

EMBEDDED SOUND: A PROJECT ON TURKISH TRADITIONAL CALLIGRAPHY AND ITS MULTI-TOUCH TRANSFORMATION

Adviye Ayça Ünlüer, Oguzhan Ozcan & Hüseyin Kuşçu

This paper is about the idea of composing contemporary interactive screen designs using multi-touch technology in union with the dynamism and spirit lying beneath the art of Khatt. For the auditory orientation, a wind instrument called 'ney' has been chosen. Demonstrating the same space of time and variability with the exhalation, ney is an instrument originating from the philosophy of Tasawwuf as a visual concept and a musical one.

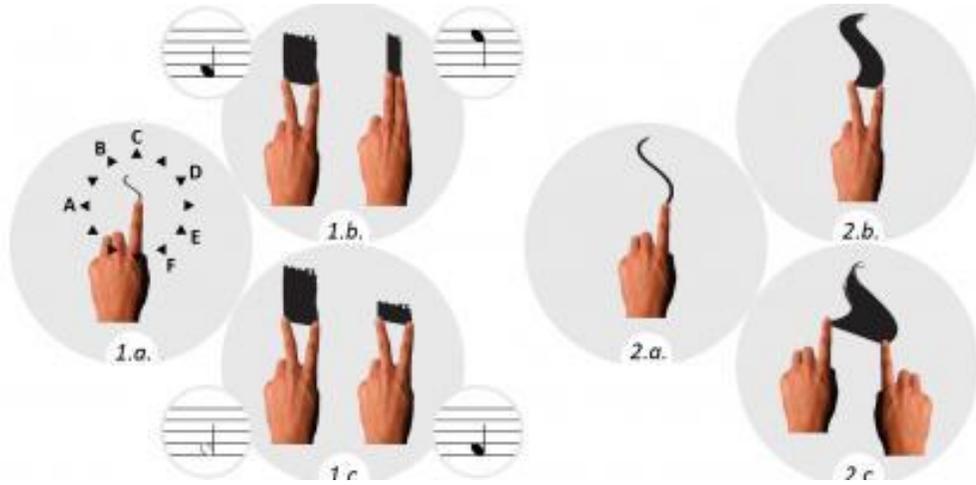


Fig 1. The relation between sound and image and the gestures for different line types.



Fig 2. A composition according to the gestures 'About Absence'.

Introduction

As digital technologies evolve, new forms of art are discovered by designers and artists. Yet throughout this fast evolution it is hard to say these art forms develop a solid background. We believe that one of the many reasons to this may be the fact that conventional input devices such as mouse or keyboard, do not provide freedom to hand and body use that were essential in traditional arts. It's a credible idea to achieve a well established approach by experimentally adapting art forms from past cultures to new digital media. Traditional arts in which body motion is used can be a source of inspiration for artistic achievement in digital media. [1] We believe one such subject of inspiration can be Turkish Traditional Calligraphy known as '*Khatt*'.

With the inspiration from the methodology and philosophy of this traditional art form, our aim is to create an interactive art tool that benefits from the possibilities of digital technologies. With interaction, we don't mean to create a series of preset moments for the participant to interact with, or a tool to get randomized outcomes, but a way to consciously create the art work itself.

Overview of Turkish Islamic Calligraphy

Khatt, which literally means '*line*', is described as '*the art of measured and beautiful writing*' using the Arabic alphabet. [2] *Khatt* emerged after the evolutionary period of Arabic letters, between the 6th and 10th centuries. During the *Anatolian Seljuq* period, from the 11th to the 14th century, and the Ottoman Empire, from the 13th to the 20th century, calligraphy not only was regarded as an art form itself but also made a significant contribution to the other decorative arts and architecture. [3] Between the 17th and 19th centuries, Turkish artists brought figurative and philosophical depth to the tradition.

In the practice of calligraphy, a pen that is made of a special kind of reed, - the same kind which the musical instrument *ney*, "reed flute" is made of-, a calligraphy ink that is made of soot, and a special calligraphy paper is used. [4] The *khatt* artist (*Khattat* in Turkish) candidates, with the guidance of their masters, pass through not only a long and disciplined technical education period, but also a philosophical education towards perfecting their body and self-control. Along with the hands and wrists, they learn how to use their whole body, posture, and breath, in order to represent their world view on the paper. The one who accomplish to reach the master level, are qualified with a practicing certificate (*icazetname*) by their masters and obtain the authority to sign their own works. [5]

Due to the religious prohibitions of their historical period, many artists stayed away from figurative painting. This constraint caused them to apply 2D visualizations through religious writing. [7] It was mostly verses and sayings from the Qur'an that were visualized, with the purpose of symbolizing words and ideas. This approach increased the strength of the emotional content. [8] Turkish Islamic Calligraphy was a favored art form during the 19th and in the beginning of the 20th centuries. After the fall of the Ottoman Empire and the foundation of Turkish Republic, due to the 'modernization movements' such as the change of the alphabet from Arabic script to Latin script, and the liberation of other plastic arts, calligraphy ceased to be popular and turned into a traditional and rare art form which is taught in a limited number of specific institutions.

Multi-Touch Technology and Inspirational Breath- Rhythm Structures in *Khatt* and Similar Art Forms

According to the arrangement, calligraphic compositions can be classified under four titles, which are “text in a line”, “text in stack”, “pictorial text” and “*tugra*” that are used as sultan’s signatures. [9] In this project we studied pictorial texts that demonstrate both iconographic and typographic features and in which plastic quality is in the foreground.

When the pictorial text-based *khatt* compositions are in question, even if the text is not legible, the dynamic structure of the pictoriality which emerges from the connected letters, gives a feeling of rhythm to the reader. [6] The eye follows the line in the composition, thus the reader gets the feeling of drawing the whole composition from scratch when the eye catches the rhythm.

This is actually an experience which is more common among the calligraphers during the creation process of calligraphy. While a calligrapher creates a composition, he not only uses his hands and wrists through the use of pen, paper and ink; but also his breath and rhythm and his whole body as if he is one sublime spirit. This spiritual and emotional experience is projected on the visual language of the composition. In other words, we can say that the main form, which is formed by words, is first shaped through the calligrapher’s body, and then it is projected on to the paper.

This time and motion-based creation process has been experimented in various other art forms. For instance, a similar method is used in the art of *ney* playing, (or *ney blowing* as a preferred term by the musicians) which is performed within Sufi music. The visual structure of the *khatt* and the auditory structure of the *ney* of Sufi music have key features in common. [10] The connections between the letters in the calligraphy and the soft transitions between the notes in Sufi music are parallel. While a calligrapher is drawing a composition, he inhales and holds his breath and completes the composition in one cycle of breath. The use of breath during this drawing period have similar uses of rhythm and breath as *ney blowing*, which has a principle of using the breath fully.

Within interactive media works, visual and auditory elements are used to create a complementary whole. That is why we argue that an inspiration from the common features of calligraphy and Sufi music can provide a significant contribution to the development of a contemporary and interactive artwork with a new language of expression.

However, while generating this kind of an artwork, there are crucial points to be taken into account:

First of all, *khatt* does not merely consist of the literal meaning of the text. The sacred text is transferred along with the stress and intonation from the body to the paper. That is why; it is not possible to get the spirit of a calligraphic work only through the literal meaning of the words written. [11] The whole meaning of the composition is constructed by and through its performance.

Reproducing a calligraphic performance is never less demanding than the original one. The calligrapher must comprehend all the visual and literal elements of the composition, and realize the performance just like an expert orator. [12] The audience can get the full meaning of the *khatt* only if it is created in their presence.

Today’s technologies have the potential to reveal the previously hidden philosophies behind calligraphy and make the audience comprehend the spirit of its birth. As a remarkable example, multi touch, as today’s popular technology, can recognize the touch, the position and the motion of more than one finger. As it leaves the conventional mouse and keyboard interaction behind, the user gets a more intact

interaction with the screen. With the development of interfaces sensitive to multi-user and multi-touch inputs, the users are able to use both of their hands with more natural gestures. [13]

In our study, these fundamentals of multi-touch technology provide us with the advantages of increasing the impact of the work by directly using gestures instead of traditional user interface devices and their constraints, a wider and closer screen as an ergonomic and sophisticated workplace environment, and the possibility of more than one person to participate in the composition creation process.

Embedded Sound

The purpose of the project developed for this study was to create an application that allows the audience with no prior calligraphy background to experience the performance process of the calligraphy by reproducing it themselves. If the user requires guidance on the use of the body, pen and breath of a *Khatt* artist, the application should give helpful hints and clues.

In order to accomplish this, we first eliminated the use of pen and paper and replaced them with a multi-touch screen. We then designed an interface that resembles the *Khattpaper* on which the users can draw *Khatt* lines with their fingers, with the help of hints when the users need help on form, speed and rhythm. Because the breathing technique of *Khatt* requires a deep and disciplined training that cannot be completed in a real-time performance, we chose to use sound effects in harmony with the breath. This enabled the audience to overcome the tendency to make untimely breaks in their performance. We used samples of Sufi music, which has significant similarities with the performance of *Khatt*.

The project was designed on an Apple iPad multi-touch screen, with a digital background imitating natural paper texture. The user activates the system and starts drawing by touching one or two points on the screen. By dragging the fingers on the screen, the user constructs the line and hears the music. Both the sound and the line are interrupted as soon as the contact of the fingers with the screen is lost.

There are four different kinds of relations between the sound and the image in the calligraphy:

1. **The direction of the line:** The program creates different audial responses in accordance with the changes in the direction of the line being drawn by the user. Each musical note has been assigned to a different direction in a circular scheme. A change in the direction of drawing leads to a corresponding change in the sound (Fig. 1.1.a).
2. **The thickness of the line:** The distance between the two fingers that are touching the screen represents the thickness of the calligraphic pen. This thickness, which is the thickness of the line being drawn on the screen, also defines the intensity of the breath that is playing the Ney and thus the octave of the sound being played. As the line gets thicker, the octave becomes lower (Fig.1. 1.b).
3. **The length of the line:** The length of the line is linked to the time length of blowing. The note is played as long as the line continues. This allows the user to feel the heaviness of the time that passes while drawing and also convinces them to create uncut lines (Fig.1. 1.c).
4. **The speed of the drawing:** The volume of the sound coordinates with the drawing speed. The faster the performance is accomplished, the stronger the sound. When an optimum volume is met, the user is expected to adjust to the ideal speed of the performance.

GESTURES-LINE TYPES AND DRAWING STYLES

Four different gestures have been introduced into the application:

1. In the case of one-finger touch, a black ink track is left at the point of contact, and the track will follow the finger as long as the contact remains. Ney sound will be played at the highest predetermined octave, in the direction of the hand. When the contact is over, the sound stops but the track of the line remains (Fig. 1.2.a).
2. In the case of two-finger touch, the distance between the two contact points will act as the tip of the calligraphic pen. As the hand moves, a calligraphic line will be drawn as thick as this distance. The Ney will play a musical note according to the direction of the mid-point of the two fingers, and the octave will be determined by the thickness of the line (Fig. 1.2.b, 1.2.c).
3. In the case of three-finger touch, the closest pair of contact points will act as the calligraphic line; the third will remain as a separate thin line. Each line will generate its own sound.
4. In the case of four-finger touch, two pairs are selected from the points closest to each other. Two calligraphic lines and their corresponding sound effects will be generated.

Composition

The traditional calligrapher forms text in an abstract or concrete shape in order to enhance the meaning of the subject. Khatt artists usually avoid color and perspective and prefer using artistic principles such as white-black balance, perceivability and anatomical consistency for the sake of simplicity. [8] They use bonds between letters to assure continuity from beginning to end and to reach an unlimited number of letter combinations. In this way, a single line can result in an incalculable number of diverse holistic forms.

In order to mimic the Khatt recreation performance, we developed various different compositions to be completed in one breath and one-line cycles as an alternative to freestyle creation. We refrained from using original Pictorial Text style because of legibility problems as well as the difficulty of re-creating such complicated artwork. By developing various linear and visual compositions using the above gestures (Fig. 2), we expect that users will be able to attune themselves to the sense of time during the performance and follow the guiding hints effortlessly throughout the performance.

Conclusions

In this research, we explore a new way to generate an innovative, pioneer expression language in gestural user interface area with the inspiration from traditional calligraphic art. When the project process is analyzed with the aim of seeing the results of this research clearly, it's seen that there are 3 inspirational facts in Khatt. These are *the unity and fluentness elements of the form, the use of breath and rhythm in the performance, and recreation element of its philosophy*. At first, with the inspiration of recreation, we developed a drawing tool that is used by body motions. In this way, the participators who do not even know anything about Khatt can experience this implementation beyond vision. The most important component of experiencing *khatt* performance, using of breath and rhythm properly, directed us to use sound in order to represent this element. In order to get sound as secondary output during the performance, the gestural characteristic of hand movements are distinguished and mapped to the auditory traits.

Lastly, with the inspiration of the unity and fluentness elements of the form, we created various visual compositions and designed an interface along with some clues so as to be followed by the users.

In the light of the progress of this project, it can be seen that Khatt can be source of inspiration for gestural user interface design. We have evaluated the novelty and advantages that evolved from these structures, under a number of different topics.

From the view point of Khatt, recreation is made possible by using new technologies instead of traditional supplies. The philosophy behind this art has been made comprehensible to the untrained viewer in a contemporary means. Visual and rhythmic details of this art form are featured not only by recreation as in classical terms, but also by aural supports to address different senses. Therefore, the emphases of body movements are made more perceivable.

New expansion opportunities are presented for the Khattats. The guidance of sound in the drawing process may bring out new aspects and expressions. By using aural output as an instrument, different lineal forms can be practiced.

From the viewpoint of gestural interaction technologies, the most remarkable finding is the unconnected outputs (visual and auditory) can be acquired by only one gestural input synchronously. The most important discrepancy of this project from previous similar studies is the way that both outputs work in accordance to the direct manipulation principle and carry directive aspects by giving instant feedback. Therefore, both the sound directs the visual and the visual directs the sound within all attributes of the applied gestures, such as presence, orientation and speed. Neither of the outputs are each other's coincidental result. With a little experience with the tool, both of the outputs can be acquired consciously.

It is also once more observed that, innovative ideas in the interactive media design field can be derived with the inspiration from traditional arts and further research should be made on other traditional arts that haven't been dealt with so far.

References and Notes:

1. Oğuzhan Özcan, "Turkish-Ottoman Miniature Art within the context of electronic information design education," in *Journal of Technology and Design Education* 15, no. 3 (2005): 237-252.
2. *Eczacıbaşı Encyclopedia of Art*, Vol. 2 (Istanbul: YEM Pub, 2008), 668.
3. Oktay Aslanapa, *Turkish Art* (Istanbul: Remzi Bookhouse, 1984), 386.
4. M. Uğur Derman, *Pen*, Vol. 24 (Istanbul: DIA Pub, 2001), 245-246.
5. Oral Onur, *Edirne Khatt Art: The Reign of Line* (Istanbul: Dilek, 1985), 167.
6. *Ibid.*, 9.
7. Bülent Özer, *Commentaries: Culture Art Architecture* (Istanbul: YEM, 1993), 50.
8. Sezer Tansuğ, *History of Painting Art* (Istanbul: Remzi, 1992), 156.
9. Hüseyin Gündüz, "Technical and Aesthetic Measures of Khatt" (PhD diss., Mimar Sinan Fine Arts University, 1994), 94.
10. I.Hakkı Bursevi, *Spirit of the Mesnevi* (Istanbul: İnsan, 2006), 90.
11. Anthony Welch, *Calligraphy in the Arts of the Muslim World* (Austin: University of Texas Press, 1979), 33.
12. Brinkley Messick, *The Calligraphic State: Textual Domination in a Muslim Society* (Los Angeles: University of California Press, 1993), 240.
13. J.Y. Han, "Low-Cost Multi-Touch Sensing through Frustrated Total Internal Reflection," *Proceedings of the 18th Annual ACM Symposium on User Interface Software and Technology*, New York, (2005).