INVESTIGATING SPATIAL EFFECTS IN ARCHITECTURE AND PAINTING

How Historians Are Now Using Computer Technology

Historians increasingly use the computer for analysing spatial effects and perspective spaces in ways that were hitherto impossible. The authors provide examples of their extensive work on computer modelling of Roman and Renaissance architecture and painting.

The computer facilitates the analysis of â€˜fictiveâ€™ spaces such as painted scenes, and the modelling of â€˜anamorphismâ€™, one of the most striking forms of perspective effect (distortion) employed in Renaissance art. Perspective scenes such as those by the Renaissance architect Sebastiano Serlio rely, for example, on vanishing points in mid-air which are impossible to model in conventional ways, and theatrical scenes such as Serlioâ€™s are too large to replicate with any accuracy in physical form.

Serlioâ€™s Theatre
In Serlioâ€™s architectural treatise Architettura, the second book of 1545 on perspective describes how to build a small, temporary theatre that is illustrated in plan, section and three stage views. A model constructed using CAD software facilitates, for the first time, full visualisation of this Renaissance theatre. This model enables the assessment of the effectiveness of Serlioâ€™s perspective scenes when viewed from different positions within the audience. For example, distortions in the scenery when viewed from seats on either side of, and below and above, the sceneâ€™s fixed vanishing point, can be easily assessed. Serlioâ€™s theatre worked rather well, even from seats close to the edge right at the front.

Inigo Jonesâ€™s Stage
The first adaptation of Serlioâ€™s type of proscenium stage in England was by Inigo Jones, assisted by John Webb, and took the form of their temporary masque stage built in the early 1600s in the Banqueting House in Whitehall, London. As with Serlioâ€™s drawings, Webbâ€™s plan and section of the stage, together with his drawings of the masques, provide a complete record from which a computer model can be constructed of these scenes, not viewed in 3D for over 350 years. The scene was applied to a series of forward-facing receding shutters on the stage. The model shows that Jonesâ€™s scenes worked far less well than did Serlioâ€™s from the point of view of the most important officials, including the King, in the front row of the audience at the Banqueting House. For the gaps between the shutters are clearly visible from these important seats.

Covent Garden Piazza
Inigo Jones applied his ideas concerning the power of perspective scenes when designing actual architecture, notably his Covent Garden Piazza, today much altered since its construction in 1631-38. The axial arrangement of this space, centred on the new church of St Paulâ€™s, exploited the effects of perspective to direct attention to the church as the centre of the scene whilst not actually in the physical centre of the space. Our computer model illustrates the relationship of the piazza to the Renaissance ideal city, with its temple on the longitudinal axis, and the potential of computer-aided design for urban planners in their attempts to visualise, in 3D, proposed reconstruction of destroyed parts of cities.

Painted Perspective
Painted space in the form of perspective scenes can also be modelled in 3D using the computer, in order to test the accuracy of the application of the rules of perspective drawing and to measure aspects such as the depth of the scene. In the case of Carlo Crivelliâ€™s Annunciation (1486), one of the most famous Renaissance painted scenes, a computer model shows Crivelliâ€™s manipulation of the rules by using variations in human scale to create scenographic effects. For here the figures farthest from the picture plane (and therefore the viewer) are deliberately made larger than life relative to their position in the scene, bringing them closer to the eye. As such Crivelli creates in his painting what might be termed â€˜depth with intimacyâ€™.
We have also manipulated by computer Hans Holbeinâ€™s The Ambassadors (1533), held in the National Gallery, London. The modelling enables identification of viewing positions from which the well-known distorted skull (which employs anamorphism) becomes visually realistic. This analysis leads to speculation that the painting was originally hung on a staircase and that it encoded a cross, formed by the figure of one of the ambassadors which is visible only when the skull is in focus. Such a hidden cross would have further illuminated the paintingâ€™s central message of hope and diplomatic mission.

Napoleonâ€™s Route
More recently we have extended our work to model transient events and settings closer to our time, notably Napoleonâ€™s triumphal route through Paris and his coronation at Notre-Dame in 1804. This model forms part of the exhibition â€˜Nelson and NapolÃ©onâ€™ held at the National Maritime Museum, Greenwich (7th July to 13th November 2005). Based on contemporary descriptions and drawings, our

computer animation shows the procession moving through the streets of Paris to the Cathedral. The computer model visualises spaces, and indeed events, that are now long gone, and so we glimpse something of the spectacle of the original event in ways impossible in any other medium.

Concluding Remarks

The computer is a unique tool for the historian, facilitating the study of the numerous historical representations of space, from theatrical to built, and painted to ceremonial.

Further Reading

- Hart and Day, A Computer Model of the Theatre of Sebastiano Serlio, 1545, Computers and the History of Art, vol.5.1, (1995) pp 41-52.
- Hart and Robson, A Computer Model of Inigo Jonesâ€™s Perspective Stage, Computers and the History of Art, vol.6.1, (1996) pp 21-27.
- Hart, Day and Robson, A Computer Reconstruction of Inigo Jonesâ€™s Original Covent Garden Piazza, London, c.1640, Computers and the History of Art, vol.7.2, (1997) pp 81-86.
- Hart and Robson, Carlo Crivelliâ€™s Annunciation (1486)â€™ and â€˜Hans Holbeinâ€™s The Ambassadors (1533), Computers and the History of Art, vol.8.2, (1999) pp 1-13, 55-70.