AUTOMATIC GAMELAN

USER GUIDE

Contents

1.   Introduction

The *Automatic Gamelan* software is designed to emulate a Central Javanese *gamelan* ensemble by realising various instrumental parts from a central melody.

The GUI and sample playback engine have been created in the *Max/MSP* graphical programming environment.

The algorithmic system itself has been created in *Java* so that an object-oriented approach may be used. It is also hoped that this portion of the project may be expanded to run on a variety of platforms and with a variety of applications.

This user guide is intended to serve both as instructions for operation and as an introduction to the basic concepts the user should understand in order to use the software properly. Experienced *gamelan* players may wish to skip directly to section 4 (**installation)**.

For more information on the ideas and technical processes behind the *Automatic Gamelan* project see the accompanying paper – *Creating Algorithmic Systems Based on Central Javanese Karawitan*.

1.1 Gamelan Samples

The sounds within this program are generated using a set of samples from the *gamelan Kyai Parijata*, which resides at the Museum Delft Nusantara in the Netherlands. The samples are available for free download – along with further information about the instruments and their tuning – under a GNU public license from:

http://www.marsudiraras.org/gamelan/

1.2 Kepatihan Notation

Kepatihan numeric notation is used throughout the software and its documentation.

The *slendro* scale is represented by the following numbers:

1 2 3 5 6

The *pelog* scale is represented by the following numbers:

1 2 3 4 5 6 7

Low and high octaves are represented by adding a dot below (low) or above (high) a note – e.g.

6̣ Low 6   i High 1

In addition to numbers the following symbols are used to represent *colotomic* instruments:

0   Gong   ⌢ Kenong   ⌣ Kempul

+   Kethuk   - Kempyang   ⌢⌣ Gong Suwukan

pin (rests) are indicated by a ▪

Kendhang kalih:

t Tak   ° Tong   k Ket

ρ Dhe   ♭ Dhung

PART 1: Theory

2.   Central Javanese Gamelan

The term *gamelan* is used to refer to an ensemble consisting primarily of metallophones and gong-type instruments found throughout Indonesia and parts of South-East Asia. The majority of *gamelan* music that tends to make it overseas comes from either Bali or Central Java.

While there may be instrumental or musical differences between regions, the *gong* is consistent and central to all *gamelan* ensembles[1]. *Gamelan* pieces are divided into sections called *gongan* that are typically treated as cycles, and may be sub-divided further by smaller gong-type instruments.

As it would be impossible to represent the vast quantity of forms of *gamelan* fairly here, henceforth the term will be used to refer to that found around in the Central Javanese cities of Solo and Jogja.

Gamelan in Central Java may be played by itself in a *klenengan* or be used to accompany events such as weddings, dance, drama and *wayang* (shadow puppet plays).

2.1 The 'Loud Style' Ensemble

This project does not cover the *panerusan* section – the soft-style instruments such as *rebab*, *gender*, *gambang*, *siter* or any vocal parts.

It is not uncommon, particularly in Jogja, for an ensemble to play without any soft-style instruments, even when softer instruments are available. The first piece played at a *klenengan* is often a *gendhing bonang*, in which only the loud instruments are played and the *bonang* acts as the melodic leader. The majority of other pieces written specifically for this sort of instrumentation are referred to as *gendhing soran*. It is possible for a *klenengan* to consist entirely of *gendhing bonang* and/or *gendhing soran*.

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[1] In smaller ensembles that do not have a *gong* its role is almost always fulfilled by another instrument, e.g. a wooden slit gong in *gamelan gadhon* or a blown bamboo resonator in *siteran*.
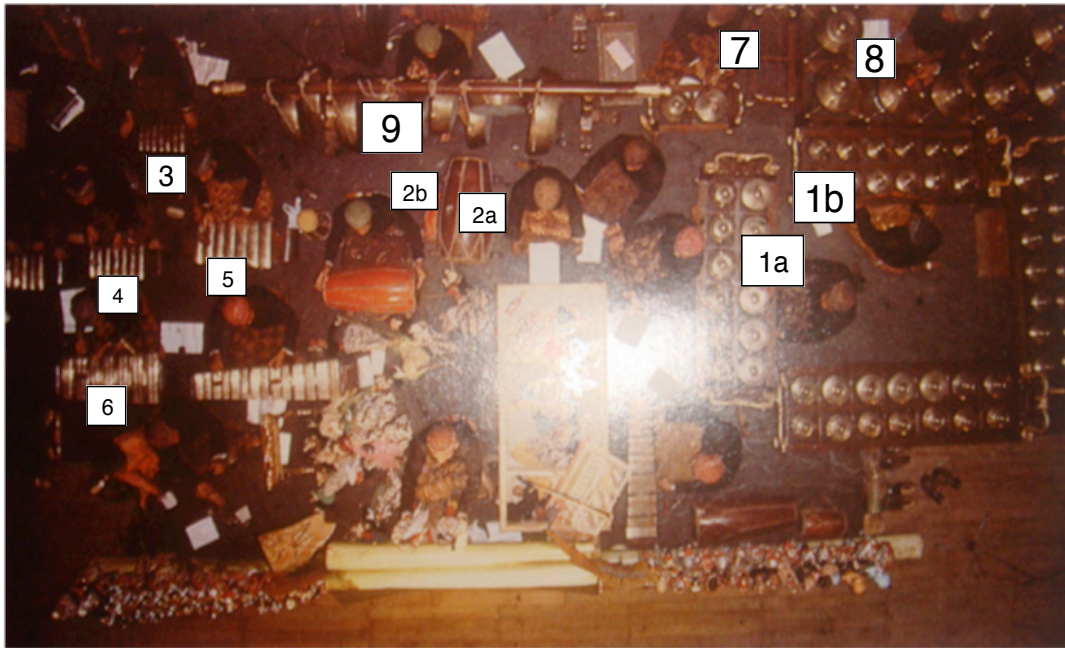
A loud style ensemble consists of the following instruments (indicated in the photo of a full ensemble above[2]):

1. *Bonangan*
    a. *Bonang Barung*
    b. *Bonang Panerus*
2. *Kendhang*
    a. *Kendhang Ageng*
    b. *Kendhang Ketipung*
3. *Peking* (*Saron Panerus*)
4. *Saron Barung* (*Saron*)
5. *Saron Demung* (*Demung*)
6. *Slenthem*
7. *Kempyang* and *Kethuk*
8. *Kenong*
9. *Gongs* and *Kempul*

For more information on the roles of individual instruments please refer to the **instruments** section.

3. Gamelan Concepts

The following introduction applies to loud-style ensembles although ensembles containing soft instruments are referred to in specific examples.

3.1 Tuning

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[2] Photograph used from Taylor, 1989

3.1.1 Laras

A full size *gamelan* consists of two sets of instruments – one for each tuning system, or *laras – slendro* and *pelog*.

The constituent intervals of either *laras* are consistent within a particular set of instruments but vary across *gamelan*.

3.1.2 Pathet

These two tuning systems are further subdivided into *pathet*, which might be considered the equivalent to modes in western music. Every *pathet* has strong notes and notes that are commonly avoided as *seleh*.

Pathet	Strong notes	Note to avoid
Slendro:		
Nem	2, 5, 6	1
Sanga	3, 5, 6	3
Manyura	2, 3, 6	5
Pelog:		
Lima	5, 1	3
Nem	2, 5, 6	7
Barang	2, 5, 6	1

3.2   Tempo and Irama

The rate at which the *balungan* is played is called *laya*. The *laya* does not necessarily give a direct indication of the overall feel of tempo of a piece, as the relative density of embellishing parts changes as the *laya* passes certain thresholds. This relationship is referred to as *irama*.

A piece is often said to "live" in a certain *irama*, often determined by its *bentuk* (see the following section).

Certain instruments are designated as mediators of *irama*, in particular the *kendhang*, which is often described as the leader of an ensemble, the closest equivalent to a conductor in Western music.

The various levels of *irama* can be demonstrated by the strokes of the *peking* relative to the *balungan*[3]:

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[3] *Lancaran* (the most common pieces that are played in *irama lancar*) are often written in *balungan nibani* style, so it appears that the *peking* plays two strokes to the *balungan* beat.

Level	Name	Peking Strokes to Balungan Beat
LCR (½)	Lancar	1
I	Tanggung	2
II	Dados	4
III	Wiled	8
IV	Rangkep	16

Irama Lancar (same as balungan):

2	3	2	1	5	2	3	5

Irama I:

2	2	3	3	2	2	1	1	5	5	2	2	3	3	5	5

Irama II:

2	2	3	3	2	2	3	3	2	2	1	1	2	2	1	1	5	5	3	3	5	5	2	2	3	3	5	5	3	3	5	5	.	.

Changes in *irama* rarely occur immediately in Central Javanese *gamelan*. The *kendhang* player will signal a change in *laya* over the course of a couple of *gatra*. Players usually wait until an appropriate point to switch, for example a *kenong* or *gong* stroke.

 A transition from *irama tanggung* to *irama dados* may be represented as follows:

2		3		2		1		5		2		3		5	
2	2	3	3	2		2		1	1	5	5	2	2	5	5	2	2	3	3	5	5	3	3	5	5	.	.

Changes in *laya* may take place without affecting *irama* – for example in case of *seseg* – speeding up to signal the end of a piece or section, or *suwuk*, which may slow down past *irama* thresholds to end a piece without signalling a change in *irama*. Players are able to distinguish *suwuk* from a change in *irama* as it is indicated by a variation in the *kendhang* part.

3.3 Bentuk

Bentuk is often compared to the Western term *form* – most importantly it refers to the placement of *colotomic* instrument strokes relative to the length of a *gongan*.

The choice of *bentuk* also implies the *irama* that a piece is most commonly played in:
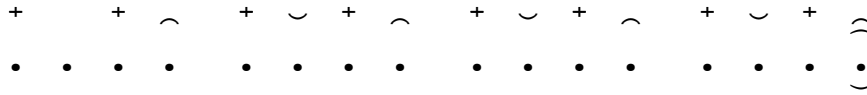
Bentuk   **Irama**

Lancaran   *LCR* (I and II also possible)
Ketawang   II (typically moves from I to II in first *gongan*)

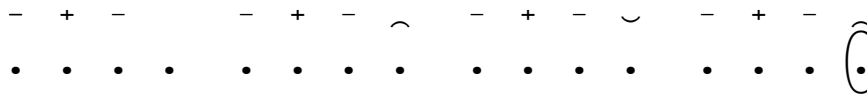*Ladrang*   I / II / III / IV (typically II in loud-style rendition)

3.3.1 Lancaran

A *lancaran* consists of sixteen *balungan* beats per *gongan*.

As there is little space between gong strokes in *irama lancar* the *gong suwukan* is used in place of the *gong ageng* until the final gong stroke.
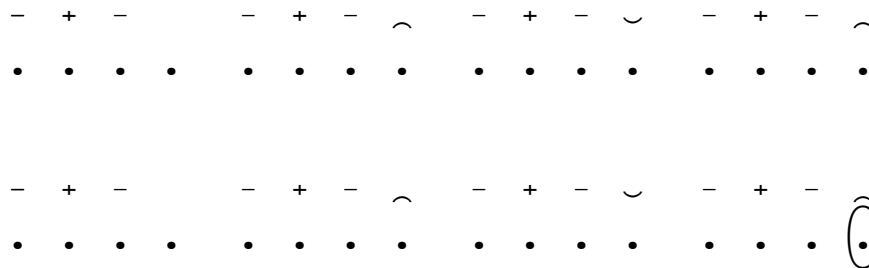
3.3.2 Ketawang

A *ketawang* consists of sixteen *balungan* beats per *gongan* but contains a different colotomic structure to a *lancaran*.

Ketawang are generally considered vocal pieces and therefore are rarely heard played by a purely loud-style ensemble.

3.3.3 Ladrang

A *ladrang* consists of thirty-two *balungan* beats per *gongan*. It is the most flexible of the *bentuk* presented here, often moving between four *irama* when played by an ensemble including soft instruments.

3.3.4 Gendhing

Gendhing is the Javanese term for composition, but is also used as an umbrella term for large-scale *bentuk*, consisting of up to two hundred and fifty six *balungan* beats per *gongan* and at least two distinct sections. The final section of a *gendhing* may be a piece in its own right, often a *ladrang*.

PART 2: Operation

4.   Installation

4.1   System Requirements

The *Automatic Gamelan* software requires a Macintosh with a Power PC (G4 upwards) or Intel based processor (recommended) running OS X 10.4 or later and 1 GB RAM. The software uses approximately 120MB of hard disk space.

The GUI is optimised for a resolution of 1440x900 pixels. Some scrolling will be required if loaded on displays with lower resolutions.

It is possible that the software will run on systems with less than the 1 GB of RAM but users attempting to do so may experience audio glitches and unsteady timing.

4.2   Notation Font

Automatic Gamelan makes extensive use of the *Kepatihan Pro* font, which is available for free download from the *American Gamelan Institute* website:

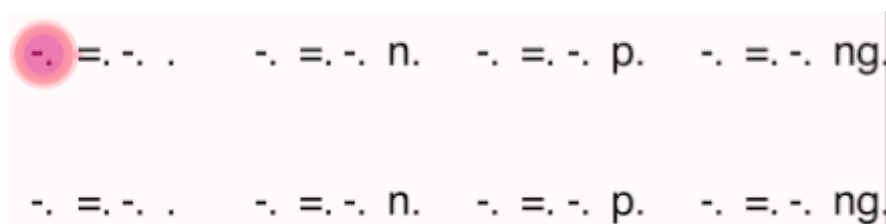http://www.gamelan.org/library/index.shtml

It is essential that this font is installed correctly in order to use the notation view.

The following screen-shots indicate how the notation view will appear with and without *Kepatihan Pro*.
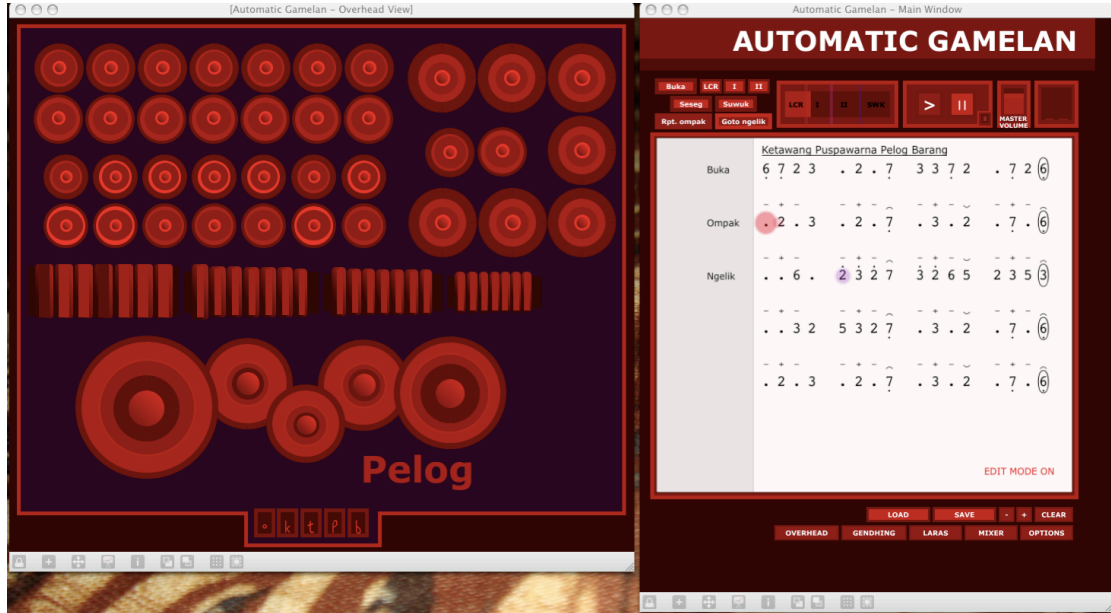
With:
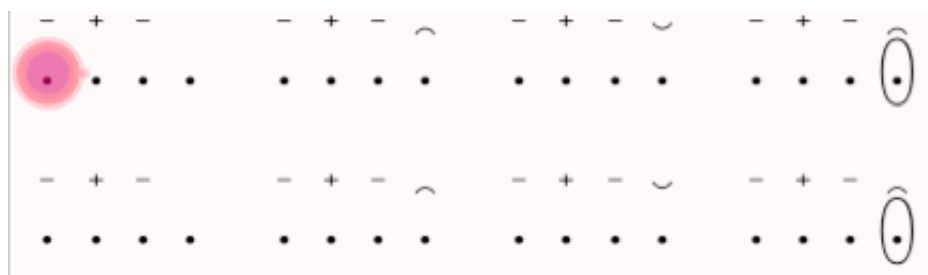
Without:

4.3   Installation and Loading

Once you have confirmed your computer meets the minimum system requirements and you have installed the *Kepatihan Pro* font, drag the *Automatic Gamelan* folder from CD into your *Applications* or *Program Files* folder. You may launch the software by double-clicking on the *Automatic Gamelan* icon. A short delay should be expected as the sample engine is loaded.

If no sound is available click the **OPTIONS** button in the bottom right hand corner of the main window followed by **DSP STATUS**. Use this window to check that your sound card has been recognised and that audio is **ON**.

5. Getting Started
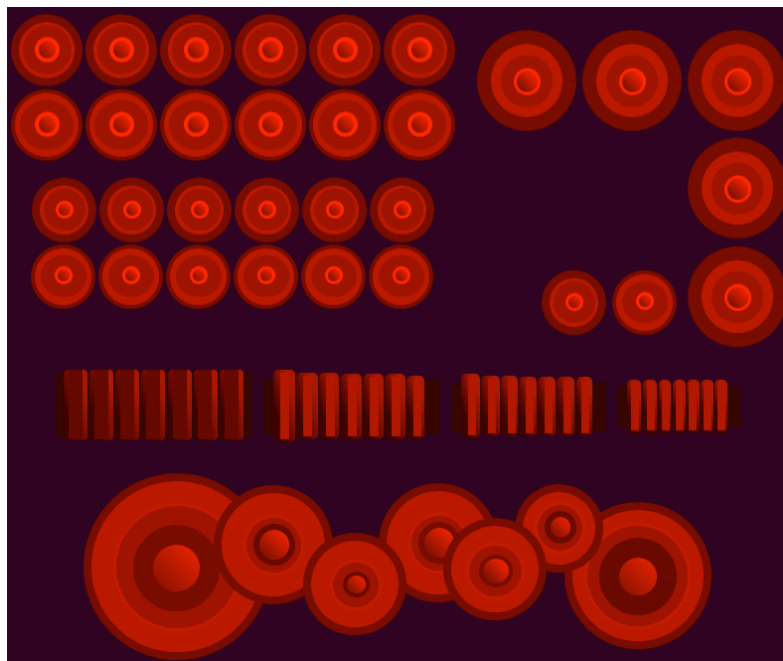
5.1 Main Window and Sub-windows

Upon loading you will be presented with two windows: the **overhead** and **notation** views. These are where the majority of your work will take place.

The software relies on a combination of mouse and keyboard input. For a full set of key commands see the **keyboard shortcuts** section towards the end of this document.

5.1.2 Overhead View

For a breakdown of how the parts for these instruments will realised from the *balungan* see the **instruments** section.

The set of instruments displayed is determined by the current *laras* – by default this is *slendro*. In order to view and play the *pelog* instruments it is necessary to change the *laras* and *pathet* in the **gendhing** window.

Kendhang strokes are represented by *kepatihan* symbols and are available to the bottom-right of the **overhead** view. The *kendhang* remain constant across both *laras*.

5.1.3 Laya and Irama Control
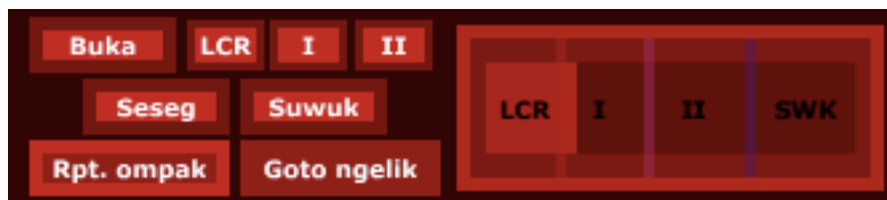
The *gendhing* should be initialised by pressing the **Buka** button. *Laya* and *irama* will be determined automatically according to *bentuk*.

Laya and *irama* may be controlled manually by adjusting the **laya slider**. As *irama thresholds* are crossed the new *irama* is stored until the end of the current *gatra*.

Alternatively *irama* and conventional *laya* changes (*seseg* and *suwuk*) may be controlled using the buttons adjacent to the **laya slider**. Pressing **suwuk** will end the piece at the next *gong* stroke and will disable any further changes in *irama*.

Only *irama lancar*, *tanggung* and *dados* are available in this software as they are the *irama* most commonly played in loud-style ensembles in Solo.

5.1.4 Notation View
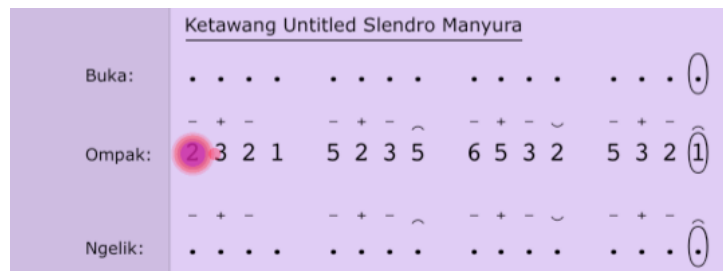
The notation view features two cursors – the **edit cursor** and **position cursor**.

Use the arrow keys on your keyboard to move the edit cursor. To place a note, use the number keys. Note that the number 4 is unavailable in *slendro* and will create an adjacent note. To place a rest, use the **0** key.

The current input octave is indicated by a dot to the right of the cursor (shown below). The input octave may be altered by pressing plus (up) and minus (down).

High-register

Middle-register

Low-register

5.1.5 Gendhing

The **properties** window comprises settings for the *gendhing* (name, *laras, pathet and bentuk*) and instrument *garap*.

All changes in **gendhing properties** are reflected immediately in the **notation view**.

Note: changing *laras*/*pathet* from *pelog* to *slendro* will automatically change the value of any note 4s to the closest equivalent according to *pathet* – their original values will not be retained upon switching back to *pelog*, and must be re-entered if desired.

When changing *laras*/*pathet* from *slendro* to *pelog*, all note 1s will automatically be converted to note 7s, as 7 serves as the equivalent to 1 in *pelog barang*.
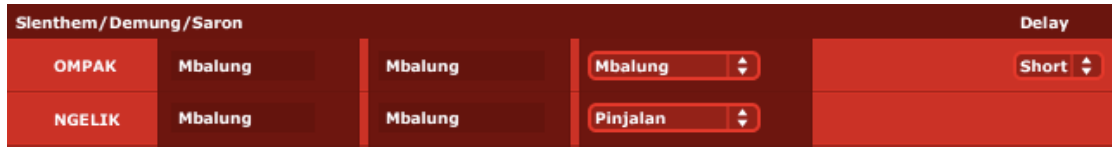
Garap is determined by the choice of *bentuk*. The *saron*, *demung* and *slenthem* include a user-definable option to play *mbalung* (single-octave *balungan*) or *pinjalan* (see **Garap** for more details).

All instruments may be assigned short or long delays that correspond to the probability distribution tables in **options**.

5.1.6 Mixer
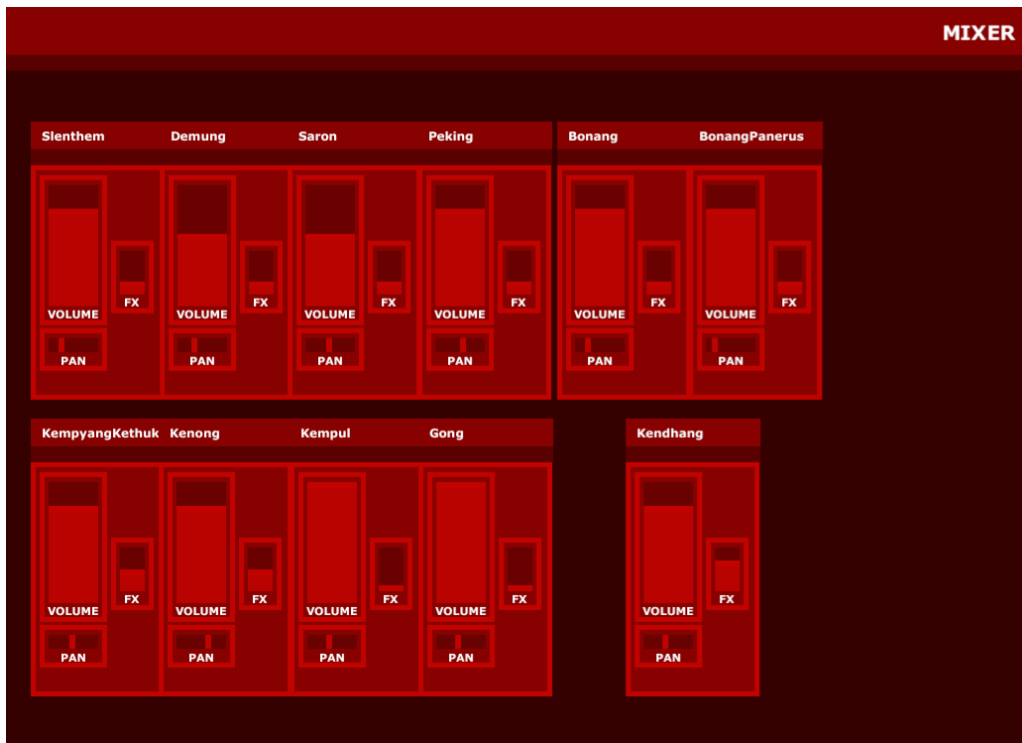
Each instrument has an individual control for volume, panning and *fx* (reverb send amount). The mixer serves both the *slendro* and *pelog* sets of instruments; it is not possible to define independent levels for either set.

5.1.7 Laras Edit

Each note in either tuning is represented by a slider; drag the slider up with the mouse to raise the pitch, or down to lower it. To return to the original *laras* use the **reset** button below the slider bank.

By default the tuning of the *gamelan* is set to that of the original set of samples. All changes made to the *laras* are relative to the originals. It is not currently possible to edit the *laras* directly in terms of frequency.

5.1.8 Options
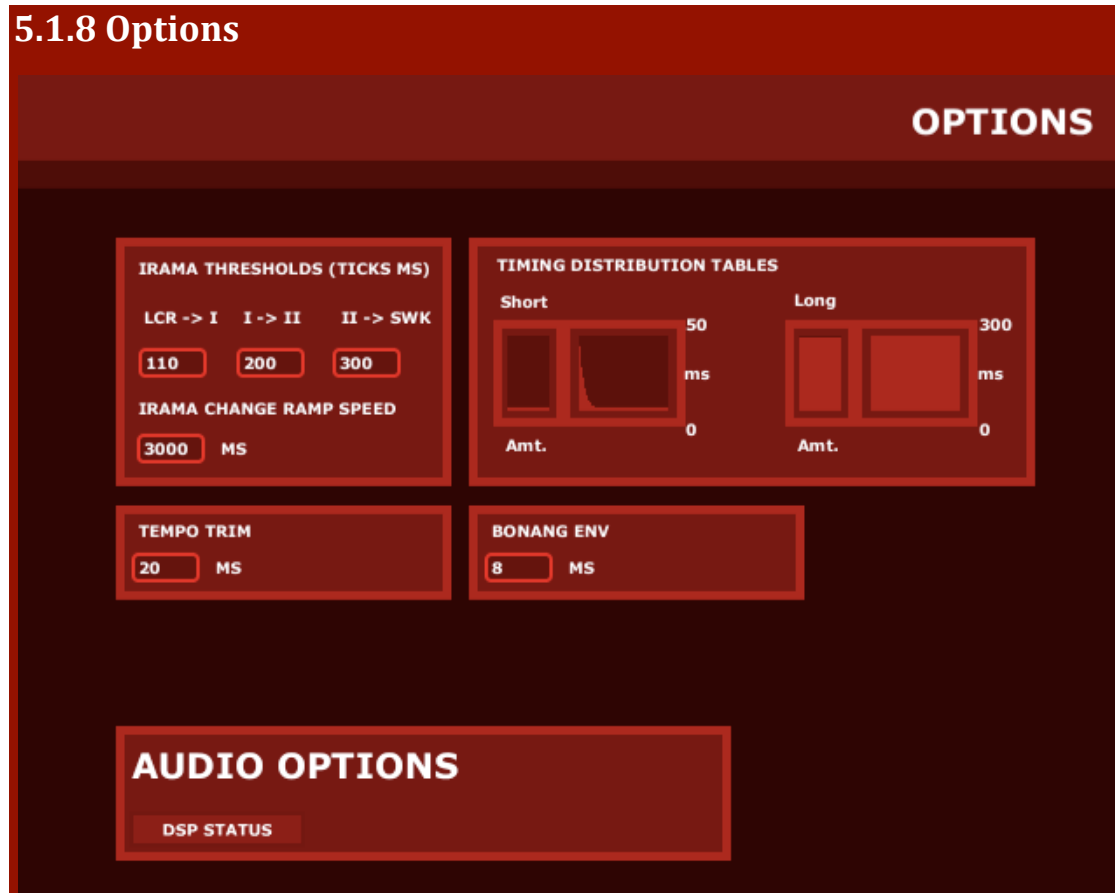
The **timing distribution** sets the probability distribution tables for note delays. On triggering a note, a random value is selected from the table. Instruments may be set to use short or long delays in the **garap** sub-section of the **gendhing** window. Use the **amt** sliders to increase or decrease the potential delay time for each group.

The thresholds that the *laya* must pass in order to change irama may be modified using the **irama thresholds** section. Any changes will be reflected immediately on the **laya slider** in the **notation view**.

The overall playback speed may be modified without affecting relative **irama thresholds** by setting **tempo trim**.

Bonang env sets the attack time for *bonang barung* and *bonang panerus* samples.

6.   Instruments and Garap

All the instruments have been assigned default behaviour according to Solonese conventions.

The following breakdown of instruments and their default behaviours includes information for *irama* I and II only as available in the software, and does not include information on all variations that take place in these *irama*, such as *kebar* (*kendhang ciblon* and *bonang imbal* etc. in *irama* I).

In *garap* examples the following lettering system is used to indicate notes relative to a *gatra*:

Previous gatra	**Current gatra**	**Following gatra**
w x y z	a b c d	e f g h

The *balungan* beat is shown in blue above the *garap*. For example the *peking garap selang-seling* is represented like so:

...z......	a		b		c		d

a	a	b	b	a	a	b	b	c	c	d	d	c	c	d	d

And represents the following for the *gatra* 2 3 5 6 (preceded by note 1):

...1......	2		3		5		6

2	2	3	3	2	2	3	3	5	5	6	6	5	5	6	6

In these examples it is assumed that the *seleh* is always the last note of the current *gatra* (d) unless otherwise stated.

A modifier is indicated by a + or – sign. E.g. a+1

Bold numerals are used to indicate where notes are played that over-ride any reference to the current or adjacent *gatra* – for example, the low 6 pattern played by the *bonang barung* in *irama II*:

...z......	a		b		c		d

2	**1**	.	5̣	5̣	**1**	.	.	5̣	**1**	5̣	.	6̣	6̣	**1**	6̣

Where *single-octave* balungan is indicated a default algorithm is used to determine which notes should be played according to the contour of the

balungan. As the *bonang* instruments have two octaves they use a variation of this algorithm.

Some *pathet*-specific variations have not been included here; these may be found by browsing the *garap* section of the software. All examples are for *laras slendro pathet manura* with the exception of *pinjalan*, which is generally only played in *pelog*.

6.1 Balungan

6.1.1 Slenthem

Irama Lancar and Irama I:

Single-octave *balungan*:

a	b	c	d

a   b   c   d

Irama II:

Single-octave *balungan*

Pinjalan off-beat part (paired with *demung*)

...z......	a	b	c	d

..z   a   b   a   b   c   d   c   d...

Pinjalan is similar to the *selang-seling* approach taken by the *peking* (see **section 6.1.4**), but split across two instruments. It generally only occurs in *pelog* pieces.

6.1.2 Demung

Irama Lancar and Irama I:

Single-octave *balungan*

Irama II:

Single-octave *balungan*

Pinjalan on-beat part (paired with *slenthem*):

...z......	a	b	c	d

a   b   a   b   c   d   c   d

6.1.3 Saron

Irama Lancar and Irama I:

Single-octave *balungan*
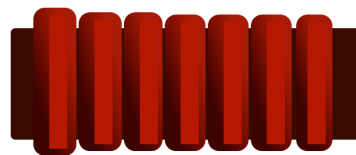
Irama II:

Single-octave *balungan*

Single-octave *half-seleh* (if *slenthem* and *demung* are playing *pinjalan*):

a	b	c	d
b	b	d	d

6.1.4 Peking

The *peking* plays the *balungan* at greater density, anticipating the notes of the *balungan* in lower *irama*.
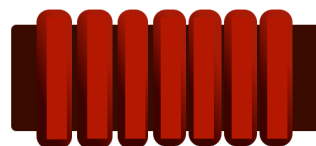
Irama Lancar:

Single-octave *balungan* or double density single-octave *balungan* according to *balungan* type (determined automatically)

Irama I:

Single-octave *double density balungan*[4]

a		b		c		d	
a	a	b	b	c	c	d	d

Irama II:

Single-octave *selang-seling* interpretation of *balungan*:

...z......	a				b			c			d		
a	a	b	b	a	a	b	b	c	c	d	d	c	c	d	d

---

4 Literally *balungan* at double density to other keyed instruments, not to be confused with *double density* type *balungan* as described by Pickvance 2005.

6.2 Bonang

6.2.1 Bonang Barung

The *bonang barung* is the melodic leader of the loud-style ensemble. As such it provides the *buka* and cues to change section where possible (e.g. moving from *ompak* to *ngelik* in *ketawang* and *ladrang* where the first *gatra* of the *ngelik* is *gantungan*.
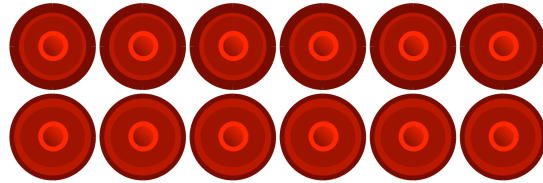
Buka:

Multi-octave *balungan*

Irama Lancar:

Gembyangan Cegat:

a	b	c	d
d (mid)	.	d (mid)	.
d (low)	.	d (low)	.

Irama I:

Mipil Lamba:

...z......	a	b	c	d
a	b	a	.	c	d	c	.

Mipil Lumpatan:

...z......	.	b	.	d
b + 1	b- 1	b + 1	.	d	d- 1	d	.

Gembyang:

...z......	a	b	c	d

.	.	d (mid)	.	.	d (mid)	.	.

d(low)	d (low)	d (low)	.	d (low)	d (low)

Irama II:

Mbalung (dual octave variation of single-octave *balungan* algorithm)

Mipil Lamba

...z......	a	b	c	d

.	a	b	a	.	.	b	a	.	c	d	c	.	.	c	d	.

Mipil Lumpatan

Cadential patterns:

Low 6:

...z......	a	b	c	d

.	2	1	.	$\underset{.}{5}$	$\underset{.}{5}$	1	.	.	$\underset{.}{5}$	1	$\underset{.}{5}$	.	$\underset{.}{6}$	$\underset{.}{6}$	1	$\underset{.}{6}$

Low 5:

...z......	a	b	c	d

.	2	1	.	$\underset{.}{6}$	$\underset{.}{6}$	1	.	.	$\underset{.}{5}$	1	$\underset{.}{5}$	.	$\underset{.}{3}$	$\underset{.}{5}$	$\underset{.}{3}$	.

Gembyang:

...z......	a	b	c	d

.	.	.	d	.	.	d	.	.	.	d	.	.	d	.	.

.	d	d	d	.	d	d	.	.	d	d	d	.	d	d	.	.

6.2.2 Bonang Panerus

The *bonang panerus* essentially plays a simplified version of the *bonang barung*'s part at double density.

Irama Lancar:

Gembyangan Cegat:

a	b	c	d
.	d (mid) .	d (mid) d (mid) .	.
.	d (low) .	d (low) d (low) .	.

Irama I:

Double density *Mipil Lamba*:

…z……	a	b	c	d
. a b a	. a b a	. c d c	. d c d	.

Double density *mipil lumpatan.*

Cadential patterns:

Low 5:

…z……	a	b	c	d
. 2 1 6̣	. 6̣ 1 6̣	. 5̣ 1 5̣	. 3̣ 5̣ 3̣	.

Low 6:

…z……	a	b	c	d
. 2 1 5̣	. 5̣ 1 5̣	. 5̣ 1 5̣	. 1 6̣ 1	.

Gembyang:

...z......	a	b	c	d

```
.   .   .   d   .   .   d   .   .   .       d   .   .   d   .   .
.   d   d   d   .   d   d   .   .   d   d   d   .   d   d   .   .
```

Irama II:

Double density *mipil*:

..z...	a	b	c	d

```
.   a   b   a   .   a   B   a   .   a   b   a   .   a   b   a   .   c   d   c   .   c   d   c   .   c   d   c   .   c   d   c   .
```

Cadential patterns:

Low 5:

..z...	a	b	c	d

```
.   2   1   5̣   .   6̣   1   6̣   .   6̣   1   6̣   .   6̣   1   6̣   .   5̣   1   5̣   .   5̣   1   5̣   .   3̣   5̣   3̣   .   3̣   5̣   3̣   .
```

Low 6:

..z...	a	b	c	d

```
.   2   1   5̣   .   5̣   1   5̣   .   5̣   1   5̣   .   5̣   1   5̣   .   5̣   1   5̣   .   5̣   1   5̣   .   1   6̣   1   .   1   6̣   1   .
```

Mipil and *Gembyang* at double density*.*

6.3 Colotomic

Colotomic instruments (excluding the *kempyang* and *kethuk*) are fixed to the last note of a *gatra* in this version. Notes are delayed according to a probability distribution table (see section 5.1.8)
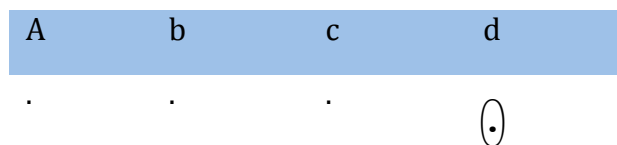
6.3.1 Gong Ageng

The *gong ageng* is played on the last beat of a cycle except in *Lancaran*, where it is only played on the last note of the piece.
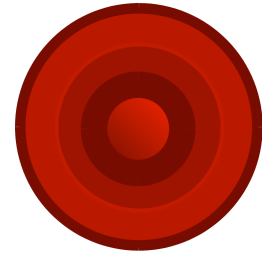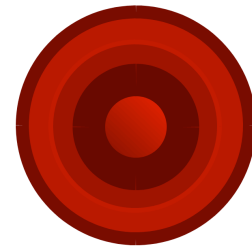
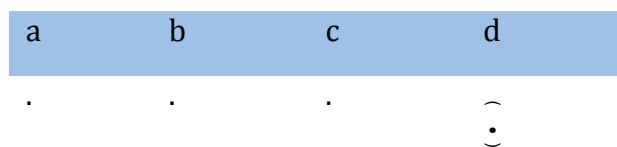**Irama Lancar/Irama I/Irama II:**

Play:

A	b	c	d
.	.	.	(⦁)

6.3.2 Gong Suwukan

The *gong suwukan* is played in place of the *gong ageng* in *irama Lancar*.

Irama Lancar:

Play:

a	b	c	d
.	.	.	⌣̇

6.3.3 Kempyang and Kethuk

The *kempyang* is never played independently of the *kethuk*.
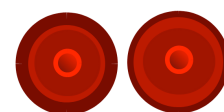
Irama Lancar:

a	b	c	d
.	+	.	.

Irama I:

a	b	c	d
-	+	-	.

Irama II (bouncing *kethuk* stroke)**:**

a	b	c	d
-	+++₊	-	.

6.3.4 Kenong

The *kenong* is played on the *gong* stroke and at regular intervals to reinforce the *seleh*.
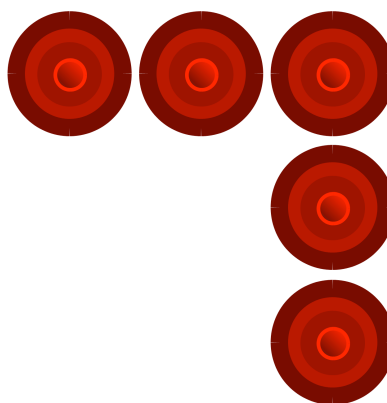
Irama Lancar/ Irama I/Irama II:

Single octave *seleh*:

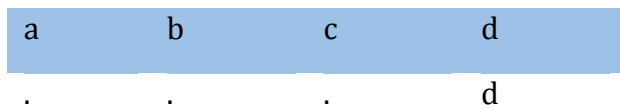| a	b	c	d
.	.	.	d

6.3.5 Kempul

The *kempul* are played on alternate beats to the *kenong*. The first *kempul* stroke after the *gong* is generally
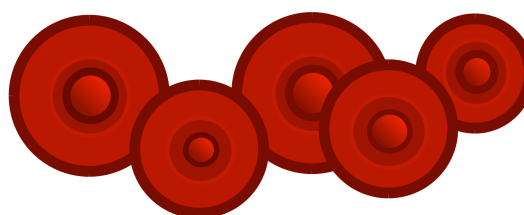
omitted so that it does not interfere with the sound of the *gong*.

Irama Lancar/ Irama I/Irama II:

Single octave *seleh*:

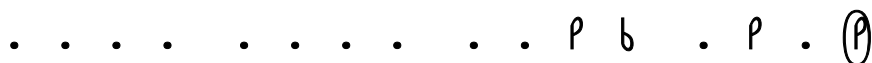| a	b	c	d
.	.	.	d

6.4 Kendhang Kalih

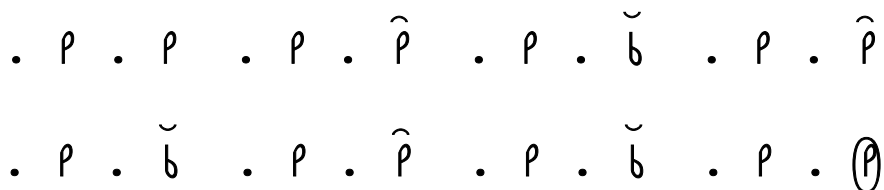The *kendhang* plays fixed patterns according to the *bentuk* and current *irama*.

The patterns included here are simplified versions of what a Javanese musician might play as found notated in Pickvance(2005) and Martopangrawit(1972)[5].

6.3.5 Lancaran

Buka:

Ompak/Ngelik:

---

[5] The *kendhang* patterns for *lancaran* in this version are overly simplified across all *irama*.

6.3.5 Ladrang

Buka:

. . . . t t ꧀ ꦧ꧀ ꧀ꦧ ꧀꧀ ꧀ꦧ (꧀)

Irama I:

꧀꧀ꦧ꧀꧀꧀ꦧ꧀ ꧀꧀ꦧ꧀꧀꧀ꦧ꧀̂ ꧀꧀ꦧ꧀꧀꧀ꦧ꧀̆ ꧀꧀ꦧ꧀꧀꧀ꦧ꧀̂

꧀꧀ꦧ꧀꧀꧀ꦧ꧀̆ ꧀꧀ꦧ꧀꧀꧀ꦧ꧀̂ ꧀ꦧ꧀.ꦧ.꧀ꦧ̆ ꧀꧀ꦧ꧀꧀꧀ꦧ(꧀)

Irama II:

Ompak:

.k.k.k.k .k.k.k.꧀ .꧀..ꦧ꧀.ꦧ ...k...k̂

...꧀...꧀ ..꧀ꦧ꧀.ꦧ꧀̆ ...k...꧀ .ꦧ.kt꧀.ꦧ̂

.꧀.ꦧ...꧀ .k꧀ꦧ...t̆ .꧀.꧀.꧀.ꦧ .꧀.k꧀ꦧ.꧀̂

..꧀ꦧ.꧀ꦧ. ꧀ꦧ꧀.ꦧ.꧀ꦧ̆ ....꧀ ꧀.꧀ꦧ.꧀.(ꦧ̂)

Ngelik:

.� notation — gamelan balungan notation

Suwuk (from first kempul):

6.3.5 Ketawang

Buka:

Irama I:

Irama II:

.k.k.k.k .k.ktℙ.♭ .k.ℙ.k.ℙ .kℙ♭ℙ.♭ℙ̂

.ℙ.♭.ℙ.♭ ...ℙ.♭.ℙ̆ ..ℙ♭.k.ℙ .♭.ktℙ.(♭)

Suwuk:

.t.ℙ.♭.. .ℙ.k.ℙ.♭ .k.ℙ.k.t .k.ℙ.k.t̂

.k.♭.k.ℙ .k.k.k.♭̆ .k.∘.k.ℙ kkk∘k∘k(∘)

PART 3: Appendices

8.   Keyboard Shortcuts

8.1 Playback

{SPACE} – start/stop playback.

o – decrease *laya* (triggers change in *irama* upon crossing appropriate thresholds).

p – increase *laya* (triggers change in *irama* upon crossing appropriate thresholds).

[– force repeat of *ompak* (only used during *ompak*).

] – progress to *ngelik* (only used during *ompak*).

; – goto *irama lancar*.

' – goto *irama I*.

**** – goto *irama II*.

, – goto *buka* on starting playback.

. – goto *seseg*.

/ – goto *suwuk*.

8.2 Balungan Entry

{UP}, {DOWN}, {LEFT}, {RIGHT} – navigate *balungan* by beat.

{TAB}, {SHIFT} + {TAB} – navigate *balungan* by *gatra* (shift to tab left).

0 – 7 – place note.

8.3 Miscellaneous

{ESC} – toggle full-screen mode (use buttons below the **notation** view to bring the **overhead** and other windows to the front of the screen).

9. Glossary

Balungan – skeletal melody of a *gamelan* composition.

Balungan mlaku – step-wise balungan in which there may be *pin*, but not at regular intervals as in *balungan nibani*.

Balungan nibani – type of balungan characterised by alternating notes and *pin*.

Bentuk – the form of a *gendhing*, indicating structure of colotomic instruments.

Bonang – a rack of ten, twelve or fourteen small, horizontally mounted gongs arranged in two rows.

Bonang Barung – the mid-range instrument in the *bonang* family, melodic leader of a loud-style ensemble.

Bonang Panerus – the highest pitched and smallest instrument in the *bonang* family.

Buka – opening phrase typically played by one instrument and joined by the

kendang.

Colotomy – structure used to mark intervals of musical time.

Demung – low-register *saron* that typically plays the *balungan*.

Gamelan – generic term for ensembles found in South-East Asia, particularly Indonesia, consisting primarily of gong-type instruments, keyed metallophones and drums.

Gamelan gadhon – gamelan ensemble consisting of only the soft instruments.

Garap – the method by which musicians work out their parts.

Gatra – measure of time lasting four *balungan* beats.

Gender - an instrument with thin bronze or brass keys, each suspended over a tube resonator.

Gendhing – generic term used to refer to a *gamelan* piece – also used to describe the *bentuk* of longer pieces.

Gendhing bonang – loud style piece in which the *bonang* is the melodic leader.

Gendhing soran – loud style piece similar to *gendhing bonang* typically played in Yogyakarta.

Gerong – male chorus.

Gong – metal disk with a bossed centre, generally suspended vertically.

Gongan – measure of time between two strokes of a gong

Imbal – multi-instrumental interlocking parts.

Irama – the relative density between the *balungan* and elaborating parts.

Kebar – a lively type of instrumental *garap* generally played in *irama* I involving *ciblon* and *bonang imbal* and *sekaran*.

Kempyang – small horizontally mounted *gong* played in conjunction with the *kethuk*.

Kethuk – small horizontally mounted *gong*.

Kempul - a hanging gong, smaller than the *gong ageng* and *gong suwukan*.

Kendhang – double headed-drum.

Kenong – horizontally mounted gong.

Kenongan – a musical passage ending on a *kenong* stroke.

Kepatihan – cipher-based notation including symbols for strokes played on colotomic instruments etc.

Klenengan – playing of *gamelan* for pleasure, as opposed to accompaniment for *wayang* or *dance.*

Ketawang – a type of *bentuk* in which a *gongan* lasts sixteen *balungan* beats, and is divided into two *kenongan*.

Ladrang – a type of *bentuk* in which a *gongan* lasts thirty-two *balungan* beats, and is divided into four *kenongan*.

Lancaran – a type of *bentuk* in which a *gongan* lasts sixteen *balungan* beats (often approached as eight *balungan* beats as *lancaran* are generally written as *balungan nibani*), and is divided into four *kenongan*.

Mbalung – playing the *balungan* note-for-note.

Panerusan – group of soft-instruments.

Pathet - sub-division of a scale, similar to the concept of mode in western classical music.

Pin – rest – generally means that an instrument is sustained until the next note.

Rangkep – *irama* IV, in which the *peking* plays sixteen strokes to the *balungan* beat.

Saron – metallophone whose keys rest on low trough resonators – also used to refer to the *sarong barung*, a medium range instrument which typically plays the *balungan*.

Seleh – Note of resolution on which all parts meet, generally the last note of a *gatra*.

Seseg – Speed-up, generally leading to the *suwuk* or a change of section in longer pieces.

Slenthem – low register *gender*-type instrument that typically plays the *balungan*.

Siter – zither.

Siteran – small ensemble consisting primarily of *siter*.

Suwuk – Ending of a piece, generally indicated by slowing down.

Wiled – *irama* III, in which the *peking* plays eight strokes to the *balungan* beat.

10. References

Martopangrawit, R. L. (1972a), *Catatan-Catatan Pengetahuan Karawitan* [Notes on Knowledge of Gamelan Music], Akademi Seni Karawitan Indonesia and Pusat Kesenian Jawa Tengah (trans M. Hatch)

Martopangrawit, R.L. (1972b), *Titilaras Kendangan*, Konservatori Karawitan Indonesia

Pickvance, R. (2005), *A Gamelan Manual*, Jaman Mas Books

Schneider, A and Beurmann, A. E. (1993), 'Notes on the Acoustics and Tuning of Gamelan Instruments', *Performance in Java and Bali* (Ed. Arps, B), School of African and Oriental Studies

Sorrel, N (1990), *A Guide to the Gamelan*, Faber and Faber

Supanggah, R (2004), 'Gatra: A Basic Concept of Traditional Javanese Gending', *Balungan*, American Gamelan Institute

Taylor, E (1989) Musical Instruments of South-East Asia, Oxford University Press

11. Laras Conversion Table

Slendro Manyura to Pelog Barang

Original - Slendro Manyura (decimal):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Slendro Manyura (Kepatihan):	0	1̣	2̣	3̣	5̣	6̣	1	2	3	5	6	1̇	2̇	3̇	5̇	6̇
Pelog Barang (decimal):	0	7	2	3	5	6	7	9	10	12	13	14	16	17	19	20
Pelog Barang (Kepatihan):	0	7̣	2̣	3̣	5̣	6̣	7̣	2	3	5	6	7	2̇	3̇	5̇	6̇

Pelog Barang to Slendro Manyura

Original - Pelog Barang (decimal):	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Pelog Barang (Kepatihan):	0	1̣	2̣	3̣	4̣	5̣	6̣	7̣	1	2	3	4	5	6	7	1̇	2̇	3̇	4̇	5̇	6̇	7̇
Slendro Manyura (decimal):	0	1	2	3		4	5		6	7	8		9	10		11	12	13		14	15	
Kepatihan:	0	1̣	2̣	3̣		5̣	6̣		1	2	3		5	6		1̇	2̇	3̇		5̇	6̇	
Substitute additional notes (decimal):					4			6				9			11				14			11
Substitute additional notes (Kepatihan):					5̣			1				5			1̇				5̇			1̇

12. Supplementary Patches

Patches to control additional parameters or override the way the system handles certain types of data may are presented in Max/MSP patcher format and may be opened from the file menu.

The **Box of Feathers** patch modifies the *laras* by random amounts according to which *seleh* notes are played in the main program. It also receives information from the *laras* section to trigger changes in structure and *garap*.

By modifying the *balungan*, range of random number generation and trigger thresholds it is possible to hear variations in tuning and structure of the piece.