

# Musicpainter: a Collaborative Composing Environment

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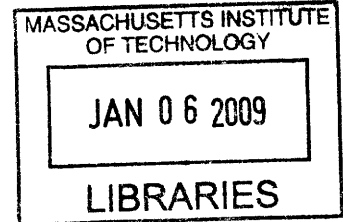
Submitted to the Program in Media Arts and Sciences,  
School of Architecture and Planning,  
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## **Abstract**


This thesis presents the design and implementation of Musicpainter, a networked graphical composing environment that encourages sharing and collaboration within the composing process. Instead of building a computer-assisted composing tool, Musicpainter aims to provide a social environment where users can gather and learn from each other. Our approach is based on sharing and managing music creation in small and large scale. At the small scale, users are encouraged to begin composing by conceiving small musical ideas, such as melodic or rhythmic fragments, all of which are collected and made available to all users as a shared composing resource. The collection provides a dynamic source of composing material that can be directly reused and it inspires users with more ideas. At the large scale, users can access full compositions that are shared as open projects. Users can listen to and change any piece if they want. The system generates an attribution list on the edited piece and thus allows users to trace how a piece evolves in the environment. Shared resource and open projects form the foundation of the social environment, and they create an opportunity for users to compose in a collaborative manner. A pilot study is conducted to verify our design. Thirty users downloaded the program and contributed a total of 90 partial or complete compositions. The statistics of basic user usage, a summary of user survey, and an analysis of the compositions created by selected users are presented in the thesis.

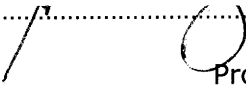
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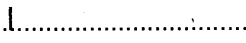
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# Chapter 1

## Introduction

### 1.1 Motivation

Composers seem to compose alone. Especially in western music culture, composing is mostly an off-stage process. A composition is published or performed only after the composer finishes endless revision. However, in different music cultures, composing could mean to improvise on-stage, which could happen between multiple improvisers.

As various graphical computer-assisted composing tools gradually become pervasive, composing is no longer exclusive to professional composers. While they successfully reduce the learning curve of music composition, a missing element of those tools is the chance to share and collaborate within the composing process in a community. A novice composer will enjoy composing more if not composing alone.

On the other hand, several user-generated content websites on sound/music domain allow users to share and reuse audio clips. For example, SPLICE (2008) enables users to share any sound sample, track or song and see how the community rates and remixes their creation. However, these tools are sequencer-based applications that the composing process is mostly re-mixing audio and midi tracks, and playing with DSP effects.

In this thesis, we seek to carry out the culture of sharing and collaboration in music composition domain and extend a graphical composing interface design to a social medium that creates and supports the community.

## 1.2 Aims and Objectives

The focus of the thesis is to explore how the design of a composing environment can encourage and support sharing and collaboration between players through the composing process and how such collaboration would contribute to engaging users and affect the quality of learning.

We design and implement Musicpainter, a networked graphical composing environment in which users can compose and share music. All the music compositions created here are available to all users as a rich composing resource. This composing environment doesn't teach you how to compose. Instead, it aims to provide an environment where users can gather and learn how to compose from each other. It seeks to create a place where different musical perspectives collide. The ultimate goal is to create a community of Musicpainter.

## 1.3 Preliminary Study

I started the Musicpainter project last summer and built a prototype three months after. The preliminary version is a stand-alone software, which has a painter-like interface, four clipboards which support copy/paste, and eight different music instruments (with no percussion instrument). A screenshot of the prototype is shown in Fig 1-1.

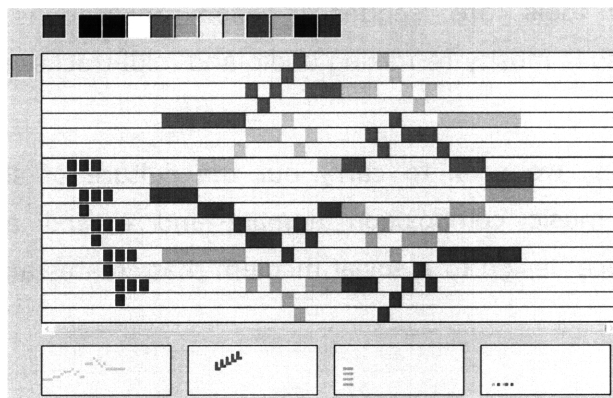


Fig 1-1: A screenshot of Musicpainter's prototype in fall 2007

Two experimental features include: users can flip, reverse, or rotate the selected music pattern on the score, and users can switch between six different musical scales to remap the painting to music.

The prototype has appeared in the crit-day, two conferences and numerous sponsor or private demos. I also released the prototype in professor Resnick's creative learning class by late last year. Here I will summarize user feedback and user behavior.

(1) In general, users had positive responses on how easy it is to start playing with the interface. They did not need a tutorial to comprehend how a color grid is mapped to a musical note by themselves. However, later they found out that it was only easy to draw music, but not as easy when they wanted to create music. Only a few musical-proficient users did successfully create simple compositions.

(2) Since dragging the mouse cursor on the canvas creates instant sounds, some users played with the canvas like playing with a musical controller. A three-year-old kid was so obsessed with this feature that he never tried to play the music. However, this feature is also one of the reasons why it is not easy to create music on the interface. Users had hard time to synchronize the music they created because the music they heard by dragging was not time-consistent to the music on the score.

(3) The conversion between different musical scales was the most popular feature. Users can easily create music with unique cultural characteristic and convert it into another.

(4) The clipboards were hardly used by most users. They did not know how to use the copy/paste function, let alone how to flip/reverse/rotate selected notes. Moreover, these operations were commented as being too visual-oriented.

To conclude the preliminary study, I realized that I couldn't ask most users to create complicated music compositions on a music-drawing

interface. When they experience difficulties during converting music onto paintings, they will stop trying or start “drawing” music. A possible solution is to encourage users to create and collect mini-compositions and then to piece together larger compositions.

In addition, it is impossible to find the perfect mapping for a music-drawing interface. When the system is too smart that it turns almost anything into pleasant music, users cannot learn anything from the process. Therefore, the focus of the design should be how it supports and encourages sharing and collaboration between users. The system will not teach users how to compose music, but it will provide a place where users gather and learn from each other.

## **1.4 Terminology**

The word *collaboration* used in this thesis will only refer to those asynchronous forms of collaboration. Synchronous collaboration on music composition, like music improvising or jamming between multiple players in real-time, will not be discussed here.

## **1.5 Approach**

My approach of encouraging users to share and collaborate in music composition is mainly based on the design of managing compositions in either large or mini-scale. In the interface, a large-scale piece is called as a composition, and a small-scale musical structure is called as a music brick. There is no strict rule of what can or cannot be a composition or brick, but the interface design encourages users to view bricks as the components of the composition, and to reuse them in different pieces of compositions. Moreover, the bricks created from different users are collected and provided as shared resource. The result is an increase of indirect links between users and their creation, as represented in Fig 1-2. These links may not be strong social ties, but do make users more aware of what other players are doing. In addition, to create your compositions



by using other users' musical bricks forms a stronger link than to see or listen to others' compositions.

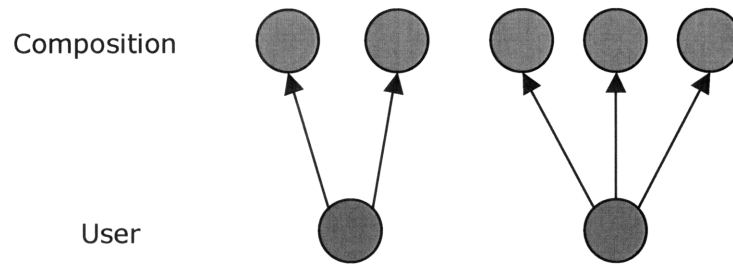


Fig 1-2a. With a one layer hierarchy, users and their compositions would become isolated trees

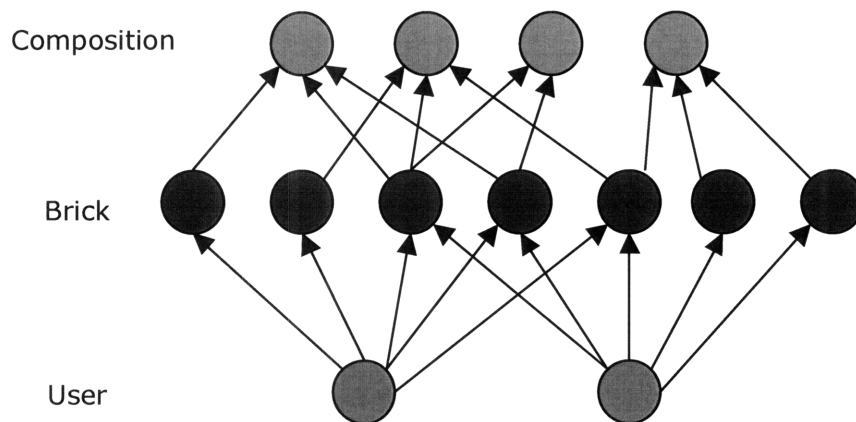


Fig 1-2b. Sharing composing material as public resource turns the relation between users and compositions into a more entangled network

The capability to share, browse, collect, and reuse musical bricks not only makes all the tiny efforts from users become accumulative, but also changes users' mindset of music composition. Many people don't compose because they think it is difficult, and it usually takes a long time. When one can put up three or four notes, save and share it and call it a day, that makes users consider composing even all they have are the 10 minutes on the bus.

To encourage and support sharing and collaboration in creating large-scale composition, we enable users to browse, open and edit any shared composition. When you apply any change on a composition created by others, it will be saved as a different file under your name with an attribution list that indicates the history of the creation. As a result, multiple versions of the same piece of composition will be stored on the system, and their relation can be depicted as a list or a tree, as in Fig 1-3. With the attribution information, we can trace the history and the follow-up evolution of any composition. Moreover, additional text information can be attached to title or describe the composition. Other than recording what has been done, it can be used to suggest what could have been done in order to prompt the collaboration.

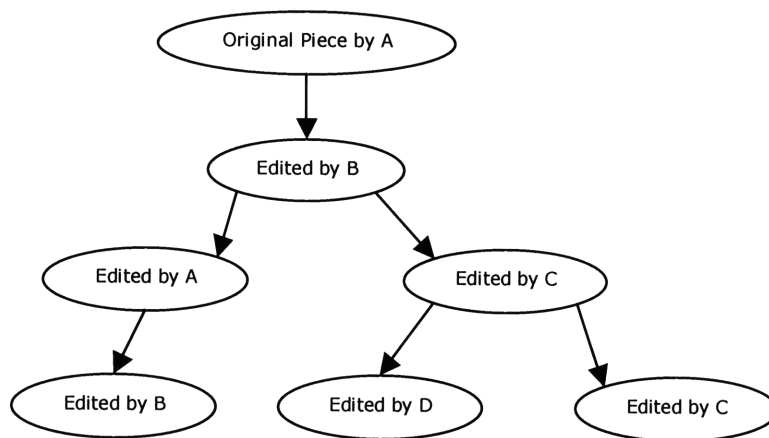


Fig 1-3. The relation between an original piece and its re-created versions forms a list or a tree

## 1.6 Contribution

The concrete results of the thesis include:

- (1) **Design** an environment that brings together a graphical composing interface and a social medium that supports and encourages sharing and collaboration.

(2) **Implement** the above design in Musicpainter, an introductory web page, and a file server that manages user creation.

(3) **Evaluate** the composing environment by performing pilot studies over thirty online users.

## **1.7 Thesis Structure**

Chapter two, *Background*, reviews the literature and related projects to this work.

Chapter three, *Design and Implementation*, describes the design principles, and the making of our Musicpainter system, graphical composing interface, musical brick box, and music browser.

Chapter four, *Evaluation*, provides the statistics of user usage, user behavior analysis, and user response of a pilot study.

Chapter five concludes this thesis by summarizing its contributions and future works.



# Chapter 2

## Background

### 2.1 Collaborative Music Composing Platforms

Here we will review several user-generated content (UGC) websites on sound/music domain. Because of the convenience to create mashups by simply remixing multiple sound tracks, sound is a suitable medium for creative appropriation and thus it has great potential to arouse collaboration during the creating process. We can observe how these websites manage shared contents in order to inspire further collaboration.

#### SPLICE

SPLICE (2008) is a web-based music-making tool with social networking features that allows you to create music by remixing sound tracks and samples contributed by users. It is basically an online sequencer with a real-time synthesizer and DSP sound effects. Its interface is shown in Fig 2-1. Users create wav-based music by looping, mixing, editing audio and MIDI tracks, and applying various sound effects.

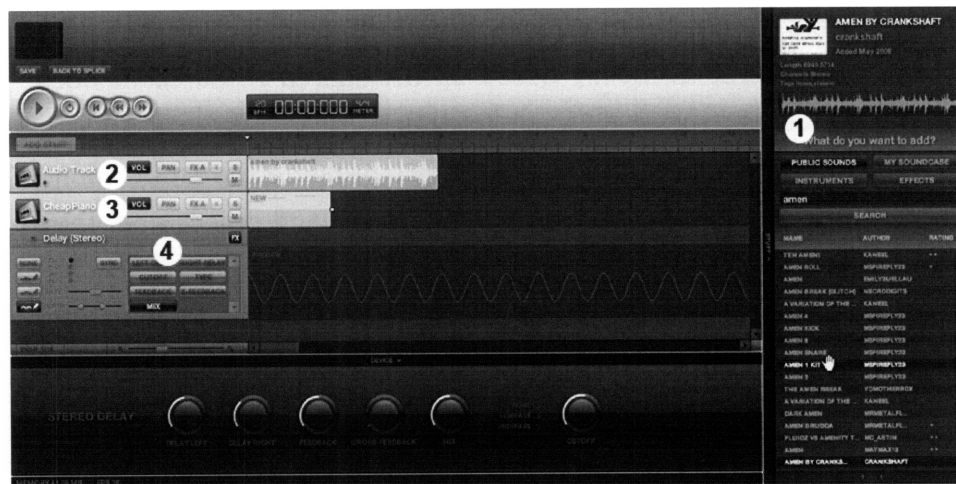


Fig 2-1: A screenshot of the sequencer interface on SPLICE

Users are encouraged to add their sounds to the common library, and other users create music by remixing existing sounds. It has a user rating system like YouTube (2008), where users rate a sound clip between none to five stars. One interesting fact is that, on average, top-rated sounds are much longer sound clips than most-used sounds. They are well developed and thus sound better. Most-used sounds, on the other hand, are short sound samples/clips, which are more suitable for reuse.

The sounds shared in SPLICE are licensed under Creative Commons. Users can mark their works in one of the following domains: (1) Public Domain, (2) Attribution, (3) Attribution, Non-Commerical, (4) Attribution, Non-Commerical, Share-Alike (Creative Commons, 2008).

SPLICE emphasizes its social values on their website. For example, one of its slogans is "MEET, Find musicians from all around the globe", and it places a Google map on the front-page, marking the geographical location of each contributed user. In addition, there are forums on the website and two contests held in the past year.

SPLICE provides an important reference to our work, especially how they grow the community and license the shared content for reuse purpose. Both SPLICE and our work provide music making tools and encourage users to share creation in multiple layers. However, the collaboration in SPLICE is mainly based on the shared resource. It does not encourage users to take different roles and collaborate in a project. Moreover, it does not have an effective way to organize the entire sound archive and thus it is inefficient for users to browse and collect what they want.

### **Open Source Composition Project at Myspace Music**

Open Source Composition (2008) is a collaborative music composition project on Myspace Music, which has a community of 133 users. It claims "Music should always be changeable." Therefore, while a plugin music player is playing a list of songs on the web page (Fig 2-2), all of them are

available for download and further editing. The project doesn't provide any tool for music making, and therefore users need to use their own tool for editing purpose. The website and all sound files are all managed by a moderator. When users make any change on a sound clip, they need to email it back to the moderator.

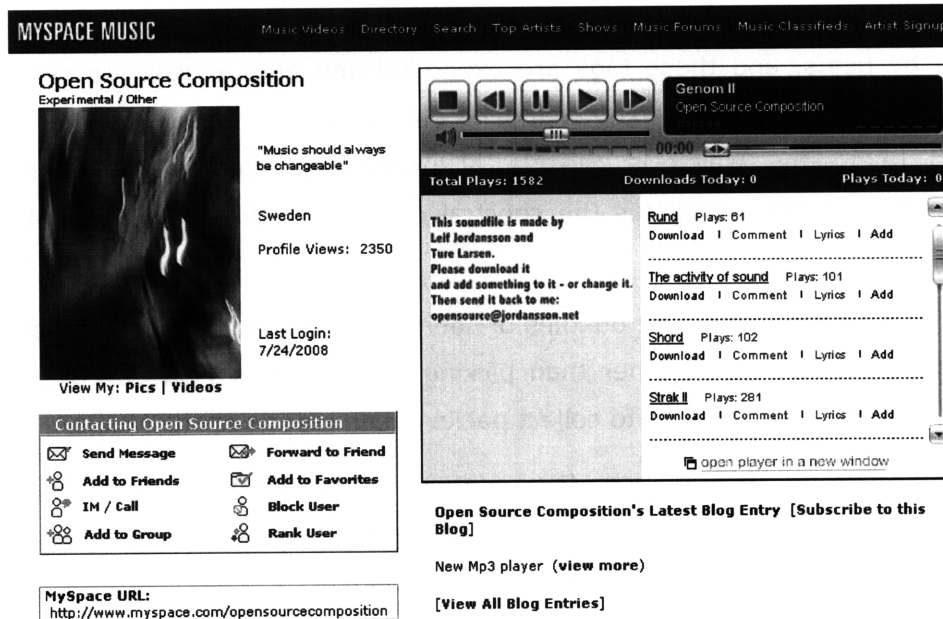


Fig 2-2: The front page of Open Source Composition project

The project takes advantage of the existing users and social networking features directly from Myspace.com and thus receives a boost on the amount of users visited. However, the lack of easy sound-editing tool might become an obstacle for non audio-hacker to participate. In addition, its centralized management might also hinder the site from growing.

### The Freesound Project

The Freesound Project (2008) is developed by the Music Technology Group of Pompeu Fabra University, which consists of a huge repository of Creative Commons licensed audio samples. Sounds uploaded to the website cover a wide range of subjects, from field recordings to

synthesized sound effects, which are mostly tagged and can be browsed by folksonomic means (The Freesound Project, 2008). While this project does not fall in the category of collaborative music composing platforms, what we can learn from here is its following features to make sound files easy to index, search and browse:

(1) **Audio search**: Audio clips are described by a collection of tags given by users, and these tags are expanded and automatically turned into semantic descriptors. The searching engine is powered by WordNet-based taxonomy, which is capable of performing "nearest neighbor searching". It also calculates the spectral centroid to provide additional information of audio clips.

(2) **Sample packs** are bundles of sound samples that are organized and collected by users. Other than picking sound samples one by one, users now have the options to collect packs of samples at once.

(3) **Remix tree** depicts the relation between sound clips. For example, an original sound clip is edited or remixed as new sound clips; they will be placed in a tree under the original clip.

### **Scratch and ScratchR**

Scratch (2008) is a programming language that enables kids to create programmable media such as games, interactive stories, animations, music and art (see Figure 2-3), and ScratchR is a social media platform which powers the Scratch website (Monroy-Hernandez 2007). While Scratch is obviously not a composing environment, it establishes a model for user-generated content websites that allow creative appropriation. In Monroy-Hernandez's thesis (2007), he described Scratch Online Community as a design *"to be a source of inspirational ideas, provide an audience for children's creations and to foster collaboration among its members."* Musicpainter seeks to carry out the same goal in the music composition domain.



It is worth mentioning that they replace the general rating system with the "Love it" feature considering that low ratings would create the risk of discouraging novice users. The design of "Love it" button, on the other hand, enables users to express their positive opinions on a project.



Fig 2-3: The front page of Scratch Online Community

## 2.2 Graphical Environments for Composing

There has been a vast amount of graphical composing environments designed since Max Mathew's first attempt in the late 60's (Mathews & Rosler, 1966). What makes Musicpainter not just another graphical composing environment is its being a social medium that supports collaborative composing. Therefore, the design goal of its graphical composing interface is to support its function as a social medium and to keep the door open for novice composers. In this section, we will review a few graphical interfaces that influence our design.

### Musical Sketch Pad

The goal of Morton Subotnik's Creating Music (1999) website is "to provide an environment for children to experience creative play in the creation of music, with the same ease they have been able to enjoy with toys, drawing tools, building blocks, puppets, etc." (Subotnik, 1999) Musical Sketch Pad is the music composition tool among various activities on the website. It is designed to be played by kids at the age of eight or higher, and thus is extremely easy-to-use. Users can 'draw' at the level of finger painting and get musical feedback, as shown in Fig 2-4. They can also edit the score by moving, reversing, and copying pixels in a selected region.

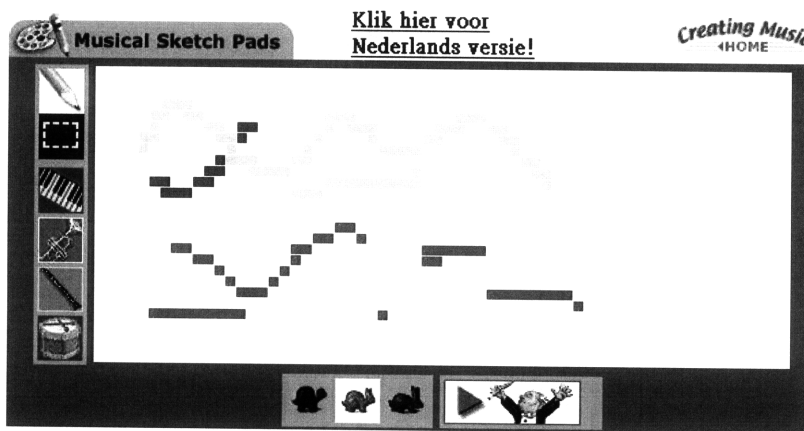


Fig 2-4: The free-hand drawing interface in Musical Sketch Pads

One of the advantages of Musical Sketch Pads is its straightforward approach in the graphical interface design, which maps the pixels into individual musical notes according to their position. Users don't need to be taught to understand such relation. In comparison to the piano-roll representation, they overlap the scores from different instruments on the same map, which provides a chance for users to read between the instruments. The major limitation of the approach is that users don't have the patience to put up musical notes one by one, and they tend to draw on a sketchpad and conceive the music visually.

### **Hyperscore**

Hyperscore (2008) is a graphical computer-assisted composing system developed by the Opera of the Future group in MIT Media Lab. If all the other interfaces allow users to create music, Hyperscore is the one that really enables users to compose music. It also allows users to create music by free-hand drawing, but the strokes in the drawing are mapped to structural and gestural elements in music (Farbood, 2001). These basic musical structures come in both small and large-scale forms. Melodic and rhythmic fragments are small-scale structures; harmony and how these small fragments are restated and developed are large-scale structures. To visualize those structural properties of music in different scale, the graphical interface in Hyperscore provides a layer of abstraction between two levels: (1) the melodic, note-level input as motives and (2) large-scale, form-level shaping (Farbood et al., 2007) (see Figure 2-4). The two-layer graphical control and the tension line allow users to conceive composing ideas through a top-down manner. The social features in Hyperscore include a website that enables the Hyperscore community to share their compositions with others. It also has a collaborative mode designed for the convenience of teaching in classroom situation.

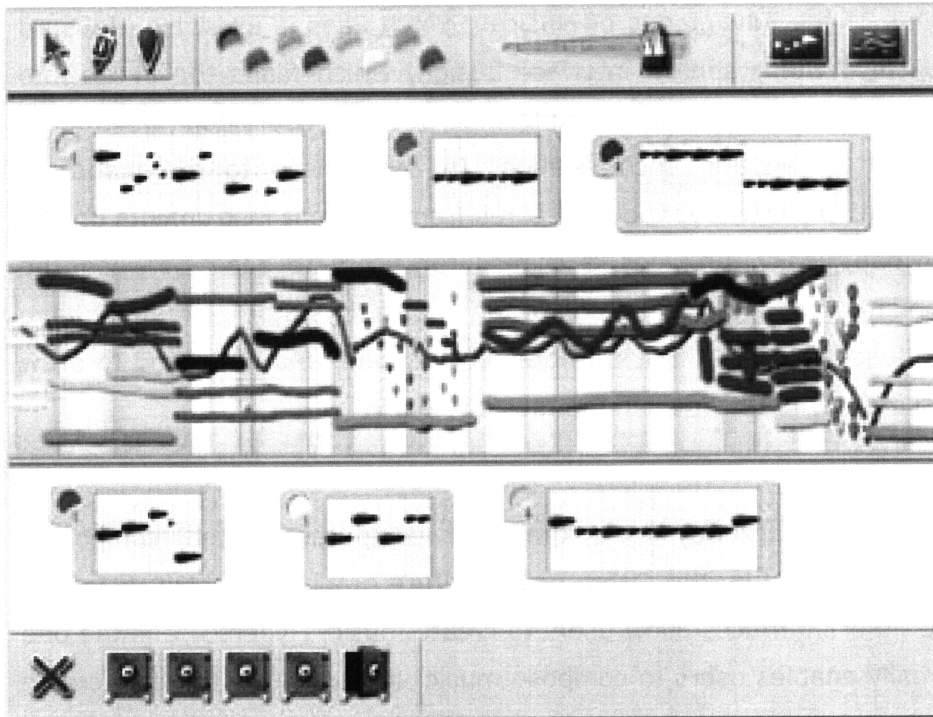


Fig 2-5: The screenshot of Hyperscore

What we want to learn from Hyperscore is how it leads users to compose music with a structural sense, which makes users create small-scale structural elements, and then large-scale musical structures. However, the foundation of such approach is based on the fact that Hyperscore is capable of assisting users with the motivic development of music. It will be a challenge to realize the similar goal in a non-musical-intelligent environment in Musicpainter.

### **Tenori-on**

Tenori-on (2007) is an electronic musical instrument designed and created by Toshio Iwai, who is also the designer of Electroplankto. Its composing interface is a sixteen by sixteen grid of LED backlit buttons, as shown in Fig 2-6. Users compose by pressing and holding these buttons in different modes of input to generate musical notes while the instrument keeps looping and playing existing notes. In other words, Tenori-on

makes users play jam with themselves by enabling users to create notes while the music is playing. The other interesting feature is that these notes (pixels) are not static; they move and interact with other notes.

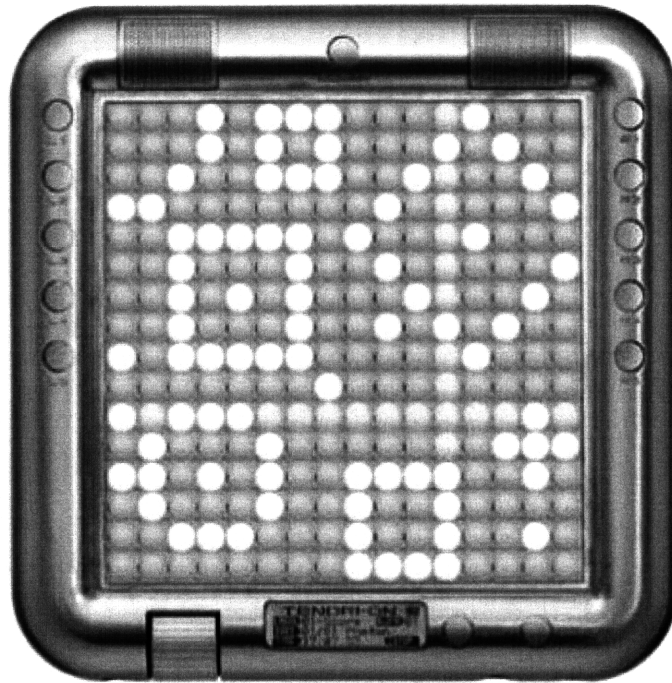


Fig 2-6: The composing interface of Tenori-on is a 16 by 16 grid of LED backlit buttons.



# Chapter 3

## Design and Implementation

In this chapter, I will describe the design and implementation process of Musicpainter. The first section states the principles that guide our design. The following sections will divide Musicpainter into three parts: graphical composing interface, musical brick box, and music browser. We will describe the goal, design process, and constraint of each part.

### 3.1 Design Principles

(1) **Fun for almost everyone.** Not everyone can become Beethoven, but anyone can surely have fun in composing. The most essential principle is to make composing a fun thing to do.

(2) **Simple, easy, but not superficial.** It has to be really simple and easy to quickly engage first-time users. However, it cannot be a superficial, one-dimensional design, or it will not be able to attract users for long-term.

(3) **Encourage users to compose together.** It takes several steps to build a collaborative composing environment. First, it encourages users to appreciate what other composers create. Then it encourages users to learn from and appropriate others' compositions for creative purpose. Finally, it delivers a message to users that music composition is the sum of those tiny musical ideas, and each idea is just as valuable.

### 3.2 System Architecture

The block diagram of Musicpainter is shown in Fig 3.1. The main program of Musicpainter consists of three parts. The canvas is a graphical composing interface that turns music composition into painting. It is the interface that allows user to create and edit music in a drawing style. The musical brick box is a container that stores the composing material

collected by users. They can transform and apply the material on their compositions by moving it around on the canvas. The music browser is a window that enables users to see what other users create.

The main program connects to a local database and a remote database. The remote database is a file server located in media lab, which stores all music compositions created by users. The local database stores private music compositions and caches a portion of shared resource in order to support the program running without Internet access. The music synthesizer - CSound server - is running as an external process in local machine, which communicates with the main program through a local socket connection.

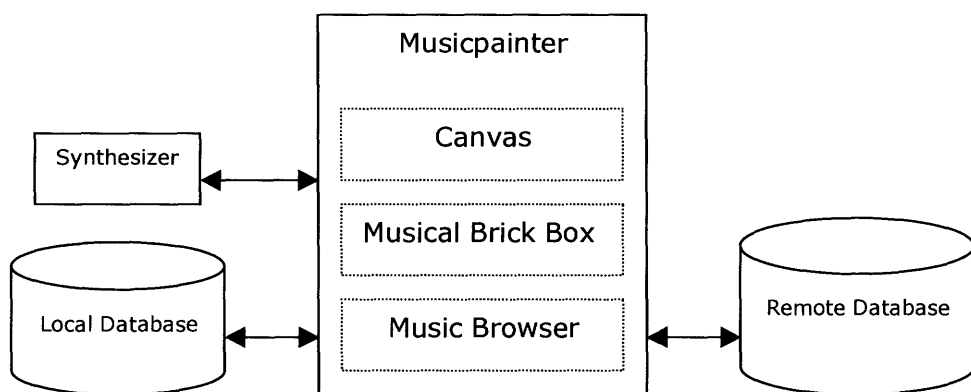


Fig 3-1: Block diagram of Musicpainter

### 3.3 Graphical Composing Interface

#### 3.3.1 Design Process

"Simple, easy-to-use, but not superficial" is the first principle that guides the graphical composing interface design in Musicpainter. Since the graphical interface is the front door of the system, which has the mission to attract users to step in the door in a short period of time, its basic functions should be intuitive for users to pick up by themselves so that they can quickly have a taste of what composing is like in Musicpainter.



My approach here is to borrow the entire interface from a painting program. Assuming that many computer users have experience in drawing on a painting program, they would be curious to see a composing program that looks almost the same to a painting program. In addition, their experience in using a painting program would help them explore the functions in Musicpainter, so they could quickly understand the relation between painting and music.

The mapping mechanism between graphical and musical features is the foundation of a graphical composing interface design. We want to keep the mapping clear at a glance. Therefore we adopt the direct mapping approach from Subotnick's Musical Sketch Pads (1999). It is the most straightforward mapping, in which each color block is a single musical note. The canvas is basically a simplified piano-roll representation. The horizontal axis represents time, and the vertical axis represents pitch. But the scores from different instruments are colored differently and merged onto the same canvas. In addition, the pitch axis is mapped to a major scale, instead of the chromatic scale in a piano-roll representation.

In Musicpainter, we seek to extend the above design by applying nonlinear mapping on both the pitch and time axes. As shown in Fig 3-2, the relation between painting and music score includes a y-to-pitch mapping and an x-to-time mapping. By assigning the pitch mapping to a pitch set based on a musical scale, we can embed the scale on the canvas. The current Musicpainter has six built-in musical scales: major, minor, chromatic, Chinese pentatonic, Japanese pentatonic, and blue note scale. User can arbitrarily change the mapping to project a painting onto different tonal-space. The process becomes an integral part of the creative exploration for users. By assigning specific time mapping, we can embed rhythm or musical pulse on it. The feature of embedding rhythm or musical pulse has not been implemented in the current Musicpainter yet.

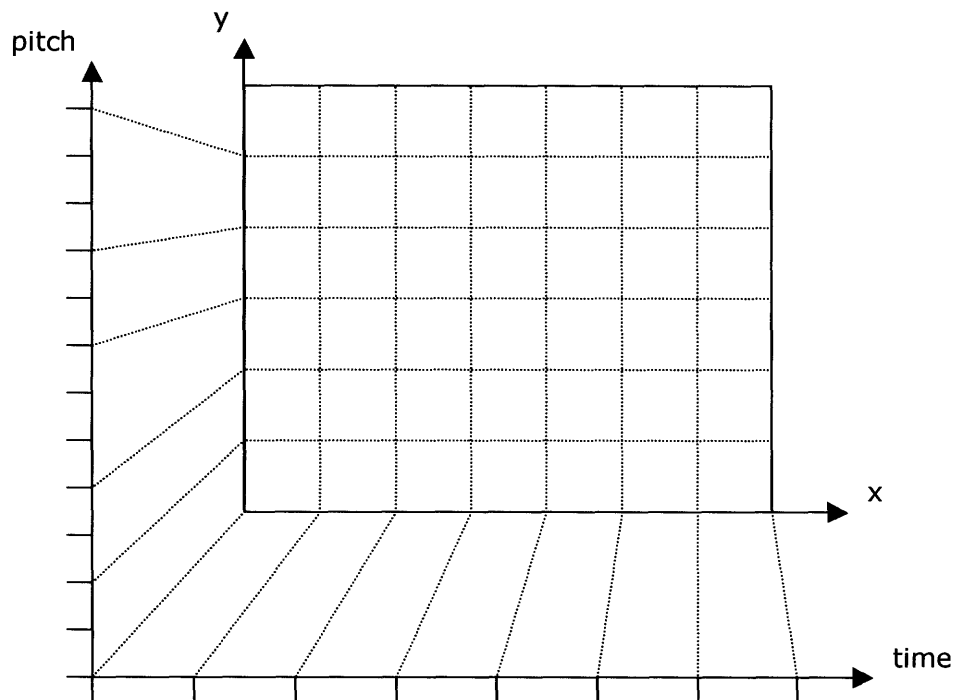


Fig 3-2. The relation between painting and music score includes a y-to-pitch mapping and an x-to-time mapping

A screenshot of the drawing area in Musicpainter is shown in Fig 3-3. The canvas is a 64 x 18 pixel map. It has horizontal grid lines but no vertical (bar) lines. On top of the interface are the toolbar, colorbar, and a tempo slider; on the left are buttons to trigger system functions. Users can select different musical instrument by selecting different color. Though the system provides no information about which instrument each color represents, it plays a sample sound whenever users change the color selection. A percussion instrument is available by choosing the rightmost color.

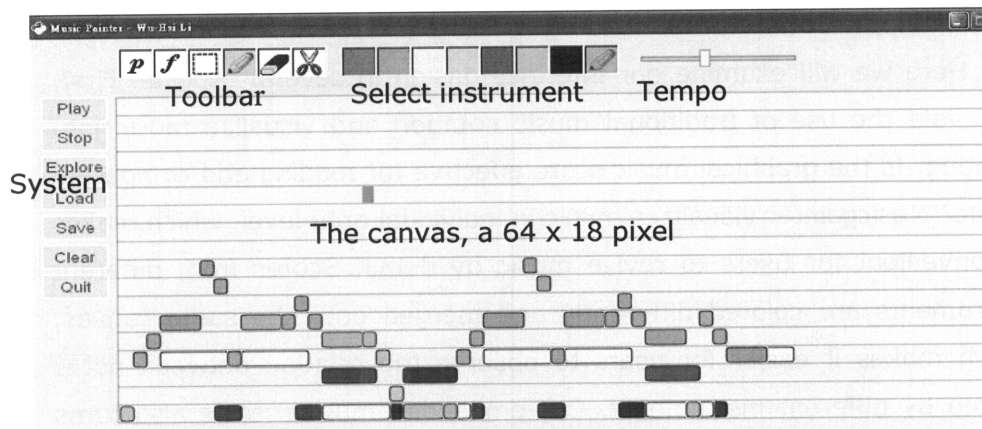


Fig 3-3: A screenshot of the drawing area on Musicpainter

The last noticeable feature in Musicpainter is its support on music dynamics editing. Users can select the 'P' (piano) and 'F' (forte) on the toolbar to edit the intensity of individual note. They can also use "crescendo" or "diminuendo" tool to apply dynamics change over a selected region. We visualize the intensity of musical notes into the darkness of the color. The stronger a note is, the darker the grid is, and vice versa. An example is shown in Fig 3-4. However, putting musical symbols - a 'P' or an 'F' - beside other graphical icons makes the interface design look inconsistent, but this will remain as a temporary solution before better alternative icons are made.

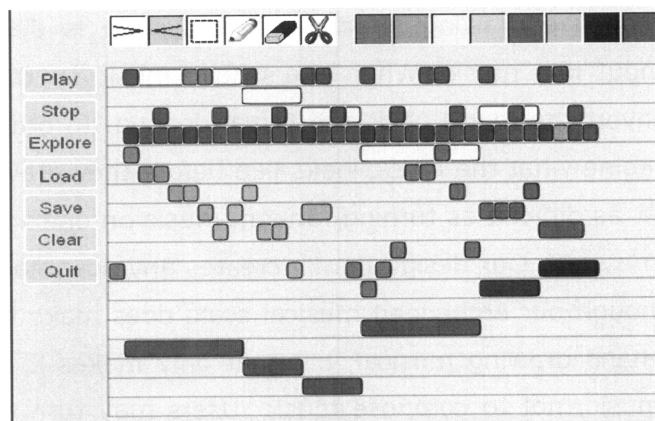


Fig 3-4: The score after dynamics editing

### **3.3.2 Design Constraints**

Here we will examine our interface design in several aspects. First, we avoid the use of traditional music notation and visualize music into painting. Is the graphical music score effective for reading and composing music? Musicpainter visualizes music in individual note level, which makes it convenient for users to revise music by detail. Scores from different instruments are colored differently and merged onto the same canvas, which makes it easier for users to observe the relation between notes played by different instruments. Our embedded musical scale also turns the relatively scattered grids in typical piano roll representation into more connected visual patterns. However, the embedded musical scale is not visualized on the canvas. Users need to re-learn how to read the score under different musical scale. In addition, the interface is not capable of abstracting music in a higher level, e.g., harmony, or musical structure. To conclude, it is easy for any user to understand the relation between music and our graphical representation, but it doesn't assist users to read between the notes.

Second, as the drawing-interface-like design is certainly easy-to-use for users, is it an effective interface for users to compose music? While it is technically feasible to create any music since Musicpainter displays music in individual note level, it is difficult and time-consuming to compose music on the drawing interface. The system is designed to convert visual input into music. When users have music on their mind, they need to convert the music back into visual domain. In other words, they need to imagine what the music looks like before they draw it. Such conversion is just as difficult as turning random music on one's mind into musical notes on a staff. Our design hardly creates any advantage during the process. Although our embedded musical scale does make the music created by free-hand drawing musical, but that only makes it easier for user to create music, not to compose music. Users may turn to a pure visual approach of music composition after they fail to convert musical

ideas into music on the interface, which is a common defect for any draw-music interface. In the next section, we will introduce our design which encourages two-stage music composition to mend the drawback. In addition, we plan to support alternative music input methods to satisfy users with different music proficiency.

Finally, Musicpainter uses pixel maps as the data structure for music. Though the system improves the storage efficiency by quantizing the pixel map with embedded musical scale, the size and resolution of pixel maps do create an initial constraint of the music composition. As we plan to make Musicpainter support alternative music input methods in the future, it would be better to use a score-like format to store music.

## **3.4 Musical Brick Box**

### **3.4.1 Design Goal**

The musical brick box is intrinsically a copy-paste clipboard. Users select patterns on the canvas, copy to the clipboard, and paste it back on the canvas. However, our design aims to extend the design of clipboard to serve the following purposes: First, it encourages users to repeat musical patterns in their music compositions. In general, repetition makes a musical piece more structural. Second, if each musical pattern represents a musical idea, the musical brick box is not only a clipboard, but also a container for musical ideas. When users run out of ideas, this is their dynamic source of inspiration. Third, it encourages users to divide the process of music composition into several sub-processes: creating material, collecting material, and piecing together the material into a composition. These sub-processes do not need to be proceeded in specific order, and it is not necessary for users to complete all sub-processes in order to finish composing a piece. Finally, the musical brick box is the interface between personal creation and public creation. It encourages users to evolve from composing on their own to collaborative composing.

### 3.4.2 Design Process

#### From a copy-paste clipboard to the musical brick box

The motivation of the musical brick box comes from a basic clipboard, which is simply a data buffer for copy-paste functions. However, I found out that I occasionally put scattered creations in the clipboard without pasting it. They are small patterns that I am reluctant to let go, but they are not complete enough to save it. Later I found out that I always needed more than one clipboard, so I tried to increase the number of clipboards to four.

I added a function that users can play the music on the clipboard. In this way, the clipboards are visible and audible at the same time. Whenever I cannot find a spot in the composition for something I create, I leave it on the clipboards; and whenever I don't know what to do next, I try to play with those scattered material on the clipboards. In this way, those clipboards are beyond data buffers now. They become a place you deposit arbitrary ideas.

Imagine when you deposit many of these musical ideas, or when we collect all the ideas contributed by different users and make them available, they are something you can start with. In some way, it's like playing the Lego blocks. You don't need to have a concrete purpose; you don't need to conceive everything; you just collect some blocks and start playing, and the bigger idea emerges.



Fig 3-5: Lego blocks

To borrow the Lego philosophy, we name those musical ideas “the musical bricks”, though they are conceptually in a higher level than Lego building blocks. Most musical brick is a fragment of music with its own meaning. Since the design is derived from a clipboard, the boundary between a composition and a brick is blurred. Users can turn the entire composition into a brick by putting it in the box.

The brick box has several sub-boxes, and each sub-box contain several musical bricks. “Working area” is one of the sub-boxes that functions as clipboards; it has six empty frames, as shown in Fig 3-6. When a user copies a selected area, the thumbnail of the selected pattern will be shown within one of the clipboards. When a user moves a pattern from a clipboard to My Melody box, or My Rhythm box, it officially becomes a brick and will be shared to other users. Collected Melody box and Collected Rhythm box are used to store the musical bricks shared by other users. For first-time users, the system will automatically generate a random collection for them. In Fig 3-7, there are eight musical bricks in the Collected Rhythm box.

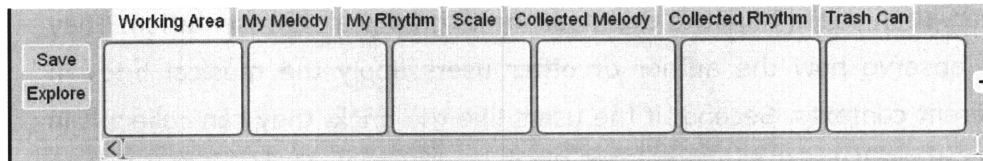


Fig 3-6: The working area in musical brick box

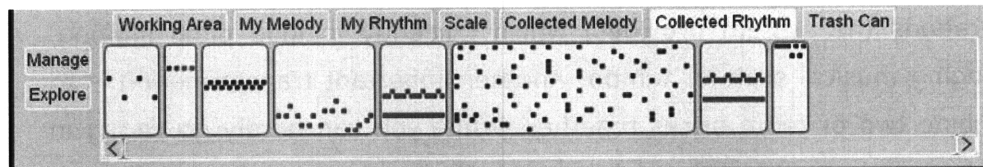


Fig 3-7: The music brick box loaded with musical bricks

### **Creative exploration by playing musical bricks**

Musical brick is not merely a data format; behind the brick is its interaction relation with players. When each musical brick represents a

tiny musical idea from one user, the collection of musical bricks is not only a source for users to gain amusement and inspiration by playing, but also a medium that connects users. Here we will describe the interaction design of musical bricks.

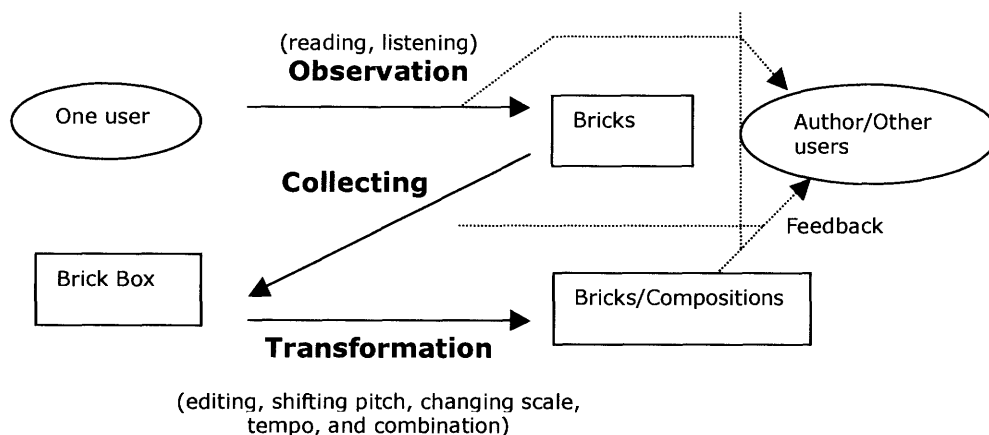


Fig 3-8: The relation between bricks and users

Fig 3-8 is a conceptual figure which depicts the relation between users and bricks. First, users read and listen to a musical brick. The observation doesn't limit to the music or its graphical representation. They can observe how the author or other users apply the musical brick in different contexts. Second, if the users like the brick, they can collect it in their musical brick box, organize them in different category. Third, they can transform the bricks by editing, or by applying the transformative operations the system provides, which currently include pitch shifting, changing musical scale or tempo. Another important transformation is to combine two or more bricks together. While you can hardly go wrong in combining Lego blocks, it is really challenging to find the right combination of musical bricks, which have to be synchronized in time, harmonized in pitch, and reasonably-orchestrated. The process of their trying, listening, reflecting and trying again is an important learning process for users.



### **3.4.2 Design Constraints**

In previous builds of Musicpainter, there are more options to transform a musical brick, such as reversing, flipping, or rotating. I temporarily took it away from the current version for the following two reasons: First, I want to maintain the simplicity of the current interface design. If the music transformation feature is added to the system, it should be implemented in a musical brick editor, instead of the main composing interface. Second, the transformations previously available include reversing, flipping, and rotating, which makes more sense visually than musically. I decided to disable these features before I provide musical transformations in Musicpainter at the same time.

## **3.5 Music Browser**

### **3.5.1 Design Goal**

When all users start sharing everything they create, we need an effective way to manage the massive amount of musical bricks. In this section, we will present the metadata attached on each musical brick and a music browser.

### **3.5.2 Design Process**

#### **Metadata of musical brick**

Ideally, the metadata of musical brick should specify the musical context in which the brick is created. It preserves the relation between the musical bricks and the compositions. Without these links, those bricks would become lots of detached musical patterns. The current metadata of a musical brick or a composition includes three parts: the musical context, history, and text description, as shown in Table 3-1. This is only a preliminary design. We will review the design in the future.

| Part            | Entry         | Example                                 |
|-----------------|---------------|---|
| Musical context | Musical scale | Major, Minor, Chromatic, Pentatonic ... |
|                 | Tempo         |   |
|                 | Pitch shift   |   |
|                 | Type          | Composition, Rhythmic or Melodic Brick  |
| History         | Author        |   |
|                 | Base on       |   |
| Description     | Title         |   |
|                 | Description   |   |

Table 3-1: The metafile of musical brick in Musicpainter

### Music Browser

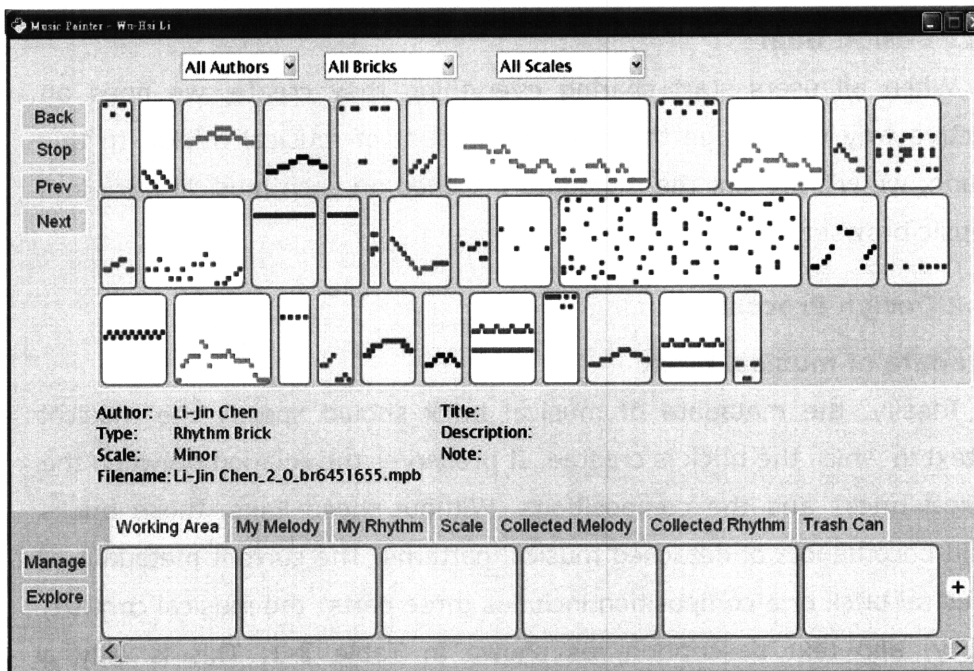


Fig 3-9: Lots of musical bricks in the music browser

The music browser is a window for users to see what every other user in Musicpainter creates. It looks like a large basket covered with a lot of bricks, as shown in Fig 3-9. Users can click on those bricks to play the

music. The browser is accompanied with the musical brick box so that users can manage their collection by moving the bricks up and down. Additional information from the metadata will be shown when users stop the mouse cursor on a musical brick. The music browser shuffles the order to provide equal exposure of all music bricks. Users can also filter the bricks by authors, brick types, or musical scales.

There is a small difference when the browser is used to browse through music compositions, as shown in Fig 3-10. Users cannot collect those compositions as musical bricks. Instead, they can load any piece of composition on the main canvas. When the composition is edited and saved, it is written on a new file with an automatically generated stamp, specifying the previous (or original) version on the composition. Such information can be used to trace how a piece evolves.

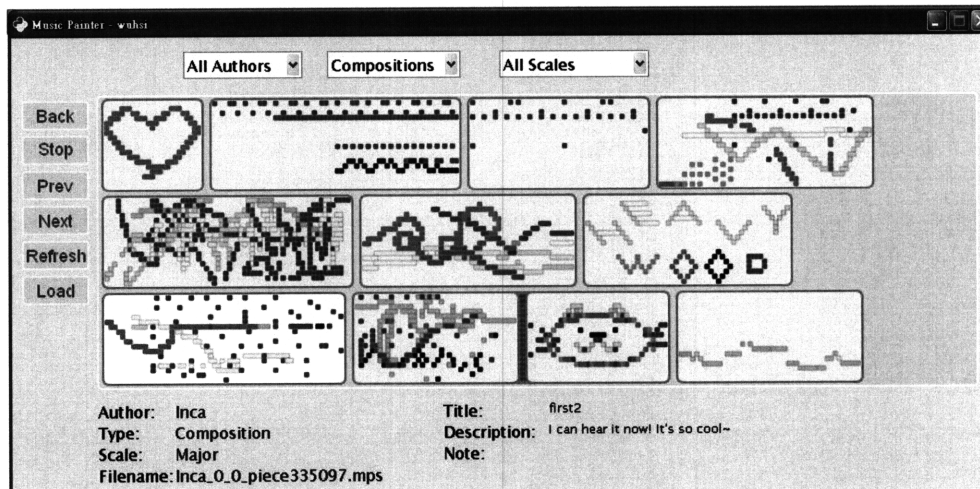


Fig 3-10: Numerous compositions in the music browser



# Chapter 4

## Evaluation

### 4.1 Overview

A pilot study was performed over the Internet to get feedback and accumulate music compositions from users. I made a web page for Musicpainter project, which includes a brief user manual and a download link to the Musicpainter project and necessary software prerequisite (see Appendix A). Over the past four weeks, about 30 users downloaded the program and logged in. Other than the compositions shared by users, the system collects statistics of basic user usage, for e.g., the amount of time users login the system. Afterwards, users were asked to fill out a survey with 21 short questions (see Appendix B). Ten users of Musicpainter returned the survey forms. The following sections will describe the statistics, user behavior, and user response of the evaluation.

### 4.2 Statistics

| Name      | No. of logins | No. of days visited | Bricks | Compositions | First visit | Last visit |
|-----------|---------------|---------------------|--------|--------------|-------------|------------|
| L.J. Chen | 2             | 2                   | 1      | 1            | 29-Jul      | 30-Jul     |
| racclu    | 4             | 1                   | 5      | 2            | 30-Jul      |            |
| taco      | 2             | 1                   | 3      | 1            | 30-Jul      |            |
| Guest     | 1             | 1                   | 0      | 1            | 30-Jul      |            |
| bravecan  | 9             | 2                   | 0      | 3            | 30-Jul      | 1-Aug      |
| nanwei    | 4             | 1                   | 0      | 1            | 30-Jul      |            |
| allison   | 11            | 3                   | 9      | 4            | 30-Jul      | 19-Aug     |
| Judy      | 1             | 1                   | 0      | 0            | 31-Jul      |            |

| Name         | No. of logins | No. of days visited | Bricks    | Compositions | First visit | Last visit |
|--------------|---------------|---------------------|-----------|--------------|-------------|------------|
| cora         | 2             | 1                   | 1         | 0            | 31-Jul      |            |
| bruck        | 3             | 1                   | 0         | 1            | 31-Jul      |            |
| cora         | 3             | 2                   | 0         | 0            | 31-Jul      | 14-Aug     |
| gl           | 8             | 3                   | 0         | 6            | 31-Jul      | 10-Aug     |
| joe          | 1             | 1                   | 0         | 0            | 31-Jul      |            |
| eric         | 2             | 1                   | 2         | 1            | 31-Jul      |            |
| hajin        | 6             | 2                   | 0         | 1            | 31-Jul      | 2-Aug      |
| angra        | 1             | 1                   | 0         | 0            | 1-Aug       |            |
| Inca         | 9             | 2                   | 19        | 10           | 1-Aug       | 3-Aug      |
| heavywood    | 1             | 1                   | 0         | 1            | 3-Aug       |            |
| H.Y. Hsiao   | 1             | 1                   | 0         | 0            | 3-Aug       |            |
| ethan        | 1             | 1                   | 0         | 0            | 3-Aug       |            |
| firefly      | 2             | 2                   | 0         | 1            | 4-Aug       | 5-Aug      |
| pipioo       | 8             | 1                   | 0         | 1            | 5-Aug       |            |
| vgod         | 39            | 1                   | 1         | 1            | 5-Aug       |            |
| toung        | 2             | 1                   | 0         | 4            | 5-Aug       |            |
| aithne       | 1             | 1                   | 0         | 0            | 6-Aug       |            |
| H.W. Chen    | 1             | 1                   | 0         | 0            | 7-Aug       |            |
| chia         | 7             | 3                   | 0         | 0            | 15-Aug      | 21-Aug     |
| ethahw       | 3             | 2                   | 6         | 0            | 19-Aug      | 22-Aug     |
| alcy         | 2             | 1                   | 0         | 0            | 20-Aug      |            |
| wuhsi        | -             | -                   | 48        | 16           |             |            |
| <b>Total</b> | <b>137</b>    | <b>42</b>           | <b>95</b> | <b>56</b>    |             |            |

Table 4-1: Statistics of user usage

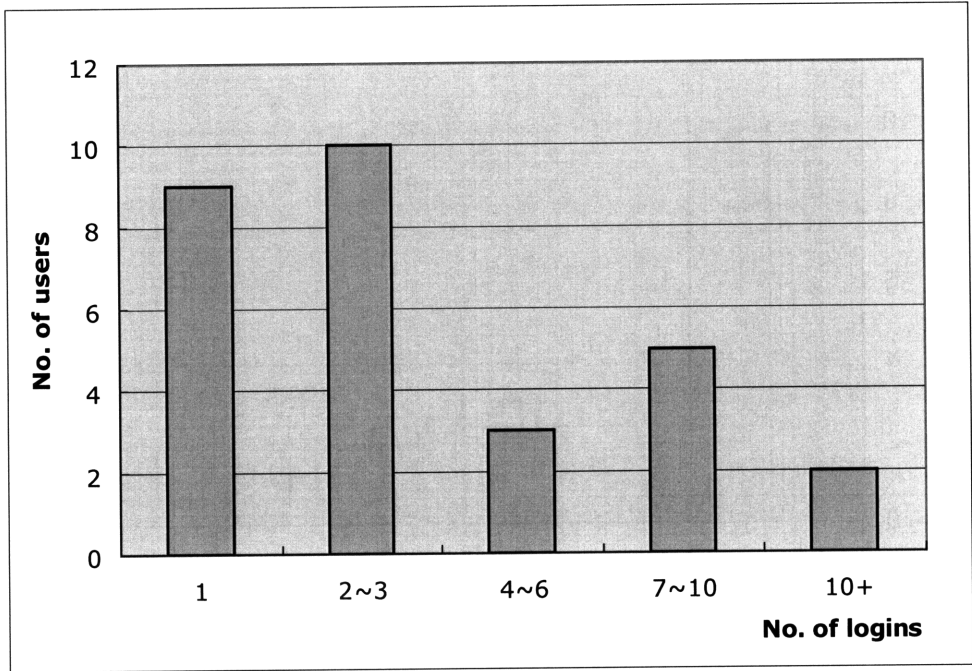


Fig 4-1: User distribution by number of logins

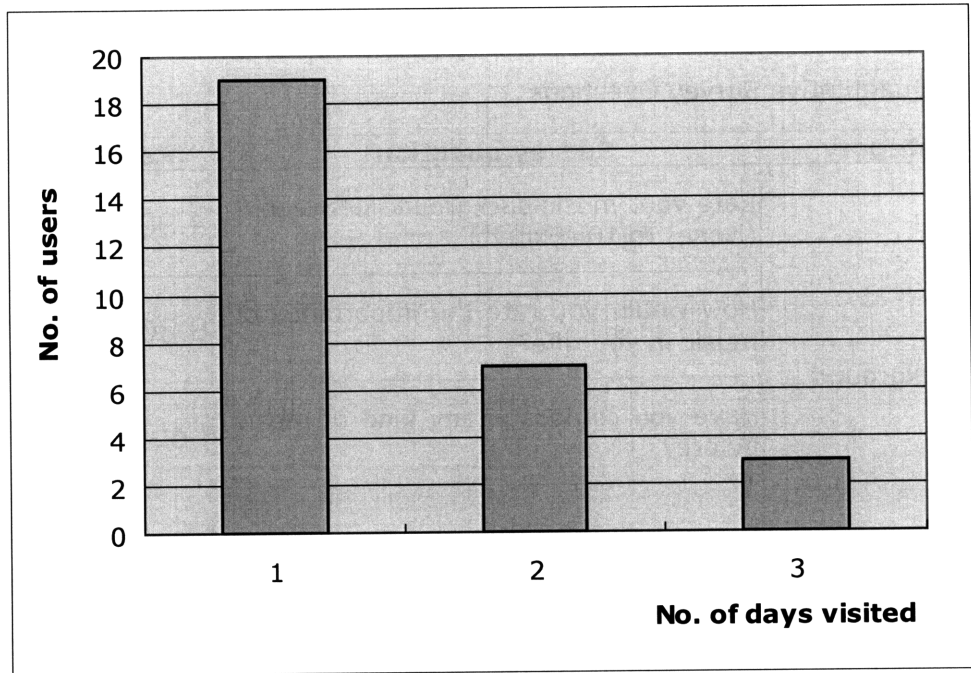


Fig 4-2: User distribution by number of days visited

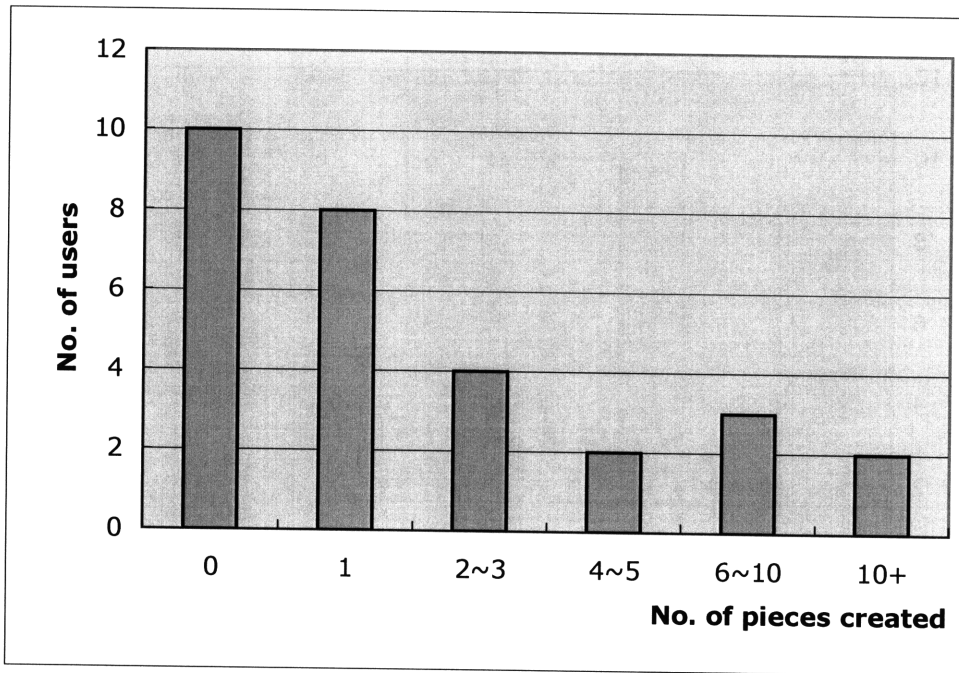


Fig 4-3: User distribution by number of pieces created

## 4.3 User Feedback

### 4.3.1 Quantitative Survey Questions

| Category            | Survey question   | Result      |
|---------------------|---|-------------|
| Background          | Rate your music background between 0 (None) to 10 (Expert)      | 4.90/10.0   |
|                     | How would you rate the importance of music in your life?        | 8.30/10.0   |
|                     | Have you composed any kind of music before?                     | 4 out of 10 |
|                     | Do you still compose?   | 2 out of 10 |
| Graphical Interface | Are you able to read the music through the painting-like score? | 7.20/10.0   |



|               |   |             |
|---------------|---|-------------|
|               | Do you consider drawing an effective way for inputting/editing music?   | 8.50/10.0   |
| Musical Brick | Did you try to make a musical brick?  | 8 out of 10 |
|               | Is it fun to find out what is in the musical brick box?   | 9.10/10.0   |
|               | Did you try to reuse musical bricks created by others in your composition?                                      | 7 out of 10 |
|               | In overall, is the musical brick box easy to use?   | 8.10/10.0   |
| Music Browser | Did you use the browser to see what other users are up to?  | 9 out of 10 |
|               | Did you have fun to see what other users are up to?   | 8.33/10.0   |
|               | Are you able to find inspiration in other users' composition?   | 9.11/10.0   |
| Sharing       | Do you feel comfortable to share your music creation?   | 9.0/10.0    |
|               | Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? | 7.78/10.0   |
| Conclusion    | In overall, is Musicpainter fun to play with?   | 9.30/10.0   |
|               | In overall, is Musicpainter easy to pick up?  | 8.30/10.0   |

Table 4-2: Summary of quantitative survey questions

#### 4.3.2. Other survey questions

##### (1) Best feature in Musicpainter

The graphical interface design receives four votes. Among these four votes, one user mentioned it's just great to remove the treble clef, which is an obstacle to him. Sharing, open source culture, and building community receives three votes. The brick-composing feature also gets two votes. One of the voters didn't give her vote to any functional feature of Musicpainter. She simply gave her vote to its being fun and easy.

##### (2) Most-wanted feature in Musicpainter

Since no one asked for the same feature, I'll just list the answers under these four categories.

(a) Graphical Interface: Turn all functions and instruments into graphical icons. Make the interface look even cuter. Have a map of what the notes are at the left panel of the canvas. Draw spectrogram of music. Add alternative input devices.

(b) Musical Bricks: Generate different variations of a musical brick, such as to reverse, turn upside down. Make musical bricks stretchable. Mark the beat points of bricks, help you combine bricks in sync.

(c) Social feature: Add a place to write description of compositions along with a message board to hear comment and response from others. Support collaborative composing in real-time.

(d) Educational feature: Offer basic composing lessons.

## 4.4 User Behavior Analysis

In this section, I will analyze selected users' behavior base on the music pieces they created, relevant information they left on the pieces and on the survey, and my personal acquaintance with several users.

(1) User Name: bravecan

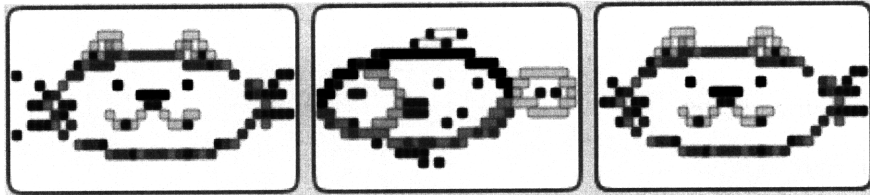


Fig 4-4a: Music created by bravecan

Bravecan is a graduate student, who wanted to pretend to be an eight-year-old representative in Musicpainter. She took a pure visual approach to create music.

(2) User Name: Allison

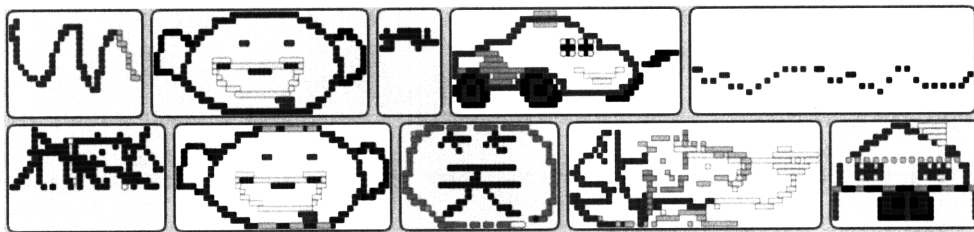


Fig 4-4b: Music created by Allison

Allison invited ethanw, an eight-year-old child to play together. She saw the "drawing" by bravecan and started drawing herself. She did try to replicate a children's song (the last piece in the first row), but it is out of synchronization.

(3) User Name: ethahw

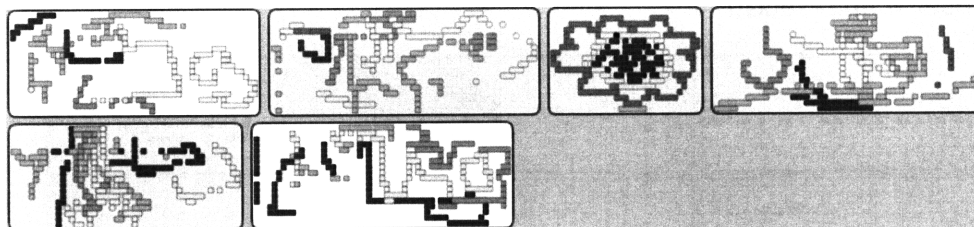


Fig 4-4c: Music created by ethahw

According to Allison, Ethan is an eight-year-old kid, who likes Musicpainter very much. He didn't know how to create a brick and to

reuse them; he just kept drawing. But he did try to revise his drawing to create better sounding piece. He never used any percussion sound in his pieces.

(4) User Name: Bruck

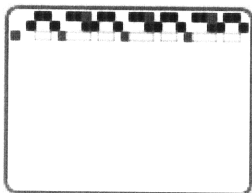


Fig 4-4d: Music created by Bruck

This is the only piece Bruck shared, which repeats a short rhythmic pattern for three times. It is likely that he was using the musical brick feature to create such repetition but didn't know how to share both the compositions and musical bricks.

(5) User Name: Eric



Fig 4-4e: Music created by Eric

Eric made his own musical brick (the second block) and composed his piece (the first block) by repeating the brick with three different ways of transformation.

(6) User Name: racclu

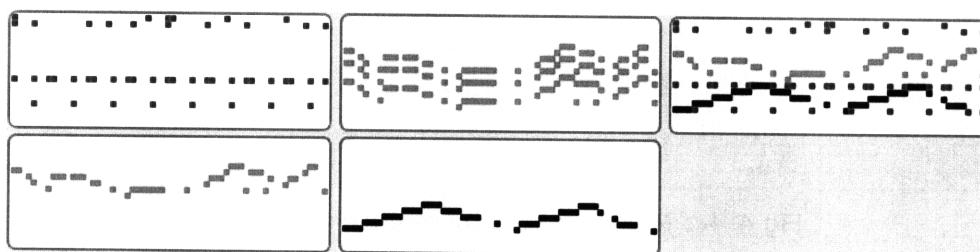


Fig 4-4f: Music created by racclu

Racclu is a jazz musician. The top-right block he created is the best jazz piece in Musicpainter so far. He also separated each track into independent musical bricks. In the second block in first row, he put three copies of a brick in parallel to create great harmony. He didn't use any brick created by other users.

(7) User Name: vgod

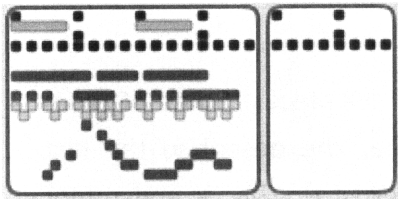


Fig 4-4g: Music created by vgod

In his composition, vgod used his own rhythm brick and two other melody bricks. He also tried to enrich the harmony by adding several sustaining notes.

(8) User Name: Inca

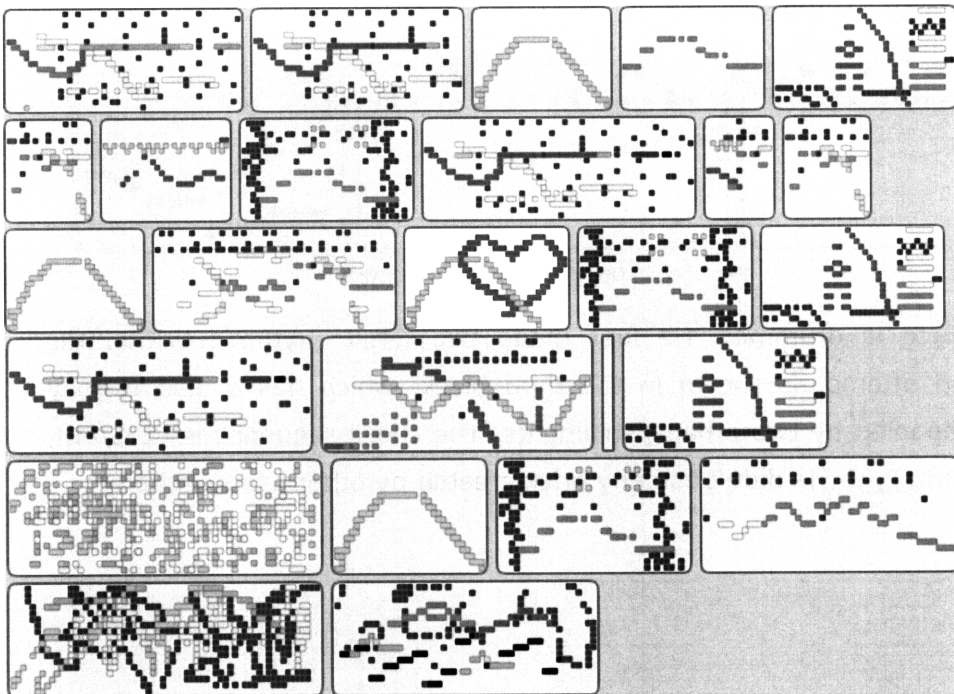


Fig 4-4h: Music created by Inca

Inca has been the most productive users on Musicpainter. She made 19 musical bricks and 10 compositions. The top half of the above figure are her musical bricks, and the bottom half are her compositions. Although she extensively used the musical bricks created by others in her compositions, it seems that she was confused by the difference of two formats. Therefore, she saved most pieces in both format. She definitely liked to play with different musical scales since she used all six of them in her pieces.

She added title and description to each of her pieces. Some of them stated her composing approaches. For example, she described the last piece in the fourth row as "lead melody + chords + ~~~ + end major chord + percussions." In the last piece in the last row, she said, "pieced several blocks together". Others were social messages like "I can hear it now! It's so cool", or "Show Fatty a melody on top of taco's rhythm".

(9) User Name: taco

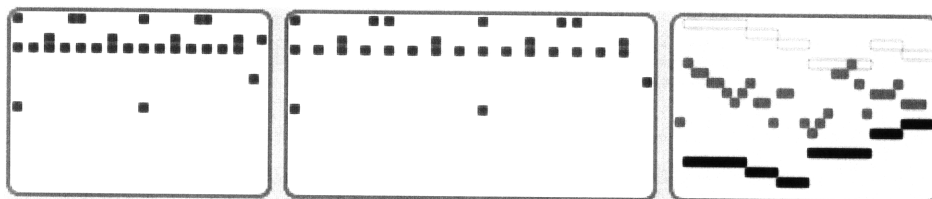


Fig 4-4i: Music created by taco

Taco is drummer. He first made two great rhythmic bricks. His second attempt is shown in the third block, which has a lead melody accompanied by two other instruments. The chord sequence is C, G/Bm, Am, Dm, F, G. He didn't use any brick created by other users, either.

(10) User Name: toung

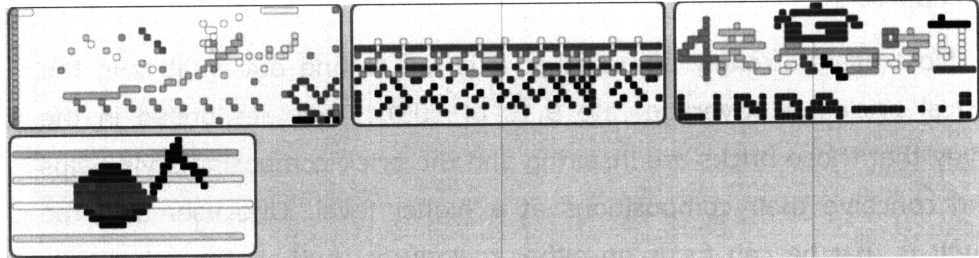


Fig 4-4j: Music created by toung

She created several interesting pieces, with a mixture of visual and musical approaches. She used every color that is available on the interface in almost every composition. In the fourth block, she put four drone-like sounds as a sustaining augmented chord, and in the foreground is a drawing of a huge smiling musical note. In addition, she is the only user who knows how to change the dynamics of music in Musicpainter.

#### 4.5 Summary

Of the 29 Musicpainter users, 19 of them (65.5%) created at least one piece of music; 10 of them (35.5%) visited Musicpainter for more than two days. Although in the survey, most users agreed that it is fun to play with Musicpainter (average rate 9.30 of 10.0), only a small portion of users login in a regular basis.

The user manual is available on the download web page, but obviously, no one is reading the manual. In my opinion, the program will be better understood and advertised with a tutorial video. However, users didn't seem to have problems without a tutorial. They agreed that Musicpainter is easy to use (average rate 8.30 of 10.0), and musical brick box is also easy to play with (average rate 8.10 of 10.0).

Users with higher music proficiency tend to give a slightly lower rate to the graphical composing interface design. What interest them are the brick-composing design and the sharing resource. Novice users, on the other hand, like the drawing interface more. We do see several users start

composing with a visual approach, but most of them were not limited to such approach.

Most users strongly agreed that it is fun to find out what is in the musical brick box (average rate 9.10 of 10.0). They responded in the survey that those bricks are inspiring and the brick-composing style helps them conceive their compositions at a higher level. One user said the benefit is that he can focus on either melody or rhythm; the other user said it is great to be able to keep the motif and think about it later. However, one user mentioned that he needs assistance in finding good ways of combining musical bricks.

## **4.6 Discussion**

### (1) Interface design

The interface design needs to be improved in the following aspects: First, there are too many buttons on the left, and users were confused by some of the buttons with identical descriptions. For example, there are two "Explore" and two "Save" buttons, one for browsing/saving musical bricks and the other for compositions. But they are unclear to users. Moreover, we really need a tutorial video for users to explain advance features like making a brick, changing the musical scale and so on.

### (2) Musicpainter as a learning environment

With such a short period of user study, it is hard for us to evaluate the effectiveness of Musicpainter being a learning environment for music composition. However, the following observations indicate a promising start. First, novice users liked to draw music, which helps them engage in composing initially. However, they moved forward because they saw how other users composed. Second, we claim that Musicpainter is a learning environment since users gather and learn from each other. The fact that users browse and play with the bricks and compositions created by others shows that we are moving toward the right direction.



### (3) Collaborative composing

Collaborative composing happened, but did not happen very often in the pilot study. Of the four users who reused musical bricks in their compositions, two of them used the bricks created by others. One user began her piece by adding notes on an existing piece. In these cases, users didn't try to collaborate with others. They were simply looking for attracting material to play with.

Aside from the interface design issue, we have such a small group of users who are strangers to other. That definitely does not help them to collaborate in any form. One thing I should try is to hold a workshop between a small group of users who already know each other. It will be interesting to observe how the social context changes the interaction between users.



# Chapter 5

## Conclusion

This thesis presents the design and implementation of Musicpainter, a networked graphical composing environment that supports and encourages sharing and collaboration between users. We address the issue that existing graphical computer-assisted composing tools are stand-alone applications that their users tend to compose alone. Other music platforms that combine the design of user generated-content and social networking websites are sequencer-based applications, in which users create music mostly by re-mixing audio and midi tracks. Our work is oriented toward a social environment in music composition domain that creates and supports a community of novice composers.

A music composition comes from a combination of various musical ideas. Each idea can be as small as a tiny catchy tune, a rhythmic pattern, a chord, or a way to combine them. Instead of sharing compositions, we encourage users to share these ideas, which we name as musical bricks. They are collected and made available to all users as a shared composing resource. As a result, users don't need to compose from scratch; they can begin composing by collecting a handful of musical bricks, and then find ways to piece them together. On the other hand, large-scale compositions are shared as open projects. Users can listen to and change any piece if they want. The system generates an attribution list on the edited piece and thus allows users to trace how a piece evolves in the environment. Shared resource and open projects form the foundation of the social environment, and they create an opportunity for users to compose in a collaborative manner. Our musical brick box and music browser are the realization of the above concept.

A pilot study of Musicpainter is conducted to verify our design. Thirty users downloaded the program and contributed a total of 90 partial or

complete compositions. We present the statistics of basic user usage, a summary of user survey, and an analysis of the music created by users.

## **5.1 Future works**

The conclusion of the thesis does not conclude the Musicpainter project. On the contrary, this is just a beginning, as I will launch the project to general public in the coming semester. Before that happens, this project can be refined in the following aspects.

### **Alternative input method**

This is the most-wanted feature according to the user survey. First, we should consider building a “scanner” mode for users to generate more synchronized music. In scanner mode, the inputted notes will be written right on the running timeline. Therefore, users can improvise music by jamming with the created music. In addition, one of the reasons why it is difficult to compose music through the drawing interface is that, when users have music on their mind, they need to convert the music back into visual domain before they create the music through the drawing interface. Such conversion requires musical knowledge and thus becomes an obstacle for novice users. In fact, several users asked me if they could directly create melody in Musicpainter by humming or singing, or produce rhythm by drumming on a table. We might want to find a solution for these demands.

### **Transformation of musical brick**

In the current version of Musicpainter, users reuse musical bricks on their compositions in a copy-paste manner. Users can only repeat, instead of develop the musical patterns as motif since there are only limited transformative operations for users to create variations of bricks. In the future work, a musical brick editor will be developed so that users can explore various possibilities to transform the musical bricks according to different musical context.

### **Managing shared musical bricks and compositions**

The increased amount of shared musical bricks and compositions doesn't necessarily lead to the increase of usable composing resource. On the contrary, sometimes it means that users need to spend more and more time in finding the right material. I plan to adopt the following approaches to manage the shared resource in a collaborative manner. First, rank all the shared bricks and compositions by collecting user feedback. However, we have to be careful whether low ranking will discourage novice users to share their creation. The "Love it" button in Scratch is one of the designs we can adopt here.

Second, social tagging is another possible approach to collaboratively manage the organization of the shared resource. With tagging information attached on each brick and composition, users can perform text search for specific material. In addition, the entire collection of bricks and compositions can be organized onto a map, which is a better medium for users to "shop" around.

Moreover, we can make personal brick collections shareable. The theme of each collection can be further described. As a result, instead of collecting bricks one by one, users will have the option to collect collections.

### **More social features to engage users**

There was one user who used to ask me, "Who else is online right now?" Knowing the presence of other users might encourage users to participate in collaboration more. Designs can be made to support social interaction between users who are online at the same time.

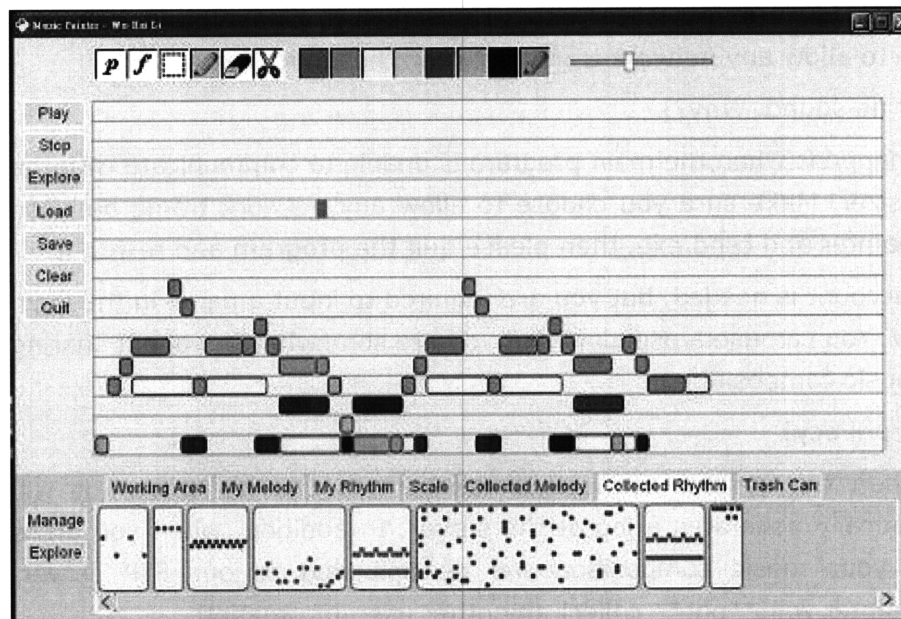
The other missing feature is also a question frequently asked by users: "What's new?" They want to know what just happened, what has happened since their last visit, or what happened to their creation later? User activities are not independent events; they should be represented as stories with multiple threads.

Furthermore, I am thinking about expanding the design of open project. In our pilot study, we hardly see any user try to help or change any composition created by others. They just don't know if they are welcome to do so or not. While all the creation in Musicpainter is open, an open project should mean something more than its availability to users; it could be a public invitation to users. The user who initiates a project will specify the game rules and other players can decide whether they want to join it or not. For example, I could mark an unfinished piece as an open project and specify that I need someone who collects rhythm bricks or someone who finishes the ending or even some experience users to be my composing consultant. Interested users can accept the invitation by claiming the roles and participating in the project.

## Appendix A – Musicpainter download page

### [Introduction]

Musicpainter is a networked graphical composing environment which aims to encourage sharing and collaboration between users. It has an easy-to-use composing interface, which turns music score into colorful painting. It guides the users to begin composing by creating mini-composition such as a melody or rhythm pattern, which we called musical brick. These bricks are collected and organized as a shared composing resource, which becomes a dynamic source of inspiration. The users can also browse and hack music pieces composed by others through the music browser. Musicpainter is not only a composing interface, it provides an environment where users can gather and learn how to compose from each other. It creates a place where different musical perspectives collide.



### [Download]

Complete .rar file (for windows) [[download](#)]

If you already have python/pygtk installed in your computer, please use this link instead (for windows) [[download](#)].

Linux and Mac version will be available soon.

### **[Install and Execution]**

1. Execute "install.bat", it will install 5 software packages on your computer: python, gtk+, pygtk, pycairo, pygobject. Related information about these software packages are available in the following link:

<http://www.python.org/>

<http://www.pygtk.org/>

2. Execute "play.bat", it will start a version check and then the Musicpainter. When the version is not up to date, it will automatically download the latest version from the server.

[Caution]

Musicpainter will trigger a music synthesizer program - csound(csnd.exe) running in the background, and it will also connect to the Musicpainter ftp server located in the media lab. If you receive warning from your firewall or anti-virus software, please make sure you choose to allow any network traffic between these programs.

[I hear no sound. Why?]

It happens when the main program is unable to communicate with the synthesizer. Make sure you choose to allow any network traffic between Musicpainter and csnd.exe, then please quit the program and re-run it.

3. No account is needed, but you are required to input a name in the login window. You can use a pseudonym if you are somewhat shy about sharing your music composition.

[About privacy]

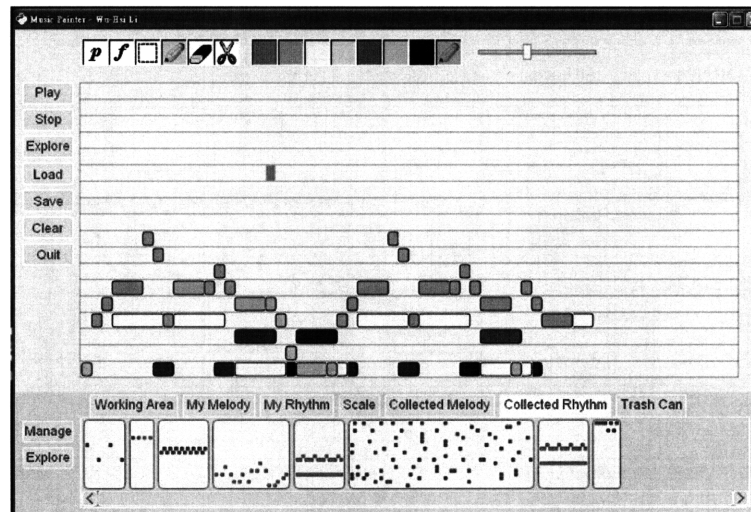
When the system connects/disconnects to the ftp server, it will automatically generates a log at the server. In addition, when you press 'save', your music composition will be uploaded to our FTP server. Musicpainter will **\*\*not\*\*** collect any other user information.

### **[Basic Features]**

1. Imagine you are using the painting program, drawing on the canvas with your mouse cursor. The difference is that you create sounds in every stroke. The x-y position and color of the block determines time, pitch, and instrument of the note. Percussion instrument is mapped to purple.

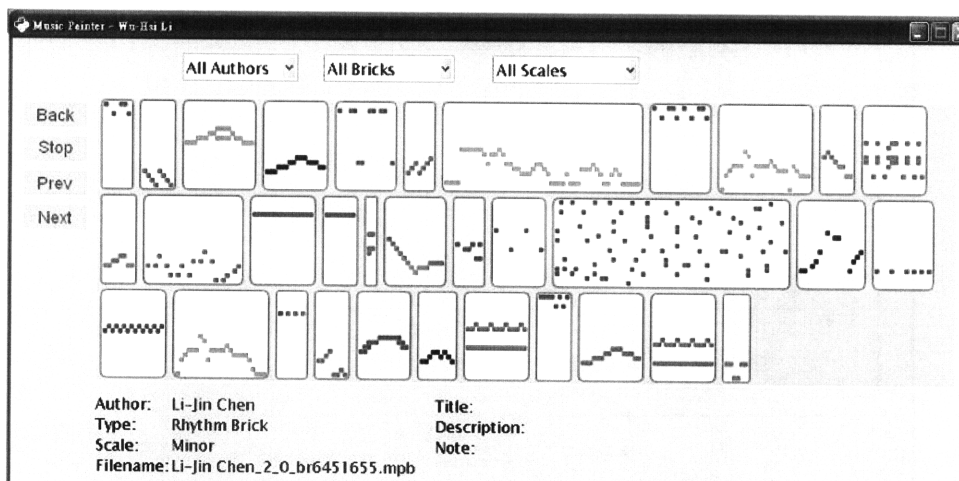


2. Click on "Play" button (Keyboard shortcut: "Space") to play music. You can use the slider on top-right to change the tempo of music during playing (Keyboard shortcut: "Left" and "Right"). Press "Up" and "Down" to shift the pitch.
3. A wider color block means a longer note. The horizontal-adjacent grids will be connected for non-percussion instrument. You may use the scissor tool to cut/uncut a long note.
4. The mapping between vertical axis and pitch is major scale by default. To change the mapping, please switch to "Scale" tab in the musical brick box below. You will see six different scale bricks: they are major, minor, chromatic, Chinese pentatonic, Japanese pentatonic, and blue note scale, respectively. Drag the brick onto the canvas to apply the change. Play again. The painting on the canvas will be re-interpreted according to the new mapping.
5. To change the volume of an individual note, please select the 'P' or 'F' tool on the toolbar and click on any note. The darkness of the color will reflect to the change of loudness. Different modes of volume change like crescendo, or diminuendo are available by clicking on the 'P' or 'F' tool multiple times.
6. With the selection tool (the one with a frame icon), you can select all notes within a region. After selecting musical notes, you can move it around, or copy it by dragging it all the way down to the brick area.



## [Advance Feature]

1. In Musicpainter, all music creation is saved as a composition or a musical brick. In general, musical bricks are small music patterns such as the melody, rhythm, or chord, which are the components of a music composition.
2. The painting on the canvas will be saved as a composition. Below the canvas is the musical brick box, which stores the material for composing. The patterns on the musical brick box will be saved as musical bricks.
3. To create a musical brick, please select musical notes on the canvas, drag it, and drop it down on the brick box. It will be placed in working area. To copy and paste a musical pattern, please drag a brick and drop it on the canvas.
4. In the musical brick box, each brick is placed in one of the six categories. You can move a brick to a different category by drag-and-drop.
5. Shared musical bricks will be placed in the category " Collected Melody" or "Collected Rhythm". The program creates a random selection for you. Click on any musical brick to play the music.
6. If you would like to collect shared bricks by yourself, click the "Explore" button (right next to the brick box) to get into the browser. You can filter the musical bricks by author, type, or musical scale. To collect the music bricks, please drag (from the browser) and drop (on the box).



7. Please click the other "Explore" button (right next to the canvas) to browser compositions. After selecting a piece of composition, press "Load" to load it. Feel free to hack a piece from others. You won't overwrite the original version and your new edition will contain a note about the history of the composition.

**[Conclusion]**

Musicpainter is developed by Wu-Hsi Li. If you have any question, please contact me: [wuhsi@media.mit.edu](mailto:wuhsi@media.mit.edu)

# Appendix B – User Survey Form

## User Evaluation of Musicpainter

Your ID in Musicpainter: \_\_\_\_\_

### Background

1. Briefly describe your music background, or rate it between 0(none) and 10(expert).
2. How would you rate the importance of music in your life? (0: I don't need it at all – 10: I can't live without)
3. Have you composed any kind of music before? Briefly describe your composing experience.
4. Do you still compose? What stops you from composing music?

### Graphical Interface

5. Are you able to read the music through the painting-like score? 1(strongly disagree) – 10 (strongly agree)
6. Do you consider drawing an effective way for inputting/editing music? 1(strongly disagree) – 10 (strongly agree)

### Musical Brick

7. Did you try to make a musical brick? (Yes/No)
8. Is it fun to find out what is in the musical brick box? 1(strongly disagree) – 10 (strongly agree)
9. Did you try to reuse musical bricks created by others in your composition? (Yes/No)
10. Briefly describe how having composing material available changes the way you compose.

**11. In overall, is the musical brick box easy to use? 1(strongly disagree) – 10 (strongly agree)**

**Music Browser**

**12. Did you use the browser to see what other users are up to?**

**13. Did you have fun to see what other users are up to? 1(strongly disagree) – 10 (strongly agree)**

**14. Are you able to find inspiration in other users' composition? 1(strongly disagree) – 10 (strongly agree)**

**Sharing**

**15. Do you feel comfortable to share your music creation? 1(strongly disagree) – 10 (strongly agree)**

**16. Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? 1 (strongly disagree) – 10 (strongly agree)**

**Conclusion**

**17. In overall, is Musicpainter fun to play with? 1(strongly disagree) – 10 (strongly agree)**

**18. In overall, is Musicpainter easy to pick up? 1(strongly disagree) – 10 (strongly agree)**

**19. What do you consider as the best feature in Musicpainter?**

**20. If you are able to add a feature in Musicpainter, regardless whether it is technical feasible or not, what would that be?**

**21. Do you have any other comment?**

## User Evaluation of Musicpainter

Your ID in Musicpainter: Allison

### Background

1. **Briefly describe your music background, or rate it between 0(none) and 10(expert).**

*One to two years' piano and violin learning in childhood. Rate: 3*

2. **How would you rate the importance of music in your life? (0: I don't need it at all – 10: I can't live without)**

*I need to listen to some music everyday. Rate: 9*

3. **Have you composed any kind of music before? Briefly describe your composing experience.**

*Not really or I've forgot, but I like to make my own songs impromptu in my daily life.*

4. **Do you still compose? What stops you from composing music?**

*N/A*

### Graphical Interface

5. **Are you able to read the music through the painting-like score? 1(strongly disagree) – 10 (strongly agree)**

*10. This application adds more flavors and colors into composition. I have had more fun and entertainment than composing on tradition score. It is definitely a very innovative application.*

6. **Do you consider drawing an effective way for inputting/editing music? 1(strongly disagree) – 10 (strongly agree)**

*5. I would rather say it is an innovative way!*

### Musical Brick

7. **Did you try to make a musical brick? (Yes/No)**

*No*

8. **Is it fun to find out what is in the musical brick box? 1(strongly disagree) – 10 (strongly agree)**

*Yes. 10.*

9. **Did you try to reuse musical bricks created by others in your composition? (Yes/No)**

*No*

10. **Briefly describe how having composing material available changes the way you compose.**

*I reviewed what I like and what I feel is beautiful. When composing, I tried to create new rhymes, therefore, I haven't reused the bricks whoever created. However, those handy bricks would become a very helpful and useful database to do future composition.*

**11. In overall, is the musical brick box easy to use? 1(strongly disagree) – 10 (strongly agree)**

*10*

**Music Browser**

**12. Did you use the browser to see what other users are up to?**

*Of course!*

**13. Did you have fun to see what other users are up to? 1(strongly disagree) – 10 (strongly agree)**

*Of course! Rate:10*

**14. Are you able to find inspiration in other users' composition? 1(strongly disagree) – 10 (strongly agree)**

*Definitely! Rate: 10*

**Sharing**

**15. Do you feel comfortable to share your music creation? 1(strongly disagree) – 10 (strongly agree)**

*Sure Rate: 10*

**16. Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? 1 (strongly disagree) – 10 (strongly agree)**

*Well..... Rate: 5*

**Conclusion**

**17. In overall, is Musicpainter fun to play with? 1(strongly disagree) – 10 (strongly agree)**

*Of course! This question answers the 5th questions above! Rate:10*

**18. In overall, is Musicpainter easy to pick up? 1(strongly disagree) – 10 (strongly agree)**

*8*

**19. What do you consider as the best feature in Musicpainter?**

*The idea itself of connecting painter with music composition. The idea of sharing as a community. I'm expecting a collaborative composition work in the near future by all the users! I'm also expecting a group competition in this application.*

**20. If you are able to add a feature in Musicpainter, regardless whether it is technical feasible or not, what would that be?**

*Make all the functions as graphic icons. To see the instrument that I'm adopting to draw.*

**21. Do you have any other comment?**

*I love the idea and the project! I have the faith that all the users do.*

## User Evaluation of Musicpainter

Your ID in Musicpainter: bravecan

### Background

1. Briefly describe your music background, or rate it between 0(none) and 10(expert).

3

2. How would you rate the importance of music in your life? (0: I don't need it at all – 10: I can't live without)

8

3. Have you composed any kind of music before? Briefly describe your composing experience.

No

4. Do you still compose? What stops you from composing music?

No

### Graphical Interface

5. Are you able to read the music through the painting-like score? 1(strongly disagree) – 10 (strongly agree)

7

6. Do you consider drawing an effective way for inputting/editing music? 1(strongly disagree) – 10 (strongly agree)

8

### Musical Brick

7. Did you try to make a musical brick? (Yes/No)

Yes

8. Is it fun to find out what is in the musical brick box? 1(strongly disagree) – 10 (strongly agree)

10

9. Did you try to reuse musical bricks created by others in your composition? (Yes/No)

Yes

10. Briefly describe how having composing material available changes the way you compose.



**11. In overall, is the musical brick box easy to use? 1(strongly disagree) – 10 (strongly agree)**

7

#### **Music Browser**

**12. Did you use the browser to see what other users are up to?**

Yes

**13. Did you have fun to see what other users are up to? 1(strongly disagree) – 10 (strongly agree)**

7

**14. Are you able to find inspiration in other users' composition? 1(strongly disagree) – 10 (strongly agree)**

7

#### **Sharing**

**15. Do you feel comfortable to share your music creation? 1(strongly disagree) – 10 (strongly agree)**

5

**16. Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? 1 (strongly disagree) – 10 (strongly agree)**

8

#### **Conclusion**

**17. In overall, is Musicpainter fun to play with? 1(strongly disagree) – 10 (strongly agree)**

9

**18. In overall, is Musicpainter easy to pick up? 1(strongly disagree) – 10 (strongly agree)**

7

**19. What do you consider as the best feature in Musicpainter?**

*It's fun and easy to use. I believe Musipainter can arouse children's curiosity to compose the music.*

**20. If you are able to add a feature in Musicpainter, regardless whether it is technical feasible or not, what would that be?**

*If Musicpainter is a toy for children, you could make the interface cuter.*

**21. Do you have any other comment?**

*It would be nice if it offers basic lessons about composing.*

## User Evaluation of Musicpainter

Your ID in Musicpainter: Eric

### Background

- 1. Briefly describe your music background, or rate it between 0(none) and 10(expert).**

*I have played trombone since I was in elementary school, played in a variety of classical, jazz and funk groups, and had some classes on jazz theory. So I'm a 7?*

- 2. How would you rate the importance of music in your life? (0: I don't need it at all – 10: I can't live without)**

*I think it's about an 8- very important.*

- 3. Have you composed any kind of music before? Briefly describe your composing experience.**

*I have done a little composing. I played around with MIDI software in high school, and wrote some compositions and arrangements for trombone quartet when I was college. Actually, lately I've used mmmtsss (the software I made for barry's class) to make little semi- improvised compositions. I used it to make a soundtrack for a youtube video that I made.*

- 4. Do you still compose? What stops you from composing music?**

*I haven't composed anything lately. I think the main thing that stops me from composing is the lack of a social context- I'm not in any musical groups right now. When I composed for trombone quartet in college, it was great to get feedback and have my pieces performed. Right now I'm not in a musical group so I don't have much motivation to compose.*

### Graphical Interface

- 5. Are you able to read the music through the painting-like score? 1(strongly disagree) – 10 (strongly agree)**

*7 it's easy to read the shape of the melody and the different parts using colors. It's hard to see the rhythmic structure because there are no bar lines, and it's hard to get a sense of the pitch space, like where the root is.*

- 6. Do you consider drawing an effective way for inputting/editing music? 1(strongly disagree) – 10 (strongly agree)**

*10 I think it definitely can be!*

### **Musical Brick**

**7. Did you try to make a musical brick? (Yes/No)**

*hm, I think I did, yes!*

**8. Is it fun to find out what is in the musical brick box? 1(strongly disagree) – 10 (strongly agree)**

*7 I enjoyed opening them up and listening to them*

**9. Did you try to reuse musical bricks created by others in your composition? (Yes/No)**

*yes, a little bit.*

**10. Briefly describe how having composing material available changes the way you compose.**

*It's interesting to try to work with other people's bits and pieces*

**11. In overall, is the musical brick box easy to use? 1(strongly disagree) – 10 (strongly agree)**

*6 I think it could be easier to use musically and also in terms of user interface*

### **Music Browser**

**12. Did you use the browser to see what other users are up to?**

*no, I didn't have a chance*

**13. Did you have fun to see what other users are up to? 1(strongly disagree) – 10 (strongly agree)**

*n/a*

**14. Are you able to find inspiration in other users' composition? 1(strongly disagree) – 10 (strongly agree)**

*n/a*

### **Sharing**

**15. Do you feel comfortable to share your music creation? 1(strongly disagree) – 10 (strongly agree)**

*I think it's hard because I would want to have a sense that I had "finished" my composition before others heard it, and I'd want to be able to add a description of it, and get feedback perhaps in the form of comments from others who listened to it.*

**16. Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? 1 (strongly disagree) – 10 (strongly agree)**

*This is an exciting motivation to compose, yes, but I didn't get far enough in using the software to really try this.*

## **Conclusion**

### **17. In overall, is Musicpainter fun to play with? 1(strongly disagree) – 10 (strongly agree)**

*8 fun but a little frustrating to really make something sound the way I wanted it to.*

### **18. In overall, is Musicpainter easy to pick up? 1(strongly disagree) – 10 (strongly agree)**

*8 it's easy to make sounds and melodies right away, and has a simple interface so there is some subtlety but not too many different elements to learn.*

### **19. What do you consider as the best feature in Musicpainter?**

*I think the instant feedback and visual nature of the composing process really lend themselves to playful, spontaneous composing.*

### **20. If you are able to add a feature in Musicpainter, regardless whether it is technical feasible or not, what would that be?**

*Ooh good question... Some features I would love to see:*

*- visible time structure to help make compositions rhythmically regular. we've talked about this a bit, and I know it is very tricky. I think it is okay to give up some flexibility in return for making it easier to make things sound good. Even if there were just vertical gridlines every 8 or 12 or 16 steps or whatever- and then you could drag them around (e.g. they would have drag handles on top and bottom, and if you moved one it would adjust the whole grid)*

*- visible pitch structure to help make compositions harmonically regular. So, like, even something as simple as a horizontal band at the pitch of the root would be nice, so you could see where a melody resolves.*

*- for sharing bricks and compositions, it would be nice to have previewing, textual descriptions, commenting, tagging, search features, etc.*

### **21. Do you have any other comment?**

*Looking forward to seeing more developments on this!*

## User Evaluation of Musicpainter

Your ID in Musicpainter:     GL    

### Background

- 1. Briefly describe your music background, or rate it between 0(none) and 10(expert).**

5

- 2. How would you rate the importance of music in your life? (0: I don't need it at all – 10: I can't live without)**

10

- 3. Have you composed any kind of music before? Briefly describe your composing experience.**

*Fairly easy composition homework*

*Electronic music, computer music, Algorithmic composition*

- 4. Do you still compose? What stops you from composing music?**

*I'm not good at conventional music composition, but I toy with computer music once in a while*

### Graphical Interface

- 5. Are you able to read the music through the painting-like score? 1(strongly disagree) – 10 (strongly agree)**

5

- 6. Do you consider drawing an effective way for inputting/editing music? 1(strongly disagree) – 10 (strongly agree)**

9

### Musical Brick

- 7. Did you try to make a musical brick? (Yes/No)**

Yes

- 8. Is it fun to find out what is in the musical brick box? 1(strongly disagree) – 10 (strongly agree)**

8

- 9. Did you try to reuse musical bricks created by others in your composition? (Yes/No)**

Yes

**10. Briefly describe how having composing material available changes the way you compose.**

*It makes composition become a dialogue, instead of a one-way expression. When you compose something, it makes you look forward to unknown consequence.*

*It provides more flexibility. I can spend all my time to work on a condensed idea, or build a random huge work by putting together existing stuff.*

**11. In overall, is the musical brick box easy to use? 1(strongly disagree) – 10 (strongly agree)**

6

**Music Browser**

**12. Did you use the browser to see what other users are up to?**

Yes

**13. Did you have fun to see what other users are up to? 1(strongly disagree) – 10 (strongly agree)**

9

**14. Are you able to find inspiration in other users' composition? 1(strongly disagree) – 10 (strongly agree)**

9

**Sharing**

**15. Do you feel comfortable to share your music creation? 1(strongly disagree) – 10 (strongly agree)**

9

**16. Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? 1 (strongly disagree) – 10 (strongly agree)**

8

**Conclusion**

**17. In overall, is Musicpainter fun to play with? 1(strongly disagree) – 10 (strongly agree)**

10

**18. In overall, is Musicpainter easy to pick up? 1(strongly disagree) – 10 (strongly agree)**

8

**19. What do you consider as the best feature in Musicpainter?**

*The sharing feature*

**20. If you are able to add a feature in Musicpainter, regardless whether it is technical feasible or not, what would that be?**

*I want to draw the spectrum of sound and hear what that becomes*

*Maybe the system can record the composition process to be reviewed after*

## User Evaluation of Musicpainter

Your ID in Musicpainter:   Inca  

### Background

1. **Briefly describe your music background, or rate it between 0(none) and 10(expert).**

*8, piano player, chorus singer, trombone player in a high school wind band...all amateur.*

2. **How would you rate the importance of music in your life? (0: I don't need it at all – 10: I can't live without)**

9

3. **Have you composed any kind of music before? Briefly describe your composing experience.**

*Barely. 6th grade composition homework. Random humming and playing on the piano. That's about it.*

4. **Do you still compose? What stops you from composing music?**

*No. Too busy with other things. Not motivated to compose.*

### Graphical Interface

5. **Are you able to read the music through the painting-like score? 1(strongly disagree) – 10 (strongly agree)**

7

6. **Do you consider drawing an effective way for inputting/editing music? 1(strongly disagree) – 10 (strongly agree)**

9

### Musical Brick

7. **Did you try to make a musical brick? (Yes/No)**

Yes

8. **Is it fun to find out what is in the musical brick box? 1(strongly disagree) – 10 (strongly agree)**

9

9. **Did you try to reuse musical bricks created by others in your composition? (Yes/No)**

Yes

10. **Briefly describe how having composing material available changes the way you compose.**

*It is nice to have different rhythms, melodies, or little cool pieces that I can put together. It is easier to create a "symphony" out of them when putting together compositions of more complicated music.*

**11. In overall, is the musical brick box easy to use? 1(strongly disagree) – 10 (strongly agree)**

10

#### **Music Browser**

**12. Did you use the browser to see what other users are up to?**

Yes

**13. Did you have fun to see what other users are up to? 1(strongly disagree) – 10 (strongly agree)**

7

**14. Are you able to find inspiration in other users' composition? 1(strongly disagree) – 10 (strongly agree)**

10

#### **Sharing**

**15. Do you feel comfortable to share your music creation? 1(strongly disagree) – 10 (strongly agree)**

8

**16. Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? 1 (strongly disagree) – 10 (strongly agree)**

6

#### **Conclusion**

**17. In overall, is Musicpainter fun to play with? 1(strongly disagree) – 10 (strongly agree)**

10

**18. In overall, is Musicpainter easy to pick up? 1(strongly disagree) – 10 (strongly agree)**

9

**19. What do you consider as the best feature in Musicpainter?**

*Being able to hear and visualize the music while composing it.*

**20. If you are able to add a feature in Musicpainter, regardless whether it is technical feasible or not, what would that be?**

*Have a map of what the notes (or percussion instruments) are at the left panel of the canvas so that I can easily find out which note sits where and compose while knowing that.*

**21. Do you have any other comment?**

*It's pretty cool.*



## User Evaluation of Musicpainter

Your ID in Musicpainter: Li-Jin Chen

### Background

1. **Briefly describe your music background, or rate it between 0(none) and 10(expert).**

*3, I played trumpet in high school for 1.5yrs, but not very good at it.*

2. **How would you rate the importance of music in your life? (0: I don't need it at all – 10: I can't live without)**

*5*

3. **Have you composed any kind of music before? Briefly describe your composing experience.**

*Never*

4. **Do you still compose? What stops you from composing music?**

*Never*

### Graphical Interface

5. **Are you able to read the music through the painting-like score? 1(strongly disagree) – 10 (strongly agree)**

*6*

6. **Do you consider drawing an effective way for inputting/editing music? 1(strongly disagree) – 10 (strongly agree)**

*9*

### 6 Musical Brick

7. **Did you try to make a musical brick? (Yes/No)**

*Yes*

8. **Is it fun to find out what is in the musical brick box? 1(strongly disagree) – 10 (strongly agree)**

*10*

9. **Did you try to reuse musical bricks created by others in your composition? (Yes/No)**

*Yes*

10. **Briefly describe how having composing material available changes the way you compose.**

*Composing by putting bricks together is kind of like doing music arrangement; it leads to higher-level thinking and it reduces the difficulties.*

**11. In overall, is the musical brick box easy to use? 1(strongly disagree) – 10 (strongly agree)**

7

#### **Music Browser**

**12. Did you use the browser to see what other users are up to?**

Yes

**13. Did you have fun to see what other users are up to? 1(strongly disagree) – 10 (strongly agree)**

5

**14. Are you able to find inspiration in other users' composition? 1(strongly disagree) – 10 (strongly agree)**

8

#### **Sharing**

**15. Do you feel comfortable to share your music creation? 1(strongly disagree) – 10 (strongly agree)**

10

**16. Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? 1 (strongly disagree) – 10 (strongly agree)**

10

#### **Conclusion**

**17. In overall, is Musicpainter fun to play with? 1(strongly disagree) – 10 (strongly agree)**

9

**18. In overall, is Musicpainter easy to pick up? 1(strongly disagree) – 10 (strongly agree)**

7

**19. What do you consider as the best feature in Musicpainter?**

*creating music without the treble clef, which is always an obstacle to me.*

**20. If you are able to add a feature in Musicpainter, regardless whether it is technical feasible or not, what would that be?**

*Automatically mark the beat points of each brick, then I'll know how to combine bricks in sync.*

**21. Do you have any other comment?**

*Good job*

## User Evaluation of Musicpainter

Your ID in Musicpainter: racclu

### Background

1. Briefly describe your music background, or rate it between 0(none) and 10(expert).

8

2. How would you rate the importance of music in your life? (0: I don't need it at all – 10: I can't live without)

9

3. Have you composed any kind of music before? Briefly describe your composing experience.

*Symphonic poems, composed and played on a keyboard*

4. Do you still compose? What stops you from composing music?

Yes

### Graphical Interface

5. Are you able to read the music through the painting-like score? 1(strongly disagree) – 10 (strongly agree)

7

6. Do you consider drawing an effective way for inputting/editing music? 1(strongly disagree) – 10 (strongly agree)

7

### Musical Brick

7. Did you try to make a musical brick? (Yes/No)

yes

8. Is it fun to find out what is in the musical brick box? 1(strongly disagree) – 10 (strongly agree)

9

9. Did you try to reuse musical bricks created by others in your composition? (Yes/No)

Not yet

10. Briefly describe how having composing material available changes the way you compose.

*it's inspiring for composing in comparison with composing alone*

**11. In overall, is the musical brick box easy to use? 1(strongly disagree) – 10 (strongly agree)**

8

#### **Music Browser**

**12. Did you use the browser to see what other users are up to?**

yes

**13. Did you have fun to see what other users are up to? 1(strongly disagree) – 10 (strongly agree)**

9

**14. Are you able to find inspiration in other users' composition? 1(strongly disagree) – 10 (strongly agree)**

9

#### **Sharing**

**15. Do you feel comfortable to share your music creation? 1(strongly disagree) – 10 (strongly agree)**

10

**16. Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? 1 (strongly disagree) – 10 (strongly agree)**

10

#### **Conclusion**

**17. In overall, is Musicpainter fun to play with? 1(strongly disagree) – 10 (strongly agree)**

8

**18. In overall, is Musicpainter easy to pick up? 1(strongly disagree) – 10 (strongly agree)**

8

**19. What do you consider as the best feature in Musicpainter?**

*the open source of music and composition*

**20. If you are able to add a feature in Musicpainter, regardless whether it is technical feasible or not, what would that be?**

*A place to write description on my piece and a message board to hear comment and response from others*

**21. Do you have any other comment?**

*Keep going!*

## User Evaluation of Musicpainter

Your ID in Musicpainter: taco

### Background

- 1. Briefly describe your music background, or rate it between 0(none) and 10(expert).**

*6, not professional player, but learned several instruments while growing up (ex. piano, guitar, drum, etc.) Also learned jazz harmony theory by myself.*

- 2. How would you rate the importance of music in your life? (0: I don't need it at all – 10: I can't live without)**

*10, definitely can't live without music.*

- 3. Have you composed any kind of music before? Briefly describe your composing experience.**

*I wrote pop rock songs, also learned jazz composing a bit. Try to arrange for pop rock songs with a band.*

- 4. Do you still compose? What stops you from composing music?**

*I still compose then. Nothing can stop me from writing and playing music.*

### Graphical Interface

- 5. Are you able to read the music through the painting-like score? 1(strongly disagree) – 10 (strongly agree)**

*6. It is in a way more effective than original score kinda approach, but the trade-off is that it's not that precise. Maybe for those who are not pro to music, it's a good way to start with and easily get sound out of it. But for professional musicians, it's not so good for presenting ideas, but this is just my personal opinion.*

- 6. Do you consider drawing an effective way for inputting/editing music? 1(strongly disagree) – 10 (strongly agree)**

*9. Yes, I believe it is one of the effective way of inputting/editing, but still somehow similar to score input.*

### Musical Brick

- 7. Did you try to make a musical brick? (Yes/No)**

*Yes*

- 8. Is it fun to find out what is in the musical brick box? 1(strongly disagree) – 10 (strongly agree)**

*10*

- 9. Did you try to reuse musical bricks created by others in your composition? (Yes/No)**

*Not yet*

- 10. Briefly describe how having composing material available changes the way you compose.**

*While I am writing songs, generally starting from one or several motifs, and the others will follow and flow out. This is usually the case for me. So I believe that music can be consisted with motifs (blocks here), if there are motifs out there, it will be easier to stimulate the song writing thinking and enter the composing stage...*

*Also, if this is a good way to save the motifs as blocks, which will be useful that if the motif comes out while you are in the middle of things, you can save it and think about it later.*

- 11. In overall, is the musical brick box easy to use? 1(strongly disagree) – 10 (strongly agree)**

*10. It's definitely intuitive and don't even need a manual to start with. Which is a really good GUI design.*

### **Music Browser**

- 12. Did you use the browser to see what other users are up to?**

*Yes, but not much*

- 13. Did you have fun to see what other users are up to? 1(strongly disagree) – 10 (strongly agree)**

*10*

- 14. Are you able to find inspiration in other users' composition? 1(strongly disagree) – 10 (strongly agree)**

*10. In music creating process, people always get influenced by others. With this block sharing thing, you can really get the idea of other musicians in the very beginning stage. Which helps you to understand and even absorb the concept why other people's music is good to listen to.*

### Sharing

**15. Do you feel comfortable to share your music creation? 1(strongly disagree) – 10 (strongly agree)**

*10. Sure, this is an interaction, and both can benefit from that.*

**16. Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? 1 (strongly disagree) – 10 (strongly agree)**

*7. I guess so. But not that sure about this part. I will still compose even no one's gonna use my stuff.*

### Conclusion

**17. In overall, is Musicpainter fun to play with? 1(strongly disagree) – 10 (strongly agree)**

*10*

**18. In overall, is Musicpainter easy to pick up? 1(strongly disagree) – 10 (strongly agree)**

*10*

**19. What do you consider as the best feature in Musicpainter?**

*The block composing feature, it really describe the music in a way that it's built up from blocks. The idea is cool.*

**20. If you are able to add a feature in Musicpainter, regardless whether it is technical feasible or not, what would that be?**

*I think maybe can try to alter the motif a bit, like I have read a book about writing songs. Maybe after one block is generate, can automatically generate the related block which are reverse, up side down, etc. That can at least help people go through one of the music composing idea/concept.*

*And I still think that the mapping from painting canvas to music score can be improved, though I don't know how.*

**21. Do you have any other comment?**

*Cool stuff, man. I think there are definitely a log more features can be added. Maybe combined with music analysis thing, maybe can be music teach kinda of thing.*

## User Evaluation of Musicpainter

Your ID in Musicpainter:   toug  

### Background

1. **Briefly describe your music background, or rate it between 0(none) and 10(expert).**

4

2. **How would you rate the importance of music in your life? (0: I don't need it at all – 10: I can't live without)**

8

3. **Have you composed any kind of music before? Briefly describe your composing experience.**

*none. none. none of any experience about composing.*

*(I actually not sure about the definition of "composing". If randomly humming sound that "I think" is dulcet is a kind of composing, then that's the only kind of composing experience I've ever had. And I do that all the time.)*

4. **Do you still compose? What stops you from composing music?**

*I never think I can do that or I am doing that.*

### Graphical Interface

5. **Are you able to read the music through the painting-like score? 1(strongly disagree) – 10 (strongly agree)**

9

6. **Do you consider drawing an effective way for inputting/editing music? 1(strongly disagree) – 10 (strongly agree)**

10

### Musical Brick

7. **Did you try to make a musical brick? (Yes/No)**

*No*

8. **Is it fun to find out what is in the musical brick box? 1(strongly disagree) – 10 (strongly agree)**

8

9. **Did you try to reuse musical bricks created by others in your composition? (Yes/No)**

*Yes*

10. **Briefly describe how having composing material available changes the way you compose.**

*It becomes a good entrance for me to sort of composing by playing with existing musical bricks. By observing the bricks that I gradually get the idea of this platform.*



**11. In overall, is the musical brick box easy to use? 1(strongly disagree) – 10 (strongly agree)**

8

#### **Music Browser**

**12. Did you use the browser to see what other users are up to?**

Yes

**13. Did you have fun to see what other users are up to? 1(strongly disagree) – 10 (strongly agree)**

8

**14. Are you able to find inspiration in other users' composition? 1(strongly disagree) – 10 (strongly agree)**

9

#### **Sharing**

**15. Do you feel comfortable to share your music creation? 1(strongly disagree) – 10 (strongly agree)**

10

**16. Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? 1 (strongly disagree) – 10 (strongly agree)**

6

#### **Conclusion**

**17. In overall, is Musicpainter fun to play with? 1(strongly disagree) – 10 (strongly agree)**

10

**18. In overall, is Musicpainter easy to pick up? 1(strongly disagree) – 10 (strongly agree)**

8

**19. What do you consider as the best feature in Musicpainter?**

*The painting-like interface*

**20. If you are able to add a feature in Musicpainter, regardless whether it is technical feasible or not, what would that be?**

*I would love to be able to compose with friends realtime (sort of like the project ClearBoard - <http://tangible.media.mit.edu/projects/ClearBoard/>)*

## User Evaluation of Musicpainter

Your ID in Musicpainter: vgod

### Background

1. Briefly describe your music background, or rate it between 0(none) and 10(expert).

2 (only have little experience on playing drum sets)

2. How would you rate the importance of music in your life? (0: I don't need it at all – 10: I can't live without)

7

3. Have you composed any kind of music before? Briefly describe your composing experience.

No

4. Do you still compose? What stops you from composing music?

No

### Graphical Interface

5. Are you able to read the music through the painting-like score? 1(strongly disagree) – 10 (strongly agree)

8

6. Do you consider drawing an effective way for inputting/editing music? 1(strongly disagree) – 10 (strongly agree)

9

### 7 Musical Brick

7. Did you try to make a musical brick? (Yes/No)

Yes

8. Is it fun to find out what is in the musical brick box? 1(strongly disagree) – 10 (strongly agree)

10

9. Did you try to reuse musical bricks created by others in your composition? (Yes/No)

Yes

10. Briefly describe how having composing material available changes the way you compose.

*Composing by existing bricks makes me easier to borrow from other great melody and rhythm. In addition, I can focus on composing either melody or rhythm, not both of them.*

**11. In overall, is the musical brick box easy to use? 1(strongly disagree) – 10 (strongly agree)**

9

#### **Music Browser**

**12. Did you use the browser to see what other users are up to?**

Yes

**13. Did you have fun to see what other users are up to? 1(strongly disagree) – 10 (strongly agree)**

10

**14. Are you able to find inspiration in other users' composition? 1(strongly disagree) – 10 (strongly agree)**

10

#### **Sharing**

**15. Do you feel comfortable to share your music creation? 1(strongly disagree) – 10 (strongly agree)**

9

**16. Knowing your music creation might reappear in other users' compositions, do you become more willing to compose? 1 (strongly disagree) – 10 (strongly agree)**

10

#### **Conclusion**

**17. In overall, is Musicpainter fun to play with? 1(strongly disagree) – 10 (strongly agree)**

9

**18. In overall, is Musicpainter easy to pick up? 1(strongly disagree) – 10 (strongly agree)**

10

**19. What do you consider as the best feature in Musicpainter?**

*Musical bricks*

**20. If you are able to add a feature in Musicpainter, regardless whether it is technical feasible or not, what would that be?**

*1. add more input devices for painting music*

*2. make musical bricks be stretchable*

**21. Do you have any other comment?**

*Music painter is cool!*



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