Utopian Cities from 15th to 19th Century Literature: A Philosophical Investigation through 3-D Visualisation

Tessa Morrison
School of Architecture & Built Environment
The University of Newcastle
Australia, 2308
tessa.morrison@newcastle.edu.au

Utopian cities have a long history and they stem from the time of the ancients. In fact concepts of Utopia are indivisible from the city. It is inconceivable to perceive a human Commonwealth except in the concrete form of city. The ideal city remained in abstract form throughout the mediaeval period i.e. the divine realm of heaven; the earthly realm appears to have had less importance. By the 15th century there was a move away from the Christian Utopia towards a humanist Utopia that desired the reconstruction of a new society. Much of the social reform literature from the 15th century on articulated the design of cities that would embody this political philosophy. This paper examines significant social reform literature from the 15th to the 19th century that is linked to utopian cities. The source texts are examined to identify the details of the cities and the cities are reconstructed using 3-D studio Max and ArchiCAD. This enables an analysis of the reconstructions to examine how the plans express the philosophy of the particular political theories that underline the design of the cities.

Utopian cities. 3D computer modelling. Architectural space. Social structures.

1. INTRODUCTION

The concept of the ideal state stems from the time of the Ancients. The earliest surviving description of an ideal state was in Plato's *Republic* where he described a *polis* (city state) that was to be imitated (Plato 1955). He did not describe the actual physical city in the *Republic* only the political framework supporting the city. In an incomplete work, in the form of a dialogue, *Critias*, he described the city of Atlantis. Plato described a symmetrical city of significant beauty, however, there was no architectural detail provided. Despite Plato's influence in the mediaeval period, the ideal state for a better life took on more heavenly attributes as the ideal state was in the afterlife.

The New Jerusalem is described in Revelation as being a divine city. Symmetry prevails in the biblical description. From this description of New Jerusalem many descriptions of heaven as a city are based. Throughout the mediaeval period heaven is illustrated and described as a city. Most of these cities were symmetrical and there were images of the Divine Architect designing symmetrical cities with his compass and straightedge (Friedman 1974). These ideal cities were worlds beyond reach of human endeavour

and were cities of escape where all good men could enter.

By the late 15th and early 16th century there was a move away from the Christian Utopia of escape to a humanist Utopia that desired the reconstruction of a new society (Mumford, 1962; Dixon, 1998). However, these ideal cities were fortified. Filarete inscribed the ideal city of Sforzinda (1464) within an eight-pointed star of walls and a circular moat, which formed the plan of the city and the buildings of secular and sacred power were planned in the centre (Filarete 1965). Filarete compared the ideal city to a human body and proposing that it should function like a communal organism. Although never built Sforzinda was perceived as a city that would contribute to the well-being of the citizenry. Filarete's *Sforzinda* is a dialogue between an architect and his detractors, a form that had its roots in the work of Plato and was the basis of other significant utopian literature, such as *Utopia*, *Christianopolis* and the *City of the Sun*.

In 1516, Thomas More wrote *Utopia* (More 1974). The island of Utopia is isolated, well-fortified and impregnable. He does not give a detailed description of the architecture and only hints at the layout of the city. There are 54 cities on the island

and each one it the same as the other. The cities appear to resemble the Renaissance ideal city: an adaption of the classical Vitruvian model, with a central civic square and a market squares in each quarter of the city. Except instead of a square in the centre of the city is a series of gardens perhaps this was symbolic of removing the central power in Utopia. The citizens all have equal status in the society, the town centre has an atmosphere of culture, relative luxury, and social responsibility, although the details of the architecture and layout are not described, the emphasis is on the sameness of the architecture which reflects the qualities of the Utopian's society. Within this closed society the citizens of Utopia escape the harsh realities of 16th century politics, war, and disease. This is the first time the word 'utopian' was used and it defined a particular form of government.

In Albrecht Durer's work on a fortified city, *Eitliche Unterricht, zur Befestigung der Städte, Schlösser und Flecken*, published in 1527, he provides plans, battlements, ditches and ramparts and he outlines a utopian city where the craftsmen are elevated in status, effectively forming brotherhood or guild and the plan of the city emphasises the centrality of the guild. Durer's city was written in Gothic German and his design was enormously influential in Germany, particularly in the Protestant territories (Lewis 1994, 28).

From this humanist movement came two significant figures of the Utopia literature, Johann Valentin Andreae (1586-1654) and Tommaso Campanella (1568-1639). Both Campanella and Andreae strove to create Christian Commonwealths and a society that used education, technology and science for the development of that community. Andreae's *Christianopolis*, published in 1619 (Andreae 1999), was influenced by Campanella's *City of the Sun* written in 1602. Both incorporated an architectural plan within their philosophy of an ideal city of a Christian brotherhood. From this period Utopia literature became popular although many of these works outline political frameworks, such as James Harrington's *The Commonwealth of Oceana* (Harrington 1887). Architectural plans of ideal cities by French architects of the 18th century such as Claude Nicolas Ledoux and Etienne-Louis Boullée also proliferated and they involved substantial designs and drawings of ideal cities and buildings. Ledoux published *L'Architecture considérée sous le rapport de l'art, des mœurs et de la législation* in 1804 which also included his works from 1768 to 1789, and Boullée wrote *essai sur l'art* which argued for an emotionally committed Neoclassicism. Although both works were intended to improve society, both books are on architecture alone.

In the 19th century Utopia literature of social reform responded to the industrial revolution and there is a

distinct divide in this utopian literature between a science and pre-science. Robert Owen was an adamant social reformer with his industrial town of New Lanark and later on New Harmony. Owen's plan for New Harmony was ambitious. The architect Stedman Whitwell produced sketches for New Harmony in 1817 and 1828 which were never realised (Whitwell 1972). James Silk Buckingham wrote *National Evils and Practical Remedies* in 1849. He proposed that a company be set up to build a Model Town, called Victoria, with a symmetrical and hierarchical social order. Robert Pemberton's *Happy Colony* published in 1854 was to be established in New Zealand away from the pollution and hardships of Great Britain. These social reformers had significant influence in early and mid-19th century architecture.

In 1887, Edward Bellamy published *Looking Backward* (Bellamy 1967). Although Bellamy's intent was to highlight the social problems of the day he framed it in utopian fiction where a man goes to sleep under hypnosis in 1887 and awakes in 2000 to a new world. In this new world social policies have completely changed, although Bellamy does not detail the city he does highlight its technical advances and the advances in architecture. *Looking Backward* was an extremely influential work particularly in America, and in the mid-1930s it was considered to be one of the most influential books that changed people's ideas about the design of cities. It stimulated many utopian works of social reform and architecture, particularly in the late 19th and early 20th centuries. These utopian cities became significantly larger and with a more scientific approach. King Camp Gillette wrote *The Human Drift* in 1894, and he details the city, "Metropolis." Metropolis was a city had high rise buildings set out in a grid surrounded by park and with underground transport systems – Towers in a park. His entire plan is reminiscent of Le Corbusier's *City of Tomorrow*, only Gillette's city was for 60 million people.

In the 18th and 19th century the word 'utopian' became a derogatory term for 'imaginary' to describe a particular form of government or commonwealth that could not be achieved. However, in the early 20th century 'utopian' became linked with 'ideal' and the expression 'utopian architecture' was used devoid of any political theory. Utopian architecture is now generally associated with designs for buildings and cities that provide an ideal environment for their users. This project is concerned with the original meaning and conceptualisation of 'utopian architecture'.

2. ASSESSING THE TOWNSCAPE THROUGH 3-D COMPUTER MODELLING

Many of these utopian writers have had extensive research executed on their political philosophy, religion, history of ideas, but little attention has been given to the architectural designs. This raises the questions; 'how does the reconstruction and the visualisation of these cities add to this body of research?' 'Can this visualisation give a better insight into these important works?'

These texts are significant not only as social reform literature but also as key works in the field of the history of ideas, and although the city is at the core of these works there has been no research into how the philosophy is embedded into the architecture. The space created by architecture incorporates society and physically enables and constrains social interaction. Architecture arranges social interaction in re-occurring patterns and thus gives form to the social structure within the city. It is the concept of space and how it is petitioned within and between the architectural units of the built environment that is the theoretical key to this research. Thus, it is not the actual buildings that are the most significant part of this study, its space between the buildings, and the connectivity of the spaces between the buildings.

The first research process of the project is to create plans of elevations and sections of the cities from the description within the source texts. Once plans, elevations and sections are provided this makes an analysis of possible through the mathematics of space syntax – a series of graphs and charts that reveal movement through the city. This type of analysis makes it possible to compare the structure of the architectural space and its connectivity. There are also other theories that help to analyse society described in the source texts, such as Anthony Giddens's *The Constitution of Society: Outline of the Theory of Stucturation*, published in 1984, which examines how social practices at the inseparable intersection of social structures. He claims that structure is what gives form and shape to social life and it is not itself that form or space. Giddens's social interaction comprises direct interchange between people and social structure and is defined by rules and resources that are recursively drawn upon and reconstituted in the processes of the interaction. These social structures are enacted in a townscape. Thus there can be an examination of social structure and architectural space, particularly in a city that was designed to enhance these social structures. Using Giddens's theories it is possible to assess the type of architecture that is required for the social structure. Although these traditional methods are an extremely good way of analysing and comparing

space and society they do not give a holistic view of how architecture and social practices work together.

Figure 1: Gordon Cullen's Serial Vision drawn by Tessa Morrison

In 1961, Gordon Cullen published *The Concise Townscape* and this book has been reprinted 15 times and has proved to be one of the most popular books on urban design in the 20th century. His technique of understanding good urban design was to examine a 'walk' through the city. Cullen developed what he called 'Serial Vision' and he created a series of drawings of each change in the urban townscape. One of the images that he created in this book is possibly one of the most famous modern images in architectural theory (see figure 1) it is also one of the most influential architectural images of modern times. This form of two-dimensional visualisation aimed to (1) make it possible to manipulate the elements of the town so that the impact of the city acts on the emotions (2) consider how our body reacts to its position within its environment (3) examine the fabric of towns in terms of colour, scale, style, character, personality and uniqueness. Reconstructing the cities using 3-D computer modelling goes beyond Cullen's series of drawings to understand these three aims, particular the latter two, of each of these cities. Fifty years has elapsed since this book has been written but these three aims remain highly relevant today and with 3-D modelling of these cities the amount of extra information achieved through this visualisation represents a deeper understanding of

the city, its usability, and how the inhabitants of those city relate to the architectural space.

The combination of these three theories is involved in this research project to examine some of the most significant utopian social theory and architecture of the 15th to the 19th century. The visualisation, through the reconstructions, is a critical element of this research and assists in the mathematical and social analysis.

3. THE CITIES

The cities selected for this project are Antonio di Pietro Averlino known as Filarete's *Sforzinda*, Albrecht Durer's *Etliche Unterricht, zur Befestigung der Städte, Schlösser und Flecken*, Tommaso Campanella's city of the Sun; Johann Valentin Andreae's *Christianopolis*; James Silk Buckingham's *Victoria*, Robert Owen's *New Harmony*, King Camp Gillette's *metropolis*; **Robert Pemberton's Happy Colony**. Filarete, Durer, Gillette, and Buckingham not only described the city, in detail but also provided detailed plans. Both Campanella and Andreae provided detailed descriptions of the cities. Campanella does not provide any image or plan, and although Andreae has one image of the city, there is neither a detailed description nor a plan. There is a common problem with earlier texts in that descriptions do not coincide with the illustrated images. However it is generally the detail rather than the overall plan that is important in constructing the space. *New Harmony* was designed by the architect Stedman Whitwell and although it is well described in the pamphlet that Whitwell produced apart from one sketch, there are no plans, sections or elevations. The happy colony has two drawings and the overall plan is discussed in Pemberton's text. Each of these source texts have enough detail to be able to reproduce a 3-D computer model.

4. PRELIMINARY RESULTS

At this stage of the project four of the cities have been reconstructed. *Christianopolis* (1619) (see figure 2), *City of the Sun* (1602) (see figure 3), *Victoria* (1849) and *Metropolis* (1887). However, this paper will concentrate on the two 17th century examples as a case study to consider how visualisation can assist in this form of research.

Both Andreae and Campanella are significant figures of the early 17th century. *Christianopolis* and the *City of the Sun* are dialogues in the tradition of Plato and More. Although *City of the Sun* was not published until 1623 a manuscript copy existed from 1602, and this was copied and sent to various people including Andreae through a mutual friend. It is often said that *Christianopolis* is just a copy of *The City of the Sun* and the fact that Andreae had possession of Campanella's work confirms this for many modern authors.

Figure 2: Ground plan of Christianopolis

Figure 3: Reconstruction of Christianopolis by Tessa Morrison

Figure 4: Plan of a quarter section of the City of the Sun

The City of the Sun (figure 5) is described as being circular and 2 miles in diameter, it is divided into seven circuits which are named after the seven planets and it has four streets that are orientated towards the points of the compass. It is built on a hill with a couple of the lower circuits on the plane. The city is strongly fortified externally with earthworks, guns, towers, ditches and breastworks and the main entrance is shut with an iron gate. Each circuit consists of a series of large houses which appears to be one large palace. Arched galleries for promenading are on the upper floors and below is an arched colonnade. The walls below and above were decorated with pictures. The aim of these pictures is not to decorate but they are intended as an educational tool. Each wall of the circuits is illustrated with a different theme of knowledge of the early 17 century. Each of the six circuits are built in a similar manner and in every ring there are suitable communal kitchens, barns, and stores of utensils for eating and drinking.

Figure 5: Reconstruction of the City of the Sun by Tessa Morrison

In the centre and on top of the hill is the Temple. It stands upon thick columns beautifully grouped. The main structure is a large dome with a smaller dome rising from it and there is a spiracle in the centre of the upper dome. Below the spiracle is the altar which is surrounded by columns. The Temple is on a space of more than 350 paces. Inside of the vault of the dome is a representation of the stars of heaven. On the altar are two globes rest one of the earth the other of the celestial skies. Seven golden lamps hung always burning each named after one of the planets.

Christianopolis is a square and is sized 700 x 700 feet (figure 3). The first row that encompasses the city was for the storerooms and industry. Andreae

organised this row into four sectors, one per side, to separate the different industries. Each of these sides was bisected by a road, orientated towards the points of the compass, and over that road was a tower that was 30 feet broad and 45 feet deep. The next two rows that encompassed the city were the living quarters. The two rows of houses faced each other. There was a vaulted colonnade of 5 feet wide and 12 feet high supported by pillars and on the second and third floor there were balconies for walkways not only to move from house to house but also walk across to the building on the other side of the street. All the accommodation was built on the same design. The most common apartment was of three rooms; a sitting room, bedroom and kitchen and the latter two were separated by a

wooden petition. The apartments had double windows one of wood and one of glass. Behind both of the rows of houses was a garden for common use, and another large tower divided the road and joined the living quarters to the fourth row – the College.

Figure 6: Residential street in Christianopolis

The College takes up the entire fourth row. It is a dominating building, surrounded by a double row of gardens – the first from the domestic buildings, the second a botanical Garden. Andreae called this the “*primum mobile* of the community.” The row of buildings was 270 feet long and 40 feet wide. There were four stories, 12, 11, 10, and 9 feet high as you go up and the towers on the corner rose another 8 feet. Around the quadrangle inside the building was a cloister of 72 columns. The College is divided into eight departments or stages – grammar, logic, arithmetic, music, astronomy, natural science, ethics, and theology; to the classical trivium and quadrivium. Andreae had a strong belief in utilitarian science and added to the College; libraries, archives, printing press, laboratories for natural science and mathematics, pharmacy, and an anatomy theatre.

At first glance there is great similarity in the plans of the two cities; they are both heavily fortified; the roads are orientated towards the points of the compass, they are symmetrical – one is square and the other one round, and there are rows or circuits of buildings that surround a central Temple and courtyard which dominates the town. In the philosophy of the cities there is similarity in the moral theology, they have similar forms government, common ownership of property is an important feature, and education is one of the main features and this education is orientated to the new sciences. When the ground plans are constructed the similarity of the main features is notable. It is only when they are constructed with 3-D modelling that the differences become very notable.

Figure 7: View from the battlements in Christianopolis

Figure 8: The central square in Christianopolis

The first and simplest difference is the scale and although it is noted in the text it becomes very evident in the flythroughs of the two cities – City of the Sun is 16.5 times larger than Christianopolis. Mathematical analysis of the cities through space syntax shows that the circuits of the City of the Sun are disconnected through buildings but they are connected through open and public spaces of which there is a considerable amount. However, through the reconstruction it is clear that it is not really public space that is utilisable since the city is built on a steep hill and ‘walking’ through the city clearly reveals that these are barriers to communication between the circuits, the only connections between the circuits are stairs which limits the public access to the different circuits. The ‘serial vision’ of the reconstruction has added additional information to the mathematical analysis. The commutability through the city and access to public spaces is an important aspect when considering social interaction. In the City of the Sun the colonnade become a communal area where most of the public activity congregates with the exception of the Temple and this greatly reduces the percentage of public space which appears on the floor plan. The Christianopolis is on a level plan

and it also has considerable public space which is easily accessible from the rows of housing and public buildings, however the reconstruction highlights the difference of this space, considering the terrain, between the city of the Sun and Christianopolis. The public space of the City of the Sun is restricted to the colonnade and the Temple precinct makes a considerable difference to how the city is viewed.

Figure 9: Inside the first circuit of the City of the Sun

Figure 10: Inside the colonnade of the fourth circuit and looking down at the third circuit below

One central component of both Campanella's and Andreae's work is their education system which is orientated to the new sciences. Andreae has a defined College that surrounds the central square and the botanical garden that surrounds the College. While Campanella's 'College' of the new sciences is written on the walls of the circuits, the city is a public library where information is accessible to all. Each circuit having a different topic and as public space of the circuits is confined to his colonnade the public is confronted with the public library on a day-to-day basis. 'Walking'

through the City of the Sun makes that accessibility to knowledge very clear.

Figure 11: The Temple of the City of the Sun

The mathematical analysis of the of these two cities does show Andreae's Christianopolis as being the more commutable, and with better social spaces which are more accessible. However, the degree of difference between the mathematical analysis and the series vision is significant. The educational philosophies of both Campanella and Andreae have great similarity. But it is in the application of the education that greatly differs. This is highlighted by the way public areas are used and the commutability between those spaces. Series vision is a method now over 50 years old, but it is valuable to understanding how the spaces are used, and how the viewer sees and experiences the space. This is invaluable to understanding the city and to whether the social structure is being enhanced and enabled by the design of city.

5. CONCLUSION

Reconstructing the cities involves more than just visualising them. Reconstruction adds valuable information on the utility of the cities and how the inhabitants are able to use the public space. With the four cities already completed reconstruction has made it possible to compare the cities and their impact on the inhabitants. It has highlights the restrictions of the spaces, or lack of them, and whether they are suitable spaces for their intended usage. It enables a more comprehensive study of the social structures that are a consequence of the political philosophy that is promulgated by these utopian writers. However, it also adds a further dimension to the analysis of the cities that the academic study alone would not be able to achieve. It is also possible to 'test' these reconstructions on a sample of people. These reconstructions will be used in a survey to evaluate if these cities inspired a sense of the authors' philosophy to a modern observer. The prime

purpose of conducting a survey is to establish whether the author's intent and their style of architecture projects their social values to a modern audience. The works involved in this project were serious political philosophy/theory aimed at improving the social fabric of society through architectural and political engineering; they have been influential through time. This project will further extend our knowledge and understanding of architecture and social structures of 'Utopian cities' from the 15th to the 19th centuries.

Figure 12: Inside the Temple of City of the Sun

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