The Pavilion: Into the 21st Century: a space for reflection

RANDALL PACKER

American University, # 162 McKinley, 4400 Massachusetts Ave, Washington, DC 20016, USA
E-mail: rpacker@zakros.com

> And so the arts are encroaching one upon another, and from a proper use of this encroachment will rise the art that is truly monumental. (Wassily Kandinsky, 1912)

In this paper, I describe the *Pavilion: Into the 21st Century* project, a multimedia instrument based on the spherical mirror created for the *Pepsi Pavilion* – a visionary work of art and architecture originally created by E.A.T. (Experiments in Art & Technology) for Expo '70 in Osaka, Japan. The *Pavilion* is being returned to contemporary artists and audiences in order to extend the experience of the original to the Internet. The project draws from the fundamental notion of interdisciplinary collaboration and social interaction that was integral to the original concept – encouraging a freer, more participatory experience that breaks down the traditional distinction between artist, audience and artwork.

1. HISTORICAL ROOTS: BILLY KLÜVER AND E.A.T.

> The new interface I will define is one in which the artist makes active use of the inventiveness and skills of an engineer to achieve his purpose. The artist could not complete his intentions without the help of an engineer. The artist incorporates the work of the engineer in the painting or the sculpture or the performance. (Klüver 2001)

The Pavilion: Into the 21st Century project finds its roots in the work and ideas of Billy Klüver (figure 1), the Swedish-born scientist, who nearly single handedly turned the New York art world upside down in the 1960s when he proposed a new role for the engineer in the creation of art. Klüver, drawing inspiration from the Greek root for Techne – in which the practice of art and science was inseparable – suggested that the engineer serve as new material for the contemporary artist. As the scientist boldly stated, 'I will argue that the use of the engineer by the artist is not only unavoidable but necessary' (Klüver 2001). Klüver claimed an active role for the engineer in the exploding New York art world when pop art, happenings, and multimedia performance were emerging on the scene during the tumultuous 1960s. He embraced the ideals of the time, convinced that the artist should draw ideas and inspiration from evolving socio-cultural issues, as well as a new and expanding world of engineering, new media, electronic music and information technology, which were emanating from such high-tech media research centres as Bell Laboratories in Murray Hill, New Jersey, where he worked as a laser scientist.

His first collaboration was in 1960 with the Swiss sculptor Jean Tinguely, who had just been commissioned by the Museum of Modern Art in New York to create a new work for their sculpture garden. Tinguely turned to Klüver and his assistant Harold Hodges, and together they constructed the now infamous *Homage to New York* (figure 2), a self-destructing kinetic sculpture of found objects and other assorted artefacts of discarded junk timed with electrical triggers to self-detonate over a precise twenty-seven-minute time period. The shocked audience at the opening on 17 March 1960 – high society types and local culturati – witnessed not only the explosive birth of pop art, but the beginning of a wild, tumultuous decade of multimedia experimentation that underscored the 1960s social revolution. As art critic Calvin Tomkins described, 'After about twenty minutes it becomes clear that the machine will not perish unaided; firemen's axes finish the job, and *Homage to New York* returns to the junk piles from which it was born. The nineteen sixties have begun' (Tomkins 1980).

Following *Homage to New York*, Klüver attracted a close following of avant-garde artists, composers and performers, including Robert Rauschenberg, Jasper Johns, John Cage, Andy Warhol, Merce Cunningham, among others, who were compelled to incorporate the new media and conspire with engineers such as Klüver to explore the unimaginable realm of art, music and technology.

In 1966, Klüver organised '9 Evenings of Theatre and Engineering', the first major art and technology showcase that took place at the cavernous 69th Regiment Armory building in New York City (where Duchamp's scandalous *Nude Descending a Staircase* debuted in 1913), pairing nine artists, composers and performers together with engineers from Bell Laboratories (figure 3). '9 Evenings' included electronic theatre works by John Cage, David Tudor, Robert Rauschenberg, among others. This much written about, often heralded, and sometimes criticised event – infamous for its ambitious performance works that didn't always function as planned – generated a critical mass of interest in new technologies in artistic circles in New York and around the country. In the fall

Organised Sound **9**(3): 251–259 © 2004 Cambridge University Press. Printed in the United Kingdom. DOI: 10.1017/S1355771804000445

https://doi.org/10.1017/S1355771804000445 Published online by Cambridge University Press

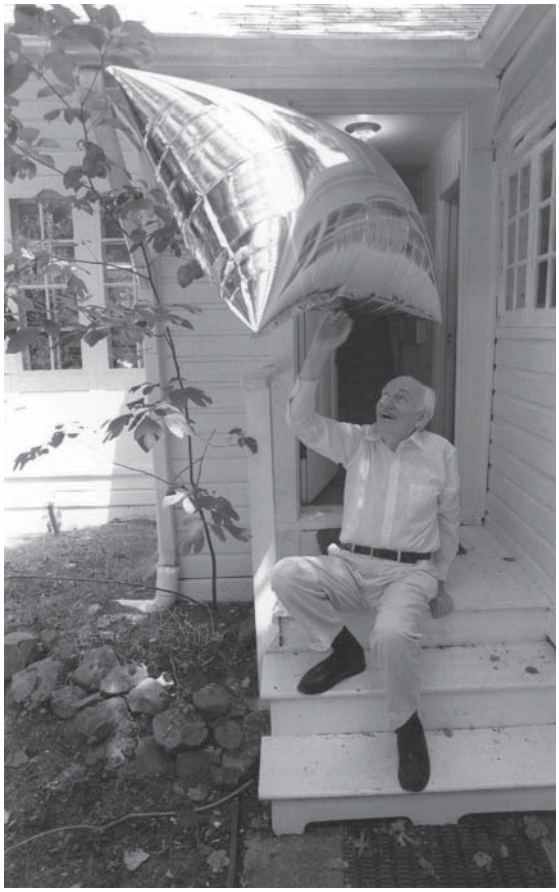


Figure 1. Billy Klüver.

of 1966, shortly after the debut of '9 Evenings', Klüver, along with Rauschenberg, performance artist and sculptor Robert Whitman, and engineer Fred Waldhauer, founded E.A.T. (Experiments in Art & Technology), the now legendary art and technology organisation, which spawned chapters in major cities throughout the US and served as a catalyst for generating broad adoption of new technologies in the arts.

2. THE *PEPSI PAVILION*

> An unprecedented structure with unprecedented capabilities for visual, aural, and theatrical experience, the [Pepsi] Pavilion is unlike any other performance arena, in that performers were as entirely absorbed into its shimmering mirrored surface as the audience – their reflections and activities merging with those of the spectators. (Rose 1972)

The culminating project carried out by E.A.T. was the *Pepsi Pavilion* – an extraordinary effort involving over seventy-five artists and engineers – a public sculpture and performance installation commissioned by Pepsi-Cola for the Expo '70 in Osaka, Japan (figure 4). The artists and engineers who created the Pavilion synthesised the tendencies of the 1960s, bringing together the currents of social interaction, collaboration, electronic media, new music, happenings, performance art, immersive environments, and mind-altering 'realities' in this transformative 'theatre of the future'.

The *Pepsi Pavilion* was first an experiment in collaboration and interaction between the artists, composers and engineers, exploring systems of feedback between aesthetic and technical choices, and the humanisation of technological systems. Klüver's ambition was to create a laboratory environment, encouraging 'live programming' in which artists, performers and engineers collaborated in real-time in front of a live audience. This offered opportunity for experimentation, rather than resort to fixed or 'dead

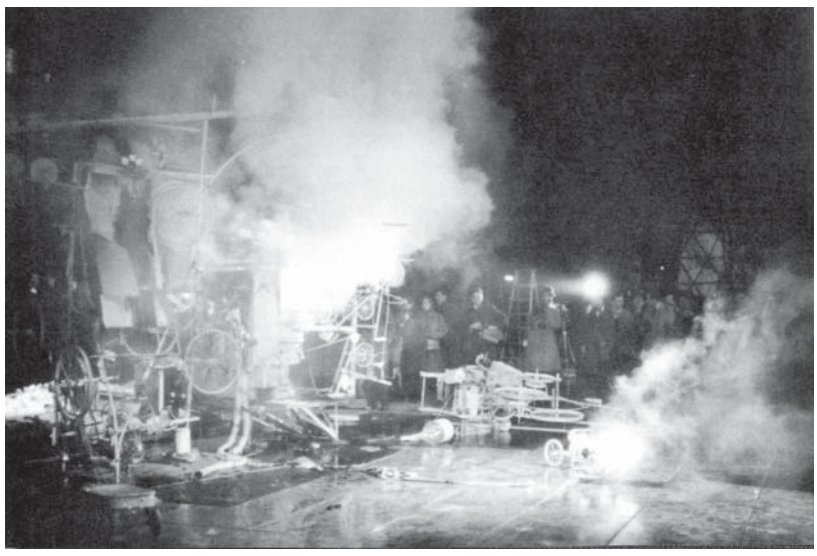


Figure 2. *Homage to New York*.

https://doi.org/10.1017/S1355771804000445 Published online by Cambridge University Press



Figure 3. Theatre Electronic Environmental Modulator.

programming', as he called it, typical of most exposition pavilions. Secondly, the *Pepsi Pavilion* evoked and celebrated aspirations for heightened, non-hierarchical social dynamics built on the aesthetics of agency and transformation brought about through the collective participation of the audience, the artists, and the engineers. The *Pepsi Pavilion*'s interior dome – immersing viewers in three-dimensional real images generated by mirror reflections, as well as multi-channel, spatialised electronic music – invited the spectator to individually and collectively participate in the experience rather than view the work as a fixed narrative of pre-programmed events. The *Pepsi Pavilion* gave visitors the liberty of shaping their own reality from the materials, processes and structures set in motion by its creators.

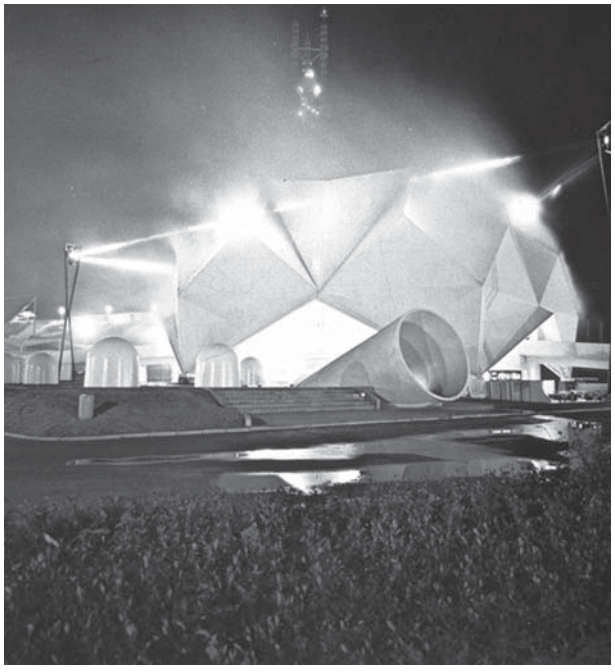


Figure 4. The *Pepsi Pavilion*.

After receiving the invitation from Pepsi, Klüver assembled a core team of artists, along with Whitman, that included Frosty Myers, David Tudor and Robert Breer. Together they conceived the key elements of the *Pepsi Pavilion*: the spherical, 90-foot diameter, 210 degree mirrored dome, inflated inside a geodesic shell, generating real-image, three-dimensional, upside-down reflections of audience and performers (figure 5); a fully programmable surround-sound system enabling composers to direct sound in various spatial trajectories via thirty-seven speakers arranged in a rhombic grid; handsets held by the viewer emitting pre-recorded 'natural' sounds as the audience traversed loop coils installed beneath the floor of the mirrored dome; 800-pound kinetic sculptures (dubbed 'Floats') roamed the terrace outside the Pavilion at a speed of approximately two inches per minute, with tape loops broadcasting sounds and gently deflecting off of unaware spectators; and four towers with powerful xenon lights generating a well-defined beam between each tower, dramatically framing the dome at night.

Additional artists and composers later joined the team, including Gordon Mumma, Lowell Cross, Tony Martin and Fujiko Nakaya, among others, who were responsible for the laser deflection system that responded to audio input, bathing spectators in

https://doi.org/10.1017/S1355771804000445 Published online by Cambridge University Press



Figure 5. Spherical mirror.



Figure 6. Laser reflections.

pulsating streamers of colour as they entered the *Pepsi Pavilion*'s lower Clam Room (figure 6); a programmable, retractable lighting system generated spectacular blossoming effects in the mirror; and a man-made fog sculpture generated by hundreds of tiny water nozzles enshrouded the exterior dome in a fine mist, interacting with the weather conditions. The sum total of the *Pepsi Pavilion* was a fluid, multisensory experience of light, sound, touch and movement, constantly changing perspective in response to the viewer's presence and actions.

3. A PAVILION FOR THE 21ST CENTURY

> The collaborative process by which the [Pepsi] Pavilion was realized was a specifically American experiment in democratic interchange. (Rose 1972)

The concept of the *Pavilion: Into the 21st Century* project is to challenge the potential of the original – 'a laboratory for social experimentation' – through the incorporation of new technologies, engineering methodologies, and artistic strategies – with the following objectives:

(1) To create a complex audio/visual environment that extends and distributes the notion of collective, non-hierarchical, audience participation into virtual, networked space.
(2) A programmable, interactive 'multimedia performance instrument', laboratory and showcase for media experimentation, and critical forum for researching and advancing the potential and future of the integration of art, music and science.

The current phase of the project, led by the author of this essay, along with Joseph Howard, Optical Engineer at NASA-Goddard Flight Center in Beltsville, Maryland; Gregory Kuhn, acoustical engineer and installation designer; and Wesley Smith, artist and electrical engineer, involves the creation of a scale-model installation (currently dubbed *Pavilion 21*) inspired by the *Pepsi Pavilion* (figure 7). The project has received supported from the NASA-Goddard Space Flight Center and the Maryland Institute College of Art, and is currently in development at the American University in Washington, DC. Currently in prototypical form, the projected completion of the

https://doi.org/10.1017/S1355771804000445 Published online by Cambridge University Press

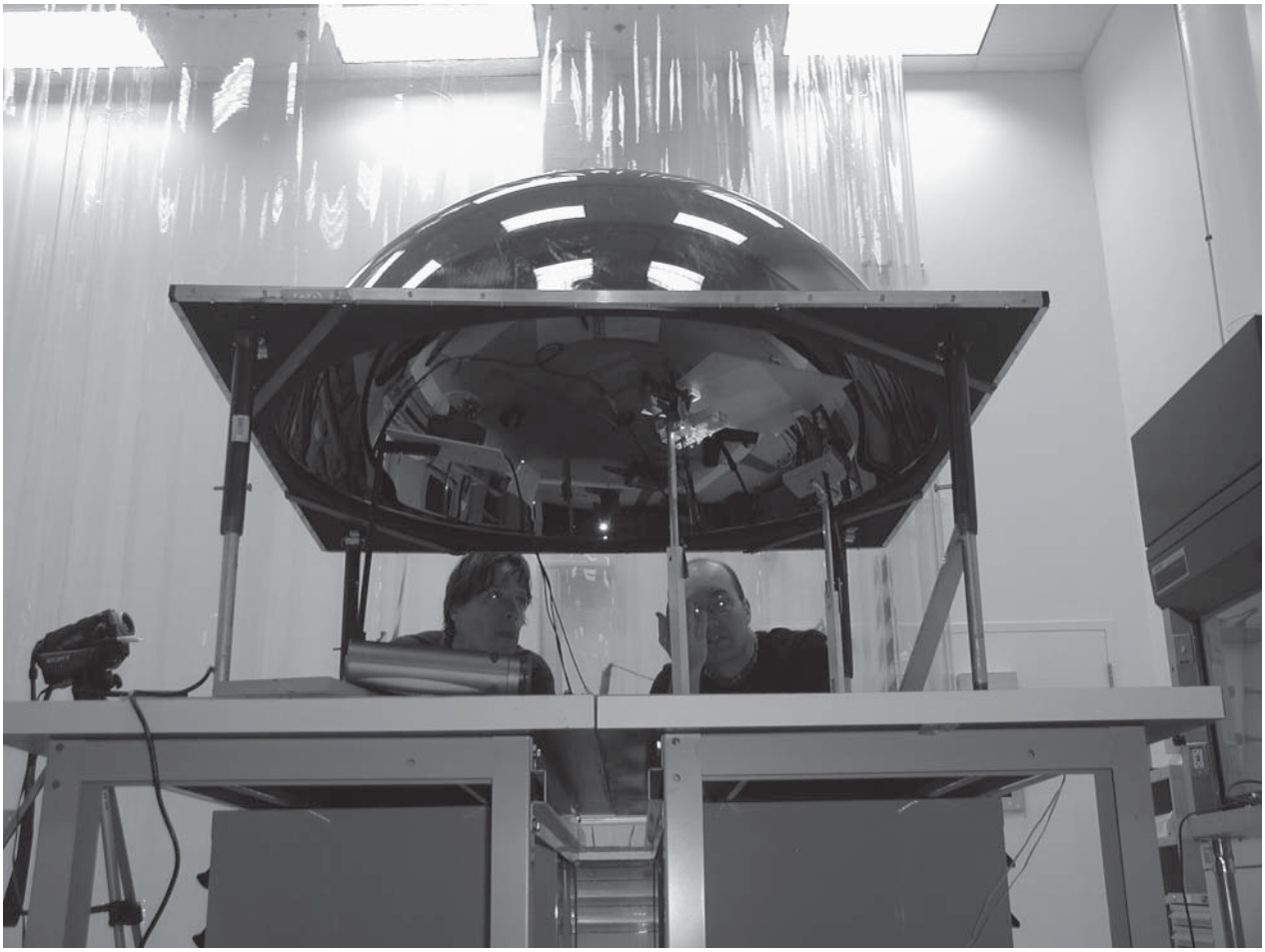


Figure 7. *Pavilion 21* prototype.

scale-model installation is early 2005, with a full-scale realisation scheduled for 2007.

4. *PAVILION 21*: A NETWORKED PAVILION

> This anthropic cyberspace recognizes space as a human-generated means of thought and communication, as a site for cultural engagement . . . The creation of this kind of cyberspace could be a Great Work, the electronic equivalent of the cathedrals in Europe. People involved in its construction are building the extensions of our present world of space and thought. In coming years we will encounter resonances between physical and cyberspaces. (Anders 1998)

Where *Pavilion 21* extends the original *Pepsi Pavilion* is in the way in which the analogic properties of the mirror optics are digitally processed and distributed to the online viewer. This capability reinforces the collective nature of the original concept – in which the audience is freely encouraged to participate by shaping its own experience – while distributing viewer interaction to the Internet.

With *Pavilion 21*, we have designed a network-based system, which can receive digital video over the Internet so that it can be projected onto the surface of the mirror dome; the resulting images are then broadcast back to the viewer in a steady stream (figure 8). A similar process takes place with the uploading, manipulation and broadcast of audio. In this way, the viewer participates in the composition of the multimedia experience.

Here, the demarcation between physical and virtual space, between online and local proximity, converges and blurs into a shared participatory experience through sound and image and our attention to its spatial and transformational quality.

The transformation of the spatio-temporal domain, in which physical materials and their specific properties and dynamics converge with those of digital media, will be a unique architectural feature of *Pavilion 21*. The space will be designed such that online participants in the virtual domain, using an interface with a window displaying live information of the physical interior, can upload imagery and sound, including the viewer's own image via webcam (figure 9). These materials are transformed visually by the mirror, and sonically by the reverb algorithm. The imagery and sound is then subjected to user-controllable digital

https://doi.org/10.1017/S1355771804000445 Published online by Cambridge University Press



Figure 8. Interior of mirror.

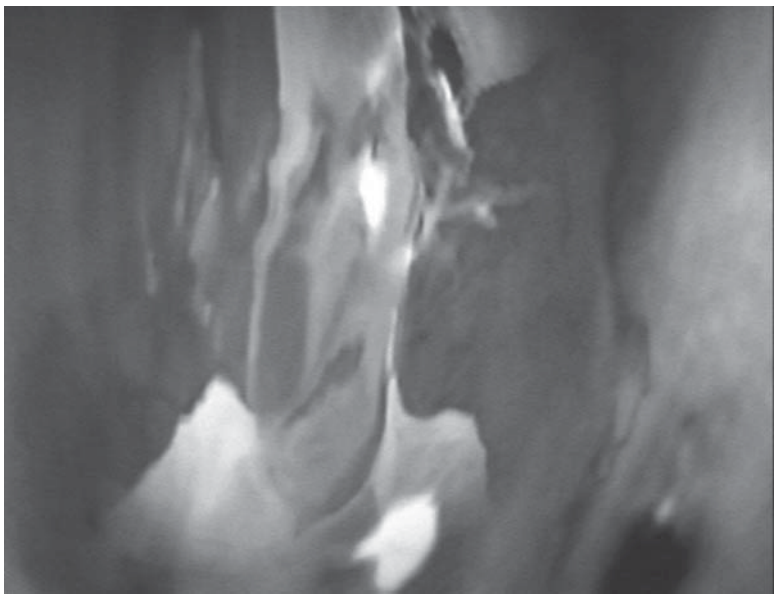


Figure 9. Billy Klüver distorted image.

https://doi.org/10.1017/S1355771804000445 Published online by Cambridge University Press

processing and returned live to the viewer via streaming audio/video. The resulting audio-visual montage is simultaneously composed by multiple online viewers, uniting them in shared, electronic space.

With *Pavilion 21*, the experience of the space is conducted through a multi-user network of viewers inhabiting real-time, electronic space. Images, light, sound, communication, movement, and peer-to-peer viewer interaction travel freely back and forth between the real and the virtual, such that the distinction between the two is blurred in a shared, participatory 'third space'.

5. SYSTEM FOR REAL-TIME MULTI-USER INTERACTION

The software design for *Pavilion 21* is being created in Max/MSP/Jitter, enabling multiple viewers to have simultaneous, independent control over the imaging produced by the mirror optics, as well as audio transformations and spatialisation based on convolution reverb using IRCAM SPAT objects.

The video transformations have been designed to accentuate and amplify the optical effects of the spherical mirror. They also incorporate fluid motion and water simulation, an important physical element and motif of the installation intended to interact in interesting ways with the optical transformations (figure 10).

The video processing chain consists of the following sequence: a user-inputted video clip is analysed by a video tracker that takes the video input and generates track or motion points. These motion points are calculated based on movement or changing visual phenomena within the image. A 'water tracker' object, which simulates the rippling effect of a pool of water, interacts with the motion points, in which each point generates a rippling of water analogous to throwing a pebble into a pond. The viewer has control of the depth and intensity of the rippling effect. An 'alpha maker' object turns the fluid simulation into an alpha channel for the video. A 'distorter' object uses the fluid simulation data to distort the video, such that the motion of water sends ripples through the image. Finally, a 'blossom' effect uses ray tracing data to simulate the effect of the object passing through the focal point of the mirror dome. This causes the image to dramatically spread and fill the space, similar to the spectacular blossoming of images in the original *Pepsi Pavilion*.



Figure 10. Video documentary of *Pavilion 21* – title screen (http://www.zakros.com/projects/pavilion/video_pavilion_promo.html).

In the audio domain, the convolution reverb is being used to sample the resonant characteristics of the scale-model dome (approximately 1/16 scale of the original), and these characteristics are multiplied to emulate the acoustics of a full-scale dome. Using SPAT localisation, the viewer has full control over the positioning of the sound/image object in the stereo field (online) and in a four-channel quad for participants viewing the on-site installation. Additional audio effects are being implemented to correspond with the optical distortions, as well as the motion and water effects produced in Jitter. These include SPAT control of late reverberation and room presence to enhance the experience of water rippling and blossoming, as well as the control of source presence to accentuate the scaling of the image. Additionally, the GRM Reson VST plug-in is used to further modulate the resonant and spectral characteristics of the sound. Fluctuation of the S&H rate, distribution curve, and number of filters, along with changing filter frequencies, correspond with the distortions in the motion tracking of the imagery. Future development is planned to give the viewer control over convolution settings to simulate a selection of dimensions of the spherical mirror.

Multiple viewers (a maximum of four is anticipated) have full, independent control over the above visual and audio transformations via a Max run-time application that features a user-interface of knobs and sliders. The interface also includes a real-time, three-dimensional representation of the mirror space and the way in which the images are mapped and transformed within the space.

6. MULTIMEDIA PERFORMANCE INSTRUMENT

> If art was going to be of any use, it was going to be of use not with reference to itself, but with reference to the people who used it. (John Cage)

In addition to *Pavilion 21*'s function as a networked, multi-user environment, it will also be used, like the original, as a 'magic theatre' for the creation of performances, environments and installations by invited artists and engineers, reinforcing the collaborative

https://doi.org/10.1017/S1355771804000445 Published online by Cambridge University Press

relationship between the artist and the engineer in the pursuit of new forms of experience that would otherwise be unattainable.

Pavilion 21 will function as a fully programmable 'multimedia performance instrument', in which the characteristics of its environment, the nature of its transformations, the field of interactions with the viewer, vary according to the artistic and technological vision of each team of collaborating artists, performers and engineers. A customised interface and set of software tools will enable teams to have complete control over the *Pavilion*'s extensive range of programmable parameters.

This capability echoes Klüver's initial vision of the *Pepsi Pavilion* as an experimental laboratory space for live programming. According to Klüver,

> live programming was designed to use the space in an organic way. The hardware ideas were so rich in possibilities that the concept of a continuously changing environment developed organically. A changing group of four artists (composers, dancers, painters or scientists) were to reside at the *[Pepsi] Pavilion* at all times and determine the activities and programming. The sound and light systems, as well as the floor space, the hand-set system, and the mirror were designed taking into account the demands of this continuously changing environment. The *[Pepsi] Pavilion* became theatre conceived of as a total instrument, using every available technology in which the accumulated experience of all the programmers expanded and enriched the possibilities of the space. The programming and operations of the Pavilion were as important as the design of the hardware. (Rose 1972) (figure 11)

The *Pavilion: Into the 21st Century* project brings into sharp focus the active role of the viewer through the work's embrace of open, responsive systems. For the artists and engineers, it is a study in the dynamics of viewer participation. Although the artists who perform in the space prepare proposals for performances and environments, they are instead encouraged to freely experiment with the multi-dimensional audio-visual system and to consider the response of the spectator in the development of their evolving ideas. This process springs from Klüver's commitment to the ideal that the advanced technological systems support the artists' ideas, creating an open field of possibilities in which they choose and do whatever is imaginable.

7. A LABORATORY FOR SOCIAL EXPERIMENTATION

> It is time to produce a kind of stage activity which will no longer permit the masses to be silent spectators, which will not only excite them inwardly but will let them take hold and participate – actually allow them to fuse with the action on the stage at the peak of cathartic ecstasy. (Moholy-Nagy 1961)

As stated above, *Pavilion 21* extends the environment for social interaction by uniting the interior of the physical mirrored space to virtual space staged on the Internet. This integration of systems and the way in which information is transformed is conceived as an aesthetic realisation of the changing nature of reality in these increasingly technological times.



Figure 11. Performance in *Pepsi Pavilion*.

https://doi.org/10.1017/S1355771804000445 Published online by Cambridge University Press

The project asks, will it one day be normal to be concentrated in many places at once? As Marshall McLuhan has famously proclaimed, 'After more than a century of electric technology, we have extended our central nervous system itself in a global embrace, abolishing both space and time as far as our planet is concerned' (McLuhan 1964).

According to Barbara Rose, the art critic who accompanied the artists to Japan, 'basic to this system of values was social interaction, control of technology toward fulfilling human needs, respect for the natural environment and its potentials and limitation, and a belief in the ability of individuals to take responsibility in democratic, non-coercive, non-hierarchical situations' (Rose 1972). This notion of establishing an environment for audience participation enables, according to media critic Pierre Lévy, 'interpretation to enter the loop with collective action' (Lévy 1997).

The *Pavilion: Into the 21st Century* is a response to the idea of freeing the spectator to make his or her own connections in the experience of the work, or as Henry David Thoreau poetically intoned, '[o]bey the spur of the moment . . . Let the spurs of countless moments goad us incessantly into life' (Thoreau 1960). Here the artists build a world, without controlling it, in order that the spectator exist in that world as a willing and equal partner in forming the experience, in shaping their own reality. Art and music then functions as a transformative agent, without imposing pre-conceived patterns of thought, which might prevent the viewer from freely experiencing the artwork according to their own unique perspective.

We could surmise that the project articulates a vision of social sculpture, in the spirit of Joseph Beuys, who was concerned with 'how we mold and shape the world in which we live: sculpture as an evolutionary process, everyone an artist' (Beuys 1990). The work is conceived as a public sculpture for constructing worlds of the imagination that defy the constraints of physical laws, of everyday reality, revealing to us, in the most extravagant manner, what our reality might be, given the tools and minds to reshape it.

The *Pavilion: Into the 21st Century* embodies the idealism of the avant-garde of the 1960s, concluding with Billy Klüver's statement, 'The initial concern of the artists who designed the [*Pepsi*] *Pavilion* was that the quality of the experience of the visitor should involve choice, responsibility, freedom, and participation. The [*Pepsi*] *Pavilion* would not tell a story or guide the visitor through a didactic, authoritarian experience. The visitor would be encouraged as an individual to explore the environment and compose his own experience' (Klüver 1972).

> Traditionally artists have been acknowledged, along with philosophers and scholars, as individuals, capable of such general thinking: The future of American civilization may be greatly affected by the degree to which they are once again permitted to interact with the society at large. (Rose 1972)

REFERENCES

Anders, P. 1998. *Envisioning Cyberspace*. New York: McGraw-Hill.

Beuys, J. 1990. Introduction [1979]. In C. Kuoni (ed) *Joseph Beuys in America: Energy Plan for the Western Man*. New York: Four Walls Eight Windows.

Klüver, B. 1972. The Pavilion. In B. Klüver, J. Martin and B. Rose (eds.) *Pavilion*. New York: E.P. Dutton & Co., Inc.

Klüver, B. 2001. Great Northeastern power failure [1966]. In R. Packer and K. Jordan (eds.) *Multimedia: From Wagner to Virtual Reality*. New York: W. W. Norton & Co.

Lévy, P. 1997. The art and architecture of cyberspace. In *Collective Intelligence: Mankind's Emerging World in Cyberspace*, trans. R. Bononno. New York: Plenum Trade.

McLuhan, M. 1964. *Understanding Media.* New York: McGraw Hill Book Company.

Moholy-Nagy, L. 1961. Theater, circus, variety [1924]. In W. Gropius and A. S. Wensinger (eds.) *Theater of the Bauhaus.* Middletown, CT: Wesleyan University Press.

Rose, B. 1972. Art as experience, environment, process. In B. Klüver, J. Martin and B. Rose (eds.) *Pavilion.* New York: E. P. Dutton & Co., Inc.

Thoreau, H. D. 1960. *A Writer's Journal*, ed. L. Stapleton. New York: Dover.

Tomkins, C. 1980. *Off the Wall.* New York: Penguin Books.

https://doi.org/10.1017/S1355771804000445 Published online by Cambridge University Press