Diane Favro with Dean Abernathy

# A Columnar Experience

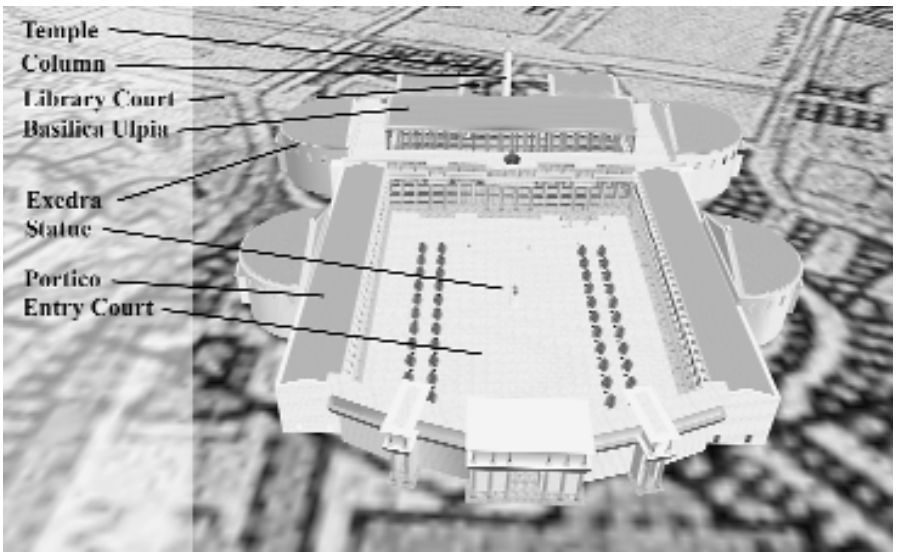
## Virtual Reality of Trajan's Column

In early second century AD, the emperor Trajan erected a towering column in the center of Rome covered with reliefs depicting his successful military campaigns in Dacia. Still standing, this monument has generated more publications than almost any other Roman building.[1] Most research has focused on the engaging sculptures. In contrast, the Column's physical context remains problematic. Only a few segments of the surrounding complex have survived from antiquity. In order to study the Column in its original setting, historians must use representational reconstructions. Until now, these took the form of two-dimensional static drawings or three-dimensional scaled physical models. The nature of these tools naturally influenced how and what researchers evaluated. Static reconstruction drawings encouraged the examination of set views, architectural style, and other visual issues. Miniature physical models promoted the study of massing and topography. Today, a new analytical tool is generating a fresh range of questions and inquiries: computer-based virtual reality (VR) modeling.

First developed for use in military flight simulations, VR models allow users to move through three-dimensional spaces in real time. Architectural historians are now taking advantage of VR technology to create highly accurate, interactive historic reconstructions to recreate the experience of being in, and moving through, past environments. In marked contrast to drawings and physical models, VR models are endlessly adaptable and can be linked with a wide range of applications. Using virtual "labs," architectural historians, like scientists, can control and repeat a range of experiments. They can evaluate virtual models under different climactic conditions, test the validity of alternative reconstructions, analyze viewing angles, explore lighting issues, display a building's evolution over time, study artworks *in situ*, calibrate the sequencing of spaces, and examine use patterns by including interactive figures. They can hyperlink models to diverse textual information while creating expansive historical environments.

A team from UCLA and the Getty Trust has produced a VR model of Trajan's Forum based upon the extensive research by Professor James Packer.[2] The model is on the uSim urban simulation system, an interactive virtual reality system with real-time kinetic and sound capabilities.[3] Currently, the Getty/UCLA model is being used to show the original context for ancient sculptures at the opening exhibition of the new J. Paul Getty Museum. Under development are the creation of various educational applications for the model, as well as continued historical research. For our first study, we have used the Getty/UCLA model to analyze the recreated, animated experience of visitors to Trajan's Forum in the early second century AD.

Individual emperors created five Imperial Fora in the center of ancient Rome. Trajan's was the last and largest, dedicated in AD 112. The next year, the emperor dedicated the sculpted Column. This magnificent monument rising 100 Roman feet (29.7 meters) stood in a relatively small courtyard between two libraries located behind the large Basilica Ulpia. At Trajan's death in 117, he was made a god; his ashes were placed in the Column's base. The incomplete physi-




*Overview of the Getty/UCLA Trajan's Forum Model showing the siting in Rome, orientation, central plaza, side porticos, exedrae, central equestrian statue, Basilica Ulpia, Library court, Column, and Temple of Trajan.*

*View from the southern entrance of Trajan's Forum along the main axis toward the equestrian statue, the triumphal chariot over the main entrance to the Basilica Ulpia, and the statue of Trajan atop the Column.*

cal remains of the surrounding structures, the seductive modern appearance of Trajan's Column, as well as the limitations of available tools, have led scholars to mention, but not emphasize, the original setting. Using VR technology, we can now recreate the impact of the Column on ancient viewers.

Let's take a virtual walk through the Getty/UCLA VR model of Trajan's Forum.[4] We enter the Forum from the city center on the southeast. Our glance is first drawn to the great equestrian statue of Trajan prancing in the center of a vast paved plaza. This sculpture, known from representations on coins, emphasized the emperor's role as a soldier in peacetime and established a sight line along the Forum's main architectural axis. Behind the statue rises the great Basilica Ulpia. Over the central door we again see Trajan, this time as a victorious soldier galloping toward us in a magnificent six-horse chariot. Far in the distance, a shimmering gilded figure of the deified Trajan hovers above and beyond the Basilica. This tripartite hierarchy of civilian soldier, triumphal general, and god remains in view until we reach the middle of the plaza, when the looming façade of the Basilica Ulpia blocks sight of Trajan atop the Column. Nevertheless, the powerful visual alignment remains strongly in mind as we walk around the equestrian statue. Entering the main entrance of the Basilica Ulpia, we confront a powerful perpendicular axis directing our glance to the left and right, yet as we turn to look down the vast Basilica, our attention is captured by a tantalizing glimpse of the Column through the open upper colonnade. Anxious to get closer to the enticing reliefs, we search for an exit. With surprise, we see that there is no door on the Basilica's northwest wall opposite the main entrance. Instead, we have a choice of two rather small, innocuous doors on either side of the main axis. Passing through one, we enter the porticoed Library Court. After the enormous plaza and Basilica, this court seems small. The sense of intimacy is further enhanced by the large Column base dominating the space. The intimate scale and sculpted armor on the base spark associations with Roman funeral monuments. Our eyes are soon drawn upward at a raking angle to the reliefs on the Column. The rising slope of the carved spiral narrative draws us in a counterclockwise direction around the Column, reenacting the choreography of many Roman rituals, including those at funerals. Circling the base, we come to the door on the southeast side. If we are literate Romans, we can read the inscription over the portal telling us that a hill was removed to make way for the Column. Craning our necks upward, we search in vain for sight of Trajan's statue crowning the shaft. The close angle prevents any glimpse of the sculpted god, yet after walking through the Forum we know well he hovers overhead.

The recreated experience of moving through Trajan's Forum reveals the ideas behind the design. The ancient architect created a strong visual axis, and underscored its importance by forcing pedestrians to deviate from this line. Ancient observers saw representations in a sequence that recalled Trajan's progression in real life from leader in peacetime to victorious soldier. After his death, Trajan alone continued along the main axis, passing in death through the solid Basilica wall into the Column base, and finally rising by apotheosis up the Column to the divine realm. By forcing pedestrians to move through the side doors into the Library Court, the design reinforced the significance of the axis as a metaphor for Trajan's path to divinity. The constriction of the Library Court underscored the funerary program, supporting the idea that the Column was planned as Trajan's tomb from its inception. Overall, the VR model helps to confirm that the sensorial experience of environments was a major consideration in the design and iconographical programming of Roman buildings.

The experiential analysis of Trajan's Column represents merely one of the many research applications for VR historic models. Such models allow researchers to uncover issues for further investigation, identify locations for future excavation, and

*Oblique view of Trajan's Column in the Library Court as seen entering from the Basilica Ulpia.*

encourage collaboration across disciplines. Unfortunately, the creation of accurate historic virtual reality models like that of Trajan's Forum is time-consuming and costly. On the positive side, once a model is built it can be continually updated and used for a wide variety of applications. For example, reconstruction models can be placed in viewing terminals at actual sites to allow visitors to experience the environment in different eras. VR models can be incorporated into promotional and didactic materials presented on videos, CD-ROMs, or fully interactive Internet connections. By moving through a recreated environment, viewers from all over the world become engaged in, and with, the past more strongly than with other delivery systems. Like all instruments, however, visualization systems privilege certain aspects over others. We must remember that computers are tools, not substitutes for thinking. Judicious use requires that the researchers and modelers have specific experiments in mind, rather than creating models merely because the technology makes it possible.[5] Caveats aside, this single experiential experiment centered on the Column of Trajan underscores the value of virtual reality models for teaching us about even the most studied of monuments. After moving through the virtual Forum of Trajan and viewing the Column, we can understand more fully why Cassiodorus wrote in the sixth century, "The Forum of Trajan is a wonder to look upon, even after continual viewing" (Variae, 7.6.1).

*VR models created jointly by the J. Paul Getty Trust and UCLA.*

**Notes**

1 Over the last decade an average of three significant research publications each year have examined Trajan's Column. Several major exhibitions and colloquia focused solely on this monument.

2 Professor James E. Packer's meticulous research on Trajan's Forum culminated in the impressive book, *The Forum of Trajan in Rome: A Study of the Monuments* (Berkeley: University of California Press, 1997). The VR model was produced in the uSim Lab at UCLA under the direction of William Jepson and Diane Favro, with Bernard Frischer as consultant; the primary modelers were Dean Abernathy and Lisa Snyder. An alternative virtual reconstruction of the Basilica Ulpia is currently in development by Infobyte based upon the research of Professors Carla Maria Amici and Lucrezia Ungaro.

3 The uSim (Urban Simulation System) was developed at the Center for Computing at UCLA under the directorship of William Jepson. This system is capable of creating a complex virtual reality model encompassing entire urban environments which can then be used for interactive fly-, drive-, and walk-through demonstrations allowing the viewer to scale elegantly between distant urban views and close-up images of building details.

4 The following is a verbal description of the most likely path for a first visitor to the Forum. However, since the VR model allows the user to control movement in real-time, many other paths are possible.

5 In addition to an experiential analysis of Trajan's Column, we conducted several other experiments using the Getty/UCLA model, always beginning with a specific hypothesis. For example, we plotted the shadows cast by the Column to determine if it was conceived as a gnomon; the results were negative.

*Diane Favro is Associate Professor, Department of Architecture and Urban Design, UCLA.*

*Dean Abernathy <dabernat@ucla.edu> is a practicing architect and doctoral candidate, Department of Architecture and Urban Design, UCLA.*

Special praise and thanks must go to the J. Paul Getty Trust; UCLA's School of the Arts and Architecture, and College of Letters and Sciences; the Creative Kids Educational Foundation; and, the uSim Lab for their commitment to the creation of historical virtual reality models and related educational applications.