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## Creation Myths and Contemporary Science



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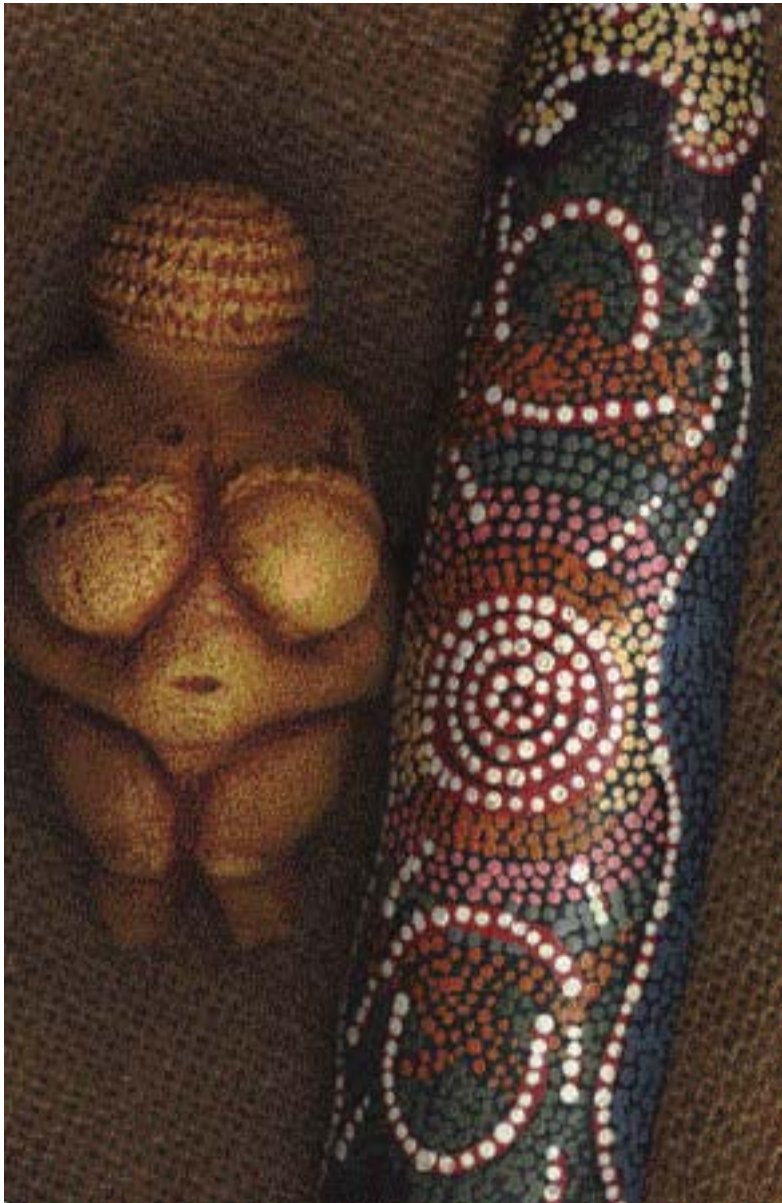
**Abstract:** Cox describes the 'grid' virtual technology used to create the animations for these museum displays. She will show avatars 'flying' over vast simulations showing scientific phenomenon and describes the high-technology used to create the most popular scientific model of how the universe was born, including work from her collaborations as Associate Producer / Art Director for Scientific Visualization for the 1997 Academy Award nominated IMAX movie *Cosmic Voyage*. These immersive experiences are linked both in concept and form to studies in mythology and metaphor. The author explores the relationship between technology, visualization and mythological structure. This presentation will show recent digital imagery the making of 'high art' of science.

Since 1985, I have collaborated with scientists and computer technologists at the National Center for Supercomputing Applications (NCSA) to visualize astrophysical data of supercomputer simulations. I am an artist who works with a team of specialists to solve problems in the visualization of scientific data. I coined the term "Renaissance Teams" in 1986 to describe this type of collaboration. The process of scientific visualization involves the translation of numbers into computer graphics time-lapsed visuals. The artist is involved at several levels of participation, including the design, color, choreography, and editing of the visuals.

Over the years, it has become apparent that these visualizations are extremely popular with general audiences and have had an impact on the way that many people view the universe. I have been involved with many visualizations of the formation of the early universe. Modern Big Bang scientific theorists believe that the universe formed over 15 billion years ago and that galaxies formed on filaments to create the structure of the universe that is understood today. I have collaborated on three major projects involving Big Bang data from supercomputer simulations. One of these projects opens June 15, 2001, at the Hayden Planetarium's new Big Bang Theater in New York City. Over 10 million people have seen these images in large-display, general audience, immersive environments. What is of interest to my research is how these images play a role similar to mythological images historically, in telling the story of creation. Like images of mythologies of the past, these modern scientific models are painting a new view of the universe and providing a modern creation myth.

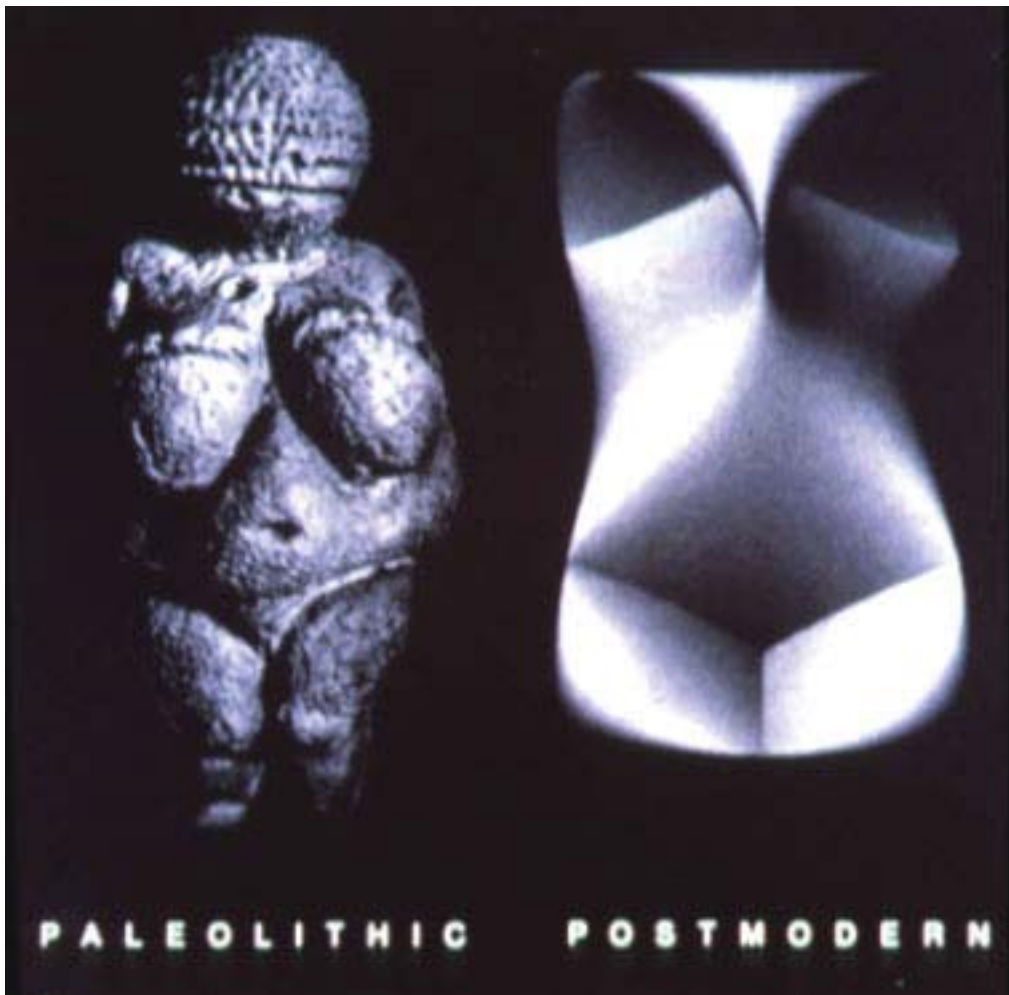
My CAiiA research involves the investigation of correspondences among creation mythologies and modern scientific models. Dating back to historical creation myths involving goddesses, we find narratives of cosmology involving heroines and heroes. However, in the research of Carl Gustaf Jung, we find a psychological approach to explaining mythology. He defines myth as any widely held belief that cannot be proven. Such a definition casts a wide net and includes contemporary mythologies, including the belief in superhuman aliens, as well as the story of

creation.



**Creation Myths are ubiquitous in all cultures: Here is the Venus de Willendorf and an Aboriginal storyboard**

According to Jung, myth making is an on-going activity. We humans socially and personally construct myths employing the latest digital technology. As a researcher and visualization expert, I have witnessed similarities in the visual forms of ancient myths and contemporary visualizations of cosmology. These visual similarities are found in the branching of forms and tree-like structures that emerge from the imagery. The Ancient Mayans were great astronomers and used their view of the night sky as inspiration for mythological tales of a cosmic monster and the creation of the universe. These people used the best technology and primitive science to relate these stories to the general public. Likewise, today, we find that humans are employing some of the best technology and science to tell the story of creation to large, general audiences.



**Venus in Time by Donna Cox, 1990**

The mythologist Claude Levi-Strauss believed that the purpose of mythologies is to provide an imaginary solution to real world problems. Modern scientific visualizations also provide similar solutions. Scientists observe the natural world and its phenomenon, such as observing the behavior of thunderstorms. Many of these scientists developed mathematical models that are computed in supercomputers in order to describe and predict natural phenomenon such as the formation of thunderstorms. This process of building and computing mathematical models of nature is called computational science. The art of scientific visualization is the translation of these billions of numbers into visual information that humans can understand.



**Astrophysical Jet by Donna Cox and Michael Norman**

Computational science and scientific visualization was an important part of the making of *Cosmic Voyage*, an IMAX film about the relative scale of things in the universe. These new technologies of supercomputing and visualization were employed to artistically render images for this movie. Galaxies colliding in swirling paint-like effects are some of the beautiful images from this movie that help to tell the tale of creation. In addition to visualization and supercomputing, other technologies were used to create *Cosmic Voyage*.



### Alliance Grid high speed network to link virtual environments

Robert Patterson, Marcus Thieboux and I created Virtual Director, a software framework that operates in a CAVE. Virtual Director is a choreography and navigation system, which not only enables the creation of visualizations; it also provides remote virtual collaboration capabilities via the Internet. We used Virtual Director to create scenes for Cosmic Voyage. It provides a network capability to connect to different people in remote locations. It operates in the CAVE virtual environment, a room-size, rear-screen projection system that allows one to see the images in 3-D stereo, in real-time. Tele-immersion is when several of these CAVE or virtual environments are linked together over the network. We have used Virtual Director to interactively work with scientists in remote locations and to meet in cyberspace in order to create the visualizations. When we meet in cyberspace, we have our independent points of view, and can navigate independently. However, we share the same environment and see one another as avatars. We share camera paths and see each other's camera viewpoint on suspended virtual televisions.



**Avatars meeting in Cyberspace over the Grid using Virtual Director software**

Avatars are visual metaphors for the human in cyberspace. The term comes from Eastern Mythology and relates to mythological construct of the incarnation of god on earth. In virtual reality, this term relates to the incarnation of human in virtual space. The ancients have constructed architectural environments and art to disseminate information to large groups of people. Likewise, moderns have constructed similar architectural, immersive environments to convey stories and information to the masses of people.



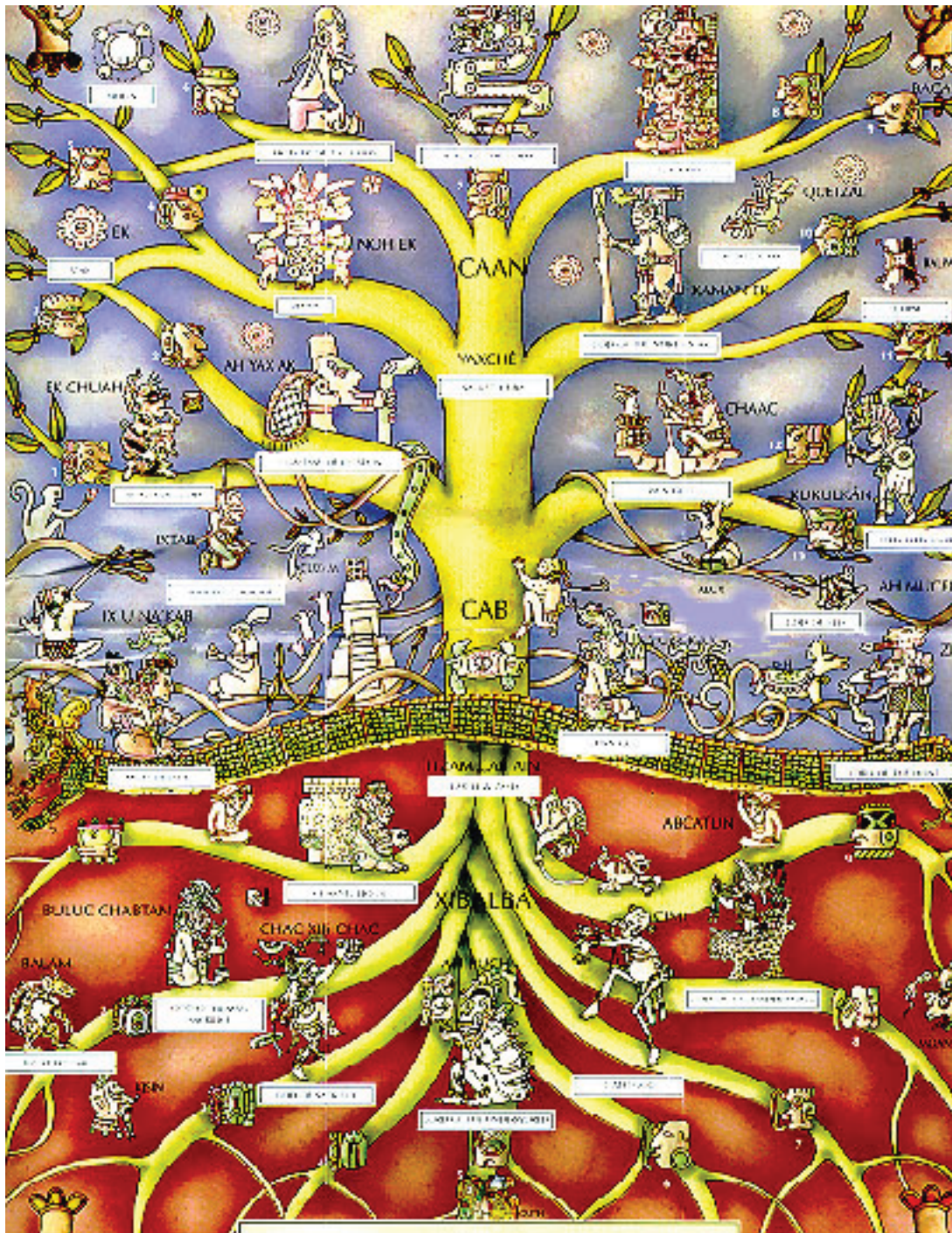
**Hayden Planetarium, American Museum of Natural History, New York City, Where millions of people see science in a virtual environment**

At the Hayden Planetarium in New York City, American Museum of Natural History, we have collaborated to create an exhibit in the large digital dome, which holds 440 people and has provided an immersive experience to over 2 million people in last couple of years. The Passport to the Universe 17-minute show is narrate by Tom Hanks and employs many of our digital visualizations of the large-scale structure of the universe as well as the local galactic structure near the Milky Way galaxy. We worked with the Hayden Planetarium staff via remote virtual collaboration from our CAVE in Illinois to the New York City dome. In addition to this exhibit, we collaborated with Hayden to provide imagery for their Big Bang Theatre exhibit, which occupies another portion of the dome structure. Here, we provided scientific simulations of the Big Bang evolution of the large-scale structure of the universe. The story of creation is being told to a wide audience via the latest technology and scientific theory today.



**Galaxies colliding in Intergalactic Space**

Such exhibits reach millions of people and provide visual metaphors in an edutainment form (educational entertainment). In addition to the exhibits, we have provided many visualizations of astrophysics to broadcast, high-definition television. These narrations provide a social function that is similar to mythological art of the past because they construct a view of reality to large audiences and these stories are supported with the best technology of the era. Jung and Levi-Strauss provided contemporary definitions of what mythologies are to culture. Contemporary models in science are providing much of this functionality. Advanced technologies including computer visualization, supercomputing, virtual reality, and the Internet are the substrate on which these stories of creation are being told, and these stories are constructing our realities and point to many correspondences among mythologies and modern models in science.



Sacred Ceiba Tree as picture of the universe: heaven, earth and hell

**Related links:**

➔ Art(n) Website:

<http://www.artn.com/>

➔ Discovery Channel Next Step Program featuring Virtual Director:

<http://www.nextstep.com/stepback/cycle9/113/virtualdirector.html>



- ⇒ Hayden Planetarium Opening Press Release:  
<http://access.ncsa.uiuc.edu/Headlines/00Headlines/000201.Hayden.html>
- ⇒ Selected Computer Art:  
<http://www.ncsa.uiuc.edu/SCMS/DigLib/text/artgraphics/Art-Computer-Graphics.html>
- ⇒ Professor Donna J.Cox:  
<http://www.ncsa.uiuc.edu/People/cox/>
- ⇒ Virtual Director Website:  
<http://viridir.ncsa.uiuc.edu/viridir/>
- ⇒ Virtual Director Website:  
<http://niri.ncsa.uiuc.edu:8000/viridir/viridir.html>
- ⇒ Classes:  
<http://www.ncsa.uiuc.edu/VR/RELNL/classes/artgd332/>
- ⇒ Classes:  
<http://www.ncsa.uiuc.edu/VR/RELNL/classes/artgd333/>

**Partners:**



<http://www.caiia-star.net>

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