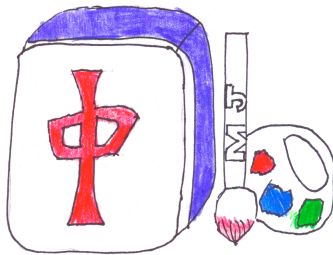


# MJ

Z0\*



## Acknowledgments

Thanks to my parents for their efforts with the Chinese translations. I am indebted to X<sub>Y</sub>TEX, X<sub>Y</sub>L<sup>A</sup>TEX, and their developers for enabling this manual's production with relative ease.

## Preface

The acronym MJ is a shorthand for the four person Chinese tile game 麻雀 (Mah Jeuk, cantonese, original) or 麻將 (Mah Jeung, cantonese, adapted modern; or Ma Jiang, mandarin), which has many spelling variations due to common transliteration practices (see [3] for the history). Many experienced players will understand what mj means. This manual uses “mj” in referring generically to the game, and “MJ” in referring specifically to the Mac OS X program.

Chinese words are sprinkled throughout this manual and within MJ by design; see Section 4 for more information. Some words or phrases are translated as best I can (using cantonese based transliterations), some are not because they would seem totally incongruent unless you understand the cultural or contextual meaning.

## Abstract

MJ is a four person Chinese tile game running on Mac OS X 10.6 and later. It features Chinese original game play with classic scoring, an adapting computer player strategy, an easy to see interface with scaling graphics for any screen size, and many customizable options.

## Dedication

Dedicated to my father who plays a remarkably strong and competitive game, without involving gambling, at an astonishing pace even in his sunset years.

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\*Pronounced as “zero.”

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# 1 Introduction

The game of 麻雀 has a diverse, cultural heritage mirrored in its evolution from China to America and beyond. Through the production of MJ, I have learned a few more things of Chinese culture including a piece my parents did not know. If you want to open a pandora's box on mj, start with [2]. One of my design goals is to bridge a gap between old school players (experienced with the Chinese rules but not the modern translations) and younger generations (familiar with modern translations and rules but not the heritage and symbolism).

There are a handful of mj computer programs, what makes MJ different?

- There are several major game play rules varieties (e.g., Japanese, American, European, etc.), and MJ follows Chinese original game play. Within a certain game play rules set, there may be several scoring rules variants (e.g., Hong Kong Old, Hong Kong New). Mahjong Wiki [1] gives a glimpse of several varieties. Even for a certain scoring rule set, there are style preferences — what might be called house rules. MJ follows classic scoring rules and allows the flexibility of house rules!
- Among the handful of mj programs I have tried and seen, in my biased opinion, their user interfaces are cumbersome and ill-suited. Most will automatically organize your tiles in a certain order. Now if you had the tiles {1 2 2 3 3 4},

you might arrange them as {1 2 3 2 3 4}. In MJ, you organize your tiles the way you want or leave as is and play 看花張. Plus, as in a live game, your tiles are randomly oriented up or down. Some programs require you to select a game action for each discard, even when the only possible action is to pass. Regarding discards, many programs have separate areas for each player's discards, clearly showing each player's discard history, which is not at all what the live game is like. Regarding scoring, many programs do not show you how a hand is scored, which is an essential peer review element of the game. Finally, to save screen space, most programs do not represent the wall tiles, but MJ uses a few space efficiency tricks. MJ represents all essential elements including wall tiles within the smallest screen sizes.

- MJ strategy is complex, changing as the game progresses with each tile. Designing a computer player is a hard task. All the mj programs I have tried use fairly predictable and simple strategies, which is not a knock on them but indicates the difficulty and variety of strategies in the game. A strategy must constantly decide whether to claim a tile, and on the player's turn, which tile to discard. I am designing a computer player strategy that adapts to the game flow just as a human would.

Have suggestions for even more? See Appendix A for contact information.

## 2 System Requirements

MJ is known to run on Mac OS X 10.6–10.9 and should run on later systems but is untested. The playing window may be resized to what suits you, and MJ’s auto-scaling will maximize the tile size while keeping everything else within proportion. Lowering the display’s resolution to make things appear bigger is unnecessary and useless due to auto-scaling. If your screen is on the smaller side such as with laptops, you may try turning off the Dock and maximizing the main window. Toggle off/on the Dock by pressing together **{option + command + D (⌘D)}**. Toggle between the maximum and current window size by clicking the green, round zoom button at the window’s top left corner.

## 3 麻雀 Rules

There are several places on the Internet with rule sets; Mahjong Wiki [1] is a start. Read some for comparison, but I have yet to find a resource matching all of these criteria: 1) comprehensive; 2) detailed explanations; 3) easily accessible. Regarding (1), there are books, but as one enthusiast says, “every writer who writes mah-jongg rules writes them differently,” which I will agree since it fits me too. Regarding (2), with the wide variety of game play rules plus house rules, my feeling is that most writers stick with the general principles for a wider audience (no disrespect intended). Regarding (3), mj books are somewhat scarce in bookstores, and as I search on the Internet, I find resources lack-

ing in one or both of the other points. My father, who has played for over 60 years, acknowledges the rule differences and simply notes that before you start a match, everyone should become familiar with the house rules. So here is my attempt at the rules, along with my father’s house rules.

### 3.1 Common Rules

Among the many varieties of mj, they share several common game play rules. So let us start by identifying the parts and terminology of the game. This assumes the reader has no experience with mj.

#### 3.1.1 Seating (位)

Each player is assigned a seat randomly. The seating positions are designated by geographic directions in a specific order: east, south, west, north. Players may be referred to by their relative seat position.

#### 3.1.2 Dealer (莊家)

A player is chosen randomly as the first dealer (起莊牌). The dealer’s position is always considered east; the players in sequence to the right are considered: south, west, north. The player positions do not correspond naturally to compass directions (unless you were lying on the floor while looking up)<sup>1</sup>.

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<sup>1</sup>My best guess to explain the rationale is rooted in Chinese cultural bias for right hand priority; that is, the sequence proceeds to the right.

### 3.1.3 Round (圈風)

A round consists of each player having a turn as dealer. Rounds are represented by the four directions: east, south, west, north.

### 3.1.4 Dealer Marker (圈風器)

The dealer marker serves two purposes; both of which are scoring components of the game. First, it indicates which player is the dealer (the marker must be kept within the dealer's vicinity), which lets everyone know their relative seating position. Thus, when the next player becomes dealer, the dealer marker and the relative seat positions shift accordingly. Second, it indicates the current round. When each player has finished a turn at dealer, the round is completed and changes to the next in sequence.

### 3.1.5 Match Length

A match's length depends on the rule set, style of play (e.g., tournament), and the players. A natural unit is to play by rounds, though some tournament style games are timed. Some players allow for mixing seats randomly after some rounds.

### 3.1.6 Order of Play

When a player has finished a turn, the normal order of play goes to the player on the right.

### 3.1.7 Tiles (牌)

Start with 34 unique tiles: three dragons (中發白), four winds, three suits of nine ranks

numbered 1–9 (一, 二, 三, 四, 五, 六, 七, 八, 九). The dragons and winds collectively may be called honors (番子). Among the suits, ranks 1 and 9 are called the ends (么九) while ranks 2–8 are called the middles. Each of the 34 tiles appears identically four times for a total of 136. Various game play rules will have sets of flowers and possibly jokers.

**Dragons:** red (紅中), green (發財), white (白板)

**Winds:** east (東), south (南), west (西), north (北)

**Suits:** characters (萬), bamboos (索), circles (銅)

Some tiles are known by various, similar names, which is indicative of the game's diverse popularity and lack of a centralized rule set. The tile names used here are evolved English constructions favoring simplicity over translation accuracy. If you are familiar with the Chinese words above and wondering why some do not match their English counterparts, see [3] for more background information. Suffice to say, these names are so widely adopted, they are practically set in stone<sup>2</sup>.

**Concealed** Concealed tiles are visible only to their owner.

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<sup>2</sup>The Unicode code chart for Mahjong Tiles [4] lists the tiles in the relevant orders prescribed by mj rules; except two flower tiles (bamboo, chrysanthemum) are swapped. I asked whether they could be updated, but list order does not meet the threshold for correction. MJ abides by Unicode naming.

**Exposed** Exposed tiles are laid out face up in plain view of all players and kept within the owner's vicinity.

### 3.1.8 Hand

A hand refers to two distinct ideas and can be easily confused without any context. A hand may be a player's collection of tiles or an individual game play session. For example, a player may be said to have won three hands in a row, or a player's hand was worth full points.

### 3.1.9 Wall

Before each hand, all players help shuffle the tiles. All tiles must be kept face down. Then each player builds a wall of equal length, stacked two high. The players' walls collectively form the Wall.

**Splitting** The wall is split (i.e., separating or making a gap between adjacent columns) for the opening deal. Different game play rules may use different methods, but the idea is to pick a random location via dice rolls.

**Head/Tail** From the wall's split location, the end encountered in the clockwise direction is considered the wall's head while the opposite end is the tail.

### 3.1.10 Floor

The floor is the general area within the walls, though it will extend out as the Wall's tiles are drawn out.

### 3.1.11 Dice (骰子)

Depending on the game play rules, either two or three dice are rolled, usually within the floor or in plain view for all players. The traditional dies for mj have distinctive red markings for the numbers one and four.

### 3.1.12 Drawing Tiles (摸牌)

Tiles are normally drawn (i.e., picked) from the wall's head.

### 3.1.13 Replacing Tiles (補牌)

Replacement tiles are drawn from the wall's tail. Some rules use separated sections of tiles for replacements.

### 3.1.14 Sets

There are three possible sets a player may declare:

**Seuhng (上)** Three tiles in numerical sequence of the same suit (e.g., {123}-bamboo). The sequence may not wrap around from 9 to 1.

**Pung (碰)** Three identical tiles.

**Gong (槓)** Four identical tiles. After exposing a gong, player must draw a replacement tile. If a player has four identical tiles in hand or has an exposed pung and also the fourth tile in hand, the player may declare concealed gong (暗槓) or promote the pung to gong, respectively. Declaring concealed gong or pung promotion is allowed only on the player's

turn and if the player has drawn a tile from the wall.

### 3.1.15 Eyes (眼)

Special set of two identical tiles.

### 3.1.16 Sihk La (食啦)

Declare a winning hand. A winning hand conforms to a normal pattern containing one set of eyes and any combination of sets for the remaining tiles. Different rules allow for some special patterns. If the dealer wins, the dealer retains the dealer marker (臨莊). If a non-dealer wins, the dealer marker passes to the right (過莊).

### 3.1.17 Discarding Tiles (打牌)

A discarded tile is placed face up within the floor.

### 3.1.18 Claiming Tiles

When a player discards a tile, other players have a chance to complete a set by claiming the discard. To claim a discard, a player declares aloud their intended set, which must include the discard, and exposes the tiles which complete the set. If multiple players want the discard, claims are prioritized as (from highest to lowest): sihk la, gong or pung, seuhng. If multiple players declare sihk la, the next player by order of play from the discarding player has priority. Declaring seuhng is restricted to the discards from the player on your left (上家). Claiming a discard potentially preempts the order of play by

skipping any players' turns since the player who discarded.

### 3.1.19 Exhausted Wall

The hand ends in a tie when no more tiles remain to be drawn. Rule sets will specify the number of remaining tiles before the wall is exhausted. These remaining tiles may be called the dead wall. Different rule sets also specify the conditions when the dealer marker passes to the next player in case of tie.

### 3.1.20 Player Turn

A player's turn contains three parts:

**Required** Draw the next tile from the wall unless claiming the previous player's discard.

**[Optional]** If a tile was drawn from the wall, the player may optionally declare a flower, gong, or sihk la. Flowers or gongs may be declared repeatedly as able. If declaring sihk la, since some scoring factors depend on the winning tile, the winning tile should be exposed first for identification and not mixed into your concealed tiles.

**Required** Discard a tile to finish the turn.

Players continue turns until someone wins the hand or the wall is exhausted.

### 3.1.21 Errors

MJ allows only valid game play actions, but in live play, human errors may occur and be

penalized. Some errors include forgetting to draw a replacement tile or drawing too many. Before starting, players should agree upon whatever penalties are appropriate.

## 3.2 Chinese Game Play

Although mj originated in China, its history is complex with many geographically evolved rules variants. The dearth of an authoritative, accepted rules set has contributed to the many variations and house rules. In 1998, China published the first version of Mahjong Competition Rules [6], a sanctioned rules set intended to steer the game play towards a sporting style with rankings, similar to Chess. The Chinese game play rules here describe the original style.

### 3.2.1 Score

Each player starts with 10000 (or some suitable value) points.

### 3.2.2 Match Length

A complete match is nominally four rounds, though players could agree to as few or as many rounds as they please.

### 3.2.3 Flowers (花)

There are two groups of flowers, but one group is represented by flowers while the other group is represented by seasons — collectively referred to as flowers for simplicity. Each group contains four flowers associated with the four seat positions (usually numbered for easier identification).

**Flowers:** plum (梅), orchid (蘭), chrysanthemum (菊), bamboo (竹)

**Seasons:** spring (春), summer (夏), autumn (秋), winter (冬)

Flowers are immediately exposed and replaced with a replacement tile. If using the notion of a dead wall, it is always replenishing. Hence, the term dead wall has no practical distinction here and is normally disregarded.

### 3.2.4 Wall Splitting

The dealer rolls three dice and, by order of play starting from the dealer's position, counts off the dice total to determine which player's wall will be split. Then count that wall's columns, starting from the wall's right end (from the player's perspective), up to the dice total. The wall is split after the total.

### 3.2.5 Opening Deal

By order of play starting with the dealer, each player takes two columns of tiles (four tiles total), from the wall's head. After three cycles, each player has twelve tiles. Continuing by order of play, each player then draws one more tile. *Since the dealer also gets the first turn, the dealer customarily draws the thirteenth and fourteenth tile at the same time as a shortcut.*

### 3.2.6 Opening Replacement

By order of play starting with the dealer, each player may expose any flowers and draw re-



placement tiles until all flowers have been replaced. *MJ uses a variation. If a replacement tile is a flower, the player waits for the next turn by order of play before drawing another replacement. For example, suppose East and South both have one flower. East draws one replacement, and it is another flower. East waits for South to draw one replacement before East draws the second replacement.* In a similar fashion after flowers are replaced, by order of play starting with the dealer, each player may declare any gongs.

### 3.2.7 Sihk La (食啦)

The normal pattern for a winning hand is precisely one set of eyes and four other sets, except for some rare hands described in Section 3.3.3.

### 3.2.8 Exhausted Wall

The wall is exhausted when fourteen (14) tiles remain. The player drawing the last available tile has the sole option of declaring sihk la, which carries a scoring bonus. Otherwise, the player does not discard a tile, and the hand ends in a tie. In case of tie, if the dealer draws the last tile, the dealer retains the dealer marker (臨莊); otherwise, the dealer marker passes to the right (過莊).

## 3.3 Classic Scoring (數糊尾)

After a player declares sihk la, all players count their hand's value to exchange points. Sets which have not been exposed are considered concealed. Losing players may use

their concealed tiles to form as many sets and scoring factors as possible with one exception — four identical tiles may not be used to form gong. Counting a hand's value involves two phases, additive and doubling, unless the hand qualifies for full points. The default values listed here are the values my father plays. For a one page listing of all classic scoring factors, see Appendix C.

### 3.3.1 Additive

Refer to Table 1 for the point scoring factors. Gong is worth four times as much as pung. Concealed sets are worth two times as much as exposed sets. Points from exposed and concealed sets along with any winning factors are totaled. Then round up to the next ten unless already a multiple of ten. Some sets may satisfy multiple rules for additional points. For example, a pair of winds in the current round which is also your seat position is worth (2+2) points. Some point scoring factors may also satisfy related double scoring factors (see Table 2).

- End pung is any suit of rank 1 or 9.
- Middle pung is any suit of rank 2–8.
- Win on eyes refers to if the winning tile completes a set of eyes.
- Win on center seuhng (卡隆) occurs if you have tiles  $\{X\ Z\}$  and the winning tile is  $Y$ , where  $X < Y < Z$ .
- Win on edge seuhng occurs if you have tiles  $\{1\ 2\}$  or  $\{8\ 9\}$  and the winning tile is 3 or 7, respectively.

4	flower
4	wind pung
4	dragon pung
4	end pung
2	middle pung
2	honor pair (of round your seat)
2	win on eyes
0	win on end/honor eyes
2	win on center seuhng (卡隆)
2	win on edge seuhng
2	win by self-draw (自摸)
30	win bonus
0	win concealed
30	win mix seuhng (平糊)

Table 1: Point scoring factors. Some factors may also count for doubles (see Table 2).

- Concealed hand does not have exposed sets except flowers.
- Mix seuhng (平糊) contains seuhng and flowers and may not contain point bearing sets from seuhng or the eyes. For example, a pair of dragons or center seuhng would tally points and disqualify this points factor.

### 3.3.2 Doubling

Double scoring factors result from related point scoring factors or certain tile patterns. Refer to Table 2 for double scoring factors related to point scoring factors. Refer to Table 3 for double scoring factors by tile patterns. Count the number of doubles (番) from all applicable scoring factors. The additive phase points are multiplied by two according

1	flower of your seat (正花)
1	wind pung/gong of round your seat
1	dragon pung/gong
0	win concealed by self-draw
1	win pure seuhng (清平)

Table 2: Double scoring factors for related point factors. These factors also count for points (see Table 1).

1	all flowers seasons (一台花)
0	pure straight
1	three concealed pung/gong
1	lesser three dragons (小三元)
1	lesser four winds (小四喜)
1	win on gong (槓上花)
0	win on flower
1	win on stolen gong (搶槓)
1	win on last tile
0	win middles
0	win ends/honors
2	win pung (對對碰)
2	win mix suited (混一式)
3	win pure suited (清一式)

Table 3: Double scoring factors by tile patterns.

to the number of doubles. The total is the hand's value. Some sets may satisfy multiple rules for additional doubles. For example, a pung of winds in the current round which is also your seat position is worth (1+1) doubles, also known as 雙番風.

- Pure seuhng (清平) is more discerning than mix seuhng by disallowing flowers.
- All flowers|seasons (一台花) contains the

set of four flowers or seasons.

- Pure straight is three seuhng sets of a single suit: {123}, {456}, {789}.
- Lesser three dragons (小三元) is two dragon sets and a pair of the third.
- Lesser four winds (小四喜) is three wind sets and a pair of the fourth.
- Win on gong (槓上花) occurs when the replacement tile is the winning tile.
- Win on flower occurs when the replacement tile is the winning tile.
- Win on stolen gong (搶槓) occurs when a player draws a tile, declares gong via pung promotion, but that tile becomes your winning tile.
- Mix suited (混一式) contains sets from a single suit and honors.
- Pure suited (清一式) contains sets from only a single suit.

### 3.3.3 Full Points (滿糊)

Some tile patterns are very rare and have the designation of 滿糊, automatically earning full points. Via normal scoring, doubling factors can easily boost a hand's value very high. Thus, the full points value is usually set as the points limit on a hand's value. Before starting the match, players should agree on a limit; common values are 500 or 1000.

---

four gong
four concealed pung/gong
greater three dragons (大三元)
greater four winds (大四喜)
win green (綠一色)
win honors (全番子)
win ends (清么九)
win second gong (槓上槓)
✓ win initial hand
✓ win on first tile
✓ win Nine Gates (九子連環)
✓ win Thirteen Orphans (十三么)
win on flower, 5-circle
win on stolen gong, 2-bamboo
win on last tile, 1-circle
win thirteen consecutive

---

Table 4: Full points tile patterns.

Table 4 lists the full points tile patterns and whether they are enabled by default<sup>3</sup>.

- Greater three dragons (大三元) contains all three dragon sets.
- Greater four winds (大四喜) contains all four wind sets.
- Green (綠一色) refers to tiles colored

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<sup>3</sup>Why are most of the rare hands not enabled by default? Players have different ideas of a truly rare hand. Some hands have been named and imbued with a story to describe its rarity [1]. Such stories take on legend status where a player might tell a tale on the spot to describe their hand, trying to convince others of its full points value. Besides being skeptical of legends, players may readily acknowledge that some hands have a large point value already via normal scoring which alleviates the need for special rules. Anyway, they are just the defaults.

with green only: green dragon, {2, 3, 4, 6, 8}-bamboo.

- Second gong (槓上槓) occurs if a player declares at least two gongs on the same turn, and the last gong replacement tile is the winning tile. Flowers may be exposed, but the winning tile must be from gong replacement.
- Initial hand occurs if a player wins with precisely the tiles from the opening deal. That is, the player is ready to win (叫牌) from the opening deal and may discard only drawn tiles. Typically, a player must declare their readiness to win from the opening deal; other players may then confirm whether the player has discarded any original tiles.
- Win on first tile occurs if the dealer wins on the first drawn tile, including replacement tiles; or if a non-dealer wins on the dealer's first discard.
- Nine Gates (九子連環) contains a single suit of {1 1 1 2 3 4 5 6 7 8 9 9 9} plus one more tile of the same suit. In pure form, the winning tile may be of any rank.
- Thirteen Orphans (十三么) contains one tile from each honor (7), each end (6), plus one more matching tile to form the eyes. *This is an exception to the winning hands pattern.*
- Win on flower, 5-circle occurs if the replacement tile is the winning tile and is 5-circle.

- Win on stolen gong, 2-bamboo occurs when a player draws a tile, declares gong via pung promotion, but that tile becomes your winning tile and is 2-bamboo.
- Win on last tile, 1-circle occurs if the last tile is the winning tile and is 1-circle.
- Winning thirteen consecutive hands is practically unheard of and probably disregarded in practice because it involves tedious counting (though computers can easily handle it). According to other rule sets, this rule should apply only for the dealer and may not include ties. MJ allows non-dealer wins and ties, which still seems impossible unless computer opponents are at lowest skill levels.

### 3.3.4 Points Exchange

The winner collects the hand's value from all players. The player who discarded the winning tile must give double the hand's value. If the winning tile was self-drawn, all players must give double the hand's value. Then the losers will exchange the difference between their hands' values. If the dealer is a loser, any exchanges with the dealer are doubled.

### 3.3.5 Reckless Play

There are some situations where discarding certain tiles is considered reckless play. For example, suppose player **A** has exposed sets toward completing a special hand. If **B** discards a tile which helps **A** complete another set toward the special hand, then **B** would be

considered 包 (the word is a shortened form of a phrase meaning the player will comprise everything as a gift) and must cover the points for all losers! If you have just exposed enough sets to create a possible 包 situation, you should declare and warn others by announcement, otherwise 包 would not apply. Such action guards against players who obscure their exposed sets for a special hand, and another player discarding out of ignorance or recklessness. The following situations describe when a player is considered 包.

If a player has exposed at least nine tiles towards one of these hands:

- Pure Suited (清一式)
- Honors (全番子)
- Ends (清么九)

that player is said to have 九張包 (meaning at least nine tiles are showing) in effect. If a player discards the winning tile completing the special hand, that player is 包.

If **A** has 九張包 and **B** discards a tile which **A** claims to complete another set towards the special hand, then **A** now has 十二張包自摸 (meaning at least twelve tiles are showing; in actuality, four sets must be exposed — three gong sets would count only for 九張包) in effect. If a player discards the winning tile completing the special hand, that player is 包. However, if **A** wins by self-draw (自摸), then **B** carries the burden of 包.

Suppose **A** has exposed sets towards:

- Greater Three Dragons (大三元)
- Greater Four Winds (大四喜)

but lacking one set. If **B** discards the winning tile which **A** claims for the last set, then **B** is considered 包.

If the wall is within five tiles before exhaustion, then every player should beware of 五子包生張 (meaning for the last five tiles, a player will comprise everything as a gift if discarding a new tile for the win). If a player discards a winning tile which has not been exposed or discarded yet (i.e., a newly discarded tile), then that player is 包.

## 4 Playing MJ

When MJ is started, the quickest route to play is by entering your name and clicking OK. MJ is designed to be simple to use yet feature flexible, though recognizing that there is a fine line between usability and features and that simple to use is highly subjective for users. With that in mind, my design target users include those with poor eyesight like my father. Therefore, the visual elements are on the larger side, sized to use as much window space as possible (even this manual uses a larger font size); button labels are in Chinese with English tool tips; some scoring factors are labelled with Chinese to connect with the English descriptions.

I am aware of localization, but between English (or Latin based) and asian languages, the visual design would require more than double the time to get the spacing right; plus the design really is just to connect some Chinese words with their English descriptions, not to have fully native language based versions of the game. My father knows fluent

English, but he would be sufficiently confused by any of the many efforts at translating mj rules and terms because some words are difficult to translate without cultural or contextual understanding. Compare the translations in these examples [1, 5]. However, my father could instantly recognize the Chinese words, so a simple design idea was to use Chinese words as appropriate.

## 4.1 Setup

The Setup screen appears at first start or when selecting Match → New from the menu. Other players' names are filled with defaults, but you may use any names you like — the defaults are just for convenience. Names may also be entered on the Preferences screen, to be saved and used on subsequent starts. Each player has a Lefty checkbox which sets how the tiles are positioned. A left-handed person, such as my father, would pick up tiles and place them on the left side.

Each computer player has discard and claim strategy options along with their respective skill levels. Discard strategies include: Oblivious, Cautious, Balanced. Claim strategies include: Chicken, High Roller, Dynamic. Clicking the Random checkbox will pick random strategies and skill levels. If you select no strategy (i.e., “Discard” or “Claim” option), the computer player will discard random tiles or never claim sets.

- Discard

**Oblivious** selects the least useful tile to its Claim strategy, without regards for already exposed tiles.

**Cautious** selects what it thinks will least likely help others, judging by exposed tiles.

**Balanced** is a blend of Oblivious and Cautious.

- Claim

**Chicken** wants the fastest win, usually resulting in minimal points (雞糊), by claiming any set. At higher skill levels, the computer will know when not to claim (if it already has a set) and which tiles are worth more points.

**High Roller** wants maximum points. From the opening deal, the computer calculates the probabilities for attaining each scoring factor, chooses the highest probability, and goes for it.

**Dynamic** is similar to High Roller but periodically calculates the probabilities for most expected points, which may change as the hand progresses, to guide its decisions.

## 4.2 Menu Options

### MJ

**About MJ** displays a window showing brief credits and dedication.

**Preferences...** displays the Preferences window where options are grouped into General and Classic Scoring screens.

## Match

**New** brings up the Setup window to start a new match.

**Training** mode can help players who are learning the game by revealing the tiles of all players. Mode can be toggled on/off.

## Window

**Tile Tool Tips** mode will show brief descriptions for a tile. Position the pointer over a tile for at least a second. Mode can be toggled on/off.

**Main Window** displays the main playing window. This menu item appears only if the playing window has been closed by clicking on the red circle at the window's upper left corner. You may also click on MJ's application icon in the Dock.

## 4.3 Preferences

The Preferences window contains tabs for General and Classic Scoring. In General, you may enter player's names which will be used on future starts. You may also adjust the computer player's action delay between 0–6 seconds. During a computer player's turn, each major action is delayed by this many seconds, allowing you to see who discarded and claimed which tile. If you want immediate play, set the delay to 0.

In Classic Scoring, you may customize the points, doubles, full points, points limit, and enable the full points patterns to your style

of play. While the full points value is usually equal to the points limit, if you want no points limit, set it to 0. In my research, considering how every house rule has slightly different values, a flexible scoring system is invaluable. The reset button will restore the default values, so feel free to experiment. For Classic Scoring, the default values are the values my father plays.

## 4.4 Main Window

The main window has many visual elements to resemble the actual table and play pieces. While most elements should be directly recognizable, some interface elements are artifacts of this virtual representation.

### 4.4.1 Your Tiles

You may organize your tiles as you like.

- Rearrange your tiles' positions by click-dragging them around.
- Rotate a tile by double clicking.
- Toggle a tile's selection by single clicking; selection is indicated with a black outline.

### 4.4.2 Action Buttons

Within your player area are action buttons which will be automatically enabled and disabled, indicating when that action is valid and available for you.

**⌫** declare seuhng.

碰 declare pung.

槓 declare gong.

摸牌 (mo paaiah) draw a tile.

不要 (bat yiu) pass on a claim.

食啦 (sihk la) go out.

打牌 (da paaiah) discard a tile. First, choose a tile; then click this button.

#### 4.4.3 New Hand Buttons

Within the upper player's area are buttons to begin a new hand. These buttons automatically appear and disappear as appropriate.

洗牌 (sai paaiah) shuffles the tiles and builds the wall.

打骰子 (da sik ji) rolls the dice. After rolling the dice, click on any of them to pick them up and proceed automatically to opening deal followed by opening replacement. A computer dealer will automatically roll the dice and pick them up (clicking the dice will have no effect unless you are dealer).

#### 4.4.4 Miscellaneous

The following notes explain MJ's visual cues or operations.

- The dealer marker is always positioned near the front of a player's area, towards the wall. Besides displaying the current round, the marker also indicates the current player's turn by its orientation.

It displays right-side up for the current player.

- When you have drawn a flower or declared a gong, a replacement tile will be automatically drawn for you.
- Gong sets appear with the fourth tile stacked on top of the other three to form a pyramid. The fourth tile is face down when indicating a concealed gong (暗槓).
- Concealed (暗) pung sets in the scoring summary appear with the third tile stacked on top of the other two to form a pyramid.
- After declaring sihk la, the scoring summary for all players appears in the wall floor. If you think there is a scoring error, first check the scoring values in the Preferences window. If you still believe there is an error or have a question, take screen shots {**shift + command + 3** (⇧⌘3)} of both and email them to me.
- Near each player's name is their counter for consecutive wins.

## APPENDIX

### A Contact

To contact me at Z0, see Ground ZZZ0 [7] and click on **Contact** to use an anonymous form, or send email to <*address*@zzz0.org>



where *address* is any address — really! Constructive comments and suggestions are appreciated.

MJ is distributed as try-before-you-buy and costs X to unlock all features (*beta versions are free for sampling*). Bug reports and money support are appreciated. If you give money support, I would put more priority to your bug reports or feature requests, assuming I know that you gave X amount. That means I do not record who gave what unless you say so. Supporters who want to remain anonymous have my utmost thanks.

## B Credits

MJ is designed and developed by Jerry Hom. Artwork, including the program icon, the flower tiles, and the 1-bamboo (bird) tile, were contributed by Leah Hom (11 years old, niece).

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## C Classic Scoring Charts

These tables copied from Section 3.3 for a one page quick reference.

4	flower
4	wind pung
4	dragon pung
4	end pung
2	middle pung
2	honor pair (of round your seat)
2	win on eyes
0	win on end/honor eyes
2	win on center seuhng (卡隆)
2	win on edge seuhng
2	win by self-draw (自摸)
30	win bonus
0	win concealed
30	win mix seuhng (平糊)

Table 5: Point scoring factors. Some factors may also count for doubles.

1	flower of your seat (正花)
1	wind pung/gong of round your seat
1	dragon pung/gong
0	win concealed by self-draw
1	win pure seuhng (清平)

Table 6: Double scoring factors for related point factors. These factors also count for points.

1	all flowers seasons (一台花)
0	pure straight
1	three concealed pung/gong
1	lesser three dragons (小三元)
1	lesser four winds (小四喜)
1	win on gong (槓上花)
0	win on flower
1	win on stolen gong (搶槓)
1	win on last tile
0	win middles
0	win ends/honors
2	win pung (對對碰)
2	win mix suited (混一式)
3	win pure suited (清一式)

Table 7: Double scoring factors by tile patterns.

	four gong
	four concealed pung/gong
	greater three dragons (大三元)
	greater four winds (大四喜)
	win green (綠一色)
	win honors (全番子)
	win ends (清么九)
	win second gong (槓上槓)
✓	win initial hand
✓	win on first tile
✓	win Nine Gates (九子連環)
✓	win Thirteen Orphans (十三么)
	win on flower, 5-circle
	win on stolen gong, 2-bamboo
	win on last tile, 1-circle
	win thirteen consecutive

Table 8: Full points tile patterns.