DESIGNING PLAYFUL METAPHORS IN THE INTERACTIVE SOUND INSTALLATION, `NET DISRUPTION`

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DESIGNING PLAYFUL METAPHORS IN THE INTERACTIVE SOUND INSTALLATION, ‘NET DISRUPTION’

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ABSTRACT
Interactive media art requires participation of visitors and their feedbacks. It is important for artists to design how to attract visitors and make them voluntarily participate in their artwork. This paper discusses an idea of utilizing play metaphors in an artwork in order for visitors to easily recognize the play and interact with the artwork. This paper presents an interactive sound installation that adopted the metaphors of play including cat’s cradle and musical performance. Net Disruption was introduced before audience during the FutureEverything Festival 2015. The paper evaluates the artwork from the feedbacks and observations of the visitor’s participation.

Keywords: Play, Metaphor, Interactive Installation.

INTRODUCTION
Interactive media art requires visitor’s participation. It is not yet complete until visitors participate and interact with the artwork. In order to attract visitors and lead them to participate, artists design affordances. Affordance can stimulate human senses visually, aurally, or physically. It gives a hint to a visitor what gestures to take based on human’s common experience and knowledge. This study explains how the interactive art installation, Net Disruption expressed the concept of play in its form and interactions with visitors. Net Disruption reflected the division of space and string patterns of cat’s cradle and the metaphor of playing a stringed musical instrument. These two playful metaphors are combined together to create a new experience. This study, first, explains how the metaphors of play are designed in the installation and how it is practiced through interactions. Next, it explains how metaphors help visitors to easily recognize and participate in an interactive media art, in general. Then, it illustrates the technical aspects of realizing the metaphor of play in this installation. Finally, it discusses the shortcomings found during the exhibition and suggests improvements.

THE CONCEPT OF PLAY IN NET DISRUPTION
Net Disruption is an interactive sound installation in which the form takes after the string figures of the cat’s cradle and visitors play as a stringed musical instrument. This artwork can be specifically categorized as ludic interface, which is inherently “playful” interface according to HCI. It is related to the concept of humans as playful creatures, introduced in ‘Homo Ludens’ by Huizinga (1950). This artwork has a dual aspect of playfulness including the form and the gestures of interactions.

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<th>Form (Interface)</th>
<th>Play</th>
<th>Visual Elements</th>
<th>Concept</th>
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<tr>
<td>Cat’s Cradle</td>
<td>String Figures</td>
<td>Division of Spaces</td>
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<td>Musical Instrument</td>
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<td>Experience (Interaction)</td>
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Figure 1. Conceptual Model of ‘Net Disruption’
The table above briefly explains how the metaphors of play are reflected in the form, contents, and experience of the installation. *Net Disruption* has two aspects of play, implying cat’s cradle and a musical instrument. First, this artwork was inspired by the division of space and geometric patterns occurring during cat’s cradle play. Therefore, the installation anchored the strings randomly inside the cube representing the geometric figures. The space inside is divided into different scales and disrupted when a smartphone triggers sound through vibrations on the strings.

Secondly, the installation leads to the playful interactions through gestures and sound. 12 strings are anchored in *Net Disruption*. This number reflects the number of major scale of music. A visitor should take certain gestures in order to make sounds. These gestures have a metaphor of plucking the strings on a stringed instrument such as Korean traditional musical instrument, gayageum.

**THE ROLES OF PLAY METAPHORS IN THE INTERACTIVE MEDIA ART**

In *Net Disruption*, the roles of a play metaphor are exercised through interactions with visitors. Metaphors of play have a significant role when it comes to interacting with *Net Disruption*. The diagram below shows the influences of playful metaphor on the interactive media art. A metaphor influences the form, content, and experience of the interactive art, creating new experiences with digital media.

When the metaphor is reflected on the form, visitors can perceive more intuitively what action they need to take according to the artist’s intentions. When the metaphor is reflected on the contents, visitors can catch the message of the artwork more easily. Moreover, if a visitor has an experience of playing the metaphor that is reflected on the artwork, it will be much easier and more natural for the visitor to participate and play with it. However, the experience will be different from the visitor’s expectations and it will be a whole new experience.

In other words, these three aspects can be all referred to as affordance, which leads a visitor to take a certain action. Good affordance has a form of a ‘metaphor’ and there appears ‘logic’ between the interface and a desired event as well as ‘clarity’ during the process of interactions (Kim & Yi & Park, 2007).

![Figure 3. Interactive Media Art with Physical Metaphors of Play. (Left: Jeffrey Shaw «The Legible City», Right: Everyware-Oasis).](image)

As we can see from the artworks above, a physical object such as a bicycle or a spade gives a hint to a visitor what actions to take, working as a symbolic medium for the artwork. Visitors act based on their previous experiences and knowledge of a play. Utilizing a visitor’s child memory and previous experience works as a starting point of interacting with the artwork.

![Figure 4. Interactive Media Art (Left: Eness «A Tilt of Light», Right: Daily tous les jours «21 Balancières»).](image)

Two examples above are interactive media art installed in the public space. The form itself is not in any degree different from the original shape of the rides we easily find in the playground. A visitor comes and plays with it thinking of the childhood
memory and experience of playing the ride. Sound and light respectively work as a creative factor that makes difference to the common experience and adds amusement and freshness.

In Net Disruption, playing cat’s cradle is presented as a metaphor of musical performance as if playing a musical instrument. The concept of cat’s cradle is combined with the act of playing a stringed musical instrument and the installation works as a musical interface. When a visitor hangs a smartphone on a string and manipulates the string, the installation begins to work as a musical instrument. Through interactions, a visitor becomes a performer creates sound. One or multiple visitors can participate and do the performance together.

THE TECHNICAL ASPECTS OF REALIZING PLAYFUL METAPHORS IN NET DISRUPTION

Net Disruption is a cube-shaped interactive sound installation with the dimension of 1m in width, 1m in length, and 1m in height. Strings are randomly attached to the edges of the cube that create different scale of spaces inside. The string patterns are the metaphor of a net and the division of the space represents disruption of a net as audience interacts and transforms the shape of the spaces inside. This division of space can be experienced from the multi-sensory perspective, including the visual elements and the aural elements as well.

The string patterns that divide space inside the cube are consistently transformed while strings are sunk down with smartphones hung on the string. The pieces of the space divided by the strings are expanded or reduced by the gestures of audience. There are mainly three gestures that the visitors can take in order to make sounds (figure 6).

Visitors can simply slide a smartphone along with the string, lift it or shake the string. When a smartphone is stuck at the middle of the string, the variations of sounds are made which lead to the variations of spaces as it visually and aurally disrupts the different scale of spaces inside.

Sound mapping was done through programs including OpenFrameworks, Xcode, Max/MSP and Logic Pro X. OpenFrameworks and Xcode were used to receive data from the sensors of a smartphone including the compass and the accelerometer. Xcode sends raw data from the sensors to the mapping in Max/MSP to transform the data into sound. Specifically, the data from the compass sensor is transformed into the pitch of sound. The accelerometer sensor controls the amplitude of sound. Logic Pro X software was used in order to transform electric sound into MIDI bell sound. The figure 7 below shows how the sound mapping algorithm works and the actual sound mapping on Max/MSP.

![Figure 6. Gestures To Play With the Installation.](image)

In addition, the accelerometer sensor was used to create an event to make variations of sound. When there are big changes in data, it creates random sound with higher amplitude. It adds to the coincidences of the play.

EXHIBITION AND EVALUATION

Net Disruption was selected to have a showcase during the FutureEverything Festival held in Manchester City Hall, UK in February 2015. During
the conference, *Net Disruption* was introduced as 'Interactive Art Performance' for the installation shows its interface as a musical instrument. Through performance, visitors learned how to interact with the installation and played with it after the presentation. Pictures below describe how visitors interacted with the installation and participated in the performance.

![Figure 8. Net Disruption. Showcase in City hall, Manchester.](image)

Visitors shook a string with one hand, while pressing it with the other hand as if playing an instrument. Usually, two people participated at the same time and played together. The way of playing with the installation was varied depending on each person. There were some feedbacks from the visitors related to the timbre of the sound variations and a demand of making a more delicate musical instrument that can control pitch and volume quite freely.

There were some shortcomings found during the exhibition that need to be improved as in the following. One of the prominent weaknesses was that there was a collision between the two different metaphors of 'play', which are playing cat’s cradle and playing a musical instrument. Due to the duality of the play metaphors that are reflected on the installation, metaphors of the play overlapped and didn’t work properly as clear affordances. The form of the installation reflected the concept of space division from cat’s cradle play. The interaction reflected the metaphor of playing an instrument. There should have been a clear distinction between the metaphors and clear indications of what actions they need to take in order to participate. It is to some extent due to the fact that there was no solution to freely attach and manipulate a string leaving the geometric patterns behind. At an early stage, several trials such as moving the string or hanging the string have been examined, but came to naught. Thus, another play metaphor, which is playing a stringed instrument, was adopted as a solution to interact with the installation.

Another shortcoming related to the technological issues was that there should have been more delicate work of musical instrument. Since the installation shows its appearance and interactions as a musical performance, it should have been a more elaborate musical instrument that visitors could control the pitch, volume and timbre freely and easily. For example, 12 strings that are attached to the artwork should have been analyzed by the different degrees and substituted the range of data with sound mapping so that visitors could have easily played with the installation as an actual musical instrument.

**CONCLUSION**

*Net Disruption* tried to imply the metaphor of playing an instrument with the concept of division of space, disrupting the net visually and aurally. It first started as cat’s cradle, which almost everyone played as a child, especially girls. The concept influenced on the formation of the installation. For interacting with the artwork, another playful metaphor, which is playing a stringed musical instrument, was adopted. Therefore, there were some collisions between the form of the installation and the approach to play with the installation. In order for this artwork to properly provide affordances to visitors, it needs to have more delicate work as a musical instrument or as a cat’s cradle play. It has to have a clear identification of which play to reflect as interactions. Therefore, the future plan of this work will be reflecting the motions of cat’s cradle for the interactions as well. Furthermore, detailed sound mapping should be applied to the installation in order for visitors to freely and easily control the elements of sound through experience.

**REFERENCES**


