

# Interactive Art Based on Musical Genealogy: Nam June Paik's Random Access Byeongwon Ha

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## Abstract

*Random Access* (1963) is one of the earliest interactive art pieces, which incorporates an electronic interface in art. Compared to Paik's fame in video art, his originality in interactive art was hardly examined in the history of new media art. This paper explores *Random Access* as a pioneering project in interactive art. Paik was educated in West Germany from 1956 to 1963. Based on his academia in the center of music, Paik published several music articles for Korean and Japanese readers as a foreign correspondent. According to his articles about progressive music in Europe, Paik was inspired by Karlheinz Stockhausen, Pierre Schaeffer and John Cage when he started to create his own interactive project. His specific articles about these experimental composers reveal that *Random Access* shows a long-time development of a diligent academic artist. As a history of interactive art, this study traces Paik's unprecedented creation, which made a significant transition from music to interactive art.

## Keywords

Interactive Art, Nam June Paik, Random Access, Karlheinz Stockhausen, Pierre Schaeffer, John Cage

## Introduction

*Random Access* encourages visitors to make collage music in their active participation. With a mobile head of a tape recorder, visitors are directly able to play music with many strings of graphical magnetic audiotapes on a white wall. Their action converts the visual montages into sound collages in real time. Through *Random Access*, Paik literally utilized the original meaning of "random access," nonlinear access to database for the interactive environment. To study the musical interactive device, Paik's musical background is the fundamental material.

After completing his thesis on Arnold Schoenberg's serialism, or twelve-tone music, at the University of Tokyo in Japan in 1956, Paik went to West Germany in the same year to continue his study of this

progressive music technique in a musicology PhD program at the Ludwig-Maximilian University of Munich. The following year, he transferred to Freiburg Music Academy to be a composer. He also attended several music conferences and festivals in Darmstadt, Strasbourg, and Donaueschingen to directly experience contemporary music. Paik practiced music as well as studied it, just as an art-practice based PhD student nowadays. In particular, when Paik attended the Yearly International Holiday Courses for New Music in Darmstadt, he encountered the most influential composers, Karlheinz Stockhausen and John Cage, and found after serialism<sup>1</sup> experiments in their progressive compositions and performances. His interest in purist music, or serialism naturally reached to a new type of purist music, or electronic music. Stockhausen's electronic music encouraged Paik to study Pierre Schaeffer's *musique concrète* as the origin of electronic music. Paik witnessed Cage's music performance as spatial collage in real time. The critical mixture of three composers encouraged Paik to create interactive art as a new type of progressive music. However, Paik's articles about them in the late 1950s and the early 1960s are hardly examined in the history of interactive art. This research scrutinizes this unexplored literature to trace Paik's idea while he gradually developed his own interactive art.

## From Progressive Music to Interactive Art

After his successful debut, *Hommage à John Cage*, in 1959, Paik became a famous performer for action music. Paik's action music incorporates spatiality in music and sounds from his provocative performances as a significant element for music. It aimed to break static

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<sup>1</sup> Nam June Paik published two articles, "Après Serie," about subversive music breaking from serialism. The title means after serialism. For this reason, this paper uses after serialism instead of post serialism.

bourgeois art with aggressive actions. For example, Paik performed the text-based composition written by La Monte Young's *Composition 1960 #10 to Bob Morris* (1960), which consists of a simple text, "Draw a straight line and follow it." Paik reinterpreted it as a subversive performance, *Zen for Head* (1961). Using his head dipped in ink as a brush, Paik slowly dragged himself along a piece of paper laid on the floor (Ahn, 2014). The text became a performance. The performance was left on a long paper as a painting.

This performance seems to inspire the development of *Random Access*. Similar to a pun in Dada works, Paik replaced his head with a head for a tape recorder. Visitors followed the strings that Paik attached on the white wall (Broeckmann, 2006). This articulates Paik's transition from composition to action music to interactive art. Finally, his gradual endeavors of breaking high art emancipated audiences from one-way communication, and invited them to two-way communication. This paper bridges the gap between Paik's study of experimental music and his interactive art.

In studying the relationship between Paik's musical education and his artworks, the academic community has been neglecting his interactive art. That is the reason *Random Access* has not been scrutinized in the study of Nam June Paik. His article, "About the Exposition of Music (Paik, 1962)," clearly mentions the idea of his interactive art, which provides visitors with real freedom as not audiences but participants. Another of his articles, "New Ontology of Music (Paik, 1963)," also reviews the trajectory of his experimental music from action music to interactive musical project. They show the culminating period for his interactive art. However, these English articles are too short to articulate how Paik develop the idea of interactive art. Therefore, this study explores Paik's Korean and Japanese literature during his creation of interactive art. He wrote diverse texts about new music from the Korean newspaper *Chayushinmun* and Japanese music magazine *Ongaku Geijutsu*. They contribute readers to revisiting the critical transition from action music to interactive art in the artistic world of Nam June Paik. In particular, his Korean and Japanese articles deal with significant issues from three experimental composers, Stockhausen, Schaeffer, and Cage. In this regard, they are essential literature to study the relationship between Paik's new music and interactive art. This research examines each of these artists as significant contributors to *Random Access*.

### Karlheinz Stockhausen's Random, Electronic, and Spatial Music

In *Ongaku Geijutsu* on October of 1957, Paik (1957) published "The Bauhaus of Music," which deals with the Darmstadt music conference in the same year. In the music magazine, he first mentions "random access," which allows data to be approached in a nonlinear way. He (1958a) also mentioned the same topic in "The Music of 20's Century<sup>2</sup>," which consists of eight serial music articles from the Korean newspaper *Chayushinmun*. He (1958a) used the computer term, random access, to explain Stockhausen's *Klavierstück XI* (1953), which a pianist is able to start and play randomly based on the composition's algorithm: when the same patterns are repeated three times, the pianist ceases to play. Paik (1958b) focused on Stockhausen's *Zeitmass* (1956) with the dialectic combination between random access and a whole organization in music. They are well-organized pieces based on the algorithms with randomness, which is common in computer-generated art today. Paik (1958a, 1958b, 1958c, 1958d) mentioned the talented composer Stockhausen four times among the total eight articles. In random access, each space has the equal access to be used. Paik thought that this was the advanced music style of serialism, which composers use each tone equally regardless of their chord. By unrolling strings of audiotapes, Paik's interactive project, *Random Access*, realized "random access" for audiences. This new approach is a primary element of *Random Access*, which inspired by Stockhausen.

Next, Stockhausen developed spatiality of music. Paik (1959b) mainly dealt with the issue in his article, "Serie, Chance, Space," in *Ongaku Geijutsu* on December of 1959. Paik explained that Stockhausen's piece *Gruppen* (1955-57), which allows three conductors to randomly conduct three different orchestras with a basic rule at the same time. Stockhausen turned a time-based medium, music, into a space-based medium by employing three orchestra teams, which surrounded the audience in a horseshoe curve (Paik, 1959b). This description is also included in Paik's Korean article, "The Music of 20's Century (Paik, 1958d)." This reveals that Paik was impressed by Stockhausen's new experiment, which provides audiences with unfolded environment for music. Paik also adopted the new possibility of music for *Random Access*. It was not well known that

<sup>2</sup> Its original Korean title can be translated into "The Music in the Second Half of the 20th Century." It seems that Paik used a pun for the title.

*Random Access* was a spatial music project beyond a white wall since the white wall part in the project only remains in exhibitions. As proved in the documentation pictures of *Random Access* in the exhibition catalogue of *Exposition of Music Electronic Television Revisited* (Neuburger, 2009), *Random Access* has a three-directional environment for music like *Gruppen*. On the both left and right lower sides of the white wall, there were several parallel tape strings on the top of the clothes, which could be rotated with a ratchet lever like a mechanic music box. In other words, Paik's original idea on *Random Access* is based on a three-dimensional interactive medium. He encouraged visitors to be active performers to create spatial music. In other words, with the spatial interactions, *Random Access* converted passive audiences to active conductors, and allowed audiences to make collage music in real time.

Finally, Stockhausen's contribution to *Random Access* is electronic music. In "The Music of 20's Century," Paik (1958e) suggests that Korean musicians need to learn twelve tone technique and electronic music to catch up with the contemporary music in Europe. He also stresses that he would make electronic music, which was mainly developed by Stockhausen in the Cologne electronic music studio.

Electronic music at that time consisted of two main elements, music collages like *musique concrète* and sine wave sounds from electronic sound generators including an oscillator. In particular, collage music significantly changed Paik's style away from his early focus on serialism, a type of purity music style. This encouraged him to study *musique concrète* as the origin of electronic music. *Random Access* basically employs this collage method to compose an ephemeral music.

Stockhausen's contributions to random access in music, spatiality in music, and electronic music are foundational theories for making *Random Access*. After meeting Cage in the 1958 Darmstadt music conference, Paik (1961) equally dealt with Cage and Stockhausen as the main after-serialism composers in his Japanese article, "Après Serie." After leaving West Germany for New York, Paik mentioned much more Cage than Stockhausen. However, without Stockhausen's legacy, it is impossible to study Paik's interactive art projects in West Germany.

### **Pierre Schaeffer's Musique Concrète**

As Paik got interested in electronic music, he researched

*musique concrète* as the origin of electronic music. In particular, he visited Schaeffer's *musique concrète* studio in Paris on April 16, 1958 (Paik & Steinecke, 1999). The main purpose of the visit was to use the studio for his *musique concrète* composition under Professor Wolfgang Fortner in Freiburg. This event was well described in Paik's unpublished article, "The Paris Studio of Pierre Schaeffer and *Musique Concrète*," for Korean readers in *Chayushinmun* in 1958 (Paik, 1973).

*Musique concrète* is a progressive music style developed in Paris during the late 1940s. Pierre Schaeffer created this new composition style with *objets sonores*, or sound objects. The sound objects are 0.5 to 5 second-long sound fragments from any sound databases (Godøy, 2009). By extracting a specific sound from diverse sound sources, sonic objects are converted from objective to subjective sounds. This is a fundamental unit for *musique concrète*, and one of the most remarkable achievements in Schaeffer's *musique concrète*, which is based on the subjective perceptual listening experience, *acousmatic listening* (Godøy, 2009). *Acousmatic* refers to a noise that one hears without seeing what causes it. Schaeffer mentioned an anecdote about Pythagoras regarding *acousmatic* from the Larousse dictionary, which he taught his lectures behind a curtain and his disciples could only listen to him without seeing him. Like the curtain, Schaeffer thought that today the radios and tape recorders can play a similar role with an invisible voice. In other words, he insisted that the tape recorder had the virtue of Pythagoras' curtain, which created new phenomena to experience, such as audio independent of visual sources (Schaeffer, 2004). By discovering the instinctive paths that lead from the purely "sonorous" to the purely "musical," this type of environment denies the instrument and cultural conditioning, and puts the sonorous and its musical possibilities in front of audiences (Schaeffer, 2004). This is a very phenomenological experiment due to direct sound experiences without visual and contextual references. Schaeffer experimented with a large archive of sound effects records, which consisted of more than 500 records in 1950 (Schaeffer, 2004). Ultimately, he dreamed of a huge cybernetic-like machine that could achieve millions of combinations (Schaeffer, 2012). By using sound objects, Schaeffer created a musical database with recordings of everyday sounds like bells ringing, trains, and humming tops. These sounds were manipulated using various sound editing techniques,

including reverse playback, changes of speed and adjustment of the attack and decay, and loops of these sounds were recorded onto discs (Meigh-Andrews, 2006). This experimental music incorporated noises and every day sounds as well as a manipulated sound database in the blurred boundary between art and life. He believed that these techniques were able to provide new notes or pseudo-instruments without normal musical instruments (Schaeffer, 2012).

In his article “Time Collage,” Paik recollects the conversation with art critic Yoshiaki Higashino in the WDR studio in Cologne. When the critic visited the studio, he saw more than one hundred audio strings hung on the ceiling. He was surprised that the cutting-edge electronic music came from a handcraft workshop that looked similar to a workplace in the medieval age (Paik, 1984). Likewise, according to his colleagues, Paik only used simple sound devices<sup>3</sup> and accumulated a bunch of abandoned audiotape strings for his project (Rennert, 2010). In other words, as an aspiring composer at the University of Cologne, he had a hard time accessing the expensive electronic music devices including the high-end oscillators and amplifiers at the Cologne studio. He mainly used the concrete music editing system in the studio. Paik used a huge number of audio strings to make his music by his hands. He utilized the practical element of musique concrète, a wide range of haptic databases to make recorded collage music, for the database environment of *Random Access*. Nevertheless, the relatively out-of-date musique concrète experiences became an important event, which changed Paik’s musical idea from serialism to collage. His haptic experiences in the musique concrète studio in Paris and the electronic music studio in Cologne were reflected in his musical interactive art. The process of making musique concrète was not based on the graphic-user interface in the computer, which contemporary composers use. By unrolling the sound database at the gallery, Paik gave audiences a chance to be a musique concrète composer. His physical experiences from audiotape led him to create *Random Access* with his musique concrète experiences. In other words, the basic environments of *Random Access* came from the process of making musique concrète. Audiences in *Random Access*

<sup>3</sup> In particular, Hans G. Helms recollected that Paik used only an electrical studio. He incorrectly distinguished electric from electronic music devices. It seems that he wanted to emphasize that Paik had the only access to common music mixers instead of the cutting-edge electronic music equipment.

visited in a quasi-musique concrète studio with tons of strings of audiotapes, and experienced the sound database making their haptic music in real time (Ha, 2015).

### John Cage’s Prepared Piano, Theater Music, and Cartridge Music

Paik was not interested in Cage prior to meeting him. Paik confessed that he went to see Cage’s Oriental music with a very cynical mind (Decker- Philips, 1998), but Paik (1959c) became a strong supporter of Cage’s music after his first performance at the Darmstadt music conference in 1958. Paik became a member of the small audience fascinated by Cage’s performances in Darmstadt (Iddon, 2013b). Paik introduced Korean and Japanese readers to these exciting events. Paik’s articles, “Chance Music – the yearly International Holiday Courses for New Music in Darmstadt Festival” and “Serie, Chace, Space” are critical materials that reveal which courses Paik took and what he thought during the Darmstadt music conference. First, his Korean article, “Chance Music” was published as small articles on January 6 and 7, 1959 in *Chayushinmun* (Paik, 1959a). In comparison, Paik (1959c) published the Japanese article, “Serie, Chance, Space” about the same event for *Ongaku Geijutsu* in December of 1959, which is a twenty-page article for the music magazine. In these articles, Paik concentrated on “chance music” from Cage first. After the meeting with Cage, Paik’s interest in electronic music and musique concrète were dramatically shrunk. Instead, he focused on three properties of Cage’s music: chance operation, music performance, and appropriation of musical devices. First, Cage’s chance operation thoroughly changed Paik’s philosophy of music. Paik (1959a) explains that Cage’s chance operation follows a number of throwing coins based on *I-Ching*, which is an ancient Chinese divination text. Cage darkened natural stains on paper with his pencil, and based on the paper’s materiality, he chose some of these stains, then, he overlaid the stained paper with his transparent sheet of blank music notation, and the intersection between both papers would become tones in addition to sharp or flat by chance operation (Paik, 1959a). In fact, Cage experimented with diverse chance operations by overlaying transparent graphical papers. His score was decided by the materiality of paper and coins rather than his artistic creations.

In “Chance Music,” Paik (1959a) asks Cage, “If a composer would make more than twenty scores a day

by using this simple rule, how could the composer choose a single composition for a performance among them?" Cage answers that it did not matter which one was chosen. (1959a) Paik was impressed by his answer not because of irresponsibility but because of its conformation to Nature by removing a fixed thought. (1959a) This chance operation makes music with no priority. Paik thought that this method was a subversive technique as a-composition against Schoenberg's a-tonal music (Paik & Steinecke, 1999).

Paik utilized Cage's chance music to undermine a huge gap between double meanings of quality, or value and character. Before Cage's music, Paik interpreted quality as value, concentrated on elitist music from a few great composers, and was disappointed by the popularity of serialism. Paik thought that there were few quality serialism composers were overwhelmed by a majority of so-so serialism composers (1958f). However, after Cage's chance music, Paik (Paik, 1973) thought of quality as character. With Cage's philosophical approach, Paik acknowledged differences rather than superiority in music. He left purism and elitism in music, and then was able to break all authorities in that field. Cage's chance operation allowed him to quit the authoritative position of composer, and explore to compose 70% and remain 30% for audiences (Makoto, 1963). Similarly, on the poster of Exposition of Music – Electronic Television, Paik wrote a sub-topic "How to be satisfied with 70%." In this regard, Cage's chance operation inspired Paik to make interactive art as an unfinished project, or an open work. This idea helped Paik escape from the classical definition of music. This became a fundamental idea for his interactive art.

Second, Paik stressed that he was not fascinated by Cage's theories but his performances (Decker-Philips, 1998). Paik (1959a) discussed another aspect of chance music, which some durations and timbres were freely decided by a pianist. Cage's chance operation score was based on simple graphics like lines or rectangles. Because some parameters are missing in this score, musicians can interpret them in their own way. Musicologist David W. Bernstein (2014) divides Cage's chance music into two different kinds: chance operation is pre-compositional random procedures used to determine a fixed musical score, whereas indeterminacy provides far more freedom for the performer with a set of unlimited possibilities. In fact, these two qualities are mixed together in Cage's indeterminate music. His

indeterminate music was mostly created by his chance operation and pianists have, in some degrees, their own choices. Whereas Stockhausen's random access music, *Klavierstück XI*, in the Darmstadt music courses of the previous year was able to be altered by performers' decisions, Cage's music could be manipulated by both the composer's decisions based on the materiality of chance generators such as a coin and paper and performers' reinterpretations based on the compositions. In other words, Cage's action performance was different from Stockhausen's musical spatiality. Stockhausen stuck to the classical structure of music even though he experimented with music by using extremely progressive methods such as surrounding music with several loud speakers, audiences surrounded by multiple orchestras, random access algorithmic music, music theater, and electronic music. Compared to Stockhausen's music, Paik described that Cage's busy performances reminded Paik of an exciting pro wrestling match (Paik, 1961a). His performance involved a variety of noises as essential fragments of music. He broke the clear boundary between music and noise. Paik thought Cage's music as the earlier and better version of musique concrete, which deals with the same approach. In particular, Paik emphasized later in the United States that Cage's *Imaginary Landscape* was the origin of media art as "some kind of quantum leap (Daniels, 2011)." Paik insisted that unlike Schaeffer, Stockhausen, and Hindemith, Cage not only made montage sounds but also recognized and used the existence of ubiquitous radio waves, hardware audio, and software ephemeral waves (Daniels, 2011). Paik admired the development of Cage's chance music from chance operation to musician's indeterminate music, and then to indeterminate music with ephemeral signals from electronic music devices.

However, Cage used a timer to follow his fixed composition. Paik wanted to create more flexible music than Cage's chance music. Even though Paik (Paik, 1962) respected Cage and his colleagues, he did not follow Cage's chance or indeterminate music at all since it did not allow audiences to experience real chance and freedom in art. In other words, freedom of Cage's music still remained in himself and few performers. Paik planned to trespass the last authoritative property in Cage's performance environment by providing audiences with roles of creators such as composers, conductors, and musicians.

Finally, it is essential to draw attention to Cage's

appropriation of musical instruments and devices for the study of Paik's interactive art. Cage's prepared piano was developed to make an African pitch set when he composed *Bacchandle* (1940). After experimenting with the strings of his piano with newspapers, magazines, ashtrays, books and a pie plate, he fixed the thread of a wood-screw, wound between two strings of a single note (Revill, 1992). In "Chance Music," Paik (1959a) stressed that Cage's prepared piano is not a classical instrument, but still a young one as a new musical instrument. Cage's piano's strings, its lid and body itself were able to be beat, hit, and scratched in Darmstadt in 1958. In *Music for Amplified Toy Pianos* (1960), Cage's pianos made a sort of string instrument sound by flicking the plastic rod between the key and the hammer, which in turn strikes the metal bar which produces sound (Iddon, 2013a). In other words, Cage skipped "the key", a key element for piano, to make the sound of a different musical instrument. Inspired by several Cage's appropriations of musical objects, Paik himself continued to develop the interactive piece, *Klavier Integral* (1958-63), which incorporates the significant transition from Cage's prepared piano to interactive art. It started as a simple prepared piano, but finally became a multimedia instrument with diverse inputs and outputs such as ointment, toys, a light bulb, a hair dryer, a motor, barbed wires, etc. Whereas Cage often omitted the key of his prepared piano to make sound, Paik actively utilized the key as an important interactive interface for his *Klavier Integral*. Visitors were able to enjoy the transition from touch to other senses when they played the manipulated piano.

In *Cartridge Music* (1960), Cage manipulated electronic music devices such as turntables and contact microphones. By replacing a stylus in the cartridge with different daily materials such as a feather and a leaf, Cage created experimental music, which could not be expected (Paik, 1961a). Without records, performers played music by carefully touching these materials. Paik made the cartridge of turntable a movable interface for random access to a variety of 78-rpm records in *Record Shashlik* (1963). Paik threaded several records in two different axes on a table. This is similar to a hard disk drive, which has several layers in an axis. Audiences were able to choose any points to play these sounds databases in two rotating axes. They were spatially able to have random access as computer users can nonlinearly use any files on a hard disc drive. In *Random Access*,

similar to *Record Shashlik*, the cartridge was switched into the head of a cassette recorder. The mobile interface interacts with chaotic magnetic audiotape montages on a white wall.

In *Cartridge Music*, Cage also made a new sound approach by attaching contact microphones on tables or furniture. Unlike normal microphones, contact microphones can only detect sounds very near them, like tapping on the surface they are attached to. In other words, they mainly receive the sound from the attached objects. With loud speakers, audiences can listen to daily sounds that they hardly recognized before due to their small volumes. Cage showed that any materials can be musical instruments or music contributors. In other words, Cage broke the clear boundary between musical instrument and readymade objects in his performance. He played with daily-life objects and incorporated ignored sounds for his performance. Whereas Cage fixed the sound detectors, cartridges and contact microphones in his music, Paik liberated heads for turntables and audiotape recorders from their fixed positions. Paik found that musical devices could be manipulated as a creative interface for interactive music projects. Paik went one step more toward progressive music. Whereas Cage only gave these new interfaces for playing music himself and his talented musicians, Paik provided normal audiences with his appropriated musical devices in *Random Access*. He pointed out that his creativity in interactive art did not follow Cagean idea (Makoto, 1963b). Finally, Paik had his own original position in interactive art beyond his influential composers.

## Conclusion

Paik mentioned "Do It Your..." as one of the subtitles for the poster of his first solo show, *Exposition of Music – Electronic Television*. This reminds us of "Do It Yourself," nowadays prevailing in the art-and-technology field. In fact, Paik never learned how to make visual art in the academic field. In the same way, he never learned electronic engineering or computer science in that field. To make his unprecedented interactive pieces more than a half of a century ago, Paik mainly studied and practiced this progressive art by himself. However, Paik did not create his own interactive art as *Tabula Rasa*. Paik actively reinterpreted his musical knowledge and experiences to create interactive art based on active interaction with creative composers Stockhausen, Schaeffer, and Cage. His inspirations from

those composers were able to be articulated by the study on Paik's Korean and Japanese music articles from 1957 to 1963. In this regard, the study of *Random Access* depicts an early part of the history of interactive art from progressive music to interactive art.

Some artists in interactive art use visual language computer programming, Max/MSP Jitter, to create interactive projects. Max/MSP was originally created for electronic music. However, later it incorporated the visual component, Jitter, beyond sound. Currently, it became a multimedia tool for interactive art by connecting with the technology of physical computing. The natural transition of Max/MSP Jitter from music to interactive art coincides with Paik's trajectory from music to interactive art. Interactive art has plural origins including Marcel Duchamp's kinetic 'sculpture' and Roy Ascott's changing 'painting.' Likewise, Paik's *Random Access* reveals the musical genealogy of interactive art. He was a creative composer, an active musician, a musical instrument inventor, and ultimately an important pioneer of interactive art. In particular, *Random Access* contributes to verifying his pioneering musical approach to interactive art.

### Acknowledgements

This research developed from my previous proceedings, "A Pioneer of Interactive Art: Nam June Paik as Musique Concrete Composing Researcher" at the ISEA 2015 and "An Origin of Interactive Art: Nam June Paik's Interactive Musical Instruments" at the ISEA 2016.

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Byeongwon Ha studied in the Film, Television and Multimedia department at SungKyunKwan University, Seoul, South Korea. After receiving his BFA, he created interactive media, experimental films, and video art in the graduate study of Media Art at Yonsei University, Seoul, South Korea. He earned an MFA degree in Digital Media from Rhode Island School of Design in Providence, RI, and won the thesis project award. Now he is writing a dissertation about Nam June Paik's interactive art in the

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