

The Expanded Artwork – Modes and Purposes of Interaction
in Sound Sculpture and Installation

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Introduction

This paper posits that interactive sound sculpture and installation are both media that call for human experience. They occur within “extended space”¹, counteracting the ever increasing compaction and digitisation present within our modern society. The most effective works are also accessible to all, allowing a layman to participate and to create sound in a meaningful way, unlike traditional instruments which have favoured the virtuoso for almost all of human history. These two qualities of expansion and accessibility occur in sound works across three modes of interaction: Impulse, Combine and Dynamic², as defined by Kersten Glandien, and are exemplified in this essay by two particular works: Harry Bertoia’s *Sonambient* series (1950 - 78) [fig. 1] and Christina Kubisch’s *Oasis 2000: Music for a Concrete Jungle* (2000) [fig. 2]. The paper will examine interaction across sound installation and sculpture from philosophical, sociological and historical standpoints, combining all three to demonstrate the necessity of the expanded, open and accessible work within current society. It will seek to establish a historical precedence for the fusing of art and life and for the importance of art in counterculture; providing parallels, arguments and answers to issues we have faced as a society. In our modern times this means engaging with and counteracting the effects of technological insurgency, including compression of space, reduction in human interaction and the use of computers as a crutch rather than as a tool.



Fig. 1: Bertoia, Harry. *Sonambient*, sound-sculpture, 1950-1978, USA.³



Fig. 2: Kubisch, Christina. *Oasis 2000: Music for a Concrete Jungle*, Sound Installation, 2011, The Hayward Gallery, London, UK.⁴

¹ P. Sloterdijk, *In the World Interior of Capital: Towards a Philosophical Theory of Globalisation*, Polity Press, Cambridge, UK, 2013, p.250.

² K Glandien, 'Sound and interactivity', *T3*, Digital Music and Sound Art, University of Brighton, 18th March 2018.

³ Bertoia, Harry. *Sonambient*, Sound Sculpture, est. 1950 -78, The Estate of Harry Bertoia, accessed 5th January 2019 <https://harrybertoa.org/about-bertoia-sonambient/>.

⁴ Kubisch, Christina. *Oasis 2000: Music for a Concrete Jungle*, Installation, 2000, Hayward Gallery, London, UK, Photographer Unknown, accessed 5th January 2019, <http://www.christinakubisch.de/en/works/installations/2>.

Chapter 1: An Overview of Interaction

To fully experience an interactive art piece, in-person engagement is key. Unlike images, audio or text, interactive artworks are not so vulnerable to reproduction and as such escape “the bogus religiosity which now surrounds original works of art [paintings]”⁵, which in turn causes the shifting of meaning from “what it says to what it is”⁶. This resistance to copying is a trait unique to works of art that are not only difficult to reproduce, but are heavily related to their location and thus if reproduced somewhere else, or even taken away to be owned, would be stripped of their core functionality or meaning. This positions interactive artworks as anti-capitalist, anti-globalist entities, which resist historical and critical “mystification”⁷ due not only to their irreproducibility but also their variety of meaning derived from their interactive elements. It is no coincidence that art such as this first made its appearance during the mid 20th century; it is inextricably linked to the advent of widely available communications and reproductive technology such as the telephone, the camera and the television. The philosophies of this new kind of art were exemplified by Allan Kaprow’s *Happenings*, as well as in his writings, in which he asserts that art has moved away from looking to old forms as guidance and towards “modern society itself, particularly how we communicate, what happens to us in the process and how this connects us.”⁸ This fixation on the binding of art and life has been present in art since the Futurists, when Luigi Russolo proclaimed, in his 1913 manifesto, that “every manifestation of life”⁹ was compositional material.

Both the anti-capitalist undercurrents of interactive art and the aim to “close the gap between art and life and also to democratise”¹⁰ came to the fore in the latter half of the 20th century with the Fluxus movement, of which Kaprow’s philosophy was a cornerstone. This movement was mainly concerned with performative pieces that could not be commodified, and adapted the idea of the

⁵ J. Berger, *Ways of Seeing*, British Broadcasting Corporation and Penguin Books, London, UK, 2008, p.23.

⁶ *Ibid.* p.21.

⁷ *Ibid.* p.23.

⁸ A. Kaprow, ‘Education of the Un-Artist (Part III)’, 1974, in *Essays on the Blurring of Art and Life*, J. Kelly, University of California Press, London, England, 2003.

⁹ L. Russolo, ‘The Art of Noises, Futurist Manifesto’, 1913, in *Audio Culture*, C. Cox & D. Warner. Continuum, New York/ London, 2004, p. 13.

¹⁰ G. Maciunas, ‘Fluxus Manifesto’, in *100 Artists Manifestos; From the Futurists to the Stuckists*, A. Danchev, Penguin Modern Classics, London, England, 2011.

Happening, embedding it further into the everyday. This movement provides the foundation for much of modern 21st century art, especially art forms concerned with sound and interactivity. The philosophies held by the Futurist and Fluxus movements are critical to art's importance in our society today, solidifying its ability to address rapidly changing societal conditions, catalysed by our increasing reliance on technology. Two very different works which exemplify interactivity in sound works are Harry Bertoia's constructivist sound sculptures entitled *Sonambient* and Christina Kubisch's Cageian electromagnetic compositional matrix: *Oasis 2000*. Neither of these works are part of either of the aforementioned movements, though Kubisch's work contains obvious influence from artists such as Max Neuhaus and Nam June Paik, in their *LISTEN* (1966) and *Random Access* (1963) works respectively.

Before closely analysing interactive works it is important to define the different levels of interaction which may take place. Dr Kersten Glandien proposes three discrete modes¹¹:

Impulse Interaction is present in works that require single or repeated actions from their experiencer. For example, pressing a button to trigger a series of actions or the same action repeatedly. This can be seen in Janet Cardiff and George Bures Miller's *The Killing Machine* (2007) [fig. 3] in which a button is pressed to activate a series of instruments affixed to a large chair. The onlooker must then imagine the machine working to torture anybody who'd dare to sit in the chair. It can also be seen in Marco Evaristti's *Helena* (2000) [fig. 4], in which 10 goldfish were left in 10 blenders on a table. When the exhibition opened the artist left the work plugged in implying that visitors may blend the fish if they wished.



Fig. 3: *The Killing Machine*, Janet Cardiff and George Bures Miller, Installation, Oxford, UK, 2007.¹²



Fig. 4: *Helena*, Marco Evaristti, Installation, Kolding, Denmark, 2000.¹³

¹¹Glandien, op. cit.

¹²Cardiff, Janet & Miller, George Bures. *The Killing Machine*, Installation, Oxford, UK, 2007, Photographer unknown, accessed 5th January 2019, http://www.cardiffmiller.com/artworks/inst/killing_machine.html#.

¹³ *Helena*, M. Evaristti, Installation, 2000, Kolding, Denmark, Evaristti Studios, accessed 5th January 2019, <https://www.evaristti.com/helena-el-pescador-1>.

Combine Interaction requires the agent to interact with multiple elements in order to experience the whole work. It emphasises the assembling of different unchanging components to create a finished product. This kind of interaction can take many forms and can be seen in works such as Paul Matisse's *Kendall Band* (1986-88) [fig. 5], which consists of three 'instruments' hanging in between the tracks of a subway station. There are three corresponding levers on the walls of the platforms that can be operated by different people, in order to play the instruments together. Nam June Paik's *Random Access* (1963) [fig. 6] is also an example of combine interaction, with lengths of cassette tape stuck to a wall, crossing each other in a seemingly random pattern, and a tape head hanging next to it. The experiencer must apply the tape head to the tape in order to play it back; composing within the work by exploring its matrix.



Fig. 5: *Kendall Band*, P. Matisse, Installation, Boston, MA, USA, 1986-88.¹⁴

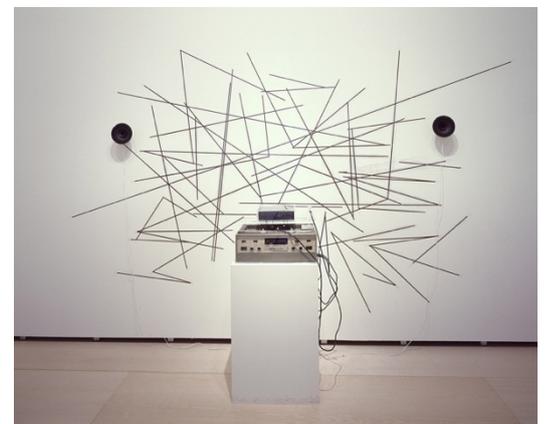


Fig. 6: *Random Access* (2000), N. June Paik, Installation, The Guggenheim, New York, NY, USA, 1963.¹⁵

Dynamic Interaction allows for "creative and fluid exploration in the work"¹⁶. Works of this type include David Rokeby's *Very Nervous System* (1982-91) [fig. 7], which allows an audience member to interact with a piece of music that is playing via wireless, concealed sensors, and dancelike movement of the body. The music continues to play in linear fashion whilst you interact, meaning that you are interacting with a changing element. This opens up a back and forth dialogue between work and agent, which is not seen in other modes of interaction. Rokeby's piece is particularly interesting due to the early stage at which it exhibits an artist reacting against the nature and limitations of computers through dynamic interaction.

¹⁴ Matisse, Paul. *Kendall Band*, Installation, Boston, MA, USA, 1986-88, Photograph by James Moore, 2018.

¹⁵ *Random Access* (2000), N. June Paik, Installation, The Guggenheim, New York, NY, Photographer unknown, 2000, accessed 5th January 2019, <https://www.guggenheim.org/artwork/9536>.

¹⁶ Glandien, op. cit.



Fig. 7: David Rokeby Performing *Very Nervous System*, Potsdam,

1993¹⁷

Glandien states that although the interactivity of some works that fall into the first two categories may be limited, all works position the artists as “facilitators, delegating execution through exploratory action to encounterers”¹⁸. Both Kubisch and Bertoia’s works exemplify this, and embrace it in their purpose.

Bertoia’s sculptures are difficult to categorise in a number of ways due to the duality of sight and sound that they possess. They may be considered sculptures in their own right, each work made of precisely cut and welded metals. The main sculptural series “consist of a base supporting rods that move and ring against each other”¹⁹, yet when still, are “only awaiting the point of action”²⁰. They therefore cannot be considered only sculptural or instrumental, as they possess aesthetic intent and constructivist qualities in their “welded, put together”²¹ form. In Bertoia’s work “the sounds... are identical to the forms”²², this is due to the organic nature of the sculptures, they are made through an understanding of the properties of their materials – rods at a certain thickness are made as long as possible and cut as soon as they will no longer support themselves. In this sense they are entirely

¹⁷ David Rokeby *Performing Very Nervous System*, Potsdam, 1993, Photographer unknown, accessed 5th January 2019, <http://www.davidrokeby.com/vns.html>.

¹⁸ K. Glandien, *SoundArt and Performativity*, <http://kerstenglandien.com>, Papers and Talks, <http://kerstenglandien.com/papers-talks/>, accessed 22nd March 2018. P.8.

¹⁹ J. Brien, *Sonambient* (Record Booklet), Important Records, London, UK, 2015. P.27.

²⁰ Ibid. p.19.

²¹ N. Gabo, ‘Constructivist Manifesto’, in *Sonambient*, J. Brien, Important Records, London, UK, 2015.

²² Brien, op. cit.

open, chance based works, leaving the artist at the will of his materials. In Bertioia's words, when the framework from moulding is removed it is like "hearing the cry of a new-born baby"²³. This duality between sight and sound is inseparable due to its organic nature and therefore brings many unique qualities to the work, that no normal sculpture or instrument would possess. They aren't able to be made a commodity, as their sounds, though recorded and sold, lose their full impact when detached from their source. Conversely, his sculptures have been purchased by galleries to sit silent and lifeless. Both commodification's destroy the essence of the work by preventing its dual nature. The sound sculptures are also difficult to categorise in terms of interactivity as anybody can play the sculptures. It has been said that even Bertioia's cat would rub against them to extract their sounds²⁴.

If we are to categorise *Sonambient* as individual pieces, rather than a series, they fall into the *impulse* category; each work has a very distinctive sound, that on its own would be difficult to compose with. However, if we treat these works as one work of art comprised of many individual pieces, as Bertioia purportedly intended it to be experienced²⁵, then interaction would fall into the *dynamic* mode. Unlike *Kendall Band*, where instruments can only be activated in a single way via a lever, Bertioia presents us with a plethora of instruments that can be played in a number of intuitive and immediate ways. Huge gongs and *singing bars* complement the variety of unique wire sculptures, large and small, making the combinations appear almost endless. When you consider that each instrument may be played by a layman²⁶ this is an accessible orchestra, with no instrument or player more important or virtuosic than the next. This is made possible by the nature of the works. It is musical and artistic experience, rich, yet accessible to anyone who wishes to immerse themselves within it. It is an open work by Eco's definition²⁷ and also escapes the reproduction of art that John Berger cautions against in this technological age.

²³ Ibid. p.20.

²⁴ Ibid. p.27.

²⁵ Ibid. p.33.

²⁶ Ibid. p.26.

²⁷ U. Eco, 'The Poetics of the Open Work', 1959, in *Audio Culture*, C. Cox & D. Warner, Continuum, New York/ London, 2004, pp. 167-175.

Chapter 2: The Open Work

Interactive artworks are intrinsically open, meaning that the artist must relinquish their control over the final nature of the work. Eco defines the open work, or the *work in movement*, as:

*The possibility of numerous different personal interventions, but is not an amorphous invitation to indiscriminate participation. The invitation offers the performer the chance of an oriented insertion into something which always remains the world intended by the author.*²⁸

This comes with a number of ramifications not only for the artwork itself, but for the role of artist and audience, placing a far greater weight on audience's interpretation of the environment or object they find themselves presented with. In order to analyse the open work, we must accept Roland Barthes' theory of *The Death of the Author*. It states that the meaning that an artist may have intended to instil within a work has no agency after it is consumed by another individual; an experimenter's meaning is the only one which may be true to them.²⁹ As such, each work provides an opportunity for artistic play, as championed by Kaprow, and therefore should be equally accessible to everyone who encounters it. The complexity of interaction that can be experienced in a work is core to how an agent may perform "interventions"³⁰ and as such the mode of interaction present within a work is inextricably linked to its perceived openness.

Kubisch's *Oasis 2000* is a work that falls within the combine mode of interaction; it bares much similarity to Paik's *Random Access*, and it feels inevitable that Kubisch must have drawn inspiration from his ideas. *Oasis 2000* is an environment piece typical of Kubisch's work. *Oasis 2000* consists of overhead wires strung in triangular formation, electromagnetic headphones invented by Kubisch, a multi-channel composition of nature sounds, juxtaposed with the London skyline visible from the terrace of the Hayward Gallery, where the piece was installed.³¹ The experimenter walks underneath the wires whilst wearing the headphones, picking up composition being transmitted along them; exploring the installation spatially as well as aurally. The experience of Kubisch's piece is much more exploratory than in Paik's installation due to the expansion of space and sound within, as such

²⁸ Ibid. p.172.

²⁹ P. Barry, *Beginning Theory: An Introduction to Literary and Cultural Theory*, Manchester University Press, Manchester/New York, 2009, pp. 63-65.

³⁰ Ibid.

³¹ B. LaBelle, *Background Noise: Perspectives on Sound Art*, Bloomsbury, London, UK, p.227.

Kubisch states that here in this work “The visitor becomes a “mixer” who can put his piece together”³². As much as the work draws from Paik in its mechanism, it can be seen to be conceptually inspired by John Cage’s philosophy that “in new music nothing takes place but sounds”³³, as well as Max Neuhaus’ idea to “take the audience outside”³⁴ rather than bringing the outside in, as the Futurists had wished. *Oasis 2000* combines the exploratory aspects of Neuhaus’ sound walks with fixed, constant, environmental parameters. This allows exploration within a more limited environment than a Dynamic work would provide, meaning that the experiencer, or *mixer*, is free to create a kind of sound collage, creating through ordering and layering different sounds, never effecting the nature of sounds individually. The consequence of this is that Kubisch retains more control over the agents’ experience within the work. Therefore, unlike a sound walk, or even Bertoia’s sculptures, the work is not in movement and the agent is subjected more to an artist’s own vision than perhaps the Fluxus movement would have agreed with.

Kubisch’s work is an example of the augmentation of space, much like virtual or augmented reality, yet rather than the augmentation being digital it is electromagnetic. She has imposed sounds onto an environment that would never naturally be heard, allowing for totally new experience when engaging with it. The installation is inorganic and created through the use of technology, placed away from the everyday, it clearly defines itself as art. Even though the process of taking it in is experiential, *Oasis 2000* can’t be said to fully align itself with the values of Fluxus or Futurism, though it is undeniable that Kubisch draws great influence from these movements. It is interesting to compare it to Neuhaus’ *Times Square* (1977) [fig.8], which similarly uses inorganic sound, experienced by walking through it. However, the sounds are subtle and audible without the use of technological implements (Kubisch’s headphones). The installation sits under a subway vent in the middle of Times Square, and is potentially the most experienced artwork in the world, though most people probably don’t realise they are experiencing it. This is an experiential work that uses inorganic sound to encourage exploration and close listening, the same Cageian concepts to be found in Kubisch’s work, however Neuhaus’ intervention aims more to fuse art with life; due to its location it is only ever experienced as a part of everyday life for many New Yorkers. Kubisch’s

³² Ibid.

³³ J. Cage, “Experimental Music” in, Cage, J. *Silence: lectures and writings by John Cage*, Calder and Boyars, London, 1968, p.7.

³⁴ M. Neuhaus, *Listen* (1990), Maxneuhaus.com, Listen, accessed 22nd March 2018, <http://www.max-neuhaus.info/soundworks/vectors/walks/LISTEN/LISTEN.pdf>, p.1.

installation shows some departure from these values in favour of contrived space that may still be experienced in a human and expanded sense, though the experience is a facsimile of reality nonetheless.



Fig. 8: Max Neuhaus walking over his Times Square Installation, New York, USA, 1977.³⁵

That being said, the sound of Kubisch's electro-magnetic work has, from the start, been described as "delicate, mysterious, strange and yet seemingly familiar"³⁶, aligning its aural aesthetics incredibly closely with Bertoia's "celebration of sustained tones... healing vibrations, deep listening and shimmering harmonics"³⁷. Whereas Kubisch's practice revolves around her electromagnetic technology, Bertoia's revolves around his materials. The organic nature of his practice ensure's that the sculptures are all unique, allowing the works as a whole to classify as dynamically interactive, as previously discussed. Bertoia aimed for this, stating that he wanted to create "an atmosphere of involvement rather than passivity"³⁸. In correspondence with their different modes of interactivity, the works are open to different degrees, with Bertoia's classing as an ever changing *work in movement*³⁹. The key difference between the two pieces is that Kubisch retains control over the material the experienter may work with, whereas Bertoia provides "a venue that anyone could

³⁵ Max Neuhaus walking over his Times Square Installation, New York, USA, 1977, photograph by the Estate of Max Neuhaus, accessed 5th January 2019, <https://www.diaart.org/visit/visit/max-neuhaus-times-square/>.

³⁶ C. Kubisch, KlangRaumLichtZeit: Arbeiten von 1980 bis 2000, Kehrer, Heidelberg, 2000, p.42.

³⁷ Brien, op. cit., p.3.

³⁸ Ibid. p.1.

³⁹ Eco, op cit., p.174.

play”⁴⁰. The freeness of Bertoia’s work results in an environment in which a “never ending play of changing conditions”⁴¹ facilitate individual creation, much similar to Kaprow’s works such as *Yard* (1961), where each individual will create something totally unique to themselves, with very little of the artist’s aesthetic vision present. The opposite is true for Kubisch, who’s aesthetic vision will remain, due to the fact that she dictates identical sound material for every experienter.

This is not to say that the works are radically different, or that Kubisch’s work is less valid for not being so open. Both works demonstrate different aesthetic and conceptual premises, the key thing that links them is their media and their accessibility. The interaction in both pieces allows for a meaningful creative experience for those who enter them; though it is less open, *Oasis 2000* is not constrained enough to prevent this. The meaning to be extracted is also never defined, therefore one experienter may come away with a very different feeling about the piece than another. It is the aesthetics that are somewhat constrained. In spite of this, both pieces allow for many interpretations and results in accordance with *Death of the Author*, and they both occur within expanded physical space, allowing for free and human interpretation from any participant. Their accessibility and openness is key to what makes them function as well as they do, a person may enter with no experience of the work and create something meaningful to themselves.

⁴⁰J. Brien, Op. Cit. p.105.

⁴¹A. Kaprow, ‘Creation of a Total Art’ in, *Essays on the Blurring of Art and Life*, Ed. J. Kelly, University of California Press, London, England, 2003, p.12.

Chapter 3: Artworks in Extended Space

It can be seen throughout history that art and society are inextricably linked, and the 20th century saw the attempted fusion of both. In response to this, a number of theories about the role of art in modern society have developed. Kaprow hypothesises that art has “taken on early philosophy’s role as a critique of life”⁴² and that modes of art now stem from society, and the nature of new communication, rather than previous art⁴³. If we accept these premises, then art’s primary focus must be to engage with the current digitisation of our environment, and of our lives.

Philosopher Peter Sloterdijk states that through modernisation we have facilitated globalisation, with “each and every inhabitant being urged to constant mobilisation”⁴⁴, with space becoming “a seemingly ignorable factor”⁴⁵ in our day to day lives. He argues that the combination of these two factors result in the constant changes of our world no longer “have[ing] the quality of history”⁴⁶. More imperative to this outcome than the comparative ease and speed of travel in the 21st century is the advent of digital technology, which has spawned a new kind of space. This space is compressed within our screens, comprised of “gathering, connection and compaction”⁴⁷ rather than the distance and physical separation of natural space. This new dichotomy of spaces bares some semblance to Debord’s writings in *Society of the Spectacle* (1967). In the book’s second thesis, Debord describes the societal impact of the stream of images we are constantly ingesting via entertainment and advertising as “fragmented views of reality”, regrouped “into a new unity as a separate pseudo world”⁴⁸. Following Kaprow’s thought on the new purpose of art, and the rise of installation and interactive works in kind with the development of technology, we can extrapolate that the purpose of the media is to combat the compaction of space introduced by new technologies. This is not to say that this is the aesthetic meaning of every installation or interactive work ever created, but that “the personal and social consequences of any medium... result from the

⁴² A. Kaprow, ‘Manifesto’, in *Essays on the Blurring of Art and Life*, Ed. J. Kelly, University of California Press, London, England, 2003, p.83.

⁴³ Ibid. p.130.

⁴⁴ Sloterdijk, op. cit. p.249.

⁴⁵ Ibid. p.250.

⁴⁶ Ibid. p. 249.

⁴⁷ Ibid. p.251.

⁴⁸ G. Debord, *Society of the Spectacle*, Rebel Press, London, England, 1994, p.7

new scale that is introduced into our affairs by each extension of ourselves, or by any new technology.”⁴⁹ There is meaning embedded within the form of any artwork, meaning that a work’s form will always have an impact on what an agent gains from experiencing it. This is all the more true for interactive pieces, as the agent often has to physically move through the form of a work in order to experience it.

We can see resistance to compaction of space in both Bertioia’s and Kubisch’s work. *Sonambient* and Kubisch’s electromagnetic installations require the agent to move through space in order to create, though each does this in a slightly different way. Bertioia’s work demands a more active process of creation than Kubisch’s. It requires you to move and touch various physical objects in space, composing via solid forms that are incredibly organic in nature. *Sonambient* is devoid of technological elements, therefore you are not constrained by any limitations or code, other than the physical objects that you are presented with. You are not pushed into creating using a certain methodology or guided by any digital processes running alongside your composition.

Kubisch’s *Oasis 2000*, though still relatively low-tech, raises more interesting questions. The creative experience here is far more passive for an agent, you take in and process pre-existent material in order to create something new. This is not at all the same as creating a series of unique sounds as in *Sonambient*. It is an exploratory rather than a compositional artwork, therefore movement through physical space is perhaps more essential to it. It is the work’s exploratory nature that is its purpose, and it is that part of its form which best demonstrates resistance to compaction of space. It is a work that demands physicality in order to function. Yet, you are working with ephemeral material, as sound is playing overhead and cannot be manipulated, you may only pass through it, there is nothing tangible about the work other than the space it inhabits. In this sense the work is similar to augmented reality works. I have already mentioned the idea of *facsimile space* in relation to Kubisch’s piece, this is something that may also apply to augmented and virtual reality (AR and VR) work in general. Both media take their form in a hybrid of compacted and natural space, imposing some qualities of each unto the other. Yet unlike virtual reality, Kubisch’s work doesn’t present you with a new version of a space, or a different space altogether. It imposes itself and its qualities upon pre-existent space through its sounds. In this sense it does more

⁴⁹ M. McLuhan, *The Medium is the Message*, Web M.I.T., accessed 3rd January 2019,

<http://web.mit.edu/allanmc/www/mcluhan.mediummessage.pdf>.

to work against the compression of space than for it and therefore is not truly a facsimile in the way that virtual reality can be.

There is an important distinction that must be made between augmented and virtual reality; AR allows digital objects to be implanted within natural space, whereas VR is a complete immersion within a digital environment. This means that AR requires physical movement and exploration through natural, extended, space, much like Kubisch's work, whereas VR creates the impression of natural space through incredibly advanced compaction.⁵⁰ VR and AR, are polar opposites in the ways in which they utilise the dichotomy of space presented to us by technological advancement. Augmented reality encourages physical exploration of space through imposing digital objects within it, enhancing the space in which we inhabit and prompting us to experience it. At this moment in time, it therefore appears opposed to spatial compaction, whereas virtual reality is the extreme of compaction. This comparison of physical and AR installation is perhaps a dangerous one, and it is important to emphasise the importance of tangibility in extended space as well as how inflexible digital technologies can be. If we remain unaware of these factors then it is incredibly easy to become "largely insensitive to the distinction between the natural and the made up"⁵¹.

The level of digitisation within a work not only has an effect on its spatial elements, but also its openness. Code, no matter how creatively written, is constrained to its own rules and parameters in a far less flexible way than a physical object is to its dimensions or intended purpose. This is due to the concept of *affordance*⁵² in physical objects; they are often applicable to uses other than their primary one - for example, a chair may be used to prop open a door, or even dismantled and used as firewood. Code does not currently possess such a quality, even when you are presented with a large number of choices, there is nothing fluid about its nature. When this rigidity is combined with the extreme spatial compaction of virtual reality we are presented with a facsimile of life that is incredibly unnatural and constricted. It is this growing constriction that technology presents us with that art must move away from. Rigidity is not the only issue with creating within digital environments, it is worth mentioning that they can be incredibly suggestive. Speaking about

⁵⁰ The Franklin Institute, last update 2018, accessed 3rd January 2019, https://www.fi.edu/difference-between-ar-vr-and-mr?fbclid=IwAR2XnrBwB5PSFnQF_wemDcAl-toyOY2dJtC_OUjHXYZdfl16Nx2jDdneKDo.

⁵¹ H. Rosenberg, *The Anxious Object*, Horizon, New York, New York, USA, 1964, pp. 61-62.

⁵² J. Gibson, *The Ecological Approach to Visual Perception*, Psychology Press, London, 2014.

recording music digitally David Byrne, of *Talking Heads*, muses that not “bending to what the software makes easiest” allows the music to “breathe a little more”⁵³.

Carrying on from Debord’s thinking in *Society of the Spectacle*, art critic Claire Bishop observes that “participation is important as a project: it rehumanises a society rendered numb and fragmented by the repressive instrumentality of capitalist production”⁵⁴. With reference to Sloterdijks thinking on capitalism and globalisation, we can safely propose that compaction of space, along with the rigid and suggestive nature of digital environments, is a huge part of that instrumentality. Dynamic, open and organic installations, such as *Sonambient*, therefore work against these societal and technological structures by providing fluid and human environments, in which one or more people may interact and create simultaneously. It is the organic nature of Bertoia’s sculptures that emphasises the meaning found within their form, however a work does not have to avoid using technology in order to be subversive in this way. For example, Rokeby’s *Very Nervous System*, which was briefly mentioned earlier, makes use of many digital technologies in a way which forces them to act in a seemingly organic and human way. Even Kubisch’s *Oasis 2000*, which utilises technology in a non-subversive way, works against the compaction of space in its form, by forcing physical movement through a physical environment, albeit an embellished one. This is something more difficult to achieve using a digital tool such as augmented reality, where objects must be viewed through an external device and are prone to a two-dimensional feel, despite technological development in recent years. Though Kubisch’s headphones also act as a device for experiencing her embellished environment, the material being transmitted through them sits in harmony with its surroundings, rather than jarring with them. Both Kubisch and Bertoia’s works, with their combination of open interactivity and expanded space exemplify the subversive nature of their form, across a spectrum of other works and artists, from Neuhaus’ participatory sound walks to Cardiff’s *Killing Chair*.

⁵³ D. Byrne, *How Music Works*, Cannongate Books, Edinburgh, 2013, P. 135.

⁵⁴ C. Bishop, *Artificial Hells: Participatory Art and the Politics of Spectatorship*, Verso, London, UK, 2012, p.1.

Conclusion: Art as Antidote

Harry Bertioia's *Sonambient* hold many Constructivist qualities in their sculptural construction. It was the 1922 manifesto of this group which stated "Technology is the mortal enemy of art"⁵⁵. This is not the case. In order to enter into a dialogue with technology that is useful within society, art must accept it and sculpt it in order to highlight its faults. It must propose ways in which we as a society can experience the benefits of technological development, whilst maintaining a connection to nature and expanded space. Art must become life, and become engaged in such a way as the Futurists and Fluxus artists envisioned in order to achieve this, and furthermore it must provide an accessible enough experience that it properly conveys the meanings contained within its form. We see as much freedom from technology in Bertioia's totally organic work as in Rockeby's technologically based work. Kubisch's work melds the two realms in order to explore a kind of hybrid space that avoids the dissonance currently present in the media of augmented reality and the total compaction of virtual reality, which must be fought against at all costs. Art must continue to utilise technology in order to realise its own concepts as fully as possible, it must never use technology as a crutch and it must never exist purely to demonstrate the capabilities of technology. This would represent art moving away from the closeness to life that it has attained over the past one-hundred years.

If art does not engage with technology then it may still act to subvert it, as in Bertioia's work, yet this kind of installation does not tackle issues head on. It provides a welcome and needed break from the constant compaction of space that we are experiencing in everyday life. Even as I write this, I am working within the compacted space of my computer screen, and I am bound by the restrictions of my word processor. Digitisation is inescapable and art must seek to address this, providing balance to our lives and society, through open and organic interaction, expansion and physical experience within that environment. Art must be able to provide this experience to any agent; it must not be exclusive of those who aren't musically or artistically trained; it must become a playground where "whoever plays can make no mistakes, but becomes an instant virtuoso"⁵⁶.

⁵⁵ A. Rodchenko, 'Manifesto of the Constructivist Group', 1922, in *100 Artists Manifestos; From the Futurists to the Stuckists*, A. Danchev, Penguin Modern Classics, London, England, 2011, p.220.

⁵⁶ Brien, Op. Cit., p. 105.

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