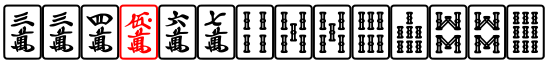
 gives 25/53,  gives 30/35,  gives 25/40 (exception to the above, since the 3-sided aryanmen is weaker than a regular 3-sided serial shape). Emphasizing a good wait is better.

Example  → cut  or 

 gives 20/42, the other two give 23/37. The acceptance into sanshoku is 0 versus 8, into iipeikou 12 versus 6, so  or  is better. If sanshoku wasn't possible,  would be better. (A bad shape confirmed iipekou 5200 is better than good shape 2600.)

Problem dora  (Source: Japan Pro Mahjong Federation)


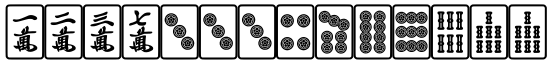
Answer:  is the widest, making ryanmen tenpai even with  .

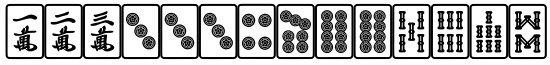
Problem 

Answer:  . While  creates a sticky shape which is wider, it makes it impossible to achieve tanyao, so  is better. While  is playable, the lost acceptance into riichi with  is more valuable than being able to call pon for tanyao. This a rare exception where declining a very wide sticky shape is better to increase the score, compensating with a strong sanmenchan + complex ryanmen pair.[33]

Perfect versus sticky

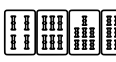
We usually prefer the much wider sticky shape, but cases where the perfect shape is preferable do exist. This is often when a 3-sided wait with a closed set () and a ryanmen pair are in the hand. If we have a head elsewhere, the isolated tile next to the closed set becomes weak. Often, while the sticky shape will have more total acceptance, the perfect shape will have more acceptance towards a good wait.

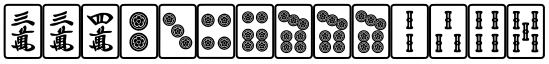
Example  → cut 

Example  → cut 

The serial shape in souzu makes it easy to get a good shape with a sticky shape. But cutting  has the advantage of being able to make an extremely wide headless shape when we draw the backfire

[33] Protip: with problems like these, `http://kobalab.net/majiang/dapai.html` is a great help (it doesn't do open hands, but can be set to aka nashi). Often the expected value difference between two good moves will be very small. Try it on some of the examples in this chapter and see where it disagrees with the author!

of  .

Example  → cut  until the mid game

While cutting  is the widest overall, cutting  makes it easier to get tanyao pinfu for a higher score.[34]

Example  → cut 

With 2 many-sided waits, preserving them is clearly good (28/28 compared to 22/33 with ). We usually won't get sanankou so we ignore it.

Returning to 2-shanten

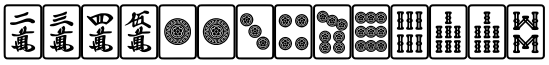
When to return

Returning to 2-shanten is limited to extra tile or perfect iishanten with bad shapes, or chiitoi iishanten. (Except for special situations where an expensive hand is required at any cost.) We should never return to 2-shanten after the 12th turn unless we're folding, because we can get no-ten payments even with a very weak hand, unless the point differences are very large and we don't care about no-ten payments.

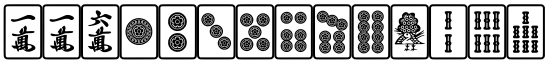
Patterns of returning

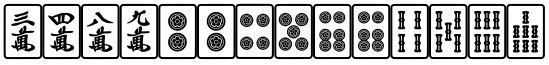
Assume East 1, West seat, dora unrelated to the hand.

Excellent floating tile (connect 4, nakabukure)×2

Example  → cut 

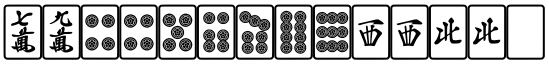
Excellent floating tile + value-creating floating tile

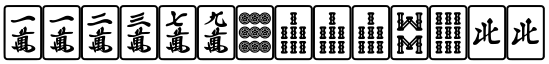
Example  → drop  for ittsuu/sanshoku

Example  → cut  for tanyao

Value-creating floating tile ×2

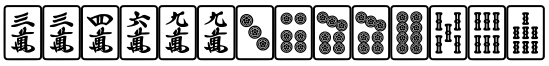
[34]  for sanshoku is also not bad

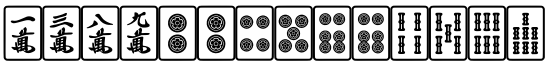
Example  → drop 

Example  → cut 

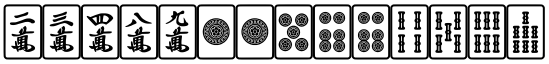
Since creating a yaku enables us to call, this compensates for the loss in speed.

Extremely bad shape (overlap, less than 2 winning tiles) or confirmed worthless bad shape hand

Example  → cut

Example  → cut 

Doesn't give tanyao immediately, but a worthless (no yaku or dora with bad shape) 1-shanten is not desirable anyway.

Example  (2  left) → cut 

If 4  are left, cut  .

Going from chiitoitsu 1-shanten to a wide or freely callable normal 2-shanten

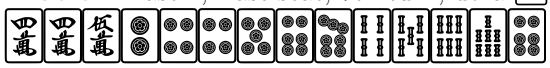
Calling from chiitoitsu 1-shanten into toitoi 2-shanten, if chiitoi would have no yaku or dora and toitoi would be confirmed mangan Especially with honitsu + yakuhai where the hand would be expensive even with a sequence.

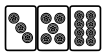
These are roughly the main cases, but in general we can decline a weak 1-shanten if we have sufficiently good floating tiles. While we should be more prepared to stay in 2-shanten in the very early game, if we have only 2 or 3 upgrades, we should take a weak 1-shanten even extremely early. The reason is that we'll have only 18 draws at best, and waiting for these upgrades will often take much too long (11 turns on average for 3 kinds, 17 for 2 kinds).

Easy to upgrade 2-shanten versus expensive 1-shanten

Even if the 2-shanten would be easy to upgrade, if the 1-shanten has a possibility of making a big dick hand, the loss from returning is bigger. This is often a difficult problem. In the early game, we'll usually return, and preserve 1-shanten from the 7th turn on. We should also consider the speed of the opponents.

Problem East 1, East seat, 7th turn, dora 



Answer:  . While cutting  into 2-shanten has many upgrades, the loss from missing out on  is very big. Rather than cutting  to keep the serial shape, we retain the possibility of sanshoku, a perfect iishanten with  and a sticky iishanten with  .

This concludes the chapter on tile efficiency. With the contents so far, we can usually choose the right discard in an equal point situation when no opponents are attacking. From here, we'll take up other skills and some practice problems on tile efficiency.

Chapter 2

Push-fold judgment

2.1 Dealing with non-tenpai opponents

Choking

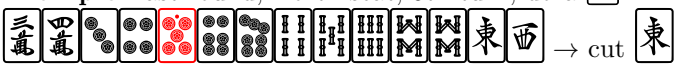
So far, we've discussed ways to determine the best move without considering opponents. However, if an opponent is in tenpai, we can't just discard tiles we don't need. If we want to defend rather than attack, we should deal the tile least likely to be useful to opponents (folding). Deciding whether to push or fold will be the subject of this chapter.

However, we can also say something about situations where no opponent is in tenpai, but we still should be careful. One of these is choking (*shibori*). We mean purposely not discarding a tile which we don't actually need to prevent opponents from calling it.

When to choke

Cases where we should choke in the strict sense (merely to prevent opponents from calling, not to not deal in or to use the tile ourselves) don't really exist. That's because **we should discard tiles that are useful to opponents early**. The probability of dangerous tiles being called or getting ronned increases continuously. It's better to get rid of the tile early and increase our own chance of winning.

Example East round, North seat, 6th turn, dora 東

 → cut 東

This hand is mentanpin aka closed, so fairly sure of mangan. Even if we draw a second 東, we still only get mangan. So we get rid of it early. If we didn't have tanyao, we'd cut 西 instead, since drawing a second 東 would double our score. If 東 weren't dora, it's useless and we should get rid of it.

Even if a tile looks very likely to be called by an opponent going for a particular yaku, it's often

not worth it to choke, since this will slow down only ourselves and one opponent, benefiting the other two opponents. **We should only choke if we don't care about helping the other two opponents**, most often in the following kind of cases:

- An opponent has made a call for a clearly big dick hand (for example, choke yakuhai when someone pons terminal dora)
- With a big lead, we only need to prevent dealer or 2nd place from winning

If no one is in tenpai, it's generally not necessary to care about opponents.

Dealing with getting choked

It can be good to refrain from calling if opponents would try to choke us in the following kind of cases:

- Calling would lower the score
- We don't have enough blocks
- We intend to fold soon
- We have an especially obvious yakuhai atozuke

Discarding good tiles first

If we have multiple useless tiles, it can be good to discard the ones most dangerous towards opponents first.

Early game

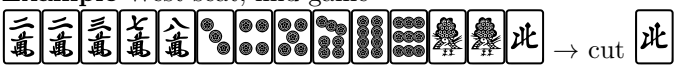
Example West seat, 1st turn, dora 

 → cut

In this hand, we cut over , but instead of keeping as a safe tile because the hand is bad, it's more to create yaku (honitsu, chiitoi) more easily, making it a more useful tile. If we make honitsu, we can keep it over the off suit tiles as a safe tile while staying efficient. With yaku that restrict the usable tiles, keeping an honor over the disallowed tiles is common, allowing us to fold easily against a riichi (we can often fold successfully if we have 3 safe tiles). However, if riichi is the mainline, we should do everything to maximize win rate, so it's not needed to keep safe tiles in the early game.

1-shanten

Example West seat, mid game

 → cut

We should almost always prefer an effective tile over a safe tile.

Example West seat, mid game

 → cut

Even the upgrades into a wider are more valuable than a safe tile. In the late game, the two are about equal.[1]

When to keep safe tiles

We should discard tiles that are guaranteed safe but especially likely to become dangerous in the future. For example, if an opponent is going for honitsu in souzu and  passes from a different opponent, we should discard it even if it's useful, especially since a ryanmen in souzu would be difficult to win with.

If we're still in 2-shanten or worse in the mid-late game, have low tile acceptance and can't call, our chance of winning is very low. Holding on to safe tiles with a hand like that is wise. However, it's better to hold on to several than to just one, and often it will be good to just fold completely.

The same is true about defending against damaten. If the hand is narrow and 2-shanten or worse in the mid-late game, we should start being cautious about damaten.

Early game defense

In the early game when no one is in tenpai, it's not really necessary to play defensively.

Even when leading in all last, the dealer can renchan indefinitely and close any gap, so we should try to end the match if we're not the dealer.

Exception: player 50000, dealer opponent 25000, opponent 24000, opponent 1000. In this case, even a big dick tsumo from the dealer won't endanger us, so we can fold immediately to prevent dealing in.

Exception: dealer opponent 55000, player 35000, opponent 8000, opponent 7000. Unless we can realistically make a big dick hand, we can fold to avoid dealing in and secure 2nd.

If we're dealer and have a big lead in all last, we only need to endure one more round. But because dealer pays double on tsumo[2], if an opponent could overturn us with mangan direct hit, he could

[1] This entire chapter is heavily based on *Scientific Mahjong* by Totsugeki Tōhoku and the author often gives no explanation for why a move is good, referring to that book instead.

[2] This is called *oya-kaburi*, "dealer hat".

also haneman tsumo, and similarly for haneman direct hit and baiman tsumo. So instead of going for a direct hit with dama, he could just riichi and tsumo, or instead of going for direct hit with riichi, he could riichi tsumo ura/ippatsu.

That's why even with a big lead, giving up on winning and stockpiling safe tiles is not a good plan. Furthermore, depending on the point system, winning a hand can give a better point outcome after the match. Of course, from the mid game on, if our hand looks hopeless we can fold against dama, or fold against a riichi or call even from tenpai.

2.2 Folding techniques

Betaori

We'll now discuss situations where an opponent is in tenpai. When we're not in tenpai ourselves, we usually should betaori. What this means is to give up on winning and discard tiles that are least likely to be the opponent's winning tiles. Since rounds where we won't win outnumber rounds where we'll win greatly, learning betaori has a great impact on results.

Danger level of tiles

Please memorize this diagram.

Diagram of tile danger level

rank	type	deal-in rate
S	genbutsu	0%
A+	tanki honor	0.9%
A	none	
B	suji 1 and 9	2.9%
C	non-tanki honor	3.4%
D	suji 2 and 8	4.8%
	suji 3 and 7	5.5%
E	no suji 1 and 9	6.3%
	half suji 4, 5 and 6	7.0%
	no suji 2 and 8	7.0%
	no suji 3 and 7	7.1%
F	no suji 4, 5 and 6	12.3%

Genbutsu are tiles discarded by the opponent or any tiles discarded after a riichi. Tanki honors are those that can only be targeted by a single wait, so those of which 3 are visible. Double suji 4, 5 and 6 ( with both  and  safe) are comparable to suji 2 and 8, so rank D.

Factors that affect danger level

Kabe (no chance) is equally safe or safer than suji If all 4  are visible,  can't be targeted with a kanchan, which it can if it's suji. No chance tiles become safer the more of them are visible (less chance of shanpon/tanki, this is also true for suji and honors). If all  are visible and  is safe,  is also no-chance. Similarly if all  and  are visible. This is especially easy to overlook.

One chance is safer than no suji but less safe than suji

Tiles outside of early discards are 1 rank safer About 60% as dangerous, even safer against open hands. (Cutting  from  early with an open hand is rare.) The earlier the discard, the safer. The same thing is true of suji, so the suji of the riichi tile (ryankan suji trap) is slightly more dangerous. Between a tile outside of an early discard and a suji of the riichi tile, we should pick the former. (Note: since in kuitan nashi calls are less common, this technique becomes slightly less reliable.)

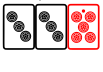
Ura suji, aida yon ken No need to consider this.

Neighbors of the riichi tile (matagi suji) Sometimes more dangerous, but usually no need to consider this.

Anko suji (The suji of a closed set in our own hand) Slightly more dangerous, but not by an entire rank.

Dora and neighbors The dora itself is 1 or 2 ranks more dangerous (120–130% more dangerous for tanyao tiles, 170% for terminals). Tiles next to the dora are about 1 rank more dangerous (110%).

Suspicious discards (at least 3 different 456 tiles) Not a factor of itself.

A player who discarded an aka usually doesn't have a regular 5 of the same suit (when playing with 3) When  has been discarded,  are rank B (can only be targeted by penchan), since from  cutting  is standard, and an aka tanki is preferable to a  tanki. If  has been discarded and  is safe,  becomes much safer and similarly for  ,  and  . If an opponent discarded  , the suji  are safer than regular suji, since he usually won't have a ryankan suji trap (but aka traps do exist with some hands).

Discard order for equally safe tiles

When folding completely, consider the possibility of other opponents entering tenpai and **keep common safe tiles, discarding the rest first**. Conversely, when still considering our own tenpai, we should fold with the tiles that are least useful to our own hand.

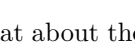
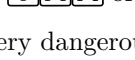
Among equally safe tiles, we usually want to **discard the tile that opponents can call**. This is because opponents counterattacking into each other decreases the chance of having to pay for a tsumo. However, if a draw looks likely and the open hand would be so expensive as to endanger our position, it's better to not let opponents call.

Effectiveness of wait reading

The theories of ura suji[3] and matagi suji have mostly been disproven.

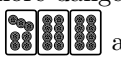
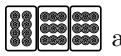
Why ura suji is wrong

For example, the ura suji of  are and  . The old theory is that from a  shape, players would cut  early, so an early discard of would make its ura suji more dangerous. However, discarding a regular also usually happens early, and we can't distinguish between the two. Furthermore, discarding early makes slightly safer by making a kanchan or penchan less likely. In general, this kind of ura suji has a negligible impact.

However what about the ura suji of  , which are  ? This is because a is a very good tile, and discarding it early is rare. It only makes sense in a or  shape, so an early often indicates those shapes. While  are already very dangerous anyway, if a has been discarded early,  do become appreciably more dangerous. Similarly, a no suji  with an early discard also becomes more dangerous, but not enough to make it F rank. Since we'll rarely need to fold with tiles that dangerous anyway, this doesn't really matter in practice.

Why matagi suji is wrong

The idea of matagi suji is that when the riichi tile is  ,  and  become more dangerous since the will often come from a ryanmen pair. However, since a  is so strong, there are an innumerable amount of other shapes where a player might want to keep it until tenpai. Also, making no suji middle tiles more dangerous is rarely relevant.

However, if the riichi tile is  ,  do become more dangerous. This is because an isolated  is rarely better than a middle tile, so shapes likes  and  are especially common. (This also is less than a 1 rank difference.)

[3] 裏スジ (n): frenulum of prepuce of penis

Principles of discard reading

Discard reading is the most useful when an opponent has discarded a very useful tile early, or a usually not very useful tile late, since these allow us to infer the existence of particular shapes in his hand. Similarly, an opponent who has discarded joints or pairs can usually be read to be holding better ones. Conversely, an opponent who has only discarded honors before riichi gives us no hints at all. Reading is only helpful when using the basic diagram from the previous subsection and counting the number of remaining suji, and applying especially strong hints from discards to the remaining tiles to pinpoint particularly dangerous tiles. However, when folding completely we'll often have many safe tiles, while with a strong hand it's usually good to push even slightly more dangerous than normal tiles. Discard reading is usually limited to situations where the decision between attack and defense is hard, or when we want to defend but have no safe tiles.

Coping with having no safe tiles

What should we do if an opponent has entered tenpai and our hand is unfavorable for counter-attacking, but we have no safe tiles? By this, we mean that all our tiles are rank E or F on the diagram shown above.

For the time being, we should attack, and fold when we get more safe tiles. If we have a bad shape iishanten with no safe tiles in the early game (because we didn't keep safe tiles to maximize speed), there will be many suji that have not yet passed, so risking one of them will not be that dangerous.

However, if we have a 2-shanten or worse in the mid-late game and run out of safe tiles, our chances of winning would be hopeless even with an all-out attack. In this case, it's wiser to try to minimize deal-in rate and deal-in score even by a little. The following techniques can be helpful:

Cutting from a set or pair, or →  when  is safe, forcing through a dangerous tile to create safe tiles for later Safer than cutting multiple different no suji tiles. Of course, between multiple no suji tiles, we should prefer to cut the safest ones (terminals) first.

Cutting tiles that would lower the deal-in score Especially terminals that would deny tanyao, and avoiding tiles close to the dora. But because a riichi can have ippatsu and ura dora to inflate its value unpredictably, this method isn't very reliable. It's more useful against open hands.

Cutting tiles conjectured to be safe from discard reading Or rather, not cutting tiles that look especially dangerous. We'll explain this in more detail in the chapter on discard reading. This technique is also more useful against open hands because a riichi will often have *irime*. (For example, if an opponent declared riichi with a  , he often had a  in hand, making a  more dangerous. But half of the time, he drew that wait first and is now waiting on his other wait, which would make  irime, "entering piece".)

2.3 Dealing with riichi

The average score of riichi

Whether to attack or to defend depends heavily on our own hand. We'll first consider the case where we're in tenpai, since otherwise we have to make estimate our chance of reaching tenpai, complicating the calculations. From 2-shanten or worse, to fold is usually the right answer, but from 1-shanten the decision will be especially hard.

Since with open hands, judging whether the opponent is in tenpai is not straightforward, but we can infer a lot about his hand from discards and calls, we'll consider the case where an opponent has declared riichi first and we're also in tenpai.

It has been shown from statistical analyses of online play that with 3 aka dora in play, the average score of a winning riichi is **7000 for non-dealer, 9800 for dealer**. (Versus 6000 and 8400 with no aka.) While we'll continue the rest of the chapter assuming the former, the difference is not very big and in aka nashi we should play only slightly more aggressively with the same value.

When in tenpai

Assumptions

- Ippatsu, ura ari, 3 aka, shuugi[4] nashi.
- If our hand is closed, we'll declare oikake riichi. (This is almost always advantageous unless our wait is on a safe tile. We'll discuss examples of oikake dama later.)
- We can safely avoid dealing in if we fold. We have enough (3 in the mid game, 2 in the late game) safe tiles (B rank or up).
- The danger level of F rank tiles in the early game (4th turn), E rank tiles in the mid game (7th turn), D rank tiles in the late game (12th turn) is roughly 5%.
- The danger level of F rank tiles in the mid game and E rank tiles in the late game is roughly 10%. (The more safe tiles there are, the less safe the rest becomes.)
- A lot of data is taken from *Scientific Mahjong*, so it's for an average situation. If we have special knowledge about the opponent's style or the table situation, we can change our assessment appropriately.
- We don't really care about no-ten payments our riichi sticks. If no-ten payments are important, we should be slightly more aggressive in the late game.

We're dealer

- With a good shape

[4]The retarded mahjong parlor rule where a set price (typically ¥1000) is added to the score for each aka dora (often also for ippatsu, ura dora and rinshan)

  - We should always attack. (Especially when considering renchan and no-ten payments.)
  - Only fold when we're okay with losing our dealership and especially want to avoid dealing in, or when we would have to push an extremely dangerous tile.

- With a bad shape
  - In the late game (12th turn)
    - Cutting a tile with 10% danger level (E rank), with at least 3900 riichi.
    - Cutting a tile with 5% danger level (D rank), with at least 2900 open.
  - In the mid game (7th turn)
    - Cutting a tile with 10% danger level (F rank), with at least 3900 open.
    - Cutting a tile with 5% danger level (E rank), with anything but a 1 han hand.
  - In the early game (4th turn), we should push everything. (Discarding a 10% danger level tile with a 1 han hand is slightly disadvantageous, but tiles are very rarely so dangerous this early.)

Non-dealer versus non-dealer

- With a good shape
  - In the late game (12th turn)
    - Cutting a tile with 10% danger level (E rank), with at least 2000 riichi or 2600 open (riichi only and 2000 open are borderline).
    - Cutting a tile with 5% danger level (D rank), anything except 1 han open.
  - In the mid game (7th turn)
    - Cutting a tile with 10% danger level (F rank), with at least 2000 open (riichi only is borderline).
    - Cutting a tile with 5% danger level (E rank), usually attack with anything (1 han open is borderline).
  - In the early game (4th turn), we should push everything.
- With a bad shape
  - In the late game (12th turn)
    - Cutting a tile with 10% danger level (E rank), with at least 5200 riichi or 5200 open.
    - Cutting a tile with 5% danger level (D rank), with at least 3900 open (2600 riichi is borderline).
  - In the mid game (7th turn)
    - Cutting a tile with 10% danger level (F rank), 3900 open is borderline.
    - Cutting a tile with 5% danger level (E rank), with at least 2600 riichi.
  - In the early game (4th turn), same as in the mid game. Attacking with a cheap hand with no safe tiles and folding once we get some is an effective strategy.

Against the dealer

- With a good shape
  - In the late game (12th turn)
    - Cutting a tile with 10% danger level (E rank), with at least 2600 riichi or 3900 open.
    - Cutting a tile with 5% danger level (D rank), with at least 2000 riichi or 2600 open (2000 open is borderline).
  - In the mid game (7th turn)
    - Cutting a tile with 10% danger level (F rank), 2000 riichi is borderline.
    - Cutting a tile with 5% danger level (E rank), with at least 2000 open (riichi only is borderline).
  - In the early game (4th turn), same as in the mid game, with the same caveat about folding later being a good strategy.
- With a bad shape
  - In the late game (12th turn)
    - Cutting a tile with 10% danger level (E rank), with at least mangan.
    - Cutting a tile with 5% danger level (D rank), 5200 riichi or open is borderline.
  - In the mid game (7th turn)
    - Cutting a tile with 10% danger level (F rank), 5200 riichi or open is borderline.
    - Cutting a tile with 5% danger level (E rank), with at least 5200, 3900 open or 2600 riichi is borderline.
  - In the early game (4th turn), same as above.

Recap

What we understand from this is that **counterattacking is much better with a good shape**, and the requirements for a bad shape are quite strict, especially when facing the dealer. When choosing which tile to call riichi with, we should also heavily emphasize a good wait. If calling riichi with a head start, 5200 bad shape is better than 2000 good shape, but when chasing, the latter is better: **we should pick the good shape even if it halves value**.

Choosing the wait against riichi

Cheap good wait or expensive bad wait

We should pick the the good shape even if it halves value. (Even riichi pinfu > riichi sanshoku, since their average winning scores are about 3500 and 7100.) If the difference is bigger than a factor of 2, the bad wait is usually better.

Cut a dangerous tile into a good wait (or safe tile wait) or a safe tile into a bad wait

Unless a draw is close or we intend to go dama and fold immediately, we should cut the dangerous tile to increase our win rate. This will lower our deal-in rate in the end.

Cut a dangerous tile for an expensive hand or a safe tile for a cheap hand

Unless the dangerous tile is especially dangerous, it's a loss to cut a safe tile to halve our score.

Should we go dama if our wait is on a safe tile?

With a good shape, if we have at least mangan. Ryanmen dama 3900 or 5200 is riichi, 6400 or 7700 is dama. However, if we can't expect going dama to increase our win rate (opponents aren't folding anyway or we are clearly pushing many dangerous tiles so they get wary and start defending against us), we should riichi anyway. Of course, if our hand is too cheap to chase, we should fold.

With a bad shape, we should usually dama. But similarly, if we can't expect a higher win rate, we should riichi or fold. Since determining how much of a win rate increase we can expect from going dama depends heavily on opponents, we'll need to apply discard reading skills.

Dealing with 2 riichi

Good wait, cutting a common safe tile (in this subsection, we consider an honor shanpon a bad wait, as we care more about tiles left in the wall than tricking opponents) On any turn, win rate is about double deal-in rate, and ippatsu is common. Unless we especially want to avoid dealing in, we should chase even with riichi only.

Bad wait, cutting a common safe tile Win rate is roughly similar to deal-in rate, so we should attack if our hand has similar value to the opponents. If our hand is too cheap, we should take dama and fold if we draw a safe tile (or call riichi if we can upgrade the wait or value). If we have no other common safe tiles, we should chase. (But because a riichi duel usually ends quickly and safe tiles are added more quickly too, we can usually fold successfully with only 2 safe tiles.)

Good wait, cutting a tile dangerous (10% danger level) against both Deal-in rate is slightly higher than win rate, so we should attack only with a mangan. The same thing as above holds about the number of safe tiles.

Bad wait, cutting a tile dangerous against both Deal-in rate is more than double win rate (even more in the late game). We should only attack with a huge dick hand or when desperate for points, and fold everything else. Even with no common safe tiles, we should try our best to not deal in.

Cutting a tile dangerous (10% danger level) against one Usually riichi with a ryanmen, and fold with a bad wait that's cheaper than 5200. Similarly for a tile that's dangerous at the 5% danger level against both opponents.

Folding against 2 riichi

We should of course prefer common safe tiles, but instead of cutting tiles that appear safe against both (no suji terminals), **we should cut tiles that are confirmed safe against one opponent**. We should emphasize not dealing into the opponent we don't want to deal into (dealer or someone who threatens our placement). While defending against 2 riichi is stressful, finding the safe tiles

against the more threatening opponent, and then choosing the tile that looks safest against the other opponent makes it easy to defend.

What to do in borderline situations

We've listed some situations as clearly good to attack or defend, others as borderline. What factor should we look to in these borderline situations?

Point standing and placement situation

How many safe tiles we have (folding success chance)

With 3 tiles in the mid game or 2 tiles, we can usually fold successfully. But what should we do if we can't?

- **0 safe tiles** Can't help but attack.
- **1 safe tile in the mid game** We should also usually attack, unless we especially want to avoid dealing in or would have to push an especially dangerous tile.
- **2 safe tiles in the mid game, 1 safe tile in the late game** Attack in borderline situations and fold otherwise.

Since it's more difficult to defend with an open hand, we should be a bit readier to push with open hands in sketchy situations.

Other players' strategy

If other opponents are pushing dangerous tiles, we should fold more often. A ron between them is more likely, and many safe tiles will be created allowing us to defend more easily.

When in iishanten

1-turn tenpai chance

A rough formula for the chance in in percent of reaching tenpai in 1 turn is

$$p = \text{tile acceptance} \times \frac{5}{6}$$

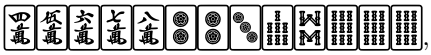
Where 5/6 is an approximation of 100 divided by the amount of possible draws. While this will depend in reality on discards and the tiles in opponents' hands, it's a good rule of thumb for thinking quickly.

Tenpai chance 10%, guaranteed good shape

A hand like  . (Strictly speaking, the tenpai chance is higher than 10% if we can see less than 4 tiles of  .) According to *Scientific Mahjong*, if we push everything with this kind of hand, deal-in rate will exceed win rate, by up to double in the late game. Even with an 18000 point hand, preserving iishanten isn't worth it if we would have to push a tile at danger level 7%. We should understand that **tenpai and iishanten differ like heaven and earth**, and a double ryanmen iishanten is not particularly wide.

However, we should in fact attack with a hand like this in the mid game if we have non-dealer confirmed haneman (12000) or better. The reason is that confirmed haneman is often either a big dick chinitsu or a hand with many dora. Since chinitsu is easy to call which increases tenpai chance, and having many dora means opponents will have less, it's fine to attack.

20%

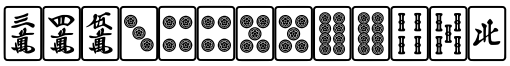
A hand like  , or a double ryanmen iishanten where we can call. Win rate and deal-in rate are roughly similar, so we can push a danger level 7% tile with a mangan.

>20%

Common with headless or sticky shapes. Attacking with these while still not in tenpai can be quite good, and we should treat them roughly as we do tenpai with a bad wait. This means all-out attack with dora dora, and folding with no added value.

Callable hands

Since a tenpai is much better than an iishanten to counterattack with, we should call everything possible if an opponent has declared riichi. (Unless we really need a big dick hand or we intend to fold anyway if we don't get a good draw.)

Example 

While this hand is easily haneman closed, and we would try to complete it closed in an equal scenario, if someone has already declared riichi, we should call into 1000 open tanyao.

<10%

Cases where it's good to attack from a narrow iishanten (especially chiitoitsu iishanten) or 2-shanten are extremely rare. The main exceptions are wide, expensive and easy to call 2-shanten (chinitsu etc.) where dealing in would not change our placement.

2.4 Dealing with open hands

Characteristics of open hands

We'll now discuss defending against open hands. Even against these, defending according to the danger level diagram is effective. However, there are some unique points of judgment.

We don't know if they're in tenpai Except with 4 calls (hadaka tanki), we can't be sure unlike with riichi (in rulesets that disallow no-ten riichi :^). 3 calls in the early game (6th turn or before), 2 calls in the mid game (around the 10th turn) and 1 call in the late game (13th turn or later) are roughly 50% chance of tenpai. 3 calls in the mid game and late game are respectively about 80% and 90%, 2 calls in the late game are about 70%.[5]

Since cutting a tile of danger level 10% against an opponent who is 50% likely to be in tenpai is the same as cutting a tile at danger level 5% against riichi, we should weight the relative values of our and the opponent's hand and decide accordingly. However, in practice estimating whether an opponent is in tenpai will depend greatly on his discards, so we should exercise caution when using general criteria like these. We'll return to this subject in the chapter on reading.

The score is easier to read It's hard to read how much a riichi is worth, and its value can get inflated by ura dora, so in the previous section we used a flat estimate of 7000 (dealer 9800) points. However, we can use reading skills to gauge an open hand's value and decide to push or fold with greater precision.

The wait is easier to read Often when a yaku like honitsu or toitoi is obvious, we can safely exclude many tiles. Conversely, this makes tiles that *can* be targeted more dangerous than when defending against a riichi, which can be easy to overlook. (There are many players who know how to fold against riichi but have low awareness of open hands.)

The tiles after the opponent's last tedashi are safe Even if an opponent has done tedashi,[6], tiles from several turns ago become quite safe against shanpon, and tiles cut by his kamicha from several turns ago become quite safe against sequence waits too. It rarely happens that he was unable to call to advance his hand and then drew the wait later. While it's not needed to remember all the tedashi and tsumogiri, it's good to remember them for an opponent who has called. (Also note that an opponent might decline ron to target us in particular, though this is very rare.)

The outside of early discards (especially neighbors) becomes safer than against riichi Cutting  from  early is especially rare with an open hand.

The neighborhood of the tile that came out after the last call (sobaten) is dangerous A perfect iishanten is common with open hands as it's easiest to call into, and the tile that comes out to make tenpai will often be from a paired joint to confirm the joint. However, calling from a

[5] See `https://blog.kobalab.net/entry/20180203/1517667551` for a table based on actual data

[6] Tedashi refers to cutting tiles from the hand and keeping the draw, as opposed to tsumogiri, which is to immediately discard the drawn tile.

paired joint and cutting the overflow tile ( chii  cut ) means another area is dangerous, especially where no tiles have been discarded.

The area where no tiles have been discarded becomes more dangerous

Since shanpon waits are more common, the danger of live tiles[7] increases

Tenpai estimation

While the percentages for tenpai chance for a given turn and call count give a rough estimate, this can change heavily depending on how many middle tiles an opponent has discarded. Since we can'r get an exact chance, the decision to push or fold will depend to some degree on our own speed and the opponent's value. (But even against an opponent with 2 calls, we should fold with a narrow 2-shanten.)

If an opponent discards an especially useful tile (what this means depends on what yaku he's making, for example dora, suited tile in honitsu etc.), he's likely to be in tenpai. If he cuts a very useful tile, followed by a safe tile (dead honor), he's especially likely to be in tenpai. In this case, a ryanmen is likely, and the outside of the useful tile becomes a lot safer. (We can infer an extra tile iishanten earlier.) This technique is of more limited use for yaku other than tanyao and yakuhai.

If other opponents are cutting dangerous tiles against a threatening open hand, they're also more likely to be in tenpai. If their hand is open too, they're probably also in tenpai. Furthermore, an opponent who declares kan is usually tenpai or 1-shanten.[8]

Defending against specific yaku

Tanyao

Will be very common. Usually easy to read with an opponent cutting terminals and honors early and holding on to middle tiles. When playing with aka, we should always be aware of how many are still unaccounted for, since the opponent might be holding all of them. Dealing honors and terminals is an easy defense against open tanyao, but sometimes we'll get tricked by what was actually yakuhai atozuke or concealed yakuhai. The following are often signs of a tanyao actually being yakuhai:

Discarded terminals after middle tiles Might have been holding them as a safe tiles, but gets less likely the more calls he has made and the more terminals discarded late.

Called a 23 or 78 ryanmen after having discarded the 5 earlier In real tanyao, it's better to discard 2 or 8 to avoid furiten.

[7] Westerners often misuse this to mean "dangerous tiles", but it means tiles that have not been discarded by anyone yet

[8] This obviously depends heavily on meta and general skill level :^)

To deal with this, if we're going for yakuhai atozuke that could pass for tanyao and draw  with  in hand, we should cut  . Rather than hope to draw  , it's better to try to trick opponents.

Yakuhai atozuke If an opponent has made any calls with terminals, this is the most likely reason especially if other yaku are improbable. We should be aware of the number of live yakuhai left. It can sometimes be good to choke live yakuhai (or fold if tenpai is likely), depending on how much we care about the other 2 opponents advancing.

Sanshoku and ittsuu When 2 groups have been called, a wait for the 3rd one is likely.

Honitsu Should be fairly obvious to notice (off suit middle tiles and ryanmen in discards early, yakuhai late). If he has discarded a suited tile or a live yakuhai, 1-shanten or tenpai is likely. If not, tenpai is unlikely and we can often get of rid of suited tiles before it gets too late.

Toitoi Middle tiles of all 3 suits discarded early, possibly ryanmen dropping, yakuhai only late. Live tiles become especially dangerous, while dead tile are safe.

Chanta 456 discarded early but no 3 or 7. 456 will pass.

Other yaku should not be that hard to defend against as they tend to be quite obvious. If we can't win realistically, we should fold from the mid game on against a decent open hand, cutting tiles that invalidate yaku if have no safe tiles.

2.5 Supplement

Push-fold judgment just before a draw

Just before a draw, the chance of winning the hand is low, so score and a good wait become less important and the danger level of the tile we would have to discard becomes more important. We can estimate the danger level by counting the number of remaining suji and by other reading techniques.

Assume there's one opponent in tenpai, and pushing a tile would certainly let us receive no-ten payments, while dealing in would cost a non-dealer mangan. Then we should push when the chance of dealing in x satisfies

$$1500(1-x) - 8000x > -1000$$

that is when

$$x < \frac{5}{19} = 0.263...$$

And similarly when $x < \frac{5}{27} = 0.185...$ when pushing against a dealer mangan. This is unexpectedly high, but it assumes that we are certain of receiving no-ten payments, so if multiple turns remain we should push only at a lower danger level. Furthermore, since the number of remaining suji just before a draw will be low, we must bear in mind that even a single no suji tile against 2 tenpai opponents will be very dangerous.

This decision is heavily influenced by point standing. Close to all last, it's good to emphasize expected placement over expected round value. For example, if we are last in South 3 and no-ten payments would raise us to 3rd place, we can risk even a no suji tile, while if dealing in would drop us by 2 or 3 places, we should usually fold.

Rolling

In mahjong, **attacking maximally when we attack and defending maximally when we defend** is often the right answer. However, it can sometimes be valuable to attempt to preserve the hand towards tenpai or a win while defending (especially in the late game for a formal tenpai) if reasonably possible. We call this style of play rolling (*mawashiuchi*), or choking when dealing with no-ten opponents.

When attacking maximally, tile efficiency will tell us the best answer X, but sometimes cutting X won't be reasonable (yet) from a defensive standpoint. In that case, deciding which of the possible less efficient moves to make is the skill of rolling.

When to roll

First, we should use the basic defensive criteria to decide whether it's worth it to attack maximally. If it isn't, we can cut a safe tile that still advances the hand is some sub-optimal way if completing the hand is possible. Often, when we have multiple isolated unsafe tiles against a riichi, it won't be possible to complete the hand anymore and we'll have to fold. In practice, opportunities for rolling will be few, and we'll fold in the majority of cases.

How to roll

If we have to break up a group, the hand will almost always be fucked and we'll have to fold, so we should avoid that if at all possible. On the other hand, if we have a safe floating tile, we can cut it without a problem: we won't usually call that rolling, instead referring to the following kind of plays:

Cut a tile from a complex joint Since this hurts speed the least, this is the most commonly used. We use it when we have a tile that we don't want to risk right now, but would be okay risking once in tenpai. (If it would be too dangerous even in tenpai, we can't use this method.) If we would draw a pair or joint into the unsafe tile, we would drop a different component; if we would draw another unsafe tile, we'd fold.

Dropping a pair or joint When dropping joints, we of course prefer to drop those of which both tiles are safe. While this is more tile efficiency, when deciding which joint or pair to drop in a non-rolling situation, we should often keep the ones that opponents would be likely to call.

Dropping a set Slightly less bad than breaking a sequence since we get left with a usable pair. Often amounts to folding.

Aiming for chiitoitsu Even with multiple unsafe tiles, we can always draw a lucky chiitoi. We should therefore preserve this possibility, but often this will amount to folding.

Rolling is an extremely high skill cap low return skill that relies greatly on mastery of all other mahjong skills. For a demonstration of rolling in practice, watch some pro games on Abema.

Ippatsu disruption and haitei shifting

We can also make unexpected calls with another purpose than winning and formal tenpai. We can disrupt the ippatsu of an opponent who has called riichi or shift the haitei to a more favorable player.

If we can call to disrupt ippatsu while advancing the hand, we usually should. Of course, if we have a chance of winning which a call would negate, we shouldn't call. If winning is hopeless, we should call if we are confident in being able to successfully fold after (we have enough safe tiles).

In the late game, we should start being conscious of who will draw the haitei. It goes without saying that we should only consider calling to shift it if we have enough safe tiles.

However, there are also cases where we should intentionally not make these calls even when we could. For example, if we're in a close placement duel with the dealer, so that an opponent uninvolved in this duel would improve our placement by tsumoing a big dick hand.

Chapter 3

Reading

Principles of reading

Types of reading

In mahjong, there are several kinds of "reading", but the most important ones (the ones with the biggest influence on results) are

- Wall reading (how many tiles of a type are left in the wall)
- Yaku reading (guessing which yaku an opponent is aiming for, as well as hand progress reading and score reading)
- Wait reading (how likely a certain tile is to be targeted by an opponent)

All of these depend on guessing what opponents hold in their hand from their discards (what they don't hold must be left in the wall). They can influence both tile efficiency (what tiles are easy to draw) and push-fold judgment (how dangerous is this tile, how expensive does their hand look).

Things to keep in mind

The foundation of reading is estimating the possible combinations of tiles And only then the situation and the intentions of the opponents. For example, a sequence is much easier than a concealed set, so at any given point, an opponent is much likelier to hold  than . Furthermore, since there are always more unseen tiles outside of a particular opponent's hand than the 13 in it, it's clearly less probable that a certain opponent has a pair of than that none of them have it.

Of course, if an opponent is going for honitsu or toitoi, or when  is dora, they become more likely to hold it since they will keep it longer, so the probability of someone holding a pair or set of will increase. However, since it's statistically more likely to draw a joint or sequence, those will be still be more likely.

It's difficult to read rare cases (Instead of reading them, we'll have to read what's not the case and deduce form there.) For example, it's very difficult to specifically pinpoint a riichi's wait, but reading what's not the wait is trivial (genbutsu always pass). The probability of a particular tile being the wait is much lower (usually 1/34 or 2/34) than it not being the wait (33/34 or 32/34).

There are some exceptions to this. For example, a player who needs to score 3500 in all last and is in hadaka tanki with only a haku visible for score is obviously waiting on dora :^) Similarly, a player who's pushing all no suji tiles into a riichi is obviously in damaten for a big dick hand. But being able to read rare cases with a high certainty is also rare.

We shouldn't try to read where reading wouldn't help Due to the nature of mahjong (high amount of concealed information), situations where reading is effective to a high degree are rare. Furthermore, often even being able to read won't change our decision. For example, if we can read a riichi's hand accurately, but our hand is fucked, we'll fold anyway. Often, reading incorrectly is worse than not reading at all. In general, **we should evaluate the situation from the certain information, and fall back to uncertain information only when we aren't sure**.

3.1 Counting

The 1/18 rule

In mahjong, we'll rarely be able to pinpoint waits exactly like Akagi Shigeru. In the majority of cases, we'll be able to exclude some possibilities, and work from there to get a probabilistic estimate of the remaining possible options. The single most effective reading technique is **counting the number of remaining suji**. When guessing an opponent's wait, we'll use this as the base. Since there are 6 suji (14, 25, 36, 47, 58, 69) in each suit, there are 18 in total.

If there are 12 suji left against a good wait riichi, a no suji will be targeted 1/12 of the time, but a no suji  will be targeted 1/6 of the time (since 456 are each on 2 suji).

Of course, this is only a rough guideline. In practice, there will be other waits than ryanmen, so we should treat these numbers as a high estimate. If pushing would be good even with a high estimate, it's definitely good to push. Conversely, since about 65% of riichi are ryanmen, the danger level of no suji  can be estimated at 13/120 = 10.83% for ryanmen alone (low estimate).

If there are especially likely non-ryanmen waits (dora yakuhai, live yakuhai against honitsu, especially suspicious suji traps), we can add them to the count. For example, if an opponent is tenpai for manzu honitsu, and there are 2 safe suji and 3 unsafe honors, the danger level of no suji  is 1/7 and of no suji  2/7. We can understand from this example that when the amount of possible waits is low, dangerous tiles become especially likely to deal in, which we should remember when defending.

Honor waits

The following table gives a danger level of honors based on data of riichi between the 9th and 14th turns:

Danger level of honors

	cut	held	danger	cut	held	danger	
yakuhai	0	1	7%	0	1	5%	guest wind
	1	0	4%	1	0	4%	
	0	2	4%	0	2	3%	
	1	1	2%	1	1	3%	
	2		<1%	2		<1%	

What can we learn from these data?

Against a late (9th turn) riichi, usually at least 5 or 6 suji will be safe. If there are 12 suji left, the danger level of no suji number tiles other than 456 or half suji 456 can be estimated as $1/12 = 8.3\%$ (double for no suji 456). This is higher than the deal-in rate of 7% for live yakuhai. Therefore, **live yakuhai are safer than no suji number tiles**.

However, 7% is quite a lot, so we shouldn't cut them from a hand that has a low chance of winning. Even if it would destroy the hand, we should fold with another honor or a suji terminal. Even the more because dealing in with a yakuhai tends to be more expensive than with a number tile.

Honors that the opponents can see discarded are safer than those we hold in hand. This is because calling pon on the first one that comes out is common, and players tend prefer waits they can see less of.

Furthermore, **yakuhai are safer than guest winds at 1 held/1 discarded**. This is because of the aforementioned yakuhai pon, and because guest winds are classic choices for tanki.

3.2 Discard reading

Types of discard information

We'll now start with the reading of particular discard patterns. The following kind of specific hints are most often useful:

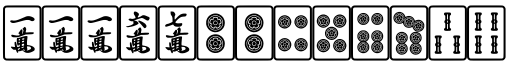
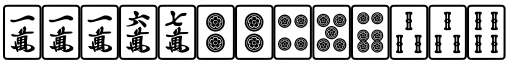
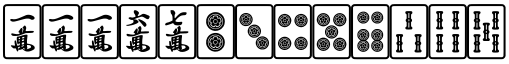
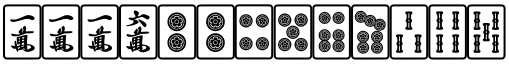
- **Calls** Since these are part of the hand. Since we can see what specific tile was used to enter tenpai with a call, we can read more precisely.
- **High value tiles cut early**
- **Low value tiles cut late** With value, we mean ease of making sequences (middle tiles are high value) and tiles that help give a higher score (dora etc.)

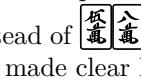
- **Tedashi of joints and pairs** We can understand that the opponent has more valuable joints. The better the dropped joint, the more information we get this way. For example a riichi that dropped a penchan can be almost any wait, but one that dropped a ryanmen is likely to wait on a ryanmen or better. While dropping groups is rare, we can understand that the opponent is going for an unusual hand.
- **Other rare cases** We should always be on the lookout for sketchy things going on. For example, an opponent who pushes dangerous tiles against riichi is probably in damaten, especially if also in the lead.

Sobaten riichi

A long time ago, the theory that "the tiles around the riichi tile (last tedashi in the case of a tsumogiri riichi) are especially dangerous" was widespread. This theory was disproved in *Scientific Mahjong*.

The problem with this theory that the single riichi tile is not nearly enough information to be able to deduce a particular pattern. We can think of many possible hands where the wait will be elsewhere than around the riichi tile. To recapitulate from the section on iishanten theory, there are four main types of iishanten:

1. **Example** 
2. **Example** 
3. **Example** 
4. **Example** 

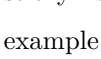
In all of the above, we are tenpai if we draw  . However, we'll only discard a tile around the eventual wait in example 2. Furthermore, even in this example, we won't sobaten riichi if we draw  instead of . (The probability of sobaten would be even lower of were .) I hope we have made clear how low the success rate is of the sobaten riichi theory. In the majority of cases, we can't do any better than to count the number of remaining suji.

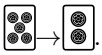
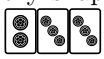
However, if we assume an iishanten of the appropriate type, we do get some information about the wait. If we suppose that the probability of such an iishanten is 100% when an opponent has called riichi with  , then the area around will be targeted about 50% of the time. (The other 50% the wait in the area will have entered first and the target will be the other wait.) Taking into account all the possible shapes with a like  , , , etc. we can arrive at a danger level for of about 20%. This is considerably than the roughly 8.3% we'd expect from

counting suji, so the theory can be said to be effective. If the opponent has called and then discarded  , the probability of sobaten will be double, since we know the other area entered first. So how often will an opponent have this kind of iishanten? We'll talk about that next.

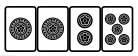
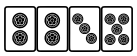
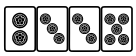
Gyakugiri

One of the cases where a perfect iishanten is likely is when **a high value tile has been cut early and a low value one late**.

With an extra tile iishanten, it's normal to cut a high value tile that's useful for upgrading the wait late. (the exception are hands with 2 ryanmen that want to keep a safe tile.) The same is true for sticky iishanten. If the probability of these shapes is low, a perfect shape is more likely, with for example a late discard likely to be from    etc.

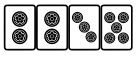
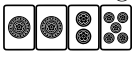
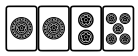
For example, let us consider the opponent who called riichi after discarding  . If it wasn't a perfect shape, what could it have been? In an extra tile or sticky shape, it makes no sense to keep  over  unless going for sanshoku or chanta, or holding  hoping to upgrade into a wider headless iishanten with  . We can hardly imagine an extra tile iishanten where both  were useless, since he would have discarded  very early. In a headless shape, we can imagine  , cutting  to make  the head, or  cutting  first and drawing  to make the head (rare). It is also possible that he cut  before another opponent called riichi, stopped on  for a bit, then rolled into tenpai and risked  .

What should be observed here is that all of the above are rare cases, and the simple case of a perfect iishanten will be more likely unless we have extra clues.

We can easily imagine this discard order from  or  (very rarely from  when aiming for tsumo sanankou), so that  and especially paia will be more dangerous.

The deal-in rate of  will be

$$(1 - \text{rare cases}) \times (1 - \text{irime})$$

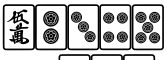
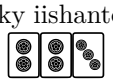
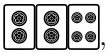
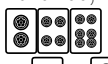
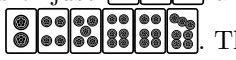
Since the probability of irime is about 50%, the deal-in rate of  will be about 40% assuming 20% chance of one of the above rare cases. Since  will be more common than  (it's common to cut  first from  before iishanten), the deal-in rate of  will be roughly 25%. While this is a back-of-the-envelope calculation, pushing a tile at that danger level only makes sense with a good wait mangan tenpai.

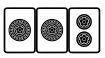
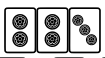
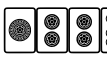
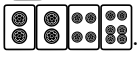
If an opponent discarded  and then called elsewhere and discarded  , we can eliminate irime and the danger level of  will be even higher.

This kind of  →  anti-efficient discard order is called *gyakugiri*. With gyakugiri, the area around the second tile becomes much more dangerous. With other patterns, we'll be able to adapt the above idea, but there will be more exceptions, so we should remember that 52 and 58 gyakugiri reading is the most effective.

Patterns of gyakugiri

 →  **with other tedashi before declaring riichi** The probability that the area around  has been completed becomes higher. If we think that the probability of the wait being in that area when  was cut at tenpai is 1/2, we can think that it's 1/3 (3 incomplete joints left to complete) when  was cut at iishanten. However, we can't exclude other iishanten types. As the number of tedashi afterwards increases, the probability decreases further. Therefore, we can't really consider this kind of reading more effective than counting suji.

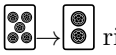
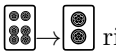
 **(middle tile from other suit)**→  We can add the cases of  sticky iishanten, ittsuu, honitsu which won't make a big difference, but instead of just  and  we can imagine shapes like  ,  ,  and rarely  . The danger level of  will thus be about 30–50% that of the  →  case (15% in total, about F rank), which is still more dangerous than the 8.3% we would expect from counting suji.  will also be a bit more dangerous, but not especially more than the 16.6% we'd estimate from counting.

 →  Instead of just  and  we can imagine shapes like  (suji trap) and  . The rest is similar to  →  .  will have a danger level of about 20%,  won't be especially dangerous.

 *rightarrow*  When playing with aka, cases with sticky iishanten will be unlikely, but we can't be as sure as with  →  . Also, it's not just  but also  that become more dangerous. Since  will generally be ryanmen, and  will also usually be targeted with ryanmen (cutting  from  for a suji trap), it's only  that becomes especially more dangerous.

(middle tile from other suit)→  We can think of numerous exceptions, so reading is not very effective.  will be slightly more dangerous.

Summary

- With  → riichi,  is especially dangerous,  is more dangerous than F rank.
- With  → riichi,  is about F rank or a bit worse.
- With middle tile of another suit →  riichi,  is more dangerous than normal but not F rank.
- With  riichi,  is more dangerous than normal.

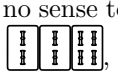
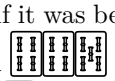
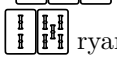
Call reading

We've discussed before how a perfect iishanten with paired joints is more efficient with an open hand. However, we can't exclude other types. Here, we'll discuss some examples where we can infer that an opponent has a perfect shape.

This is a tonpuusen sudden death overtime with 30000 to win. Blue lines indicate tsumogiri, the tiny illegible insets are (from top to bottom) 7m chii, haku pon, hatsu pon. Source is a dead mahjong

BBS post from 2008.[1]

While we want to cut  into tenpai, toimen's call is worrying. What should we do?

Calling chii on  and cutting  certainly makes the area around  dangerous. However, we can't be sure he had a perfect iishanten. Since winning this hand will put us in 1st, we should risk it and push  . However, this hand is indeed a perfect iishanten, since he cut  from  , and it would make no sense to keep a  if it was being used as just a floating tile. So he must have had something like  ,  and  (accounting for the fact that he cut  and 2  are visible). Here, we can eliminate  since he would have called chii on the dealer's discards. So the remaining possibilities are  ryanmen and  + something shanpon. Since cutting  has an extremely high chance of dealing in and dropping us to 3rd place, we should cut  preserving tenpai defensively.

Summary: opponents who cut from a paired joint are likely to have a perfect shape (other paired joints)

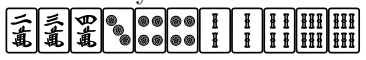
Dora discarding

Dora discarding riichi

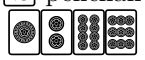
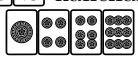
Unless the hand is sufficiently expensive (chiitoi with 2 more dora, menhon chiitoi etc., all very rare) **a tanki wait is very unlikely**. Furthermore, the chance of a ryankan suji trap becomes lower unless the hand is already expensive enough. However, we don't really know anything else. The reason is that a dora is so valuable, almost all closed hands naturally want to keep it until very late if possible, even isolated. Since the information value of keeping a dora until late is low, we can't use it to deduce a certain shape.

While "suji that cross the dora are safe against dora discarding riichi" is a proverb, this is not actually reliable enough to make these suji safer than other untried suji.

Dora → something else riichi

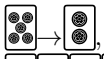
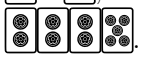
Conversely, in this case we have more information to work with. It's easy to understand that a dora-related wait becomes less likely. Exceptions are hands like  dora  or dora  keeping the dora worsens the shape and makes it harder to make yaku. We can't really read these, but they're rare cases. This technique becomes more powerful with a more central dora. For example,  dora discarded makes  ryanmen,

[1] 10hoe looks better nowadays :^)

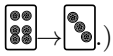
 shanpon,  penchan as well as  kanchan safe, while  dora makes all pinzu waits except penchan,  shanpon and  ryanmen fairly safe.

Furthermore, we can read that a perfect iishanten is common from the following reasoning:

- Dora is the strongest floating tile, so an extra tile iishanten is unlikely.
- Same for sticky iishanten. While an edge dora is hard to stick to, discarding a middle tile dora is especially rare.
- Headless iishanten is also slightly less likely. For example, in  dora  , we'd rather confirm a dora pair than cut  into headless iishanten.

However, other types can't be eliminated. Furthermore, if combined with gyakugiri to make dora  , we can be almost 100% sure of a wait around  . The only notable exception is headless  .

Example  dora 

If the area around  isn't irime, we can read that the wait is either  or  + something shanpon. So the danger level of  is about 50% and  about 25%. We should only consider cutting  with a good wait mangan tenpai. (Similarly for dora  .)

(If you're curious, the hand in the actual game was  .)

Joint dropping

What we can read from joint dropping

An opponent who drops a joint is holding on to a better (rarely equally good) joint unless he's folding

If an opponent enters tenpai immediately after dropping a joint, he doesn't have a headless or sticky iishanten (The exception is dropping  from  or a sticky shape going from tenpai into a better tenpai.)

Before reading any more, we should remember the above points. If an opponent drops a joint before iishanten, he might also be holding a floating tile instead of a better joint. Of course, the better the dropped joint, the more we can infer.

Types of joint dropping

Penchan The weakest joint, so gives the least information. The hand is more likely to be close to tenpai when dropping from the inside out () than from the outside in.

Kanchan Doesn't have a penchan unless it gives dora or yaku. When cutting  , he doesn't need an upgrade to ryanmen with , so either has a  shape or all ryanmen left. We can usually expect a ryanmen end shape (or a headless shape tanki). When cutting from the inside out, a  wait is hard to imagine so  will usually pass (and  too if  is safe). While there are exceptions related to dora and yaku, there will be less traps than with suji, so **the tile that completes an outer kanchan dropped from the inside out is safe**.

Ryanmen We can expect a ryanmen end wait (or headless shape tanki). If we know for sure an opponent has a ryanmen, **suji and honors are safe**. Therefore, the danger level of no suji tiles becomes equal to 1/(number of remaining suji).

While this isn't pair dropping, an opponent who declared riichi with a safe tile will also usually have a ryanmen (especially in the early game), since with a bad shape it's often good to keep a floating tile for upgrading the wait.

Exceptions

While we say that an opponent who drops a kanchan from the inside out usually has a ryanmen or a dora/yaku-related bad wait, there are exceptions. With  , a shape like  into + something shanpon is possible. Especially with → something else →  , a simple kanchan is hard to imagine.  is suji, but if a  kanchan has been dropped this way it's as dangerous as no suji, since it's hard to draw into  and irime will be rare. Conversely, with  → , will usually be safe.

When choosing which ryanmen to drop, there are some that are preferable, for example overlapping shapes like  and . If an opponent has dropped , we can be liable to think that are safe, but this is not true. Especially with some other discards in between and , become very dangerous.

To summarize, if an opponent drops a joint with some time in between its two tiles, he's usually holding on to another shape in the area of the second tile (else he would prefer another floating that doesn't create furiten).

Tedashi ryanmen → something else riichi

We can infer that the opponent dropped the ryanmen with too many joints before iishanten. Therefore, the tile that came out after must probably have been connected to another ryanmen somehow.

Suppose that it was , then and are the most likely candidates, making and dangerous. While a shape like into wait is also possible, this is of course much less likely. With a dropped kanchan, sobaten also becomes a bit more likely in this way, but there will be many more exceptions (floating tile for upgrades etc.). With penchan dropping, it's normal to keep a normal middle tile, so we can't really deduce anything. If the dropped joint contained or accepted dora, we can be especially sure of the read.

Dropping a dora bad shape joint

We can infer than the opponent has a better joint, so either a yaku-creating bad shape or most likely a ryanmen. When cutting →, a shape like is common, so are dangerous. The other possibility is a big dick hand that cuts first for safety. When cutting →, into wait is also suspect.

Dropping a dora ryanmen

When dropping a dora-accepting ryanmen, the most common reason is an overlapping ryanmen, with a dora-containing ryanmen a double overlapping ryanmen. The exception to both are big dick single suit hands. When cutting → in 3 aka rules, a shape like can be eliminated (though there are some players who will do this with a confirmed mangan to trick opponents). Outside of an irregular hand, we can think of a headless iishanten that entered dama tanki and then declared riichi after changing the wait. If the dora was discarded first, we should be especially wary as a big dick irregular hand is likely.

Pair dropping

What we can read from pair dropping

A tanki wait is unlikely

A headless or sticky shape is unlikely

The opponent is holding a better (or rarely equally good) pair

Pair dropping with an interval between the two tiles

With an honor pair, we can think of keeping the second tile as a safe tile (so ryanmen extra tile iishanten is likely), but with a number pair, the second tile most have had some purpose. While ukase-uchi is possible, situations where it's efficient are rare, so we can assume the tile was connected to another pair or joint. For example when dropping → something else → , shapes like , , , are possible, while shapes like or will be uncommon, so and will be hard to target and especially will be safe.

Honor pair A ryanmen wait is likely. The reason is that with a bad shape joint, it's common to prefer the honor pair aiming for honor shanpon. When dropping a yakuhai pair, pinfu is likely. Dropping a double yakuhai (renfonpai) pair is a surefire sign of a big dick pinfu (menpintan dora or worse) so we should be very careful.

Aka containing pair Either a big dick hand with yaku or **likely to have an omote dora pair with ryanmen wait or better**. It's common to prefer an aka pair over a bad shape joint, so a ryanmen is likely. We should also be careful.

Dora pair Either a honitsu, chinitsu, yakuman or chiitoi with the other 2 dora. Needless to stay we should be extremely careful.

This kind of yaku reading becomes more effective in open hands. If an open who's going for toitoi drops a pair, he has a better (easier to call or yakuhai) pair. If a calling opponent drops a yakuhai pair, he's usually going from yakuhai atozuke into open tanyao or from honitsu into chinitsu. An opponent who drops a renfonpai pair has a big dick hand. Unless it's the late game and he wants to make even a cheap tenpai, tanyao dora 3 or chinitsu is likely. If a clearly expensive call has been made and we're far from tenpai, we should usually fold.

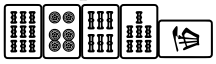
Yaku reading

So far, we've focused on reading the wait of a riichi under the assumption that opponents will play efficiently to maximize speed. In this case, aiming for yaku is more of an exception. We've already given a short overview of how to tell which yaku an opponent is going for in the previous chapter as it's not that difficult.

We can use discard reading on opponents that appear to be going for even very rare yaku. For example, suppose an opponent has called pon on 東 and 南, and then dropped a pair of 發, then we can be quite sure he's going for shousuushii.

However, reading the yaku of a riichi is a problem. We can read common yaku like pinfu and tanyao being likely when the opponent drops an honor pair, but reading sanshoku or ittsuu is almost impossible. We can at best read that an opponent who has dropped a ryanmen usually won't be going for a sanshoku or ittsuu bad wait.

If an opponent has many middle tiles in his discards, the probability of an irregular hand does increase, but we can't eliminate that his haipai could have been very good (which is quite common). To read an irregular hand, we need evidence that the opponent did not advance straightforwardly.

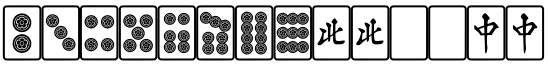
Example South 1, dora 8 (source: Sasaki-pro's hand in an online tourney)
 (all tedashi)

The point here is that he dropped  to keep 西. If 西 were a number tile, we'd expect sobaten around it, but we can only imagine a regular hand advance with cutting 西 from an anko headless

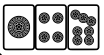
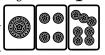
shape. Since we can assume it was used to make yaku, we can narrow it down to manzu honitsu and chiitoitsu. In this particular game, the dealer, Fujisaki-pro, risked a  with a chiitoi dora tanki and dealt into a haneman (riichi honitsu double south). While with a dealer chiitoi dora dora, it might be worth it to risk it, with a cheap hand it should be no problem to fold even from good wait tenpai.

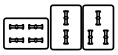
We'll now discuss some examples of how "sketchy calls" can be used to read yaku.

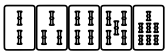
Example dora  ,  is a guest wind (source: *Dahime Obakamiiko*, Umasugi's hand)



Here, Umasugi cut  , called pon on  and cut  . This is quite a sketchy call from the opponents' point of view. Since  is dora, they can read that she has at least two  and discarded  because  is easier to call and she doesn't need any more points. While an exception would be going for shousuushii, this is of course extremely rare. Since a  pair requires another 2 han for mangan, we can narrow the possible yaku down to honitsu, toitoi and chanta sanshoku.

The idea behind this play was that if  enter first,  will come out easily with the pair in the discards. However, cutting  and calling pon on  can also be a haku only, or no-ten (cutting a guest wind pair from a weak hand is common). On the other hand, the sketchy  pon after dropping the pair of  is likely tenpai. If there isn't a difference in score, plays like this that aim to trick to opponent are good ( for the trap are more likely to come first than  that's easy to read), but here I think that the straightforward  dropping is better since there's a chance at haneman or baiman.

**Tanyao with 2 calls that called  chii and cut  **

The mainline is kuinobashi from  into a  wait. Going for tanyao with a  uncertain shape, it's rare to make 2 calls to other parts of the hand. However, even if this play makes the wait obvious, it's still effective to extend the wait hoping for tsumo.

**  pon, then  chii and cut  next turn**

We can read chanta, but with another yaku (otherwise, wouldn't call uncertain  pon), usually yakuhai or sanshoku doukou. (very rare in actual play)

Sobaten tanki

Sobaten can also occur in a headless shape. For example, drawing or calling chii on  into  will create a sobaten tanki. While this is very difficult to read in closed hands, and not calling riichi while waiting for the wait to improve will be common, it's especially easy to read in hadaka tanki (almost certainly sobaten tanki) or other open hands with many calls. Of course, when a tedashi is made after the call, the theory no longer works. Furthermore, we can often discern a tanki wait by the opponent doing multiple tedashi after calling into what appears to be tenpai.

Chiitoitsu reading

Apparently, Totsugeki Tōhoku (whose real name turns out to be 作田誠, Sakuta Makoto) wrote an article about imperfect information games and presented it at a symposium. Notably, it included a simple program that was able to detect honor waits and chiitoitsu with higher accuracy than any of a sample of 30 human mahjong players.

The algorithm for detecting honor waits was based in several criteria, such as

- A certain number of middle tiles discarded before 3 honors and terminals
- At least 40% of the discards are middle tiles
- At least one live honor exists
- A certain number of live or once discarded honors exists etc.[2]

The algorithm for detecting chiitoi was based on a single criterion.

- The riichi tile is a live or once discarded honor

With simple criteria like these, a computer was able to surpass human players' "reading skills".

Takeaways

The foundation of detecting honor waits is counting **few suji left and many honors left**. The most important factor in detecting chiitoi is that **the riichi tile is a good tanki tile**. We can combine these techniques with those discussed before for reading irregular hands, for example ryanmen dropping in discards like 

[2] Can't find a full description of the algorithm sadly

Effective wait reading situations

We've discussed the main cases where reading a specific shape is more significantly more effective than counting alone. However, making a specific read successfully often won't change our strategy (for example, if we're already folding).

Suppose there are 11 unsafe suji left, and we have read one of them to have a danger level of 50%, then the remaining 10 each have a danger level of 5%. When in tenpai, we'd stop only at the extremely dangerous suji and push the rest, but with a weak 1- or 2-shanten it's not worth pushing any unsafe tile.

Conversely, if we want to fold but have no safe tiles, we should prefer to cut even slightly safer tiles, such as suji when we are highly certain of a ryanmen riichi, or the area around the dora if it has been discarded.

Cases where we can effectively read an irregular hand are rare. Even AI can only read honor waits correctly about 30% of the time. However, if we assume there are at least 2 honors left, then the danger level of each one would be 15%, which is not much higher than a no suji number tile. We will almost never risk a no suji number tile over an honor, and we will usually simply fold anyway (same for chiitoi, defending as against a regular hand).

Hand progress reading

An opponent can be read to have a fast hand if he discards many middle tiles early without holding on to terminals and honors. Similarly, an opponent going for a certain yaku is usually close to tenpai if he discards tiles related to it.

However, these are vague and not very effective techniques, since in mahjong, knowing how far an opponent is from tenpai is much less important then knowing whether he's in tenpai at all. It can maybe play a small role in deciding which opponent to keep safe tiles against (keeping the dealer's or the placement rival's if no specific information is available).

Another obvious but important point to be made is that an opponent who is folding is never in tenpai, and we can ignore defending against him. We can usually detect that an oppponent is folding if he tedashis several safe tiles in a row, or breaks up a safe tile pair or concealed set.

3.3 Wall reading

Advantages of wall reading

- We can decide more easily when unsure about which joint to drop
- We can keep easy to draw tiles when going for chiitoi
- We can know which wait is easier to tsumo
- We can estimate what tiles opponents are holding

- We can make more precise push-fold judgments (folding in borderline situations if few tiles are left in the wall)

What we need to pin down first is that **no matter how well we read the wall, it's still uncertain information**. If without reading the wall a certain move is clearly more efficient or gives better value, we should play it without hesitation. Choosing a kanchan over a ryanmen because it's certainly live in the wall is nonsense.

We should only use wall reading in situations where we have difficulty deciding based on certain information, the "borderline" or "difficult" hands discussed before.

We should also note that wall reading does not have a major influence on results, and it's wise to make decision based on reading the opponents' hands over wall reading.

Tile group reading

To read the wall, we need to know what tiles opponents are using to build their hands. Same as with wait reading, we need to read "combinations of tiles".

Please remember the following points

- **We can get a rough idea of how easy it is to make a sequence with a certain tile**
- **We usually can't read if an opponent is holding a pair or set of a certain tile, so we don't try to**

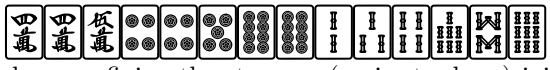
Tiles that are difficult to make sequences with but aren't discarded are more likely to be in the wall. This applies to honors as well as tiles outside of kabe (4 tiles discarded) or tiles outside of heavily discarded tiles. For example, if 3  , 3 and only 1 have been discarded, the remaining are likely to be left in the wall.

If an opponent is clearly going for a honitsu or toitoi, we're liable to think they might hold a pair of the yakuhai we have a pair of. While with obvious yakuhai atozuke this is logical, with honitsu and toitoi it's still much more likely that our final 2 yakuhai tiles are left in the wall than that the opponent has both of them.

Suit reading

We'll now investigate the concepts of "expensive suit" (discarded little, harder to draw) and "cheap suit" (discarded heavily, easier to draw).

Seeing which suits are expensive or cheap is easy from just looking at the discards. Since the opponents are more likely to hold tiles of the expensive, it's less likely to be left in the wall and vice versa. Since opponents will make less sequences with it, the cheap suit is not just easier to draw, but also easier to win on and to call.

Example  → cut if manzu is cheaper and  if pinzu is cheaper, fixing the stronger (easier to draw) joint.

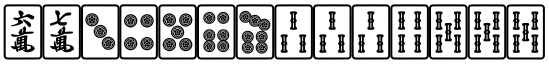
We wrote earlier that a ryanmen wait that opponents might hold is better than a kanchan that's certainly in the wall, but how about a 5-tile wait that's certainly in the wall? Please consult this table (source: `https://blog.goo.ne.jp/21_/e/3676af9ce718a9d97f07100ba5dd0356`)

Probability of drawing a tile

n	opponents might hold	certainly in wall
1	14%	21%
2	26%	38%
3	37%	52%
4	46%	63%
5	54%	71%
6	61%	78%
7	66%	83%
8	71%	87%

Bearing in mind that we will rarely be able to know tiles are left in the wall with 100% certainty, we can see that it's rarely good to choose a narrower wait based on wall reading.

However, with a very wide hand, differences in tile acceptance matter less, so we can more easily change our decision based on wall reading.

Example 

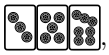
We'd usually cut  or  , but if manzu is expensive we can drop  .

Reflex reading

We can also read the wall from an opponent's discards more specifically. However, this method is not very effective. While an opponent who cut  is slightly less likely to hold  , we can think of numerous exceptions, to say nothing of the other two opponents. However, if we have no other factors to decide with at all, we can use the following two rules:

- An opponent is less likely to hold the neighbors of a tile he discarded
- An opponent is more likely to hold the suji of a tile he discarded

Example When choosing which kanchan to break from  , we should keep  if many  have been discarded by opponents.

Example When choosing the end wait from  , we shouldn't choose  if many  have been discarded. The ease of creating a suji trap after riichi also plays a role here.

With honors, **from the mid game on, honors discarded once are more likely to be left in the wall than live ones**, since opponents did not call pon on them. While if we want to stack yakuhai, we should prefer live ones (since we want a whole set), **we should prefer once discarded honors when going for chiitoi**.

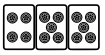
While the difference is very small, if kamicha just discarded  , is more likely to be left in the wall, since shimocha and toimen have not yet had the opportunity to match  now that it's not live anymore.

3.4 Supplement

Disguise

Since opponents will try to read our discards, it can be good to prevent showing them important information.

For example, we should cut  from  so that opponents won't know  are safe. Since tedashi gives out more information than tsumogiri, we usually shouldn't karagiri (tedashi an identical tile to the one just drawn).

There are some exceptions where it's advantageous to give opponents more information. For example, if we cut  from  and immediately draw another  , we should karagiri to create the illusion of dropping a pair, making a  appear unlikely. When in damaten for a riichi's safe tile, we should karagiri safe tiles to make opponents think we're folding.

Even if our hand is very bad, we can make threatening discards to make opponents wary.

It's sometimes even good to give opponents true information instead of false. For example, as non-dealer in all last we can try to make our wait more obvious with karagiri and hope that 1st place will deal into us on purpose to end the match.

However, techniques like these are not very important, and we should remember to have things closer to the core of mahjong have a bigger influence on our play.

Gyakugiri II

An appendix to the subsection on gyakugiri.

We've discussed the main patterns of gyakugiri, but the same can be applied to any high value tile → low value tile discards. For example  →  makes the suji  quite dangerous, and cutting 

late with all 4 visible makes suspect. If the tile discarded into tenpai wasn't a safe tile, and there was no irime, then it must have been sobaten.

Another point which we should bear in mind is that late terminal discards can be signs of upgrades or slides, for example cutting when drawing with , or . While we can't conclude the wait is likely to be around that area, we can be fairly certain a sequence exists there.

(red lines are tsumogiri)

Here, the late tedashi is suspicious. Drawing into is mainline, but even if that's not the case the opponent is likely to hold at least one . Since that means there are only two left, we should fold.

Lag reading

Not as important as other kinds of reading, but still worthwhile to remember.

Lag refers to the small pause that is inserted after a tile is discarded in online clients while players consider whether to call. While many clients sometimes add random lag to discourage lag reading, it's nevertheless possibly to notice the difference with some practice. Since lag reveals information to opponents, we should usually **play with calling off if we don't want to call**. However, we

should be careful since there are many non-obvious calls like kuinobashi that are still good to make.

While we don't know whether the lag on a certain tile is for chii, pon or kan, it's clear that if it's for pon or kan we get more information. There are many possible patterns where it's possible to call chii, but if it's possible to call pon, one of the other 2 opponents must have at least a pair of the tile. We can be sure lag is for pon if

- the tile is an honor
- it was discarded by kamicha
- it's obvious that the discarder's shimocha can't call it (in riichi or clearly not holding the required tiles)
- we're playing sanma :^)

If there's pon lag on a tile that we also hold, we can't draw a second one, so we should discard it immediately if we originally wanted to stack it. Similarly, if there's pon lag for a tile which he have a bad shape joint waiting on, we should break it as there's only 1 tile at most left in the wall.

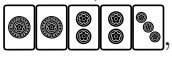
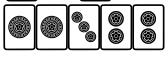
If an opponent calls riichi with a tile that was previously pon-lagged, sobaten from a perfect iishanten is likely.

Tiles outside of a pon-lagged tile becomes a bit safer, as one-chance tiles. If we can see one more tile, they're no chance and comparatively safe.

Tile arrangement reading

Since players will usually arrange their hand sequentially, it's possible to read it based on this arrangement. While there are players who don't arrange their at all, this makes it much easier to make tile efficiency mistakes and thus isn't recommended.

We should pay attention to not make our hand too easy to read. By applying the following rules, we'll be fine

- Sort by suit, with the order of the suits and honors random.
- Sort each suit in order, but sometimes in reverse lke 
- Don't put tiles that we want to call or discard at the edge
  For example, if we put  at the right edge, call pon on and discard  , it's easy to read that we have a pair of  . We should put these tiles in the center of the hand instead and completed groups at the edge, possibly reversed. However, if we might want to call into our completed groups, for example pon  or  into  , we should put these groups in the center and out of order, like 

- We should arrange joints we want to call so that there are no tiles in between. For example, with  tenpai waiting on , we want to extend by calling chii on  . However, exposing  this way with a tile in between makes it easy to read. Instead, we should arrange the tiles like 

Person reading

It's very difficult[3] to form an impression of an opponent without playing many matches. It's best to use long-term data (especially simple things like deal-in rate and riichi rate) and not rely on one's own experience since it's prone to bias. In general, we also shouldn't change our playstyle too much in response to opponents. A lot of so-called "occult" styles are based on bias from focusing on one particular case too much. However, if opponents have "tells" like getting visibly nervous when in tenpai, we should exploit those. Many people think that a digital playstyle is easy to read because it's consistent, playing the same move in the same situation. However, playing different moves in the same situation is always a loss some of the time even if opponents can't read us. Furthermore, playing consistently will let us think of what to discard and what to call in advance, making it easier to play smoothly and reduce tells.

[3]Long form shitpost abbreviated, also note that the author is talking about competent (JP) players, when playing against chinks and /mjg/ shitters you can get a lot of information from their rank and >reputation (watch out for novice smurfs especially :^)

Chapter 4

Point situation judgment

Principles of point situation judgment

In many mahjong rulesets, uma and oka exist.[1] Accordingly, round expected value is not always equal to hanchan expected value. For example, when leading in all last, it's common to go dama even when we would otherwise call riichi to secure 1st place. In general, we need to be aware of our placement at the end of the hanchan. The amount of riichi sticks and honba, as well as shuugi can also influence decisions. We'll discuss how to adapt round expected value maximizing strategies to these rules.

Rate has no impact on strategy but its ratio does The size of the rate (how many ¥ we get per money point) is claimed to influence strategy by many people. At low rate, its doesn't hurt as much to lose, so people prefer to have fun rather than to win is one line of thought. However, if we want to ~~tryhard~~ win, we want to maximize hanchan expected value, which is independent of rate.

However, the ratio of the rate (whether the uma is 10-20 or 10-30, how much the oka is, how much the shuugi are) does have an impact on strategy. In rules that have a big reward for taking 1st, we can make riskier plays at 1st that might lower our placement and vice versa. Other examples are online clients that ignore points and only record placement, shizu-uma (uma that changes depending on how many players are over/under a certain score) and tournaments where only certain placements advance or the sum of multiple hanchans is important.

The point situation becomes more important closer to all last This should be fairly obvious. While ideally we should maximize hanchan expected value, which is a combination of expected end score and expected placement, this chapter will focus on maximizng expected placement as it's easier to understand.

[1] What the fuck are these? Uma are extra points that 4th and 3th pay to 2nd and 1st at the end, commonly 10-20 or 10-30 (in money points: each player gets base money points equal to (his score - 30000)/1000). Oka is a bonus for first place, usually of 20 money points, since players start at 25000 but the end score is calculated with respect to 30000 points. The difference goes to the winner.

How to think about expected placement

Placement expected value formula

$$\text{placement EV} = \sum_{n=1}^{4}(\text{placement points for } n\text{th place}) \times (\text{probability of coming } n\text{th})$$

In all last, we can use this formula to determine whether it's better to push or to pull among other decisions.

Placement points depending on ruleset

- 25000 start, 30000 end, uma 10-20 → 35/5/-15/-25
- 25000 start, 30000 end, uma 10-30 → 45/5/-15/-35
- MFC hanchan league → 2/1/-1/2
- MFC tonpuu league → 1/0/0/-1
- Tenhou 5th dan tokujou table → 75/30/0/-105

When playing in tourneys with a prize pool or when yakitori[2] or busting out prizes exist, we can adapt the formula to include them too. Since expected placement is an important strategy concept that's very likely to change depending on ruleset, we should endeavor to always remember the rules and adapt to them.

Scoring techniques

To know our expected placement, we need to be able to score hands quickly in our head.[3] It's not necessary to memorize all the possible fu values. We only need to memorize 20 fu, 25 fu and 30 fu. Then 40 fu, 50 fu and 60 fu are double those, and 70 fu is just 50 fu + 20 fu and so on.

Point difference calculation

- Suppose we need x points to improve placement
- Then we can ron x points off any player
- Or get a $x/2$ direct hit
- Or with tsumo
  - Get a $4x/5$ tsumo if neither we or the opponent are dealer
  - Get a $3x/4$ tsumo if we're the dealer

[2]Extra payment to opponents after not winning a single hand in the entire hanchan
[3]Learn to score NOW if you haven't already. Ask in the thread for good practice programs

  - Get a $2x/3$ tsumo if the opponent is the dealer
- This is an easy to remember 1, 4/5, 3/4, 2/3, 1/2 progression.
- For each riichi stick in play, reduce x by 1000 beforehand.
- For each honba, reduce by 300 for ron off another player, 400 for tsumo, 600 for direct hit.
- A similar but inverse process can be used to calculate how big of a point difference a particular win will make
- No-ten payments induce a 4000 point difference with 1 or 3 players tenpai and 3000 with 2 players tenpai

How to fight in all last

After all is said and done, the "daigomi"[4] of mahjong is risking it all in all last.

In standard 25000 to start 30000 to end rules with 10-30 uma, improving our rank from 4th to 3rd or from 3rd to 2nd is worth 20000 points, from 2nd to 1st 40000 points. 3rd to 1st is worth 60000 points. This is more than a yakuman which doesn't change placement.

In 4th, we can't lose placement anymore. Therefore, situations where we should content ourselves with being last really don't exist. It's annoying to the other players, but in the long run, **settling for last is like strangling our own neck**.

What we should pay attention to is that **relying on luck to improve placement and then being unlucky is no problem**. There are many players who hate to rely on ura dora for a comeback, or get disappointed when the ura doesn't come.

But please consider the following. Mahjong is a game of chance. When making our hand, we rely on the luck of the tsumo. It would be funny to treat ura dora and ippatsu differently. Because ura dora exists, we must take it into account. Should we rely on ura dora or take the hand that's certainly expensive enough? We should compare the probability of improving placement and decide from there. If we're missing 1 han to a certain comeback hand, there are quite some cases where we can get it:

- At least one ura dora (roughly 30% of the time)
- Ippatsu (roughly 10%)
- Direct hit
- Kan into dora or extra fu
- Another opponent declares riichi, giving us one more stick

[4] 醍醐味 daigomi (n): 1. the real pleasure (of something); the real thrill; the true charm
2. flavour of ghee; delicious taste
3. Buddha's gracious teachings (Buddhist term)

All in all usually at least 40%, often more than 50%. Is the success rate of declining ron and getting tsumo or declining tenpai to make a better hand as high? Usually not.

However, if we can make a guaranteed comeback hand, we should take it even if the wait is worse, since the win rate of a bad wait is about 2/3 of a good wait.

Similar strategies can be used when calling. If calling would net us a confirmed comeback hand, it's fine to call aggressively even into atozuke or kata-agari hands. In all last, players will often push everything which makes calling especially effective.

We can call even with 1 han less than needed and hope to add an aka or omote dora, create another yaku or call kan. If we think the hand would be difficult to complete closed, we should make calls like these.

Declining wins in all last

A situation that often comes up is when we call riichi in all last, and our winning tile comes out from the wrong opponent, so that we'd need ura dora to come back if we call ron, but will certainly come back if we can tsumo.

The chance of getting ura dora is about 30% (depending on the number of unique tiles in the hand). If we don't care about losing placement (currently 4th), we should decline if the chance of getting tsumo is higher.

Of course, this depends heavily on the turn and on how many of our winning tiles are left. Also, we must take into account that an opponent might win before we can tsumo. We therefore need that

$$(1 - \text{opponent win rate}) \times \text{tsumo rate} > \text{ura dora rate}$$

We'll assume that East and South get 18 draws, while West and North get 17, so we should add 1 turn to the values given here if in West or North.

With a bad wait, the tsumo rate with 1 tile discarded is only 36.8% even on the 1st turn. Taking about 10% for opponent win rate, we should always declare ron with a bad wait.

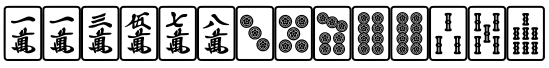
With a ryanmen, the calculation is more difficult. Assuming all opponents fold, it's good to decline with 7 tiles and 4 draws left or 5 tiles and 5 draws left. However, if an opponent cut our winning tile, it's safe to assume at least one opponent is attacking. If we assume one opponent is in tenpai (with a good wait 2/3 of the time) and the other two fold, we should only decline if we have at least 12 draws left. If we assume the folding opponents will deal in 10% of the time, we should always call ron. If we assume the attacking opponent is not yet in tenpai, it's good to decline with a good wait until about the 13th turn.

However, we have disregarded the possibility of losing placement or a renchan completely, so in practice deciding will be more difficult, but we can use the same kind of reasoning, knowing that the chance of ura dora is roughly 30%.

Speed maximization techniques

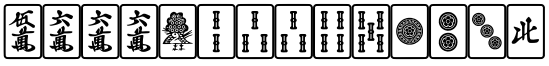
Often, we won't care about score in all last (when we get 1st with any win).

When this is the case, we need to build our hand to maximize speed. Dora and its neighbors suddenly become worse than regular tiles since they come out harder. All yaku after the highly important first one become unnecessary. However, going for no yaku riichi is not a problem either. We'll have to make plays that maximize win rate to the utmost.

Example  dora  → cut  and go for tanyao

Since we want to maximize win rate, **we should go dama if we have a yaku**. However, **we should take a good wait no yaku riichi over a bad shape dama.**

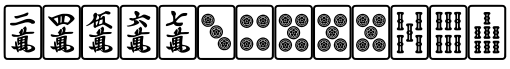
Example  → cut  and riichi

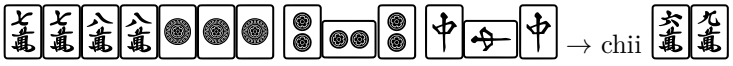
Example  → cut  and riichi!

However, in the lower example, if calling riichi would lower our placement, we should stay dama.

Other useful plays are those that upgrade the shape, ignoring score

Example  → cut to make sanmenchan with  over iipeikou

Example  → call any of 

Example  → chii

However, when playing with rulesets where raw points or shuugi are important, we don't need to maximize speed as much.

When to attack fast

There are other situations where a swift attack is useful, such as

- Slim point difference both upwards and downwards
- Improving placement by 1 is easy, but improving by 2 is unrealistic
- Improving placement is unrealistic, but there's a slim difference downwards
- We want to avoid yakitori

Often, we should emphasize preserving our placement over improving it when being overtaken is likely. While people often say "in mahjong, take 1st at all cost" and there is some truth in this (rulesets where 1st place gets a big reward are common), it's no use to chance an impossible 1st place.

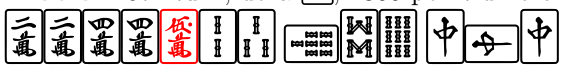
With standard 45/5/-15/-35 placement points, players who get 30%/20%/20%/30% (average rank 2.5) results and those who get 26%/26%/24%/24% (average rank 2.46) will make the same amount of money. It's both much easier and much more effective to improve average placement by 0.05 than to improve top rate by 5% (this is extremely hard). **To raise expected placement, rather than chase many 1sts, it's much more effective to slightly increase average placement by preserving placement when going for 1st is unreasonable**.

Calling when a comeback is uncertain

When we get 1st with any win, we should of course call from anywhere maximizing speed. Then what about the following situation?

If we call, we get an uncertain comeback (needing to tsumo or win with a particular tile), if we stay closed or calls something else, we can make a comeback with a win from anywhere.

The situation is similar to the theory of waiting for an upgrade we discussed earlier (a hand we can only win under certain conditions is like a bad wait or a furiten). Accordingly, if no opponent is yet in tenpai, **we should decline the call if we can draw at least 7 kinds of tiles that would give us a confirmed comeback hand**. Of course, if an opponent is already tenpai, we should take even a bad tenpai to catch up.

Problem 6th turn, dora  , 1300 point difference with 1st place (non-dealer)


If we draw or call pon on  , we can only get 1st with tsumo, but with any of  tsumo or chii (so 8 types), we can win from anywhere. Accordingly, we should not take tenpai with  .

Push-fold judgment in all last

Placement points of course have a big influence on push-fold judgment.

Suppose that under standard rules (25000 start 30000 end, 10-30 uma, so 45/5/-15/-35), we're in 2nd while an opponent has called riichi, and that if we win, we will certainly be first, but if we deal in, we'll certainly be last. When should we push in this situation?

Since both of these scenarios represent a change of 40000 placement points, we should push if win rate > deal-in rate. Even if they're the same, we should push since the opponent might tsumo and lower our placement. Since this will be the case even with a bad wait tenpai, we should attack with all but the most dangerous tiles.

The decision gets more difficult in iishanten. With a wide iishanten (about 20% chance to draw into tenpai), we should push, but with a narrow iishanten (about 10%) it's no problem to fold.

The probability of an opponent tsumo or opponents dealing into each other is difficult to estimate making push-fold judgment in all last very complex. We can figure out which opponents will push or fold not just from their discards, but also from their placement and point difference (last place will push, an opponent who can't realistically lose placement will also push, 1st place with a big lead will often fold). In general, we should start by thinking how much point each placement is worth, then estimating the chances and effects on placement of winning, dealing in, opponents dealing into each other and getting tsumo, and weighing the relative expected placement points of pushing and folding from there. Since it takes a lot of time to estimate all of these variables, we should start thinking about this as soon as all last starts.

2nd place, winning gets us 1st, dealing in gets us 3rd but certainly not last

We should attack even if win rate/deal-in rate = 1/2, so with any iishanten or even a good 2-shanten. Conversely, if we can't get 1st and can get 4th, we shouldn't attack unreasonably. Even if folding would certainly get us 3rd, we should still only push if win rate > deal-in rate.

1st place in tenpai and an opponent is also in tenpai

If the opponent is a non-dealer and we can read that dealing in will let us keep 1st, we should attack. If we are under threat of losing 1st place from the other 2 opponents and our hand is slow to tenpai, we should even deal in on purpose (if our hand is fast it's better to attack). While reading the wait is hard, it's not hard to discard tiles that are safe against the other two opponents but not against the third. Even against riichi, it's rare to deal into a baiman (or haneman when playing without aka) so it's not necessary to fold against a non-dealer if we're safe against such a deal-in and threatened by the dealer. However, if we're playing in a system where raw points impact results, we should almost never deal in on purpose.

If dealing in would drop us to 2nd, while a tsumo or ron of another opponent would let us keep 1st, we should usually fold even from tenpai. On the other hand, if we aren't safe against a tsumo, we should push unless just it's before a draw and we're safe against no-ten payments.

If dealing in would drop us to 3rd, we should push with a good wait until the mid game and with a bad wait in the early game. If dealing in would drop us to 4th, we should only push with a good wait in the early game and otherwise fold.

Push-fold judgment one hand before all last

Since our placement in South 4 is very important, thinking ahead to our possible placement there will also influence our push-fold judgment in South 3.

Since losing 2 placements in South 4 without dealing is quite rare, there is a strong correlation between our placement after South 3 and South 4. Improving our placement in South 3 even by 1 place therefore has a big impact on final placement.

However, we shouldn't focus on "being first at the start of all last" too much. If we have dama 3900 in South 3 and 1st place is ahead by 2000, we can indeed get 1st place with dama ron from anywhere. However, we'll only have a 1900 point lead which is very easy to lose, so we should riichi. The same is true if we have a small lead in South 3.

Same as in South 4, it's no problem to rely on luck to improve placement in South 3, especially since we'll get another chance in South 4.

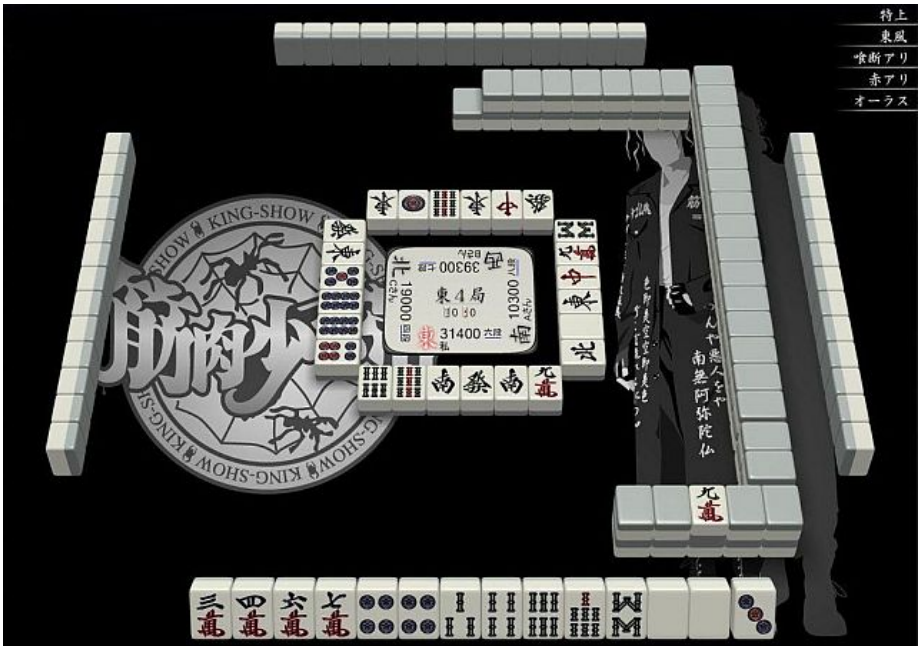
It's also often possible to win a cheap hand in South 3 that will narrow the gap to make it easier to come back in South 4. For example, if we're West in South 3 and trailing 10500 behind first place North, we need a haneman ron on someone else or haneman tsumo. However, if we win a 1000 point trash hand now, we can take 1st with just a mangan tsumo next round. Getting mangan tsumo is much easier than haneman so this is quite important.

What has been said about all last can be used in South 3 too, but to a lesser degree. We especially don't need to be severe in attacking with bad hands. If we're last place in South 3 and our hand is fucked, it's fine to sit the hand out.

How to make mangan

The most useful skill in all last is making the fastest possible hand, since 1/4 times we'll be 1st (even more if we count all the cases where we want to attack at maximum speed). The second most useful skill is how to mangan, since situations where we'll need a mnagan to improve placement are common and mangan is often a realistic goal (unlike haneman and above).

However, if we're 2nd and need a mangan to overtake 1st, while 3rd and 4rd can overtake us easily, we should go for mangan only if we get lucky draws and attack quickly with a cheap hand otherwise. Conversely, if the players below can't overtake us even with a mangan tsumo, we can go for a comeback hand. Even if we're dealer, we should try to go for one big strike than hope to chain renchan.



Since we can't get overtaken even with a mangan tsumo, we should cut 🀙 and aim for mentanpin (with sanshoku or aka if we get lucky for a guaranteed dama comeback). If the players below us were close, we'd also cut 🀇, but this time we'd call anything and go for open tanyao.

The key to chasing mangan is dora. If we have dora 3, we only need 1 more yaku, so we should call everything if we have one. If we have a dora pair and can call, it's also usually no problem. Since we can get a 3rd omote or aka dora or make another yaku, we'll end up getting mangan more often than when staying closed. If we have a single dora, we should hold on to it even if it's difficult to use. If we draw a second one, we can get mangan with just riichi and tsumo, or even with riichi tsumo dora 1 ura 1 if we don't. If we have no dora, it's usually good to try to make a closed yaku like tanyao or iipeikou (+ riichi tsumo ura 1) and hope to draw dora on the way. Of course, we should be aware of sanshoku and ittsuu, but it's not needed to break up groups to chase them unreasonably.

However, there are hands where even reaching closed tenpai, not to mention winning a mangan, is very difficult, for example if the hand is slow and has no dora or visible yaku (or the dora is completely useless). In hands like these, we should accept that it's unreasonable and go for a forced honitsu (especially with an honor dora) or chinitsu in the suit we have most of.[5] We can especially make aggressive calls like this if we're unlikely to be overtaken.

[5]The author seems to have forgotten about the shortcut to haneman. Chiitoi can be very powerful, but without dora, requires riichi chiitoi + 2 (ura or tsumo + x) to make mangan, which is quite hard to pull off (remember that chiitoi has a lower chance of hitting ura than other hands).

What to do when far behind

Haneman needed for comeback

If we need at least haneman, we're in for trouble. While aka help a bit, it's still no easy task. The most common and easiest to make haneman are **mentanpin tsumo dora 2** and **mentan/menpin tsumo dora 3**, so efficient closed hands. If we have few dora, we can think of stacking **iipeikou, sanshoku, ittsuu** with pinfu, and if we still end up at mangan we can **hope for ippatsu, ura or a direct hit**. The easiest open haneman are **chinitsu + x, honitsu yakuhai dora 3, toitoi yakuhai dora 3** and the like. If we have no other option, we can go for **riichi tsumo chiitoitsu dora 2** as a last resort. Since we're likelier to get ura than draw dora if we don't have any, we should instantly riichi with chiitoi only if our wait looks drawable.

If we aren't last place and need a haneman to improve placement, we should usually not chase it unless our draws are excellent and focus on not getting overtaken. If we need to avoid all last and need a baiman or more while our hand won't allow it, we should try to secure no-ten payments to narrow the gap or deal into the dealer for a renchan as a last resort.

Settling for last

If even a haneman tsumo isn't enough, or our hand is too bad for this hand, and we are certain the match will end after this round, what should we do? If playing in a placement system, we should go for even the slimmest chance at a comeback. However, if raw score or other factors (shuugi, yakitori etc.) play a role, it's a different story.

If the chance of our placement changing is negligible (for example also if we're first place dealer with at least a 30000 point lead), we should just maximize winnings from this round, so play just like we would in East 1.

How to play when a player is close to shadowrealm

The hanchan can also end before all last if a player runs out of points. Therefore, if someone is close to busting out, we should play with the same intuition as we would in South 4. If we're close to busting out ourselves, or 3rd when an opponent is close, we should attack unless we have a weak hand and want to bet on a draw. If shadowrealming an opponent with dama would net us 1st and calling riichi would make him fold, dama is effective. When deciding whether to decline a win from someone else, we can think in the same way as we do in all last.

In mahjong, any lead no matter how big can be overtaken, so the advantage of ending the hanchan is big. Even if we already have a lead or it's still the East round, we should assertively try to shadowrealm an opponent to end the match. For example, if haneman tsumo would shadowrealm someone and let us overtake 1st place while we have a mangan tsumo dama, we should riichi even with very few draws left. It's no problem to decline a ron off the wrong player here. If we're first, we'll want to fold more, but if we have a shadowrealming hand we'll want to counterattack (of course without declining wins).

If a ceiling (hanchan ends when a player gets more than x points) is in play, the same ides apply.

Riichi sticks and honba

Sometimes we'll play differently because of riichi sticks and honba. Especially in rules where each hinba is 1500 points their influence is big. While winning fast becomes more effective with more sticks in play, it's not that important to change our playstyle too much. For example, we should still call riichi with good waits below mangan. In general, when there are many sticks, **win rate becomes more important**.

Example With 3 riichi sticks, we can push against riichi even with 1000 good wait.

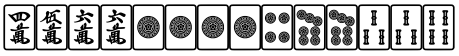
Example When unsure about whether to call riichi with a good wait mangan in the mid game, we should stay dama if there are 2 riichi sticks.

When to call kan

Basics

The player most likely to reap the blessings of kan is the one closest to tenpai. Therefore, we should call kan if we think we're that player.[6] If there's an opponent equally close to tenpai, we call can kan only if the added points would benefit us more.

When opponents are no-ten

- If we're in tenpai. (If we have an open mangan where one more dora wouldn't give us haneman, it's difficult. If the extra draw is important, call ankan and kakan. If exposing part of the hand would make opponents too wary, lowering win rate, don't ankan or daiminkan. If not calling kakan would throw off opponents, we can decline it too. But if the gain from a dora would be big, we can call kan even at the cost of scaring opponents.)
- Good shape 1-shanten in the early or mid game.
- Very good shape 2-shanten in the early game, for example 

When an opponent is in open tenpai

- If we're in riichi, kan.
- If we're in open tenpai, kan when win rate > deal-in rate. Even with a bad shape, kan if the point increase (3900→5200 etc.) is big.
- Don't call kan in no-ten.

When an opponent has called riichi

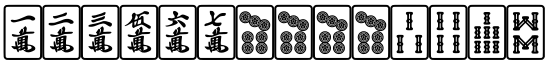
[6] This is the old theory. The modern theory is to call kan whenever we feel our chance of winning the hand is bigger than 1/4, for example with a callable 3-shanten in the early game.

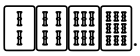
- If we're in riichi, don't kan if we have a bad shape and the tile is safe. Otherwise kan.
- If we're in open tenpai, call closed kan on a dangerous tile. Otherwise, don't call kan unless the point increase would be big (3900→5200 or 8000)
- Don't call kan in no-ten.

Together with these basic rules, we should adjust a little for point standing (kan less when in the lead and vice versa). However, it's still fine to kan in tenpai when in the lead for the extra draw. Conversely, we shouldn't call kan if our hand is fucked even when we're losing.

Using kan components

When we decide not to call kan (yet), we should get of rid of the 4th tile if we don't plan on using it and we have a more useful tile. The benefit of a faster hand is often bigger than that of kan. Similarly, we shouldn't call kan of doing so would hurt the hand.

Example  → don't call kan

Cutting  guarantees a good shape tenpai with  .

Example  dora  → call kan

While we lose a good shape if we draw  , we can go for  kanchan for 6400 or mangan dora tanki, while if we didn't call kan and cut  into ryanmen tenpai we'd only get 2600. So we should kan.

Exceptions

We should also call kan when:

- The extra fu would give us a confirmed comeback in all last
- We can steal the haitei from an opponent in riichi
- We're last in all last and don't care about losing points
- When an opponent dealing into a big dick hand or the dealer getting hit by a big tsumo would improve our placement in all last

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