

Cosmic Dancer: A Cosmological Artwork

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ABSTRACT

On May 22, 1993, my sculpture called the Cosmic Dancer was launched to the Russian Mir space station on a Progress rocket from the Baikonur Cosmodrome in Kazakhstan. The Cosmic Dancer - a painted geometric form constructed of welded aluminum tubing measuring approximately 35 x 35 x 40 centimeters and weighing exactly one kilogram - was the first three-dimensional artwork to be specifically conceived for and officially realized in a space habitat. The purpose of the project was to investigate the properties of sculpture in weightlessness and to evaluate the integration of art into the human space program. After its arrival on the Mir space station the *Cosmic Dancer* was allowed to slowly spin and freely float in the weightless environment. Freed from the force of gravity which causes any sculpture on Earth to rest or be positioned in a certain way, the sculpture could be viewed from any perspective and angle. Through this realization in the macrocosmic environment of space as an artistic visual interpretation of the "cosmic dance" at the microcosmic level, it assumed a broader cosmological interpretation of humanity's current and widely accepted cosmological myth.

PAPER

1 Cosmological Myths

Throughout millennia humanity has wondered about its relation to the cosmos and about its ultimate role and purpose in the matrix of life. Based on the available knowledge of a particular moment in time, different perceptions - *Cosmological Myths* - were created to try to satisfy its quest to find meaningful explanations to fundamental existential questions explaining the dynamic structure and order of the cosmos. As knowledge increased through a process of making finer and finer discriminations about the nature of reality, the prevailing models of understanding were consequently modified or replaced by newer ones in order to have a more precise and believable explanation of where we came from, who we are and why are we here. This continuing process influences the way our species formulates its beliefs and conducts its affairs.

Both art and science are humanity's attempts to describe the natural world and its place and purpose in the universe. The methods and subject matter may be different as well as their traditions, but the ultimate goals and motivations of scientists and artists are in fact similar. To understand the meaning our existence and to share that insight is one of the fundamental needs of our species. In today's flood of scientific data, artists and scientists increasingly collaborate to give meaning to contemporary scientific concepts and discoveries which represent current cosmological interpretations. In literature, film and in the visual arts, some artists are using this scientific information to propose their own cosmological theories.

Cosmological myths - both ancient and more modern - have always been accompanied by the creation of artifacts such as images, objects and structures which become visual symbols of the information embodied in a particular myth and used to communicate and/or access the perceived understanding. Numerous books and articles in all cultures have documented and explained these ancient and modern cosmological myths and their contributions to understanding humanity's place and purpose in the universe.

was my personal attempt to visualizing a prevailing cosmological myth that was based on accepted scientific information of the moment.

Of the four fundamental forces in physics, gravity is the weakest force at the microcosmic level but the strongest force on the macrocosmic scale by which all things with mass and energy – including planets, stars, galaxies and even light are brought toward each other. Locally, gravity has to do with the force that the acceleration of Earth imparts to objects on or near its surface. As a terrestrial environmental factor, gravity is rarely considered as essential to the creation of art, yet it has profoundly influenced and determined both the conception and the perception of art since its beginnings. Basically, gravity gives us an “up and down” orientation to the environment in which we live. Therefore, paintings, particularly those with a rectangular shape, usually have a “natural” top and bottom orientation because this reflects how the viewer and the artist perceive the world we live in.

I began to explore how gravity influenced my painting in a series of works that have a six-sided geometric shape. As there was no natural “top or bottom” orientation, these two-dimensional works could then be mounted in any position. The shading of some the triangular areas created by the intersections of the lines, added an additional perceptual component to the works which resulted in a three-dimensional effect. How the work was positioned imparted a specific uniqueness to its perception as seen in the images of the same painting below.

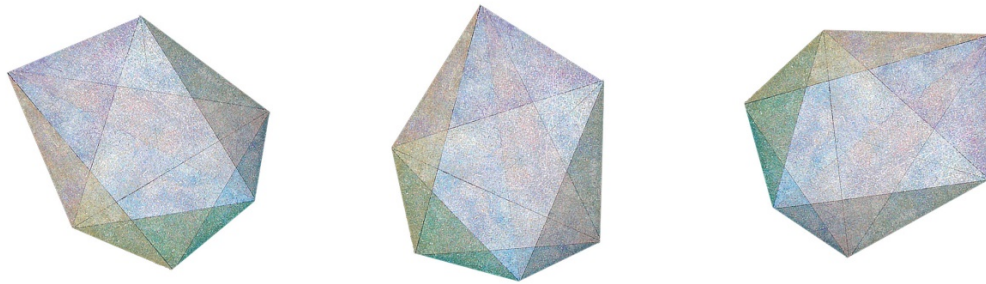


Fig. 1. Voyager Series
Acrylic on Canvas, 120 x 150 cm
Photo credit: Arthur Woods.

Likewise, because they are created in a terrestrial environment, all sculptures have a “resting point” - a point of contact in which their mass interacts with the gravity of the Earth. Consciously or unconsciously, artists conceive and carry out their sculptural creations with gravity determining the eventual resting point of the work, and, by so doing, they pre-determine how the sculpture will eventually be perceived and appreciated by the public. Thus, the influence of gravity has much to do with our perception and appreciation of sculpture - as our response to its aesthetic “rightness” is based on our own experiences within the terrestrial environment.

I applied these ideas and my painting technique to a series of three-dimensional geometrically shaped objects I call *Cosmic Dancers*. The geometric form of these sculptures enabled them to be positioned and viewed from different perspectives and, in relation to their surroundings; the same sculpture could appear as a unique three-dimensional form as a result of its varied positioning. Depending on the geometric complexity, usually between four and eight resting positions could be found for each sculpture and its interaction with gravity - *its resting point* - being the ultimate determining factor. As these works were painted in my pointillistic technique they were also three-dimensional paintings as well as sculptural works.

When imagining human civilization extended into outer space, it seems obvious that the art of this civilization will take advantage of its new environment. Much like the influence of gravity has had on the evolution of terrestrial art, the qualities specific to the space environment will have a fundamental effect on both the conception and perception of the artworks designed and realized there. In the zero-gravity (zero-G) or microgravity environments of outer space, the influence of gravity disappears and artworks become weightless and motion becomes isotropic. As a consequence, the conception, perception and the appreciation of an artwork is altered in this environment. For example, a sculpture floating in a zero-G environment can be viewed from an infinite number of perspectives or angles – something that is not normally possible in a typical art setting on Earth. These insights into art, gravity and the scientific understandings about the nature of the universe would later be applied to a version of the *Cosmic Dancer* that investigated the art of sculpture in the weightless environment of outer space.

4 The O.U.R.S. Projects

Because of my earlier personal experience having lived near the space center in Florida, and perhaps due to the reinvigoration of the US space program with the early flights of the U.S. Space Shuttle, in the early 1980's, I began to consider conceptual artworks designed for the space environment. In 1984 I initiated the *O.U.R.S. – the Orbiting Universal Ring Satellite* project. My idea was to celebrate the coming new millennium with a sculpture in Earth orbit which would be large enough to create a "circle in the sky" that would be visible to most people on the planet in order to commemorate humanity's passing into an exciting new millennium with a symbol of hope, peace and unity. I considered the symbolic use of a circle to be an uncontroversial and universally recognized symbol representing the infinite nature of energy and the inclusivity of the universe. Over the course of the next few years and in collaboration with the aeronautical engineer Dr. Marco C. Bernasconi at the Swiss space company Contraves A.G., we were able to come up with a realistic technical definition of the *O.U.R.S.* orbital sculpture based on the Inflatable Space Rigidized Structures (ISRS) technology that was being developed at Contraves which indicated a continuous torus with a diameter of 1 kilometer and a ring thickness of 10 meters. Such an object placed in a 400 km orbit would be visible to viewers on Earth as a "circle in the sky" approximately 1/4 the size of the Moon.⁶

In 1987, Contraves constructed an ISRS torus with a diameter of 6 meters for development and test purposes. Dr. Bernasconi and I felt using such an object would be a suitable and relatively inexpensive prototype for the *O.U.R.S.* development program. To differentiate from the larger *O.U.R.S.* 2000 project and to make the object more interesting we added a central quadrant and a sphere to the design. This design – a circle divided by a central cross is also the Greek astronomical symbol of the Earth where the vertical line represents the meridian and the horizontal line the equator. Versions of the symbol can be found in various ancient cultures predating Christianity often in the form of an astrolabe, historically used by astronomers and navigators to measure the altitude above the horizon of a celestial body, and identify stars, planets and day and night. Native American cultures used this symbol as a medicine wheel indicating the four seasons, the four directions, the four stages of life, and the four elements of fire, air, water and earth. We called this precursor project the *OUR-Space Peace Sculpture (OUR-SPS)* and we set a goal to realize the project in conjunction with the 1992 International Space Year (ISY) to commemorate international cooperation in space as a positive alternative to the Cold War that was at its peak. As with the circle, I intended to use another ancient mythological symbol to express an emerging contemporary concept directly related to the promise of space exploration.

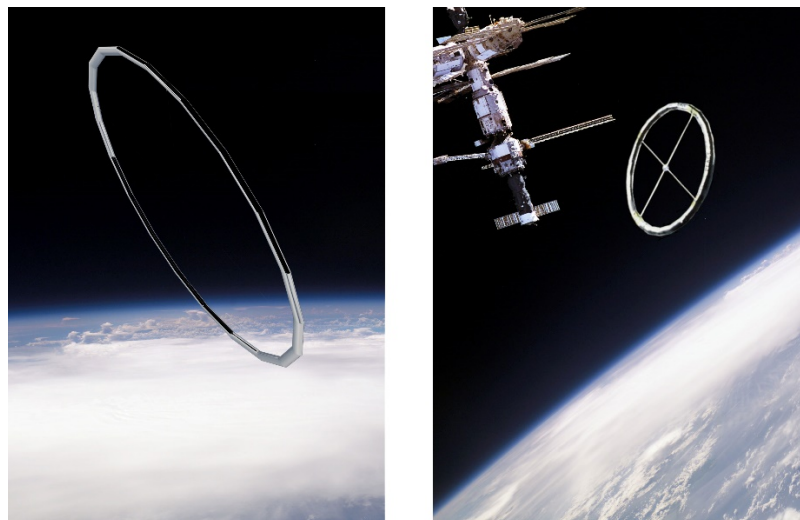


Fig. 2. *Orbiting Unification Ring Satellite, OUR-Space Peace Sculpture*
Artist conception. Photo credit: Arthur Woods.

On February 25, 1988, I signed a "Letter of Intent" with the Soviet launch service provider Glavkosmos to deploy the *OUR-SPS* from their Mir space station. Perhaps, due to the political dimensions inherent in the

project, the Swiss space company decided to withdraw its support for the project. Coincidentally, the Russian space company NPO Energia who was responsible for the Mir space station, had also been developing their own inflatable space structure technology and proposed to continue the *OUR-SPS* project using their technology. They built a full size 6 meter inflatable sculpture in 1990 which was exhibited in various space and art events in Switzerland.

With these ongoing activities, developments, and with the full cooperation of the Soviet space organizations using their own space technology, everyone involved in the project was confident about the eventual realization of the *OUR-SPS* in 1992. However, in 1991 the Cold War unexpectedly ended and, in December of that year, the USSR officially dissolved. Due to the uncertainties associated with pursuing the project within this new political context, sponsor support for the 1992 ISY opportunity was withdrawn and the *OUR-SPS* project was postponed which, in turn, impacted the development program for the realization of the *O.U.R.S.* project intended for the year 2000.

5 The Spaceflight of the Cosmic Dancer and its Cosmological Context

As the uncertainties related to the previous Soviet program settled, I learned through a former space associate that the Russian space program was still open for business and they would welcome another art project suitable for the Mir space station. With the desire to take advantage of this opportunity, the geometric shapes of the *Cosmic Dancer* sculpture series seemed to be appropriate for exploring the concept of sculpture in the microgravity environment of a space habitat. From a technical and financial standpoint, the *Cosmic Dancer* would be a much less complex project to realize than the previous orbital art projects. As a three-dimensional artwork specifically conceived for and officially realized in a space habitat, the *Cosmic Dancer* project would also serve to ascertain the process, the impact and the value of integrating a cultural dimension into the human space program. Additionally, this art intervention initiated by an American artist based in Switzerland taking place on the Russian Mir space station could also be interpreted as statement of international cultural cooperation in space.

The name *Cosmic Dancer* added another dimension to the artwork as an abstraction of *Nataraja*, (Sanskrit: “*Lord of the Dance*”) the Hindu god Shiva in his form as the cosmic dancer commonly depicted with four arms and flying locks of hair. Interestingly, a 2 m high version of the statue, symbolizing Shiva's cosmic dance of creation and destruction, was given to CERN by the Indian government in 2004 to celebrate the research center's long association with India. A special plaque next to the Shiva statue explains the significance of the metaphor of Shiva's cosmic dance with quotations from the physicist Fritjof Capra:

*“Hundreds of years ago, Indian artists created visual images of dancing Shivas in a beautiful series of bronzes. In our time, physicists have used the most advanced technology to portray the patterns of the cosmic dance. The metaphor of the cosmic dance thus unifies ancient mythology, religious art and modern physics.”*⁷

An article recently published in Quartz India titled “*Lord of the Cosmic Dance: How the Indian icon Nataraja danced his way from ancient history to modern physics*”, places the *Cosmic Dancer* on the Mir space station in an historical timeline.⁸

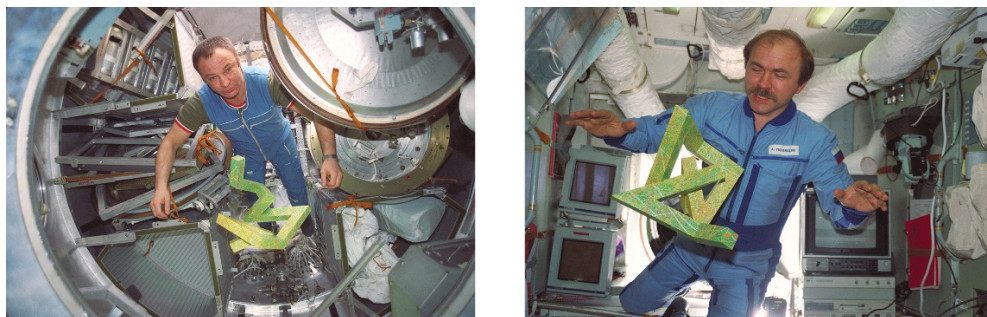


Fig. 3. Cosmic Dancer on the Mir space station (1993)
Photo credit: Cosmonauts Gennadi Manakov and Alexander Polischuk.
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On May 22, at 10:43 a.m. (Moscow time), a Soyuz rocket was launched to the Mir space station. After its arrival two days later, cosmonauts Gennadi Manakov and Alexander Polishchuk unpacked the *Cosmic Dancer* inside the Progress capsule and allowed it to freely float and spin in their living space. As part of the mission, the cosmonauts were instructed to evaluate the impact of having art share their weightless environment and were given a questionnaire. The cosmonauts, on their own initiative responded to this artistic intervention in a creative and playful way by dancing with the sculpture. A photographic and video documentation was returned to Earth in September 1993.

The *Cosmic Dancer* was not only a sculpture in a traditional sense, but also a kinetic, minimal abstract painting in three dimensions and it represented a convergence of several directions in my art that I had been developing since 1976. At that time, I looked to science to see what physics had to say about the nature of reality and the universe. What I discovered and, what has influenced my art ever since, was a description of the universe at the microcosmic level consisting of sub-atomic particles in an inseparable network of interactions. These interactions involve a ceaseless flow of energy which gives rise to the stable structures of the material world - the macrocosmos. The structures that make up physical reality do not remain static but are transient and oscillate in rhythmic movements. Thus, I became aware that the entire universe is engaged in endless motion and activity - in a continual *cosmic dance* of energy. Both the aesthetic aspects of this description as well as the environmental implications of an interdependent and interconnected universe have had much relevance for my own world view. As this insight existed in both modern physics as well as in Eastern cosmological concepts, I was both influenced and inspired by this seeming merging of diverse cultures and these different yet similar ways of describing the cosmos. This seemed to indicate that knowledge about the nature of the universe was somehow imbedded into our consciousness.

The *Cosmic Dancer*, painted in my pointillistic technique, was originally conceived of as investigation of sculpture spinning effortlessly in the weightless of a space habitat. However, its realization in the macrocosmic environment of space as an artistic visual interpretation of the “cosmic dance” at the microcosmic level, it assumes a broader cosmological interpretation directly related to humanity’s current and widely accepted cosmological myth.

In the words of Mir crew member cosmonaut Alexander Polischuk:

“The Cosmic Dancer is an angular and unusual sculpture in the classical understanding of art, nevertheless it made us pleasure. Contemplating the sculpture turning in weightlessness while listening to music resulted in an effect which is possibly totally unknown on Earth. It is difficult to describe this effect. Particularly interesting was to dance with the Cosmic Dancer to music. Dancing is meant symbolically as we circled around it and it, too, moved freely on its own and looked like it circled around us for some reason. That we can really call dancing!”⁹

6 About the Author

Arthur R. Woods is an astronautical artist and independent researcher with two art projects successfully flown on the Russian Mir space station: the *Cosmic Dancer* in 1993 and *Ars Ad Astra* in 1995 in the context of EuroMir95. He is a member of the International Academy of Astronautics and co-chair of the Moon Village Association Cultural Considerations Working Group.

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