OBJECT NUMBER: 71.2007

ARTIST: John Maeda (American, b. 1966)

TITLE: *Mirror Mirror*

DATE: 2006 (acquired by MoMA, gift from artist); 1999 (planned but unrealized CD-ROM release)[1]; 1998 (first exhibited)[2]

ACCESSION NUMBER: not on MoMA record

DEPARTMENT: Architecture & Design

MEDIUM (or COMPUTER TECHNOLOGY):
Current MoMA version: Interactive Installation with iMac, LCD monitor, Webcam (originally, a Quickcam) and numerical keypad. It is worth noting that subsequent installations of the work use different webcams (recently, the Macally Icecam).

Executable application software was programmed in C, using a commonly (yet-unnamed) compiler.

Early iterations:
Fall 2001 exhibition at NTT InterCommunication Center Gallery A, B, C: Interactive installation with book, software for Mactintosh (which is hidden from visitor), video camera, and video projector.

1999 CD-ROM version (never commercially released): Interactive program for Macintosh, some form of external camera needed, operated with mouse.

DESCRIPTION:
SIGNIFICANCE:
John Maeda's work stands at the intersection of software programming, interactive art, and graphic design. He is the author of numerous books including *Maeda@Media* and *The Laws of Simplicity (Simplicity: Design, Technology, Business, Life)* that attempt to redefine the relationship between humans and computers. In the late nineties he created a series of CD-ROMs, *Reactive Books*, to respond to the "great deal of CD-ROM-based content emerging that seemed to miss the point of computational material." He designed five books with corresponding programs to investigate "different aspects of the computer as related to the visual medium."[3]

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[1] See end of QuickTime video on Maeda's website:
http://www.maedastudio.com/2004/rbooks2k/rbooksbig.html.
[2] "'Mirror Mirror' Inaugurates Media Wall in Building 56," *MIT Tech Talk*, Sept. 16, 1998, http://web.mit.edu/newsoffice/1998/wall-0916.html.
[3] Maeda, John, "*Reactive Books*, 1994-1999," *Maeda Studio*,
http://www.maedastudio.com/2004/rbooks2k/index.php?category=all&next=2005/timestable&prev=2002/technology&this=reactive_books.

Four books/CD-ROMs were released from 1994 to 1998 through the publisher Digitalogue. These works – including *The Reactive Square*, *Flying Letters*, *12 O'clocks*, and *Tap, Type, Write* – explored the interrelationship of sound and image, the mouse as the site of interface between user and computer, visual representations of time, and the computer keyboard as technological heir to the keyboard. Digitalogue went out of business before the fifth, *Mirror Mirror*, could be released.

Like all of the *Reactive Books* this work explores the interaction between the software designer, the computer technology/hardware, and the physical actions of the user. All three are, in a sense, the performer. However, each operates at a different degree of presence and control. *Mirror Mirror* focuses in on the visual representation of the human-computer interface. By abstracting and subverting traditional expectations of the screen as mirror to reality, Maeda exposes how the technological underpinnings of electronic imagery subtend and regulate how we experience the world through visual media – scan lines, interlacing, a synchronic representation of time, light as an electromagnetic force, and additive color. At the same time, Maeda provides a tool for the user to instantaneously generate ephemeral digital images through a transformation of the physically motile into the visual.

INSTALLATION ENVIRONMENT, TECHNOLOGY, INTERACTIVITY:
"*Mirror Mirror* uses video input to translate realtime imagery to ten variations of modulated light."[4]

As an installation, *Mirror Mirror* is flexible in terms of its exhibition environment. MoMA has already presented it in two different locations. Currently, *Mirror Mirror* is installed next to the other four *Reactive Books*. (That it was exhibited on its own in 1998 implies that MoMA's current grouping together of the five may not be prescriptive. Confirmation from Maeda is needed for MoMA to consider exhibiting *Mirror Mirror* apart from the rest of the *Reactive Books* series.) The series is presently installed in a well light room with numerous other works. The single user nature of the work limits conspicuously interfering distractions from other works in the room. Current light settings should not be fixed as the only environment to present the work. Instructions for the piece raise the possibility of attaching a USB powered light to illuminate the user in darker gallery settings.

According to the video from Maeda's website the screen displays static on-screen when the user changes between 'variations.' The work is silent.

The ten variations are selected by pressing one of the numbers on the keypad. (Earlier instantiations were controlled either by a mouse (the never-commercially-released version) or nine different variations were projected at once in a grid form

[4] From *Reactive Books* QuickTime video on Maeda's site at:
http://www.maedastudio.com/2004/rbooks2k/rbooksbig.html.

obviating the need of the user selecting amongst them – at least the 2001 version.) See the appendix for screen grabs of each of the 10 variations and two photos depicting the 2001 exhibition.

Each of these variations processes the image being captured (by the camera attached to the computer) by means of a different algorithm. The physical motions of the user are transformed live on screen in near-real time. The MoMA version displays the interactive processed image on both the screen of the iMac computer that is running the software and a second flat-screen monitor that is placed above the computer for the benefit of other visitors in the gallery.

Selecting **one (1)** on the keypad (the video shows the user moving the cursor over the number one on the top left of the screen) brings up "No. 43 Screen" which shows a silhouetted outline of the user against a screen of angled widely spaced scan lines. In black and white.

Selecting **two (2)** on the keypad activates "No. 44 See-Talk" which displays rows of 12-16 rectangles of the same height but variable width that appear to be chronological snapshots (frames) from the video input. They appear one after the other in quick succession starting at the top left and moving across and down the screen not unlike the progression of a video scan. In black and white.

Hitting **three (3)** on the keypad triggers "No. 45 Hotaru" which presents one to eight (these numbers based on the Quicktime video – the number range might be higher) very small representations of the video image that show a one to two second loop. The small screens appear in different numbers and configurations and appear and fade out based on the loop. While playing they either move right or left but stay at the same vertical position. They move across the screen at different speeds. In black and white.

Pressing **four (4)** begins "No. 46 Sidewalk" in which 10 rectangular bands, 5 coming from each side, move towards the center and then other side of the screen. Each rectangular band stretches multiple different frames from the video input. Every two bands are mirror images of each other along the center vertical axis. There appears to be color in the image.

Choosing **five (5)** on the keypad initiates "No. 47 Shadow" which displays a small black square on a white screen. The "shadow" of the black square is the video input. As the shadow is coming off of the back right of the black square only a section of the video input is viewable. In black and white.

Selecting **six (6)** on the keypad starts "No. 48 Red Green Blue" which modulates the video input with small lines of red, blue, and green that are arranged into rows which have alternating horizontal and vertical colored line segments. These line segments move across the screen from right to left. The user is shown as a vague black silhouette.

Pressing **seven (7)** on the keypad launches "No. 49 Signal" which displays the video input as a waveform of white and black rectangles. From the QuickTime video it is unclear how the user interfaces with the variation to affect changes in the waveform.

Pressing **eight (8)** on the keypad starts "No. 50 Palette" in which fluctuating lines emanate from the top of a horizontal line segment in the center of the screen to the top right of the screen. As with the previous variation how the user causes these changes is unclear in the video. In black and white.

Choosing **nine (9)** on the keypads activates "No. 51 Past" which displays 20 rows of 20 small screens of the video input. Rows 1, 4, 6, 7, 10, 11, 13, 16, 18, 19 show a positive of the video from the camera while rows 2, 3, 5, 8, 9, 12,14, 15, 17, and 20 show the negative. Each screen from left to right in a column appears to correspond to a frame of video image meaning the total screen displays two-thirds of a second of video. Actions begin on the left of the screen and move across to the right. Each of the twenty vertical columns present the same frame of video though alternating in positive and negative. In black and white.

Selecting **zero (0)** on the keypads triggers "No. 52 Fountain" in which a very small screen in the center of the screen shows the video image. Coming off of the top, bottom, left, and right of the small screen in the image are columns/rows of small lines that correspond to the edges of the small and go all the way to the edge of the computer screen dividing it into four quadrants. Changes on the center screen cascade through the columns/rows. Each of the four quadrants build off of one side of a corresponding column/row that limns it: lines in the top left quadrant flow off of the left side of the center top column and moves right to left; lines in the top right quadrant builds off of the top of the center right row and move to the top of the screen; lines in bottom right quadrant branch off of the right side of the bottom half of the center column and move right; lines in the bottom left quadrant stem from the bottom side of the left half of the center row and move to the bottom of the screen. Has a green cast to the light areas.

Pre-MoMA installations of the work displayed it in a significantly different manner. Though no photographs are easily locatable, the 1998 MIT version used "a stationary camera to capture images of passersby and incorporate them onto a colorful moving grid." At MIT it was shown separately from the other four *Reactive Books*. Which variations would have been included are not documented in the article, but the mention of a grid format suggests at least a common organization to the 2001 ICC Gallery A, B, C version. That version displayed nine variations at once in a 3x3 multi-screen grid. The computer is hidden from view. A camera records gallery visitors and depicts the transformations on a wall through the use of a video projector. The nine variations used are "No. 44 See-Talk," "No. 52. Fountain," "No. 50 Palette," "No. 51 Past", an unprocessed live feed not found in other versions (perhaps to allow the user to grok the interactive nature of the piece since the

computer interface is not visible), "No. 47 Shadow," "No. 48 Red Blue Green," "No. 49 Signal," and "No. 43 Screen." "No. 45 Hotaru" and "No. 46 Sidewalk" are not included in the images of this exhibit. It is not known whether they were not included at all or if it randomly cycled through the 10 variations (11 including the direct unprocessed feed). See Appendix II for two photos from that exhibit.

COMPONENTS:
MoMA's gallery configuration of the piece was originally created for the 2007 MoMA exhibition of the *Reactive Books*, and the current 2010 installation mimics the 2007 version. This version includes an iMac computer with the program already installed, a 10 key Toshiba numerical keypad, a Macally Portable Icecam USB Video Web Cam (USB 1.1), and second flat screen. Placed just above a six-foot eyeline, the wall-mounted iMac is angled down towards the user, with the webcam extending from the iMac's side USB ports and around to the fron to fhte monitor where users may reposition it at will. The user interacts with the artwork through both the keypad and the webcam, as video images are transmitted to the computer   and visually manipulated through the processing software. Users observe visual transformations on the iMac screen while other museum visitors can view it on the second flat screen which is mounted, flat to the wall, directly above the iMac. The degree to which these should be seen as fixed sculptural elements needs to be confirmed or denied by John Maeda. That Architecture and Design added the second screen implies a fluid nature to the technological equipment used.

The earlier versions would have had a different model computer (out of view to visitors), no keypad, a different camera, and a video projector. It also would have needed more room both on the wall to show the large projected image and floor space as the user would stand farther away from the wall as compared to the MoMA version where one stands directly in front of the iMac computer. Also, as mentioned, previous configurations involved a live video feed (without any Maeda-authored algorithmic visual 'variations,' presumably so that users could better connect the dependency of the work on their movement and interaction with it.

ARTIST INTENTION:
INSTALLATION ENVIRONMENT, TECHNOLOGY, INTERACTIVITY:
Maeda's general lack of strict concern for specific technological installation arrangements of *Mirror Mirror* was apparent in the artist interview: "Part of me thinks it would be cool if [the works] were at computer desks. Part of me thinks it's cool to have them high up, as if they were meant to be consumed as art. I don't have a strong feeling about these things. I think I used to have that part in me, and then I just gave up. Technology can be so messy."

One of Maeda's statements, however, suggested that the work's previous installation as a simultaneously displayed 9-screen projection may not be the ideal: "I always struggle to figure out how to display some of my works. For *Mirror Mirror*, I found that when you show things on a grid, it cheapens it."

FUTURE MODIFICATIONS:
The various versions over the years – the never released CD-ROM, the 1998 MIT exhibition, the 2001 ICC Gallery A, B, C installation, and the 2007/2010 MoMA versions, indicate an inherent variability in presenting the piece.

No specific conditions regarding modifications to *Mirror Mirror*, differing from those that might apply to all of the works in *Reactive Books* were expressed during the artist interview.

Furthermore, though not explicitly written by Maeda on the Ars Electronica webpage devoted to *Reactive Books,* an unnamed author states "Technically, the work itself is not difficult to create; the essence, not the technology, are Maeda's sole message." This statement implies an openness on Maeda's part towards transformative preservation that can deal with technological obsolescence as it acknowledges a separation between the work's practical technology/structure/authenticity and its conceptual essence/appearance/integrity.

TECHNOLOGY (or COMPUTER ENVIRONMENT):
It is important to note that MoMA's technological documentation of all of the works is less-than-robust, and installation staff members' undocumented knowledge of the work's configuration is crucially important.

Currently, MoMA runs *Mirror Mirror* and the other works that make up *Reactive Books* on "Snow" generation iMacs (ca. 2002). it seems that Maeda's commercial release of the other works in the *Reactive Books* series suggests that they would be functional in any PowerPC Mac OS9 environment—whether on an iMac, or not. While it can be inferred that the same applies to *Mirror Mirror*, in spite of it never being commercially released, this functionality has yet to be determined/verified.

The iMac used for *Mirror Mirror*, according to MoMA Preparator, Pamela Popeson is not work-dedicated. Popeson also intimated that there are several backed-up versions of the *Mirror Mirror* installation application, on hard drives and the server, yet admitted to the lack of checksum implementations that would verify data integrity across migrations.

A driver for the webcam periphery is contained, on "Disc 8." No further information about the driver is documented.

CONDITION ASSESSMENT:
As the work is currently installed at MoMA, it is assumed to be currently operational as of April 2010.

RISK ASSESSMENT:
iMac
OS9

Availabilities of peripherals

If emulated/recompiled how to ensure interaction with peripherals?
How to deal with 16x9 displays and higher resolution.
Importance of response time when run on faster computers

RECOMMENDATIONS:
For recommendations relevant to all of the *Reactive Books*, please refer to the
Recommendations section regarding the entire *Reactive Books* work.

Specific to *Mirror Mirror*, it is recommended that should MoMA decide to continue
exhibiting *Mirror Mirror* on the OS9 paltform (as the artist interview with John
Maeda suggests may be most appropriate) the acquisition en masse of functional
webcams peripherals (that can interface with OS9) be undertaken as soon as
possible. Either of the two webcam models successfully employed in the exhibition
of *Mirror Mirror* (the Quickcam, and the Macally Icecam) would be appropriate. If
either is no longer available, additional research and drivers will be required to test
compatibility with the *Mirror Mirror* programming code.

To facilitate future research into the work, beyond the work's functional
obsolescence, it is recommended that MoMA look into recording the actions *of
Mirror Mirror*'s ten variations.. Measuring response time and any time lags inherent
in the user/camera/software/hardware chain may prove valuable aspects of the
work documentation.

While Maeda did not seem to envision exhibition of *Mirror Mirror* on operating
systems other than OS9, favoring instead video documentation, MoMA it may be
advantageous to further investigate the possibility of obtaining the original source
code from Maeda. This recommendation pertains specifically to *Mirror Mirror*, as it
was never commercially-released and a standardized ROM version of it may not
exist elsewhere.

It is recommended that MoMA immediately begin to perform integrity verification
of the migrated and original versions of the *Mirror Mirror* software and applications
using a preservation appropriate checksum, such as MD5. This is an easy task to
perform, and it is not recommended that MoMA wait for its "OAIS Digital
Repository" to be implemented before undertaking such action.

Finally, it is recommended that MoMA obtain a copy of Maeda's 2001 talk, which
was in Japanese, from the ICC Gallery A, B, C. As the talk is in relation to an exhibit
which presented *Mirror Mirror* it is likely to include relevant information.

BIBLIOGRAPHY / INTERNAL RESOURCES:
BIBLIOGRAPHY:
"John Maeda." *Shift.*
http://www.shift.jp.org/en/archives/1999/08/john_maeda.html.

A brief interview printed in August 1999 in which Maeda states the *Mirror Mirror* is under construction.

"John Maeda: Post Digital – August 10 (Friday) – October 21 (Sunday), 2001 Gallery A, B, C." *ICC Online*.
http://www.ntticc.or.jp/Archive/2001/Post_Digital/Works/mirror.html.
Includes photos of the exhibition of *Mirror Mirror* in the Fall of 2001 in Tokyo. Maeda also gave an artist talk in relation to this exhibit. It is not available online and was conducted in Japanese, but it probably includes relevant information on *Mirror Mirror* and should be acquired.

Maeda, John. *The Five Reactive Books: 1995-1999*. QuickTime video. 2002.
http://www.maedastudio.com/2004/rbooks2k/rbooksbig.html.
This video explaining the *Reactive Books* series includes a section on *Mirror Mirror* that demonstrates the piece 10 variations.

Maeda, John, "*Reactive Books*, 1994-1999," *Maeda Studio*,
http://www.maedastudio.com/2004/rbooks2k/index.php?category=all&next=200
5/timestable&prev=2002/technology&this=reactive_books.
On a webpage devoted to the *Reactive Books* series, Maeda mentions that *Mirror Mirror* was intended to be released in 1999 as a CD-ROM never was as the publisher of the series, Digitalogue, went out of business. *Mirror Mirror* is noted as using a "video input as the primary interaction means."

"'Mirror Mirror' Inaugurates Media Wall in Building 56." *MIT Tech Talk*, Sept. 16, 1998. http://web.mit.edu/newsoffice/1998/wall-0916.html.
A review of *Mirror Mirror*'s exhibition in 1998 in the new gallery space at MIT. No pictures are included but the article mentions that the work is "a "video fountain" that uses a stationary camera to capture images of passersby and incorporate them onto a colorful moving grid."
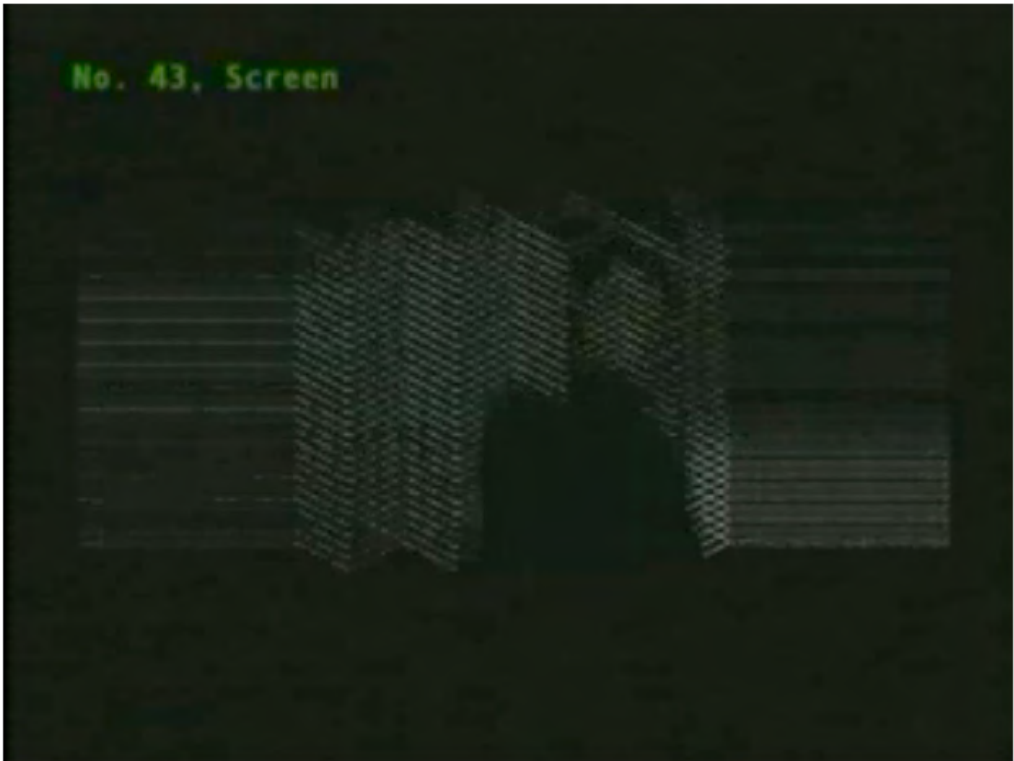
INTERNAL RESOURCES:
MoMA-generated CAD designs of 2007 installation.

AUTHORS: Walter Forsberg, Jonathan Andrew Uhrich

DATE: 2010-04-22

APPENDIX I: SCREEN GRABS OF *MIRROR MIRROR* VARIATIONS
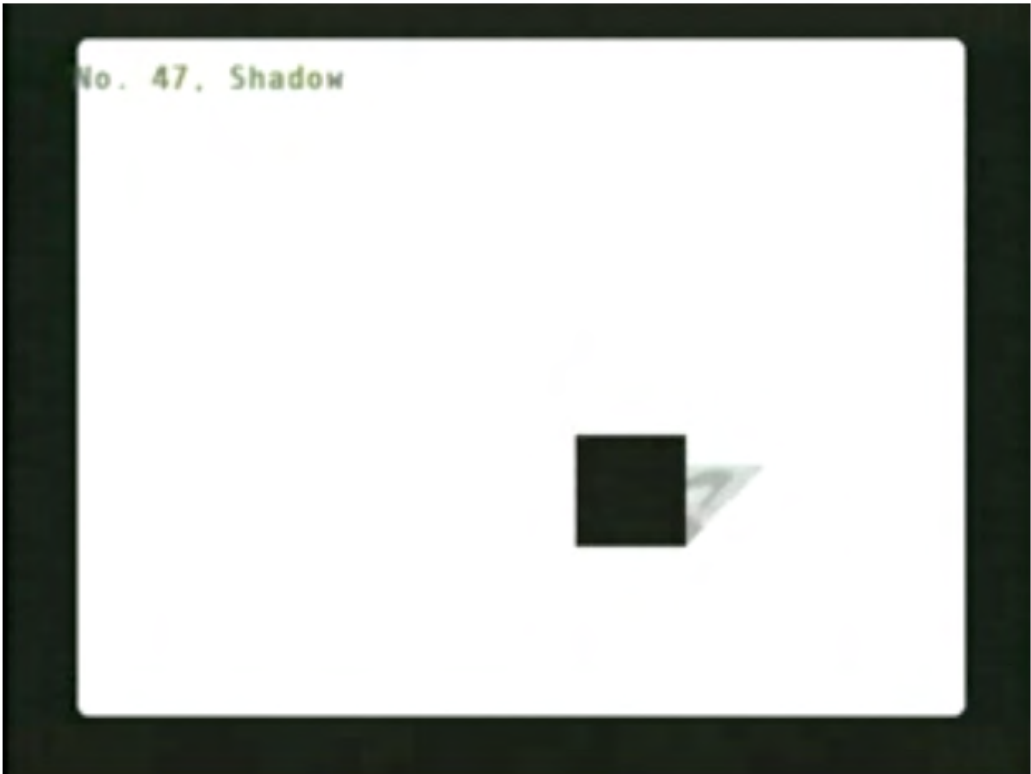
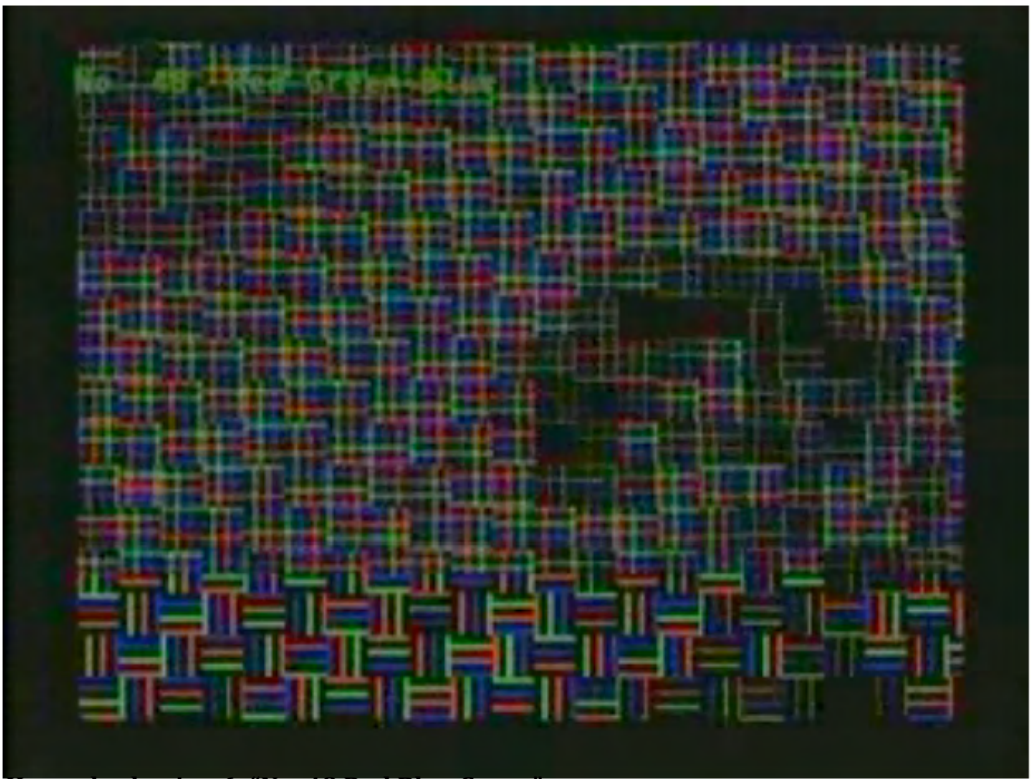**Keypad selection 1: "No. 43 Screen"**

Keypad selection 2: "No. 44. See-Talk"

Keypad selection 3: "No. 45 Hotaru"

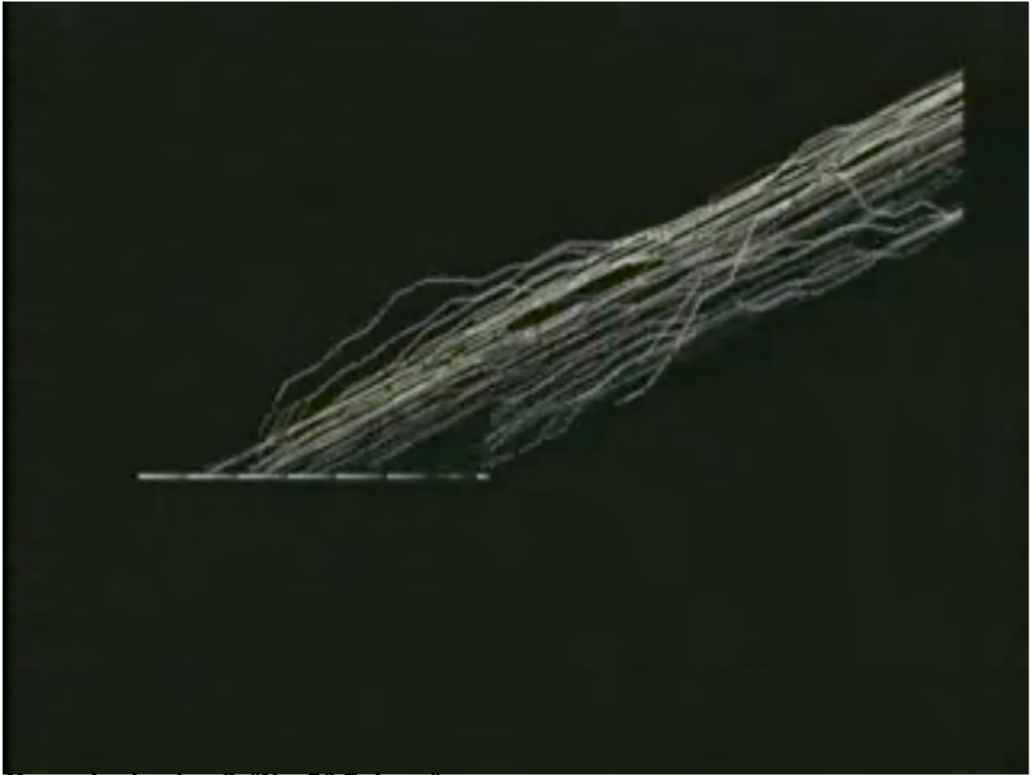**Keypad selection 4: "No. 46 Sidewalk"**

Keypad selection 5: "No. 47 Shadow"

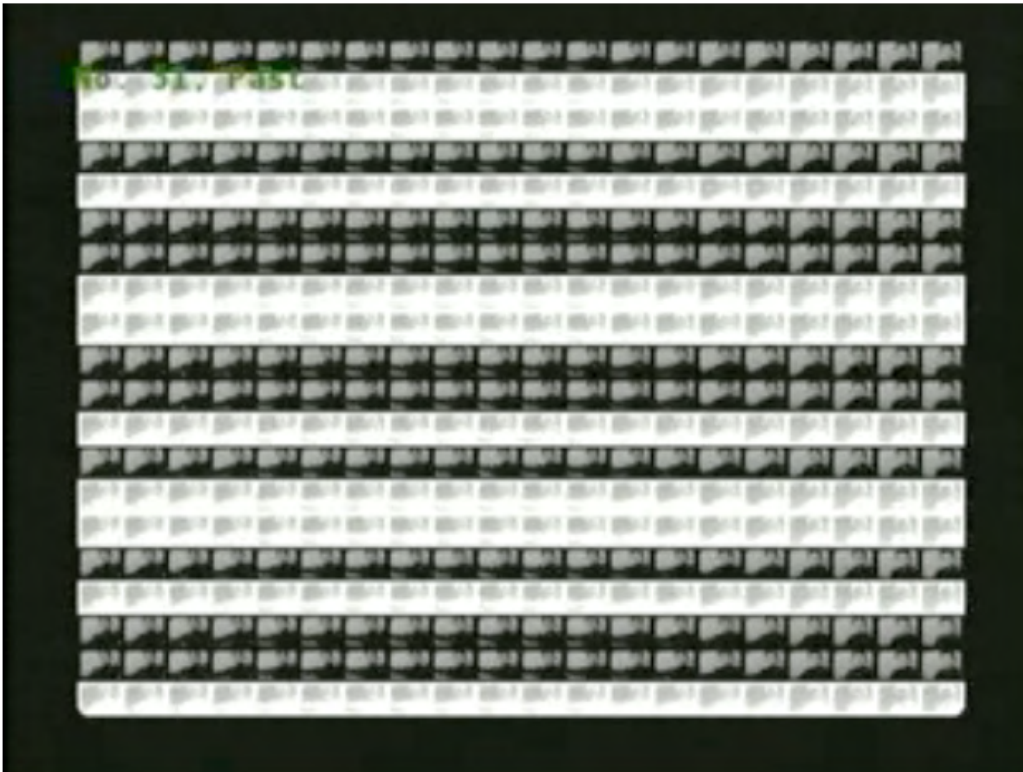**Keypad selection 6: "No. 48 Red Blue Green"**
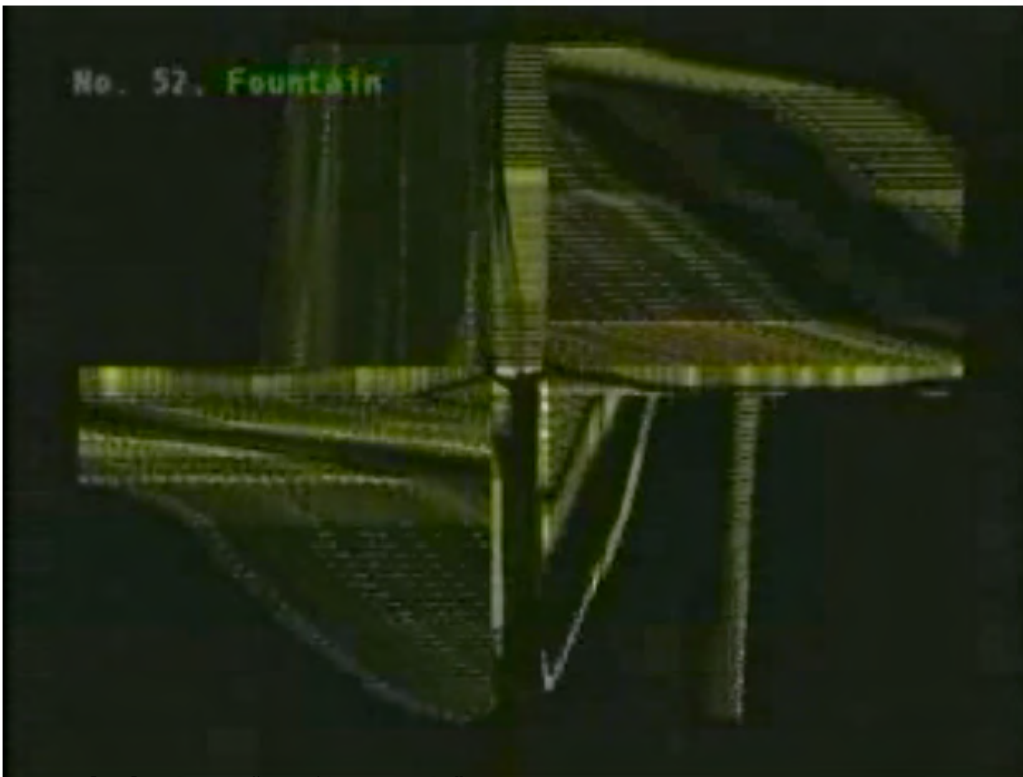
Keypad selection 7: "No. 49 Signal"

Keypad selection 8: "No. 50 Palette"

Keypad selection 9: "No. 51 Past"

Keypad selection 0: "No. 52 Fountain"

APPENDIX II: IMAGES FROM EARLIER EXHIBITIONS OF *MIRROR MIRROR*

These photos of *Mirror Mirror* as exhibited in the show "John Maeda: Post Digital" which ran from August 10 to October 21, 2001 at InterCommunications Center's Gallery A, B, C were grabbed from the ICC website at http://www.ntticc.or.jp/Archive/2001/Post_Digital/Works/mirror.html.

This exhibition had no interface between the user and the computer but instead had nine variations of the piece up at once in a grid form. Please note that they seem flipped on a center vertical axis from their display on the MoMA version though this could be an error from when they were loaded onto the above webpage. Starting on the top left and working right and then down this version includes: "No. 44 See-Talk," "No. 52. Fountain," "No. 50 Palette," "No. 51 Past", an unprocessed live feed not found in other versions (perhaps to allow the user to grok the interactive nature of the piece since the computer interface is not visible), "No. 47 Shadow," "No. 48 Red Blue Green," "No. 49 Signal," and "No. 43 Screen." Not included are "No. 45 Hotaru" and "No. 46 Sidewalk."