Vuzik: Music Creation and Comprehension through Painting

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ABSTRACT
Vuzik is an interface designed to empower users to create digital music by painting. Through an intuitive mapping of sound to visuals designed to be simple enough for a child to comprehend, *Vuzik* uses a music-painting metaphor to enable users to compose and perform music through simple painting gestures, effectively "seeing" their music as they hear it. Our paper presents the design of *Vuzik*, details the implementation of the current prototype, and discusses the preliminary user evaluation we performed and how it informs our coming design efforts. We envision that *Vuzik* will help both the creator and audience better understand music's construction, thereby making the composition of music more accessible to children and novices and opening up new creative approaches for all.

Keywords
Graphic Music Composition, Music Creation, Music Comprehension, Music Education, Surface Interaction, Children, tangible user interfaces, sketch-based interaction.

1. INTRODUCTION
Throughout musical history, musicians and music lovers have sought to create visualizations of music to give this ephemeral medium a more permanent form through which to study, preserve, and recreate it. From the highly developed symbolic language of traditional music notation, to Kandinsky's Improvisation and Composition painting series [8], to the emergence of graphic scores by composers such as Stockhausen and Penderecki [11], music's intelligibility has benefitted from the tangibility offered by multimodal renderings perceivable by sight and other senses beyond hearing.

Towards a goal of fostering music understanding and creativity through tangibility, we created the *Vuzik* interface which is inspired by these past classic visualization efforts. *Vuzik* is a creative interface that was designed to empower users to make digital music by painting using a vertical interactive surface. Named with reference to "visual" or "viewable" music (and pronounced similarly to *music*) *Vuzik* uses an intuitive mapping of sound to visuals in order to allow users to compose and perform music through simple painting gestures, without music notation, effectively allowing users to "see" their music as they hear it. We designed the interface to be simple and playful enough for a child to use, in recognition of the immense formative value that creative experiences have on a child's cognitive development [1, 13, 18], yet also to have capabilities that afford meaningful, complex musical experiences. We also hope that the *Vuzik* composing interface could open up new creative possibilities for composers and artists that would be engaging for the audience as well. In this paper we detail the motivation behind *Vuzik* and our design approach. The paper outlines our implementation efforts and describes the current prototype. We also present a preliminary evaluation of *Vuzik*, and outline our coming future efforts.

Above all, we would like to see *Vuzik* offering children an unfettered way to create music that elucidates certain normally abstract principles about music and its structure, thereby promoting greater understanding of music.

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2. MAKING MUSIC "GRASPABLE"
Creating music is a valuable activity, and is especially enriching for a child's cognitive development [3, 18]. However, due to the abstract and often intangible nature of some of the concepts involved, understanding and especially creating meaningful music can be challenging. Making sense of the complexities of music can be elusive to those who have not yet had extensive music education. The temporal nature of music is sometimes a barrier to visualizing, analyzing, and learning to compose music even for those who are musically educated. Yet we assert that these barriers must be overcome if we are to encourage children to move beyond simply consumers of music to being creators who can express themselves musically in increasingly complex ways.

We believe that if one could not only visually *see* or *touch* music, but also freeze it in time and hold its representation in stasis for more prolonged examination and contemplation, then one could gain greater understanding of its structure. This process is accessible to those who have the necessary musical education to read music notation. Yet people of all levels of knowledge would benefit from understanding the structure of music, especially concert audiences and children seeking to understand and create it.

We explore the following complementing strategies of building this understanding and comfort with music, beyond classic music notation: 1) to augment music's temporal nature by giving it a more lasting form beyond the auditory, and 2) connect musical ideas to principles and metaphors with which people are already familiar.

In exploring the first strategy, we note the prominence of visual-aural connections in the arts, education, and creative technologies. People often create strong albeit subjective visual associations with music, often as a way to relate it to their lives or to give music a more permanent, intelligible form; the music visualization movement has been motivated by this approach [4]. Effective music education techniques often combine

visuals to developing musical understanding [7] and a simple survey of toy design and of how children interact with toys will reveal that children are particularly engaged by visuals paired with sound. In view of this common pairing of music and visuals, we believe that creating a simultaneous association between visual mark, related sound, and the creator's own physical gesture, can facilitate the emergence of an empowering and confidence-building creative process.

In the spirit of the second strategy, a design that leverages a person's existing understanding of basic concepts about the physical world (such as objects affordances, height, size, and colour, etc) to build a usable understanding of music's structure could encourage more intuitive music exploration and creation.

We believe that with the help of digital interfaces that emphasize such mental connections, users can conceptualize music more easily and approach music creation in a new way. By giving music a lasting form that people can experience with many senses, music can become more accessible and tangible and therefore more intelligible. This forms the basis of a concept we call "Graspable Music," where making the music more sensorially graspable makes it more mentally graspable. Vuzik is our attempt to explore this concept in practice.

3. BACKGROUND

3.1 Visualizations of Music

The idea of relating music to visual images is not new. Numerous composers such as Xenakis, R. M. Schafer, and Stockhausen illustrated their musical ideas by creating graphical scores, usually in order to express musical ideas inexpressible by traditional notation [11]. Such paper-based scores acted as instructions to performers and guides to listeners and musicologists. Later, computers provided a mechanism to generate music visualizations, such as in the case of Malinowski's Music Animation Machine [14]. Though Malinowski's Music Animation Machine only illustrated pre-existing pieces of music and did not allow composition, the clarity with which one can follow the music being visualized, and the beauty, aesthetics, and insight of the visual artwork strongly inspired the design of *Vuzik*. Numerous computer programs also emerged that allowed users to create music by graphical input; for example, the piano rolls used to create notes graphically in MIDI sequencers, or other graphical manipulation of aspects like volume and attack-decay envelopes in programs such as Cubase. In terms of visualization technology, *Vuzik* offers unique interactivity and compositional capability through a painting metaphor that goes beyond simple graphic notation, but rather unifies the visual and sound elements into a cohesive creation.

3.2 Drawing as Musical Input

Several interfaces use the act of drawing or painting to input or manipulate sound. Singing Fingers [16] is a very playful sound sampler for children that pairs user-created sounds with what they fingerpaint on a touch screen, and then allows the user to control how the sample is played back by touching the drawing. Its ease and freedom of use lend itself well to play and exploration similarly to our *Vuzik* design goals, and it provides a means for the creative performance of sound samples, but we believe it is less of a means for composition. Another example is the Hé interface [10], where Chinese calligraphy is converted to sound. Though both interfaces share some similar mappings and use a scrolling motion on playback of the image, *Vuzik*'s sound feedback is simultaneous with creation, and uses a more universal visual language of basic brush strokes. Although DrawSound, MIT's Drawdio, and Freepad also use drawing as a way to input sound, they are primarily performance tools. *Vuzik*'s canvas and stroke metaphors also provide direct explicit mapping to the musical properties of the images, with little abstraction.

3.3 Educational Musical Interfaces

There have been a number of valiant and inspirational efforts to empower children and novices to create music using tangible digital technology. Weinberg's Expressive Digital Instruments for Children offer several tactile controllers for musical sound with intuitive mappings that invite exploration and creativity in similar spirit to *Vuzik*, such as the *Squeezable Cluster* [20] manner of shaping a sound by molding a cluster of foam balls, or *SqueezMan* [20] that maps squeezing gestures to the contour of a melodic line. Our *Vuzik* design builds on Weinberg's efforts by offering a tool with the added sophistication of the ability to create complete musical compositions with polyphonic capabilities.

Two other tangible musical interfaces, though perhaps not primarily created for educational purposes, are strong models for intuitive mapping that gives musical elements a concrete form that is easy to manipulate. Bernstein's Tangible Sequencer embeds individual notes or motives in coloured blocks that can then be moved around and put in different orders with audibly related results [2]. The BeatBearing by Bennett, et al, [1] is a rhythm sequencer that promotes "'hands-on' manipulation of the beat" via positioning metal bearings on an instrument-time grid.

Perhaps the educational interface most akin to *Vuzik* is Hyperscore, developed by Farbood et al [6]. Hyperscore allows novices to compose music, without using music notation, by creating a graphical score. Motives are created by painting on a pitch-time grid and colour-coded, then positioned and repeated if desired within a complete score. The structure of the piece is visually clear from the colour-coded motives and windows displaying the sketch of the motive. Other high-end control is available, such as the ability to control harmonic tension via changing the contour of a "Harmony Line." Our design of *Vuzik* was informed by Hyperscore, and the two share some common threads, such as the drawing/painting metaphor and visual elements to represent music. However, *Vuzik* offers a different approach to composing that employs tangible tools and freedom of painting and gestures. Furthermore, *Vuzik* focuses on micro elements of constructing music such as instrument timbre and dynamics, rather than macro elements such as musical form. While composing, the *Vuzik* user is creating a visual artwork, which is standalone yet inseparable from the music. As we will discuss later *Vuzik*'s design approach was inspired by all the above projects, has both strengths and weaknesses compared to them, but is, we believe, unique.

4. DESIGNING *VUZIK*

4.1 Vision

The concept for *Vuzik* was motivated by our desire to make music graspable, tangibly and mentally, to children and other users of all musical levels. We were aiming to achieve this through the design of a musical instrument for children that used simple gestural input to create sound and that provided multisensory feedback illustrating certain abstract principles about music. The use of a painting metaphor to input music emerged when we informally observed that one common natural motion children made in response to music was a waving of arms to the tempo of the music in a conductor-like fashion. Following this insight we pursued the paradigm of

using painting gestures to simultaneously input music and visuals. We seized on the universality and naturalness of this concept of "sound painting" and its potential to offer a more permanent medium for music for prolonged contemplation and comprehension.

Vuzik allows the user to compose music graphically by painting gestures through an intuitive mapping of sound to visuals (see Figure 1). Use of an interactive surface allows the user direct painting input of the sound with fingers or tangible tool such as a paintbrush, supporting freehand painting interaction on a blank canvas with no restrictions. *Vuzik* employs an explicit mapping of visual elements to sound elements, such that the sound produced is consistently related to what is painted on the canvas. Our mappings of visuals to sound aimed to leverage people's understanding of common physical concepts of height, size, space and time so as to be more easily understood by all users. Additionally, in order to promote music learning and pave the way for future music education, the mapping choices were also made consistent with the basic graphic principles employed in traditional music notation and certain metaphorical phrases commonly used by musicians, such as "tone colour," and "lengths of notes." This capability of *Vuzik* to simply and directly link sound to visuals allows the user to visualize the music they are creating, and thereby more easily understand its structure and components.

Another integral part of *Vuzik*'s design is the use of tangibles to control the attributes of the sound. *Vuzik* lacks any integral GUI components, so the user is able, without the use of onscreen menus, to control elements like dynamics, instrument color, and musical scale using only physical and tangible interfaces such as the *Vuzik* paintbrush and palette.

Through these elements of tangibles and visual-music metaphor, *Vuzik* offers children and other users with a wide range of musical knowledge an engaging and fun mechanism for composing music, hopefully inspiring increased understanding of music and desire to explore further.

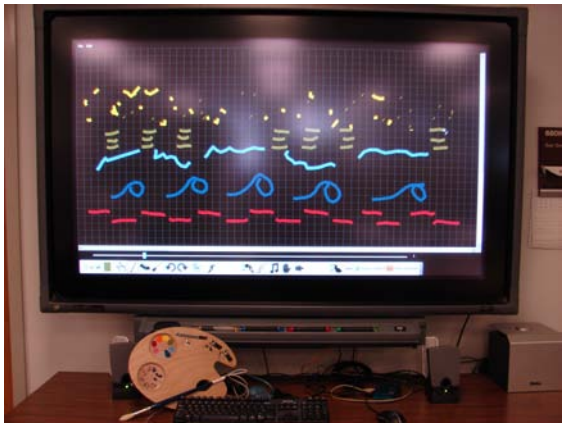

Figure 1. *Vuzik* Interface with palette and brush.

4.2 Design

The design of *Vuzik* aims to be "instantly knowable, indefinitely masterable," to borrow a phrase from Levin, [12], in that choices about mapping and operation strived to be simple enough for a child to use, but with the potential for complexity needed to create expressive music.

The interactive canvas is displayed on a large touch screen, which the user interacts with using a tangible paintbrush (see Figure 1).

Vuzik's two modes of operation, *creation* mode and *playback* mode, offer both immediate, spontaneous play with homophonic sound, and reflective, creative construction of more complex polyphonic music. *Creation* mode is the initial mode of operation where the user paints in input and hears corresponding sound feedback in real time that is related to the visual features of what is painted. At any time, at the tempo of their choosing, the user can use *playback* mode to hear a single selected stroke, or they can play back the entire canvas and hear all the strokes sounding polyphonically as the composition scrolls and plays from left to right, with highlighting circles following each stroke as it being played.

Vuzik's mappings of image-to-music and vice versa (Figure 1) were carefully considered in an attempt to be intuitive, logical, and obvious to user with their first strokes. The contour of the line on the Y-axis relates to the height of pitch in a metaphor of spatial height to frequency height, which also relates to the arrangement of pitches in music notation. The length of the stroke on the X-axis corresponds to the duration of the sound. Using horizontal space, viewed from left to right, to relate to time is a common mapping, seen in music players, music notation, and many other musical interfaces. The stroke colour selected corresponds to a related digital instrument timbre, referencing the musical concept of tone-colour. The thickness of the line painted determines the amplitude of the sound, making a simple connection between volume of line and volume of sound. The user can select colour, line width and other basic editing functions such as copy/paste, undo/redo, and erase via physical controls on a handheld palette.

Five principles guided our design choices above: 1) Simplicity, 2) Freedom; 3) Consistency and intuitiveness in the mapping of visuals to sound; 4) Capturing the user's intentions, and 5) Matching the sound in playback mode match how it sounded in creation mode as much as possible. We attempted to maintain integrity of these principles, and only compromised them if they interfered with each other.

5. IMPLEMENTATION

5.1 Software

We created *Vuzik* using two programming environments: Visual Studio for all visual and interactive aspects and Max MSP for all sound aspects. Max MSP was the server program, receiving triggers from Visual Studio, which was the client program. The two communicated via Open Sound Control, a content format for messaging between different programs across a network.

5.2 Sound Engine

Vuzik's sound was generated by Max MSP 5.1. The Max patch was based around five inputs sent from Visual Studio-generated GUI via OSC messages: voice number, pitch, instrument tone colour, amplitude, and note duration.

Each new stroke painted on the interactive surface (Figure 1) was assigned a new polyphonic voice number and sent as the "voice#" message. Simultaneously, the y-axis coordinate of the point painted was sent as the message "ypitch", causing the Max patch to generate a pitch selected proportionally out of the musical scale in operation. When the stroke is released a 0 "ypitch" value signals the note to end. The musical scales currently available in the prototype, selected by the administrator via presets connected to a probability table, include pentatonic, major, minor, blues, jazz, whole tone, octatonic, and chromatic. The colour selected by the user determines the timbre of the sound. The mechanism of sound generation can be preselected by an administrator via a dynamic poly~ object, allowing the eight available sound-colours to be selected from either 1) sounds synthesized via wavetable synthesis in Max, 2) sampled sounds, or 3) MIDI sounds. It is important to note that though some elements are

currently preset by an administrator before user interaction, this does not affect the user's freedom of use and will move towards being available for user control in future work, The eight sounds were designed subjectively to have some relationship to the colour that represents them in terms of having common associations with them. For example, as "blue" evokes images of water or calmness, the associated sound is smooth and even with low richness to its spectrum. The envelope of the sound is predetermined with a smooth attack and short decay, and the length and maximum amplitude are determined basically by the length of the stroke, a value sent as "noteDur," and the thickness of the stroke set by the user, a value sent as "thickamp." These features outline some of the expressive capabilities of the sound engine.

5.3 Graphical User Interface (GUI)

The GUI was created using Microsoft Windows Presentation Foundation (WPF) with Visual Studio 2008 C# and .NET Framework 3.5. What is seen by the user is a black canvas with a faint white grid, and a small set of icons in a bar along the base of the screen. The black background was ultimately chosen for several reasons. Firstly, the contrast between the colours and canvas was greater. Secondly, with so many aspects seeming to evoke the notion that this was primarily a painting application, we thought a black canvas would steer the user away from this thinking.

5.4 Mapping Details

As previously mentioned, time or duration was mapped to the X-axis, as read from left to right. However, we wanted to account for the inevitability of users, especially children, to paint strokes that were retrograde in time, i.e., that had decreasing X values. This would include circles, swirls, or any assortment of lines that would have less meaning in a space-time paradigm. In dealing with this problem, we sought to preserve our design guidelines outlined (see Section 4.2). Rather than restrict this kind of painting action, we tried to capture the user's intention in such painting gestures by allowing the retrograde stroke to play back as it sounded to the user when it was created. However, the stroke will begin playing when the playback cursor reaches its left edge, and the entire stroke will play for a duration equivalent to the length it occupies on the X-axis.

5.5 Interactive Surface

The current prototype of *Vuzik* takes advantage of the single-touch SMART Board, a choice made deliberately due to the fact that this interface, or similar ones, are becoming more common in schools, making *Vuzik* potentially more accessible to young learners of music.

Figure 2. The *Vuzik* physical palette.

5.6 Physical Palette

Although all controls were initially implemented as part of the GUI, we wanted the user to focus on the onscreen paintbrush and canvas interaction metaphor, have as much of the *Vuzik* interaction expressed physically, with as little need for GUI-type abstraction. Towards this end, we have placed all *Vuzik* controls on a hand-held artist's palette, an idea borrowed from the painting metaphor and implemented using a set of Phidgets interfaces (Figure 2). The screen can zoom in and out using a slider sensor, and rotation sensors control the speed of playback and the line thickness. A second touch sensor makes available the remaining editing and playback functions available. The user can hold this palette and move it with them as they move in front of the board.

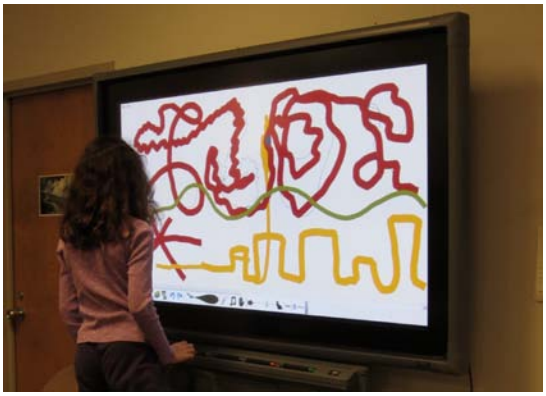

Figure 3. 10-year old girl interacting with *Vuzik*.

6. DESIGN CRITIQUE

6.1 Procedure

Although we have a number of hopes for the potential of *Vuzik* to offer a new way to compose and perform digital music, our basis for its success still remains its ability to provide an enjoyable, meaningful and creative musical experience for children. Thus, we enlisted the help of four children, three girls and one boy respectively aged 4, 8, 10 and 11, to critique and provide input on *Vuzik* during the developmental phase of our current prototype design (Figure 3). The children were recruited as design partners from among friends and family of the designers. We were particularly interested in observing their usage and hearing their feedback pertaining to the ease of use and, most importantly, that they would enjoy using it, be motivated to explore sound and music creation, and understand what they were creating.

All the children we worked with had used a SMART Board previously in their schools, with the exception of the 4 year old. Two of the children, the 8 year old and the 11 year old, had some level of music education, could read music notation to some degree, and had played or continued to play acoustic musical instruments . The 11 year old also frequently composed at the piano. The other children, the 4 year old and the 10 year old, had limited music education and did not typically play or make music as part of their regular lives.

The basic format of these informal design critiques consisted of each child receiving a brief explanation of what *Vuzik* was for, and what the icons controlled. They were then given individual sessions 30-45 minutes long (15 minutes for the 4 year old) to play freely with the interface with little intervention from the designers, followed by an interview about their experience and suggestions. For most of the design critiques, a pentatonic scale was employed.

6.2 Observations

The design critiques yielded some interesting results. Following the brief explanation of the interface, each child worked quietly and independently on using *Vuzik* with a few occasional questions to the administrators. Each interacted with the interface in unique ways. The 4-year old girl painted vigorously in one continuous stroke back and forth in her favorite colour, making notes that ascended and descended repeatedly. She used several icons correctly after only one demonstration of their usage. She continued this right until the end of her session and did not want to stop.

The 8-year old girl spent time before each stroke she made thinking about what she was going to paint, and it was significant to note that she largely painted abstract patterns and lines, listening carefully as she painted, and edited or erased strokes often while creating (Figure 4). She made use of all the icon functions, with some questions about how they worked, though she did not try to play back her composition until she had been painting for some time. She painted for the full session, starting and erasing several brief creations. During a post-session interview, she offered the comments that she preferred a white canvas because it was more similar to what she was used to drawing on, and she suggested that the instrument sounds be more similar to instruments she would recognize, like the ukulele, her own instrument.

The 10-year old girl, who stated later she enjoyed drawing regularly, largely created representational images of horses and people, making use of most icon functions, including *playback* of the images once they were complete. A brief demo was shown to her about how one could consider making music with the interface, and following this, she painted more abstract lines in an exploratory manner before returning to more representational images again towards the end. She seemed to want to continue creating with *Vuzik* at the end of the session. She suggested that the ability to erase part of a stroke, not just an entire stroke, would be helpful.

The 11-year old boy understood the functionality of the icons with little explanation and made use of nearly all of them. His creation remained abstract, painting deliberate notes or chords of many notes while listening via *playback* more often than the other children. He made an attempt to input a melody from a composition he wrote previously on piano, but abandoned this when he couldn't find the pitches. He briefly wanted to experiment with what it would sound like to paint happy-faces, then went back to trying to paint abstract music representations. He also seemed drawn to using particular colours corresponding to sounds that he said he liked. Noteworthy is his deduction that a circle should sound like a harmony of two pitches, even though the mapping was not explicitly explained to him.

All children continued to be engaged in creating for their entire sessions, and explored many or all of the instrument colours, line thicknesses and other features for the impact on the sounds. Although they comfortably used the paintbrush as a tool, the physical palette was too heavy for them to hold and it had to rest on a music stand. However, they made use of the physical controls that it presented.

6.3 Discussion

The involvement of children in this design critique was very useful in assessing the user-friendliness of *Vuzik* and ability to engage them in music exploration and creation. A strong conclusion we drew from their body language and tendency to create vigorously for the entire sessions is that all the children enjoyed having their painting actions accompanied by sound in *creation* mode, and were curious to hear what their paintings sounded like using *playback* mode. This seemed true whether the child painted representational images or abstract images. This enjoyment in hearing sound in response to their painting gestures was most evident in the 4-year old's enthusiastically repeated strokes. The engagement of *creation* mode's instant sound feedback was particularly obvious by the fact that the children often painted for extended periods of time before trying to play back their creations. The children seemed driven to explore the different sound controls offered, including the different instrument sounds, the different volumes through line thickness, and the range of pitches through the pathway of their painting stroke. They seemed to learn the functions of the icons and the mapping of visuals to sound relatively quickly with little guidance. They also learned to identify sounds by their colours, which became a good way to choose or avoid certain sounds depending on their tastes or success of the timbres.

In terms of the how *Vuzik* performed as a composition tool, there are several conclusions we can draw. With each child, there needed to be an initial period of exploration and trial-and-error where they figured out how all the visual elements sounded before they began to try to create music or music-like patterns. Thus, like many similar tools, a user would likely need either several sessions or longer sessions to begin to feel comfortable enough with *Vuzik*'s capabilities to start to create music. Also, there were some indicators that the painting metaphor and visual data were very engaging and possible overpowered the auditory considerations at times. For example, choice of sound settings, such as instrument colour and line thickness, were often made for auditory reasons, but what they painted was initially centered on what they wanted their creations to look like. Also, some of the children tended to paint representational images to explore what they would sound like. We attribute this largely as a testament to the possible strength of visual information over auditory information, and the fact that making visual artwork is a more common activity among children than making music. We regarded this kind of visual-primacy interaction as still valuable for musical exploration, however, since the children always maintained a curiosity for how the visuals would sound.

A general conclusion we drew was that the reference to a painting program initially seemed strong and overpowered the sound aspects until children were shown its capabilities to make music. But at minimum, the sound feedback to their painting created increased enjoyment beyond a silent painting program, and promoted exploration of layers of strokes to experiment with the aural effect. Just like other forms of composing, it became clear that the user would need some time to explore the interface and think about what type of sounds and music they would like to create over time before creating a piece of music. Overall, we felt *Vuzik* achieved success in promoting musical play and exploration, and in offering a basic mapping that was easy to figure out.

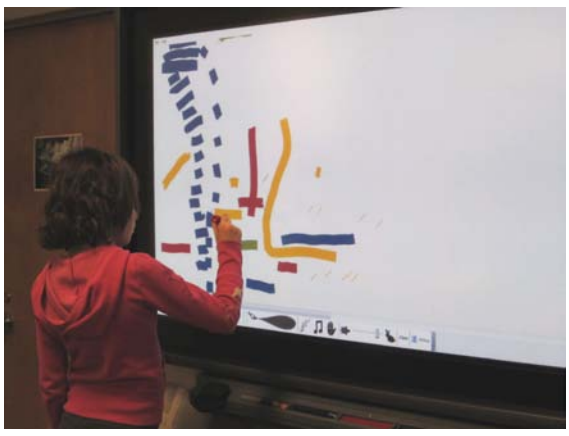

Figure 4. 8-year old girl exploring music through painting.

7. FUTURE WORK

With the emergence of SMART's dual-touch boards and other multi-touch surfaces, we see possibilities for a *Vuzik* system supporting multiple users creating music together at one time. We would also like to explore the possibility of a single user who is able to add many strokes at once, which will enhance the creation mode and allow it to be more of a live performance mode with the addition of automatic or manual scrolling.

We are planning to add components to our design which increase the tangible control of all aspects of *Vuzik*. User selection of musical scale through the use of tangibles that are related to the cultural or emotional associations with the character of the scale is one feature we plan to implement. Another is an expansion of the copy and paste function, using a tangible "stamp", where a small section of the composition could be saved and embedded within a physical artifact, a stamp, which can in turn be used to insert that section of the composition where it is to be repeated. Further, we would like all or most controls of the sound and visuals to be gestural and physical. Further developments that contribute to this would be controlling the thickness of the line physically by brush contact pressure.

In recognition of the preliminary and inconclusive nature of the design critiques we reported, we are planning to conduct a formal user study that allows users more independent time with the interface. As with composition and other complex creative endeavors, the creator needs time alone to explore and decide what he or she wants to create. We also aim to make the interface available to a set of students in a school classroom for lengthier sessions for further validation of our observations. As well, we would examine whether the interface provides a unique, positive musical experience for users with a variety of musical backgrounds.

Finally, we would like to compose a more extensive composition with the interface, keeping in mind its unique capabilities and attempting to capture some of the unique ways it enables one to think about music.

8. CONCLUSION

In this paper we presented *Vuzik*, an interface for creation and understanding of music through painting. We described *Vuzik*'s design approach based on canvas and paintbrush metaphors, our implementation efforts, the current prototype and the results of a design critique we conducted with the new interface.

We envision that *Vuzik* will offer children and novices an engaging, unencumbered way to explore composing digital music by painting that invites musical exploration, learning, and creativity. We hope it also has the potential to point the way towards a new medium for musicians or seasoned composers to compose and perform music graphically. Using its painting metaphor, *Vuzik* builds on concepts of bringing new sensory dimensions to music that have sparked people's imaginations for centuries, yet assembles them in a new way to make music creation accessible to children, music novices, and others who may not otherwise be able to explore music in this way. *Vuzik* was designed in an attempt to provide the user and audience with a lasting examination of various musical expressive elements such as timbre, dynamics, polyphonic layering, and motives. It was also designed to allow the exploration of relationships between sounds and visuals, with the end result being, hopefully, a dual-modality artwork that is related by many shared concepts of space, colour, and texture. In our coming efforts of design and evaluation we are hoping to further demonstrate *Vuzik's* capabilities of giving musical expression a more lasting form that uses metaphors to which people can relate to from their experiences with the physical world. We hope that *Vuzik* will contribute towards making music sensorially and mentally graspable, and like other emerging musical interfaces, bring the joys and benefits of music to people of varying musical backgrounds, young and old.

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