Journal of
Professional Communication

jpc

Mapping art and experience to systems thinking

Paul Goodfellow★

Northumbria University, (Newcastle upon Tyne, United Kingdom)

Article Info	**Abstract**
	This paper is about systems and their pervasiveness in society, and a possible role of artists to actively engage and reflect upon this increasingly dominant mode of thinking about, understanding and organizing the world. Systems thinking is now at the core of many areas of human endeavour, from climate science to economics and politics and much of this work has been made possible by the production of masses of spatially and temporally coordinated information about these subjects. The paper makes the argument that some contemporary artists have responded to society's shift to systems and 'big data' analysis, and the consequent alienation of the individual and their first-hand experience in these societal processes by dealing head on with issues related to systems, space and experience.

The paper discusses systems thinking and how systems are mediated by space, before discussing Lefebvre's conception of space and its relationship to art movements that addressed space as a subject, such as Dadaism, Surrealism and Land Art. It then considers Luhmann's conception of Systems Aesthetics as a method for both understanding this art and an explanation as to why art dealing with space and systems is important now. The paper is written from the author-artist's perspective, and written in the first person. It has taken examples of the author's work in both systems science and art to illustrate both the issues at the heart of a systems approach to spatial issues and how art can be begin to address these issues. The paper concludes with the argument originally made by Kiekergaard, and brought up-to-date by Lanier that our primary access to reality is through our involved action in the world.

★*Corresponding author (Paul Goodfellow)*
Email: Paul.goodfellow@northumbria.ac.uk Phone: +44 1912437825

This paper is about several interrelated points concerning the application of systems in society and how artists appropriate and respond to systems. The first point to note is that systems are increasingly shaping how society is organised, how communication and the economy operate and how we monitor and understand the physical world. The second issue is how definitions of "space" have become central to understanding most areas of human activity now, as most information contained within these systems is invariably spatially organised. The third issue is the alienating quality of these systems and the information they contain. These issues are discussed, in part, in the context of my own perspective as an artist with a systems background.

My art practice is centered on the application of systems in art and more broadly our relationship to information and experience. In particular, I am interested in the abstract representation of space, time and experience in systems as well as the exploration of the methodologies employed in the collating, organising and representing of information that relates to space and time. My art practise deals with issues of abstraction in art historical painting terms but also with other conceptual understandings of abstraction, such as the understanding of abstraction in computer science terms, which is concerned with the abstract representation of information. Both the interest in visual or aesthetic abstraction and conceptual abstraction can be traced back directly to my work and research prior to working as an artist.

I originally trained in the 1990's in early 'Big Data' visualization, working predominantly with remotely sensed satellite image data, and Geographical Information Systems for environmental and development projects. I worked with large, spatially organized databases that housed social and environmental data, which were cross-referenced with satellite images to find spatial and temporal patterns in natural and man-made activity. This work revolved around the production of maps that showed spatial and temporal patterns in information, which has informed my work as an artist. I was seduced not only by the visualisations and the maps produced – but also by the underlying conceptual underpinning of the work. I was – and remain – enthralled by the power of a Systems approach to tackling complex multi-dimensional problems, such as climate change. However, I am fundamentally concerned with the limitations of such models, both in terms of their ability to accurately represent the world and their ability to deal with qualitative information, such as intuition and aesthetic decision-making. Such systems-based or rule-based models can rarely accommodate transgressions of rules, or first-hand experience that is not readily categorizable. Therefore, inspired leaps of the imagination can rarely be accommodated where an individual, actively engaged with

a problem can see the answer.

The application of systems in this geographic context will now be described in some detail as the problems associated with this approach can be seen across other fields, such as economics, politics and art. I will also explain how I moved into art as a way of taking a critical position on Systems Thinking. Thus, in this geographic context the primary tool to manage and model the vast amounts of spatially located data that are being generated by satellites and other forms of surveying and monitoring technologies are systems called *Geographic Information Systems* (GIS). There is no one single definition of this technology since GIS is not only made up of several technical components, such as hardware and software (databases, mapping and visualizing systems), but also the processes associated with the collection, organization, interrogation and visualization of information.

To create the data sets for GIS, each specialist field – from the physical sciences, such as Soil Science to the social sciences, such as Anthropology – apply their own methods for categorizing, sampling, interpreting and presenting their data. In this work, I was drawn to the way complex physical and social systems were modeled separately, but then alchemically integrated together and visualized spatially and temporally to produce new data or information. In particular, I was interested in how this could be possible given that different research fields collected information at different spatial and temporal scales, using vastly different methods. Through the process of synthesis and cross-referencing of these disparate data sets I noted strange and counter-intuitive patterns being revealed. How, for example, could the pixel colours found on massive satellite images of the earth, at a particular moment in time, represent what is happening on the ground? Or, how could information collected by an economist be meaningfully cross-referenced with information collected by a hydrologist, when both the spatial and temporal scales of the datasets are fundamentally different? However tenuous the models being employed in this work there was something fundamentally compelling and convincing about the new meta data produced once it had been visualized. As Fyfe and Law (cited in Pickles, 1992) asserted,

> A depiction is never just an illustration. It is the material representation, the apparently stabilized product of a process of work. And it is the site for the construction and depiction of differences. To understand a visualization is thus to inquire into its provenance and into the social work that it does. It is to note its principles of exclusion and inclusion, to detect the roles that it makes available, to understand the way in which they are distributed, and to decode the hierarchies and differences that it

naturalizes. And it is also to analyze the ways in which authorship is constructed or concealed and the sense of audience is realized. (Pickles, 1992, p.1)

Of course these specialist models employed by the different specialist fields are necessary abstractions of reality, specific to those fields. However, when inter-mixed with other data, – often with different spatial or temporal resolutions – it is a potential recipe for disaster, as no one fully understands the new meta-models at play. The financial crash of 2008 is one of the starkest results of the reliance on systems and models, such as the computer-controlled short selling of the stock market that was not sufficiently understood or managed. This was a clear example of data sets coming from different specialisms with no omnipotent overview, or moral code, to moderate the decision-making within the system. Since the financial crisis of 2008, the rise of big data systems has continued unabated – every aspect of our lives is being turned into spatially located data. We are spatially tracked with our phones and our social lives and interests are logged on computers, and into the cloud. We do not know where much of this data is being stored, nor by whom, nor in what ways it will be used in the future. It is therefore incumbent on the artist to recognize these systematic changes in society and respond. Since I was working first-hand with the organization, interrogation and representation of large data sets, I became aware that this approach of explaining complex changes of time and spare was inherently flawed.

At the heart of this type of spatial analysis work is the goal of understanding patterns in spatial and temporally organized data to help model, predict and manage change in the physical world and human society. These patterns are extrapolated from data stored in databases into visual images that can be interpreted. Although this translation from text to image chimes with a general shift in society, I found this problematic and initiated my move from information systems science to art. The goal of GIS is to produce maps and images that are constructed from the stored information. This information is cross-referenced, extrapolated and put through various algorithms, but ultimately an image will be produced that requires interpretation. These pervasive systems are therefore powerful tools but ultimately require human image interpretation. During my time in this field, I noted specific issues with this approach and these have informed and been reflected in my art practice. These issues fall broadly within two areas. Firstly there are the technical, methodological and to some degree epistemological issues concerning the nature of the knowledge being collected. The second area covers the moral and

political issues and to some degree the ontological concerns that cannot easily be fixed in a database in time and space.

The first issue is the problem of hypertextuality and interpretation. There is huge potential in having access to vast amounts of information about the world. In many of the earlier texts on information systems written by geographers, the focus was on this potential, without necessarily understanding the fundamental reassessments that would need to be made in terms of our conceptions of space. Hall, for example, in 1993, made the following statement, which is representative of the positive and positivist position of many practitioners in the field of GIS:

> With stunningly precise new instruments of measurement developed over the last half century and with the tremendous graphic powers provided by computers over the last two decades, everyone from archaeologists to zoologists has been able to discover, explore, chart, and visualize physical domains so remote and fantastic that the effort involves nothing less than the reinvention of the idiom of geography. (1993, pp 4-5)

A prescient description of how this mirroring and possibly distorting of society through data was captured in the book *Mirror Worlds*, which in describing the 1990's understanding of what virtual reality would be, has in-fact accurately described our current world of spatially networked data. Like other critically acclaimed science fiction writing one could also consider William Gibson's *Neuromancer* in relation to the definition of cyberspace here it has anticipated the underlying changes technology wrought on society, even if the livery of the idea is inaccurate and dated. In the 1990s, the general conception of virtual reality was that it would be an alternative reality that people opted into, akin to the way teenagers adopted computer gaming lifestyles. What no one appeared to anticipate in early years of virtual reality was the way the physical world and the digital or virtual world would become inextricably linked. Like a virus, the digital world has infected the physical world, giving it a virtual skin – a skin through which all sensory experience is being mediated. More recently, Gibson, in an article in the *New York Times* in 2010, acknowledged that the form the virtual or cyber world has taken is fundamentally more integrated in the physical world than that which had been foreseen. He notes, "Cyberspace not so long ago was a specific elsewhere, one we visited periodically, peering into it from the familiar physical world. Now cyberspace has everted. Turned itself inside out. Colonized the physical," (Gibson, 2010).

This colonization of the physical world by cyberspace has been driven in large part by the technologies at the heart of GIS, such as the spatial and

temporal location of data, massive databases, fast computer networks and crucially, hypertext, which makes new links between information. Roland Barthes, who essentially defined the term hypertext argued that hypertext allowed the reader to operate as the author in as much as they could navigate texts and their meanings in an open way. Hypertext is, of course, becoming the dominant mode of reception for much information through the Internet due to tools such as Google and Wikipedia, as Landow notes:

> When designers of computer software examine the pages of 'Glas' or 'Of Grammatology', they encounter a digitalized, hypertextual Derrida; and when literary theorists examine 'Literary Machines', they encounter a deconstructionist or poststructuralist Nelson. These shocks of recognition can occur because over the past several decades literary theory and computer hypertext, apparently unconnected areas of inquiry, have increasingly converged. (Landow, 1992, p2)

This displacement of the author of the text places greater importance on the visual image and raises important questions regarding the ascendency of the image and the difference between an image and a constructed picture of the world. Walter Benjamin was one of the first thinkers to truly highlight the distinction between the passively captured image, such as a photograph or satellite image, and a consciously constructed picture. He notes,

> The painter maintains in his work a natural distance from reality, the cameraman penetrates deeply into its web. There is a tremendous difference between the pictures they obtain. That of the painter is a total one, that of the cameraman consists of multiple fragments, which are assembled under a new law. (Ross, 1994, p. 543)

This process is hugely amplified with GIS, as it involves the assembling of multiple photographs, or *data snapshots*, from many different fields of study. Thus, by thinking of GIS in hypertextual terms rather than pulling the data and images together to crystallize our understanding of the world, it is pulling together many fragments that can be openly read and authored by anyone who accesses the information. Meaning, you effectively do not need to understand the data in order to re-author new information from it.

The second area of concern with such information systems is the spatial and temporal incompatibilities between specialist fields. Each specialist field would have their own methods of data collection, which will have evolved over time to address questions and issues specific to their field. The spatial

and temporal scales of these data would, of course, vary between these specialist fields. Some data sets could be easily interpolated across a greater area of space, or across time. Other data sets were specific to particular moments in time and space. Whilst still other data, such as those collected by anthropologists, was essentially qualitative and descriptive in nature and could not be easily fixed spatially.

The third issue is that of *reverse adaption*, a concept developed in 1977 by Winner to describe the way that research is tailored to what is technically possible. The way technology collects data and organizes data inevitably influences what information is collected. As Veregin notes,

> Reverse adaption refers to the transformation of existing goals to accommodate a new technical means. Goals are in effect rearranged in accordance with the demands of the technological order. In extreme cases, the broader social context ceases to be relevant as long as technological demands are satisfied and maintained. (Veregin, 1995)

He continued,

> The computer influences the way in which research problems are selected for study and the character of the assumptions, languages, techniques, and models brought to bear on the problem. (Veregin, 1995)

This means that subtle qualitative information that doesn't fit the database structure, or cannot easily be placed, is discarded or lost.

This problem of the shape of the research and researcher's behavior having to adapt to the constraints of the technology, is now seen more broadly in society. Lanier (2011), flagged this as a wider issue in the area of communication and in the way the Internet, mobile communication and social networks shape how we communicate and interact. For example, users of communication and social networking applications will adapt the way they communicate to accommodate the technical and design constraints of the applications.

A further issue, *Passive Disengagement* permeates most if not all current information technology and systems. The prescriptive nature of some of these technologies leads to a psychological distancing of the individual from the environment, or a passive disengagement. As early as 1976, Weizenbaum noted the danger of disengagement due to the use of technology, (cited in Pickles, 1995, p. 100). He gave the example of computers in the battlefield where responsibility for decisions no longer rested solely with a human actor in the field, but a remote computer. In this context the data is giving the geographer,

environmental scientist or politician a remote and detached view of the world. If a person is using these data, but did not collect the data, or even design how the data were collected, there is a form of passive disengagement at work, since they will not necessarily weigh the contained information in the correct way. The information will instead become data, which is assumed to be true and can consequently be appropriated as necessary. This alludes to two trends, both of which are consequences of this passive disengagement. The first is appropriation and re-mix culture, which has emerged since the inception of the internet and will be discussed shortly. The second is the explosion of data visualization, or the "data is beautiful" strand of art and design. Much of this work effectively disregards the contained information in the data in favour of the sensuous visual spectacle.

Returning to my own experience of these large information systems, I realized the validity of the data being collected, as well as the patterns emerging from the data must be tested against reality of the terrain.

This process of going into the field and seeing whether the phenomena predicted in the data existed *in situ* is called *ground-truthing*. In practise, this meant going into the area of interest and walking with a GPS to check the accuracy of the data at a given location. In reality, the process of spending time in a place gave you a much stronger understanding of a place, even if you could not translate this into hard data. Thus, the paradox was that the accuracy of the information being generated from the GIS had to be corroborated by the qualitative process of ground-truthing walks. I made such walks on projects in South and Central America, The Middle East and Africa. The astonishing aspect of this process was that one could understand a place on an intuitive level in a way that could not be confirmed by the data. This disjunction between the systems science and the physical and subjective experience of a place ultimately led from walking as a process of systems science to walking as a process of art.

Since this work, my art has revolved around issues relating to systems, models and subjectivity, and many of my projects involve walking as both a method of collecting source material for a work and a way of physically engaging with the world. This process of 'walking as art' can be traced back to the XIX century flâneur and the XXI century psychogeographer and an understanding of this activity is underpinned in a large part by the work of the sociologist and philosopher Henri Lefebvre, who wrote widely on the importance of space. Lefebvre has been associated with the Dada and Surrealist thinkers, and in particular the Situationists International. His writing illustrates the tension between the personal experience of space and the demands of capitalist

society arguing that space can only be understood dialectically between these two demands. He defined this tension as a concrete abstraction,

> One of Marx's categories, such as exchange value, which are simultane-ously a material, externalised realisation of human labour and the con-densation of social relations of production. The concrete abstraction is simultaneously a medium of social actions, because it structures them, and a product of those actions. (Gottdiener, 1985, p.128)

Space is therefore both a physical and a mental construct.

Shields (1999) notes Lefebvre's three conceptions of space, which are use-ful for understanding the current tensions in society. The concept of *lived space (le vecu)* is the imaginative space found in art, and literature and is associated with Schopenhauer's idea of imaginative space. The second concept of per-ceived space is *le percu*: the space of everyday life. Finally, we have the concept of *le concu* – the conceived space of planners and geographers, which often ignores perceived imaginative space.

However, there is an ill-defined uneasiness amongst artists and wider society about many spatially mediated issues today. These may include social issues, such as the construction and dissemination of identities across online social networks, or the understanding and representation of climatic and envi-ronmental changes. Lefebvre argues that the understanding of space requires a multi-disciplinary approach, although he was not, at this time, alluding to the emerging field of the fundamentally multi-disciplinary GIS, rather to a conceptual ideal. The fact that each discipline sees only one aspect of space makes the social space invisible as a result. Lefebvre suggests,

> It is a question of discovering or developing a unity of theory between fields which are given as being separate...Which fields?... First, the physi-cal, nature, the cosmos, - then the mental (which is comprised of logic and formal abstraction), - finally the social. In other words, this search con-cerns logico-epistemological space - the space of social practices, - that in which sensible phenomena are situated in, not excluding the imaginary, projects and projections, symbols, utopias. (Lefebvre 1974/1994, p.19)

In artistic terms, the paradoxical and increasingly complex nature of space and how it is defined and understood has been approached using a num-ber of methods, including the Surrealist and Psychogeographic walks. These will now be put into a broader historical context, one which, as noted above, Lefebvre features strongly, before a case for a more systems understanding of

space is introduced.

There has been an increased interest in walking as a form of art since the late 1990s. This can be attributed to two related factors First, it is, as suggested above, a reaction to the increasingly complex nature of space as well as an attempt to ground experience and artistic practise in both the physical landscape and the psychological and sublime landscape. Contemporary artists have revisited approaches developed over the last 100 years of aesthetic walking. These approaches include the Dadaists and their explorations of the city, the random wandering and drawing of the Surrealists, and an application of the Psychogeographic methods developed by the Situationists International. Secondly this new generation of artists have also revisited the work of Richard Long, Hamish Fulton, Bruce Nauman and Robert Smithson, (1938-1973), artists who have worked with conceptions of space since the late 1960's. These original 'Land Artists' have been rigorous in their conceptual goals for the work, but there is a danger that the new generation of artists referencing this work undervalues its' conceptual and systemic core, instead replacing this understanding with a vague fetishism for the minimalist aesthetic of the work and nostalgia for the dated documentation.

The origins of walking in art and psychogeography can be located in Paris and to Charles Baudelaire's 1863 essay, "The Painter of Modern Life," in which he described a rather romantic figure, the flâneur as, "a person who walks the city in order to experience it." The novelist George Sand, and the liberation she experienced as a woman through walking in Paris, must also be noted as an indirect foundation of psychogeography. She described the transformative power of being free to move in the city in several of her autobiographical texts. Whilst the unfinished The Arcades Projects by Walter Benjamin, (2002) has been described as the first major work by a flâneur. In this extensive work he documented in tremendous detail, his walks and social interactions in the ageing arcades of Paris. Building on these activities and writings of the 19th Century flâneur, the Dadaists were the first to walk as an explicitly artistic practise, documenting travels to obscure parts of the city. They carefully documented the unadorned areas of Paris through photography, avoiding the obviously picturesque or historic locations. They also started to employ bizarre techniques, such as automatic writing, in an attempt to unlock the 'unconscious reality' of a given location. These techniques, known as 'deambulation' marked the transition from Dadaism to Surrealism. Francesco Careri (2001) argues that by explicitly employing the walk as an art form Dadaists and Surrealists shifted the role of art from representation to communication.

This revised understanding of art as a vehicle for ideas is, of course, the basis of conceptual art and this is developed further in this paper when the work of social theorist Niklas Luhmann is discussed.

Inspired by the Surrealist's engagement with the city, but also in response to their failure to reform society on any practical level a new art group, with an anti-capitalist outlook, the Letterists, (later known as the Situationist International), developed in 1950's Paris. They were critical of the vague ideas of the Surrealists, which focused solely on the uncanny aspects of the city and instead attempted to understand the city in more objective terms. At the heart of this movement was the concept of Dérive, which was developed by Guy Debord, the unofficial leader of the Situationist International. These methods designed to investigate the invisible workings of the city formed the basis of what is now understood as psychogeography today. Debord described psychogeography by contrasting its approach with more formalised modes of investigation of space,

> Geography, for example, deals with the determinant action of general natural forces, such as soil composition or climatic conditions, on the economic structures of a society and thus on the corresponding conception that such a society can have of the world. Psychogeography could set for itself the study of the precise laws and specific effects of the geographical environment consciously organized or not, on the emotions and behaviour of individuals…The adjective psychogeographical, retaining a rather pleasing vagueness, can thus be applied to the findings arrived at by this type of investigation, to their influence on human feelings and even more generally to any situation or conduct that seems to reflect the same spirit of discovery. (Debord, 1955, p5)

Although not dwelt upon here, the Situationist International believed these psychogeographic interventions gave the participant a new critical perspective on society that somehow subverted the model of the capitalist system. A decade or more after the Situationist International activity and writing, Minimalist Sculptors and Land Artists in the UK and in the USA began to formally present walking as artwork. British Land Artists Richard Long and Hamish Fulton used the virtual line made through walking as a replacement of the sculptural object. This shift in art from object to concept was further confirmed by the arguments made in Lucy Lippard's seminal work Six Years: The Dematerialization of the Art Object (1997).

Since the late 1990's, a new generation of artists has revisited both psychogeography and the work of the conceptual Land Artists. However, in both areas the original intentions of political change and conceptual minimalism have been replaced, at least in some cases, by visual or linguistic spectacle. Although there is clear evidence of an increased interest in psychogeography amongst artists and writers, the Marxist critique of capitalist society, central to Debord's psychogeography, is missing from much contemporary practice with Coverley suggesting that Psychogeographers today "...seem satisfied merely to experience and record it" (2006, p.136). The question therefore arises as to whether this new form of depoliticized psychogeography is something altogether different. It may in-fact be a return to the romantic tradition, or a possible response to the alienating experience of living in a digitally mediated world.

Jaron Lanier noted in *You Are Not a Gadget: A Manifesto* (2011) the general malaise within society regarding the lack of original experience and mapped this to the onset of the Internet. In particular, he noted that there has been little cultural innovation in terms of fashion, music and art since the dawn of widespread Internet use in the mid to late 1990's. Instead, the dominant culture has been one of appropriation – sampling and remixing with a retro aesthetic that references pre-Internet movements in fashion, music and art. He argues that the new works produced are essentially using the energy and ideas invested by the original artist and this may go some way toward explaining why there is a renewed interest in Land Art and Pyschogeography that requires a physical, intellectual and creative investment in the work. The walking artists Richard Long and Hamish Fulton physically expend their energy in the production of their artwork, which may consist of a conceptually driven walk. These works may only exist in the long term through documentation, such as texts and photographs, but they still required original ideas and physical energy from the artist in order to be produced. A more traditionally sculptural artist, Andy Goldsworthy, mainly creates large-scale works in remote or wild landscapes and he too must physically invest his own energy to create a new piece of work. His sculptures, such as stone Cairns and walls, are created through hard graft as he and his team of assistants physically lift the stones into place. Lanier makes the distinction between such original physical engagements in the world over the re-mix and Duchampian culture of appropriating found digital information clearly,

> Information is alienated experience. You can think of culturally de-codable information as a potential form of experience, very much as you can think of a brick resting on a ledge as storing potential energy. When the brick is prodded to fall, the energy is revealed. That is only possible because it was lifted into place at some point in the past. In the same way, stored information might cause experience to be revealed if it is prodded in the right way. A file on a hard disk does indeed contain information of the kind that objectively exists. The fact that the bits are discernible instead of being scrambled into mush—the way heat scrambles things—is what makes them bits. But if the bits can potentially mean something to someone, they can only do so if they are experienced. When that happens, a commonality of culture is enacted between the storer and the retriever of the bits. Experience is the only process that can de-alienate information. (Lanier, 2011, p.28)

This resonates with Luhmann's positing of the non-material view of art as communication, which will now be discussed in the context of the reconsideration of Systems Art.

As with psychogeography and Land Art, there has also been a renewed interest in systems thinking and systems aesthetics within art since the turn of the millennium. This may stem from an underlying concern with the increased dominance of systems as a means of organization in society and an acknowledgement that such processes distance the individual from personal experience. For example, people now consume the tastes and interests of others on social networking sites, in lieu of their own preferences gained through physical engagement with the world. So whilst psychogeography and Land Art explicitly renew the connection with physical space, Systems Art challenges the underlying processes that mediate all information in society today.

The increased interest in Systems thinking and systems aesthetics in art can be traced back to two key events: the Donna de Salvo curated exhibition, *Open Systems: Rethinking Art* c. 1970, held in 2005 at Tate Modern and the Systems Art Symposium at the Whitechapel Gallery in 2007. These events were preceded by a number of important papers that lay the foundation for re-evaluating systems art as a clear branch of conceptual art, as opposed to a solely technologically determined cul-de-sac in art history. These included Edward Shanken's, "The House That Jack Built: Jack Burnham's Concept of 'Software' as a Metaphor for Art," in *Leonardo Electronic Almanac* 6:10 (November, 1998) and *Art in the Information Age: Technology and Conceptual Art* (2002). Since the Tate and Whitechapel exhibitions and symposium there have been several

important publications that have continued to re-evaluate and rehabilitate the debate regarding the Systems Art and systems thinking within art. These include: *The Art of Systems, Art, History and Systems Theory* edited by Francis Halsall and Chris Smith; *White Heat Cold Logic: British Computer Art 1960-1980,* edited by Paul Brown, Charlie Gere, Nicholas Lambert and Catherine Mason; Charlie Gere's *Art, Time and Technology* (2006) and Roy Ascott's *Telematic Embrace: Visionary Theories of Art, Technology, and Consciousness* (2003). Many of these texts give a valuable analysis of specific events and works in an art historical context but it could be argued that a broader analysis and impact has been made by the English translation of *Art as a Social System*, by social theorist Niklas Luhmann in 2000. In this and his earlier work, Luhmann established a broader application of systems thinking; a more general social theory that described society as comprised of multiple social systems such as art, but also included the economy, law and science. Systems Art developed in the late 1960's as a branch of conceptual art that considered the emergent ideas of cybernetics and system science.

The definition of systems and systems thinking varies between disciplines but a useful description was given by Kenneth Boulding who stated, "a system is anything that is not in chaos. We could turn the pattern around and define a system as any structure that exhibits order and pattern," (Boulding, 1985). Systems theory, as applied to art, grew from a group of conceptual artists in the late 1960's, including Les Levine, Jack Burnham, Hans Haacke and Sol Lewitt, all of whom referenced Weiner's Cybernetics, and Ludwig Von Bertlanffy's General System Theory in their writing and work. Their work was concept-driven and organised by rules and although they referenced or incorporated technology, they also made a distinction between their conceptual art and art-and-technology (electronic art), which they felt took a less critical stance towards technology. Sol LeWitt noted the distinction between conceptually driven cybernetic work and technology driven work in his essay "Paragraphs of Conceptual Art" (1967), which, as a distinction, has stood the test of time. He described conceptual art as a quasi-mechanical process: "In conceptual art the idea of concept is the most important aspect of the work… the idea becomes a machine that makes the art" (LeWitt, 1967). Whereas electronic art, or digital art, as it is understood today, is in danger of being uncritically focused on the materials and the spectacle of technology. As Sol LeWitt stated "new materials are one of the great afflictions of contemporary art. The danger is, I think, in making the physicality of the materials so important that it becomes the idea of the work (another kind of expressionism)." (LeWitt, 1967, cited in Alberro & Stimson, (2000), p 13).

As noted above, the underlying reason for the resurgent interest in Land Art and psychogeography could be an attempt to counter the alienating experience of modern life, much of which is driven by the digital distribution of second-hand information. As noted, Lanier described information as alienated experience (2011, p. 28). The emotional or psychological dangers of digital information and living with secondary experience was proposed originally by the Systems artist Les Levine, with his art installation Systems Burn-Off X Residual Software at the Phyllis Kind Gallery in Chicago in 1970. In his artist's statement in the exhibition catalogue, Levine argued that

> The proliferation of mass media was changing knowledge into a second-hand mental experience of simulations and representations i.e. software as opposed to first-hand, direct, corporeal experiences of actual objects, places and events, i.e. hardware. All activities which have no connection with object or material mass are the result of software. Images themselves are hardware. Information about these images is software…The experience of seeing something first hand is no longer of value in a software controlled society, as anything seen through the media carries just as much energy as first hand experience… In the same way, most of the art that is produced today ends up as information about art. (Levine, 1970 cited in Shanken, 2003, p. 434)

Although Levine, along with Burnham, Haacke and LeWitt can be credited with introducing systems thinking into art practice and art writing in the late 1960s, it was Luhmann who established the broader application of systems thinking in art. Whilst Luhmann acknowledged the art object's perceptual function, it is art's ability to communicate ideas that defines its role as a social system. He states in *Art as Social System*, "The art system has no reality except at the level of elemental events. It rests, one might say, on the ongoing dissolution of its elements, on the transitory nature of its communications, on an all-pervasive entropy…" (Luhmann, 2000 p. 49).

Luhmann's contention that most areas of human activity, such as the economy, law, science and art, are systems of communication fits with the Marxian idea that a society saturated with consumption shifts attention from products to information. This is clearly demonstrated by the increasing economic shifts from the material to the ephemeral, such as the use of the Google search engine instead of books and music streaming services instead of compact discs. Likewise, the mass production and consumption of images through broadcast television and the Internet, instead of a limited production and finite consumption of art, can be seen as testimony of this shift.

In *Beyond Modern Sculpture* Burnham predicted this process of de-objec-tification within art. He proposed that "the cultural obsession with the art object" was being overtaken by an understanding of systems and the relation-ships between art objects. Burnham notes,

> It is a refocusing of aesthetic awareness – based on future scientific-tech-nological evolution – on matter-energy information exchanges and away from the invention of solid artefacts. These new systems prompt us not to look at the skin of objects, but at those meaningful relations within and between their visible boundaries. (1968, p. 369)
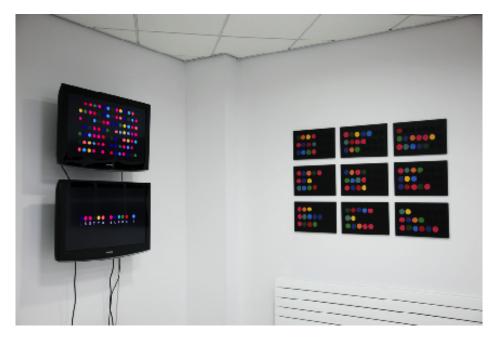
Luhmann backed this analysis arguing that the art system does not rely upon physical art objects for existence, but a continuous cycle of information exchange. Moreover, much of his work focused on the tension between system self-maintenance and potential entropic systemic collapse (2002, p. 49). This relates directly to the distinction between the systems of the image in society and the act of art construction by artists. In essence, the continual production and reproduction of images in society is necessary for the sustainability and stability of the wider market system, whilst the production of art is a disrup-tive act that challenges the status quo of the system and questions the pattern of visual consumption in society.

As human society and decision making are increasingly controlled by in-formation systems and the underlying algorithms, System Art has an impor-tant role to play in drawing attention to the limitations of these systems, mod-els and algorithms. As predicted by early systems artists such as Burnham and corroborated by the writings of Luhmann, this shift in society from produc-tion to information fits with the Marxian model of late capitalism. Therefore, it could be argued that artists engaged in systems analysis may continue the work of critiquing the capitalist system started by Letterists and the Situation-alists. Systems Artists need to make the systems inherent in both society and their practise visible. In particular, the artist needs to address the issues inher-ent in appropriating information over material experience. The Duchampian idea of appropriation has itself been appropriated and has become the domi-nant form of production, with pop culture eating itself. There are, however, alternatives – art that physically engages with the world points to new ways of living and thinking about the world. Hans Haacke, a Systems Artist, has produced work that is critical of the unthinking application of systems. Two of these works, along with a third work from the author are discussed in relation to the issue of alienating systems.

In 1971 Hans Haacke developed an exhibition for the Guggenheim Museum in which a caged Mynah Bird repeated the words "All systems go." Unfortunately for Haacke, the bird did not respond to training and did not repeat the phrase. Thus, the project could only be treated as a conceptual proposal. On reflection the title for the work, All systems go suggests the inevitable failure of this project and that ultimately all systems are susceptible to breakdown due to unforeseen circumstances or parameters affecting the system. This, of course, was dramatically illustrated in the global financial collapse of 2008. Whilst the myriad of conflicting predications on climate change suggest no one model is accurately reflecting the realities of change. In an earlier work, (Chickens Hatching, 1970), Haacke had created a controllable system that relied on a simple feedback system of lamps and thermostats to control the hatching of chicks. This contrasts with "All systems go" as the later work relied upon a parameter that could not easily be moderated in a system; namely the bird mimicking the words.

For the Symposium and exhibition, Working Against the System in 2011, I developed an artwork that directly responded to *All Systems Go* and addressed the issue of the de-alienation of information. The basis of the work, *Sly Lost Games*, was an algorithm that sought to find a pattern. The software program randomly re-ordered the letters: A L L S Y S T E M S G O, to form the phrase "All systems go." The program ran for the duration of the exhibition, but due to the millions of letter combinations the phrase "all systems go" did not appear.

To see any perceptible patterns in the random sequencing, each letter was assigned a colour based on the most commonly reported colour associations in synaesthesia research. On one wall there were two computer screens, and on the first screen the index of colours and letters was displayed. The second screen showed the seven most recent random colour combinations. The adjacent wall showed 9 hand painted sequences, selected by the artist from the reduced set of permutations, where the order of the letters was important. Only sequences that made groups of words or phrases could be included in this set. This reduced the possible combinations to just over 2300 permutations. These paintings could be seen as outputs of the system and by hand painting them, the artist had actively experienced and decoded the information through the conscious selection of the phrases. Likewise, the viewer is encouraged to stand between the screens showing the index and the random combinations on the left and the paintings on the right.

Figure 1: Sly Lost Games, Installation view, Gallery North, Northumbria University, 2011

Without an explicit explanation, the viewer can decode both the phrases chosen by the artist using the index and have an overall understanding of the system. This work then suggests one way in which artists can attempt to understand and negotiate our increasingly system-based world and activate the information in these systems through experience and energy, either through physically engaging with the world or physically making art.

   This process of engagement as either artist or participating viewer, physically in an artwork or gallery, recalls again the Lanier quote, "Experience is the only process that can de-alienate information" (Lanier, 2011, p. 28). This in turn reflects the earlier ideas of Kierkegaard who argued that the conception of self depends upon one's stand taken in life and that one's interpretation of self should be based on what you do, as opposed to what you think. Kierkegaard argued that our primary access to reality is through our involved action in the world'. (Dreyfus, cited in Guignon, page 289). He argued that the way things are seen or perceived by a detached thinker is only a partial and distorted version of the way things show up to an individual actively engaged in the world. Thus an active engagement in the world and the systems that surround us is both a necessary process in order to perceive the world and

how it works and a necessary process in order to make critical or aesthetic judgements about the world.

References

Ascott, R. (2003). *Telematic embrace: Visionary theories of art, technology, and consciousness.* Berkeley, CA: University of California Press

Baudelaire, C. P. (1863). *The painter of modern life* (2009 Ed.). City of Westminster: Penguin Classics

Benjamin, W. (1968). *The work of art in the age of mechanical reproduction.* City of Westminster: Penguin Classics

Benjamin, W. (2002). *The arcades project.* New York: Belknap Press.

Boulding, K.E. (1985). *The world as a total system.* Beverly Hills, CA: Sage

Burnham, J. (1968). *Beyond modern sculpture: The effects of science and technology on the sculpture of this century.* New York, NY: George Braziller.

Careri, F. (2001). *Walkscapes: Walking as an aesthetic practice.* Barcelona, Spain: Gustavo Gili.

Coverley, M. (2006). *Psychogeography.* Harpenden: Oldcastle Books.

Debord, G. (1955). Introduction to a critique of urban geography. In K. Knabb (Ed.) *Situationist international anthology* (Revised and Expanded Ed). U.S.: Bureau of Public Secrets.

De Salvo, D. (Ed.) (2005). *Open systems: Rethinking art* c. 1970. London, UK: Tate Publishing

Gelernter, D. (1992). *Mirror worlds: Or the day Software puts the universe in a shoebox... How it will happen and what it will mean.* Oxford: Oxford University Press.

Gere, C. (2006). Art, time and technology. Oxford: Berg Publishers

Gottdiener, M. (1985). *The social production of urban space* (2nd Ed). Austin, TX: University of Texas Press.

Guignon, C.B. (2006). *The Cambridge companion to Heidegger.* Cambridge, UK: Cambridge University Press.

Hall, S.S. (1993). *Mapping the next millennium: How computer-driven cartography is revolutionizing the face of science.* New York: Vintage Books.

Halsall, F. (2008). *Systems of art.* Bern, Switzerland: Peter Lang.

Landow, G, (1992). *Hypertext: The convergence of contemporary critical theory and technology.* Baltimore, MD: Johns Hopkins University Press.

Lanier, J. (2011). *You are not a gadget: A manifesto.* City of Westminster: Penguin

Lefebvre, H. (1994). *The production of space* (D. Nicholson-Smith, Trans.). Oxford: Blackwell Publishers. (Original work published 1974).

LeWitt, S. (1967). Paragraphs of conceptual art. In A. Alberro & B. Stimson (Eds.), (2000). *Conceptual art: A critical anthology.* Cambridge, MA: MIT Press.

Lippard, L.L. (1997). *Six years: The dematerialization of the art object* (Reprint edition). Berkeley, CA: University of California Press.

Luhmann, N. (2000). *Art as a social system.* Redwood City, CA: Stanford University.

Knabb, K. (Ed.) (1981). *Situationist international anthology.* Berkeley, CA: Bureau of Public Secrets.

McDonough, T. (2009), *The situationist and the city.* London, UK: Verso.

Pickles, J. (1995). *Ground truth: The social implications of geographic information systems.* New York, NY: Guilford Press.

Shanken, E.A. (1999). The house that Jack built: Jack Burnham's concept of 'software' as a metaphor for art. *Leonardo Electronic Almanac, 6*(10).

Shanken, E.A. (2002), Art in the information age: Technology and conceptual art. *Leonardo, 35*(4).

Shanken, E.A. (2009). *Reprogramming systems aesthetics: A strategic historiography.* Retrieved from http://escholarship.org/uc/item/6bv363d4

Ross, S.G. (1994). *Art and its significance: An anthology of aesthetic theory* (Third Ed.).

Shields, R. (1999). *Lefebvre, love and struggle: Spatial dialectics.* London: Routledge.

Veregin, H. (1995). Computer innovation and adoption in geography: A critique of conventional technological models. In J. Pickles (Ed.) *Ground truth: The social implications of geographic information systems* (pp. 88-112). New York, NY: Guilford Press.

Winner, L. (1977). *Autonomous technology: Technics-out-of-control as a theme in political thought.* Cambridge, MA: MIT Press