

## Chapter Two

### Humans and Space: Stories, Images, Music and Dance

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When told that the launching of Sputnik in 1957 meant that humans had finally gone into space, Buckminster Fuller is said to have replied: *"We are all already in space! We are on spaceship Earth."*

*"I think a future flight should include a poet, a priest and a philosopher . . . we might get a much better idea of what we saw."* -- Michael Collins, Astronaut

#### 2.1. Dreams Lead to Technology Leads to Dreams ...

Dreams of space -- of not-Earth -- have inspired humanity over the ages. Dream-inspired humans made space travel a reality. Without our dreams, there would be no space programs anywhere. Artistic, religious, philosophical, and ethical perspectives are not frills or mere add-ons to space activities. They are absolutely essential parts of all aspects of all space endeavors.

At the same time, without the science and technology that enables humans to loose the bonds of Earth, humans would still only be dreaming of space while never going to the Moon and beyond. But wait! Science and technology are themselves the products of human dreams and desires. Dreams, beliefs, science, and technology -- along with natural and human resources harnessed by human will and labor -- are all required to attain and maintain space activities

##### 2.1.1. Stories About How the Earth and Humans Were Created

All cultures have stories about the origin of Earth and humans. Almost all creation stories say that Earth, humans, and all living things on Earth were created by nonhumans or superhumans, many of whom either live in the sky, or descended from the sky to create Earth and life on Earth. Sometimes the stories tell of conflict between competing nonhumans with one kind being victorious over the others. I am not aware of any creation stories that describe something even vaguely similar to Darwinian evolution.<sup>1</sup>

All creation stories leave unanswered (and unasked) the most important creation question -- who or what created the nonhumans who then created humans and the Earth? The stories of all cultures say that nonhumans existed before and created humans and that they came from and returned to places that are not-Earth -- typically places somewhere distant "up in the sky." Most cultural stories and many religions also describe nonhumans who exist on Earth and with whom humans interact in various ways. These may be spirits, or ghosts, or angels, or various forms of microvita, many of whom also have not-Earthly origins and homes.

Most cultures and religions also have stories that tell of voyages between Earth and not-Earth, sometimes taken by humans but often involving nonhumans as well or instead. Moreover, some stories say that humans exist somewhere else before they are born and live on Earth, and almost all religions and cultures state that humans go somewhere not-Earth when they die, either to a different place, such as Heaven and Hell, or a different plane of existence, such as Nirvana.

So the idea that there are worlds and beings beyond Earth, humans, and the other creatures of Earth is apparently universal, and clearly precedes science fiction, space fiction, and other forms of space art.

### 2.1.2. Some Stories About Voyages To and From Space

One of the oldest and best-known Japanese stories is about *Kaguya Hime* (often translated as the Moon Princess) as told in the *Taketori Monogatari*. A bamboo cutter (a *taketori*) discovered a baby girl inside a bamboo shoot. He took her home, and he and his delighted wife reared the baby as their own. She grew into an extremely beautiful -- and very large -- woman. Her father wanted her to marry, and five princes came to woo her. But she did not want to marry them and gave them impossible tasks to perform. Even the Emperor could not persuade her to marry him. Then she revealed she was not of this world, and was transported back to the Moon from which she came by an array of otherworldly attendants.<sup>2</sup>

In the summer of 2007, Japan launched a lunar orbiter from Tanegashima Space Center. The name originally given to the orbiter was "Selene" for (SELenological and ENgineering Explorer). *Selene* is the name of the Greek goddess of the Moon. However, the Japanese national space agency, JAXA, asked the Japanese public what nickname they thought should be given to the orbiter. *Kaguya*, and *Kaguya Hime*, were overwhelmingly the number one and two choices. JAXA thereafter called the explorer *Kaguya* in Japanese language reports, though English-language reports still often referred to the orbiter as *Selene*.<sup>3</sup>

Another well-known story that came to Japan from China and Korea is recalled during the annual summer *Tanabata* festival (called *Qi Xi*, in Chinese, *Chil-wol chil-seok* in Korean). It is held on the seventh night of the seventh month in celebration of the annual meeting of the stars Vega (or *Orihime*, the seamstress) and Altair (or *Hikoboshi*, the ox-herder) that are separated by the Milky Way (or *Amanogawa*) and only allowed to be together once a year for a brief time. The reasons vary as to why the two lovers are separated and allowed to meet each other only briefly once a year, but they are all based on plots that have humans being punished for doing what they *want* to do rather than doing what they know they *ought* to do.<sup>4</sup>

The Japanese space agency, then known as NASDA, named a pair of satellites *Orihime* and *Hikoboshi*. The two were launched together as ETS7 (*Kiku 7*) and separated before coming together again in 1999. It was the first time such automated docking had ever been carried out in space. So JAXA was following good precedence in choosing to name its lunar orbiter *Kaguya*.<sup>5</sup>

But consider the names NASA has given to some of its space vehicles -- Mercury, Apollo, Gemini, Saturn, Jupiter, Orion, Titan, Ares, Altair -- all named after Greek or Roman gods.

Who and what is this (see Figure 2.1)?



**Figure 2.1. Icarus (Artwork Courtesy of NASA).**

Yes, Icarus. Icarus the Greek who, with his father, Daedalus, fashioned themselves wings so that they could fly like the birds, something they were totally unable to do with their wingless, flightless natural bodies. So they first imagined flight, and then developed the technologies that would enable it. Icarus also received a warning from his father before he took off. According to Ovid's *Metamorphoses* (10 AD), Daedalus

"Then thus instructs his child: My boy, take care  
To wing your course along the middle air;  
If low, the surges wet your flagging plumes;  
If high, the sun the melting wax consumes:  
Steer between both: Nor to the northern skies,  
Nor south Orion turn your giddy eyes;  
But follow me: let me before you lay  
Rules for the flight, and mark the pathless way."<sup>6</sup>

But Icarus, being a typical son -- and a typical human -- disregarded his father's warning. He did fly. But then he sailed too close to the Sun, which melted the wax on his wings and cast Icarus to his death in the ocean below.

The daring and hubris of Icarus has been an extremely popular theme in Western art and literature, warning us of the eternal tension between what we *want* to do and then *can* do because we develop technological capabilities, on the one hand, in contrast with what we *ought* to do, given our ethical limitations and frailties, on the other.

### **2.1.3. Precursors to Science and Space Fiction**

Space fiction, almost by definition, involves boldly going. Well before the modern era, most cultures had their own stories about voyages of discovery. Heroes leave home, travel through strange times and places, overcome many adversities and have many exceptional experiences before returning home again, enlightened by the process. The basic archetypal stories for Western cultures are *Gilgamesh*, and the *Iliad* and the *Odyssey*. *Gilgamesh* is about the adventures of a king of Uruk, named Giglamesh, and his half-wild (and perhaps gay) friend, Enkidu, somewhere between 2750 and 2500 BCE.<sup>7</sup> The *Iliad* and the *Odyssey* are thought to have been first composed between 800 and 600 BCE. The *Odyssey*, recounting twenty years of travel by Odysseus (Ulysses, in Latin), is a prime example of a voyage of discovery.<sup>8</sup>

In the *Bible*, the first book, *Genesis*, is immediately followed by *Exodus*: departure happens soon after creation. The story of Moses leading the Jewish people to the Promised Land -- and the belief in the existence of a Promised Land that is rightly theirs -- is an unfinished narrative of travel and travail. In Christian belief, Wise Men traveled far to find the

Messiah. Muslim faithful must travel to Mecca. There appears to be an almost irresistible urge for humans Boldly To Go -- or at least for some people, usually men, to go. In each of the stories above there are those who warn against the journey, and/or who patiently stay at home waiting for the hero's eventual return, such as Ulysses' Penelope.<sup>9</sup>

Around 150 A.D. the Greek philosopher Lucian of Samosata wrote what might be the first two western works of space fiction, *Icaromenippus* and the *True History*. In the first, written as a play, Menippus (specifically wanting to avoid the failure of Icarus) took one wing from an eagle and another from a vulture, and fashioned them so he could fly from Mount Olympus to the Moon. There he visited with many famous dead Greeks and discovered that they were all pretty much losers. Having also confirmed that the Earth is round, Menippus then tried to fly to the Sun. He got as far as heaven where he met the great god Zeus and some other lesser gods. Zeus questioned him about what was happening on Earth and why mortals didn't worship and fear him any more. The gods eventually realized that their weakening powers would be completely lost if humans were able to fly up to see how they really lived, and so they confiscated the wings of Menippus and sent him back to Earth. They ordered him never to fly again, thereby re-emphasizing one of the continuing themes of space fiction -- hubris: the fact that humans try to do things beyond their natural physical and ethical ability, and are punished for it.<sup>10</sup>

In Lucian's second story, *The True History*, a ship exploring the Atlantic was carried by a waterspout to the Moon. Its crew found the Moon-King at war with the Sun-King over which would rule the planet Jupiter. While on the Moon, they saw various marvels such as a combination telescope/telephone which Lucian described as "a large mirror suspended over a well of no great depth; anyone going down the well can hear every word spoken on our Earth; and if he looks at the mirror, he sees every city and nation as plainly as though he were standing close above each." After various adventures, the voyagers eventually returned to Earth.<sup>11</sup>

Lucian's stories are more than mere fanciful tales. In them, Lucian ridiculed humanity, its tired old philosophies and pagan beliefs, and the emptiness of the intellectual life of the time - all themes that we find repeatedly in space fiction.

Though written as theological works, St. Augustine's *De Civitate Dei* in the 5th Century,<sup>12</sup> and Joachim of Flora (or Fiore)'s *Liber Concordiae Novi ac Veteris Testamenti* and *Expositio in Apocalipsim* in the early 13th Century, each exhibited futures-oriented utopian thinking.<sup>13</sup>

The great Muslim scholar, Ibn Kahldun, wrote in the 14<sup>th</sup> Century. He is considered one of the fathers of sociology, presenting a sophisticated philosophy of history and society in his *Muqaddimah* -- again, not a work of fantasy or fiction, but rather exhibiting, perhaps for the first time, a way of thinking about humans and their past and future that greatly influenced the emergence of modern attitudes towards social change, and hence, modern science fiction.<sup>14</sup>

Another contribution to modern ways of thinking was indeed the emergence of utopian literature that actually goes back at least to Plato's *Republic*<sup>15</sup> and was also exhibited in Joachim of Fiore's writing and flourished in Europe from the 17th through 19<sup>th</sup> centuries. *Utopia* is a Greek word that literally means "no place". A *utopia* is a perfect society by some understanding of perfection. A contrasting term is *dystopia* -- a largely negative and undesirable place of some kind or another. There is a third term, *eutopia*, which means a good (but not perfect) place -- what I call "the best possible real world given the challenges and opportunities of the future" -- in other words, "a preferred future".

Unfortunately, as we will see, a great deal of current science and space fiction is dystopian. Little is either utopian or eutopian. This is of concern since images of the future are

major components in shaping the eventual future itself. Many people see the future as grim because of the way it is portrayed in modern science fiction. They therefore may avoid thinking more usefully about the future and how they can shape it -- and so the future may be grimmer than it needs to be. On the other hand, utopian thinking is equally dangerous, historically often leading to totalitarianism if taken and acted on too seriously. We need eutopias!

Early modern European society saw an outburst of utopian literature. Thomas More's *Utopia* (1516)<sup>16</sup> described his view of a perfect society: a democratic yet paternalistic agrarian community set on an island, impregnable to foreign attack. In this communal state, people alternated between living in cities and farms. Food was abundant. Diversity of religious belief was permitted, gold and silver were despised and used for chamber pots, and all people wore the same coarse clothing, symbolizing their equality.

Francis Bacon's *New Atlantis* (1627)<sup>17</sup> is more nearly a true work of utopian science fiction since he imagined a perfect society based specifically on the application of the scientific method to everything, including government and family life -- an idea replicated by many people subsequently, most powerfully by the behavioral psychologist, B. F. Skinner, in *Walden Two* (1948).<sup>18</sup>

Though not a utopia, Johannes Kepler's *Somnium* ("A Dream" 1634)<sup>19</sup> is clearly a work of space fiction, describing a person who was transported to the Moon by demons where he discovered that each half of the Moon is inhabited by two different kinds of beings. Interestingly, Kepler's book, though written in Latin, was published the same year that Lucian's ancient *True History* first appeared in English translation. Once new ideas began to appear in languages understood by relatively unlearned people; they could spread and provoke social change more widely and rapidly.

Francis Godwin's *The Man in the Moone* (1638)<sup>20</sup> combines both genres. Birds carried a shipwrecked Spaniard, Domingo Gonsales, to the Moon where he found a simple utopian world with no waste of any kind. Food grew without labor, and clothing and housing were provided virtually without work. All women were extraordinarily beautiful and yet no man desired any woman but his wife -- truly a utopia. There was no crime. Occasionally, imperfect children were born, but they were shipped off to America.

Shortly thereafter, Cyrano de Bergerac wrote two classic space travel stories *Histoires comique des etats et empires de la lune* (1648) and *Histoires comique des etats et empires du soleil* (1662)... (Voyages to the Moon and Sun) After failing to be lifted to the Moon by evaporating dew (though he did make it to Canada) Cyrano used firecrackers and eventually landed on the Moon on the Tree of Knowledge where he met and talked with early biblical characters.<sup>21</sup>

Bernard le Bovier de Fontenelle's *Entretiens sur la Pluralité des Mondes* (Conversations on the Plurality of Worlds, 1686) was written -- in French, not Latin -- as a fictional conversation between two people walking in a garden late at night and looking at the stars.<sup>22</sup> It was a daring conscious defense of the Copernican worldview and speculated about the possibilities of extra-terrestrial life and intelligence. It did so as a work of fiction in order to avoid censure by the Church. It is worth noting also that Kepler had written *Somnium* as fiction for the same reason. These are two of many examples of science fiction used to express unpopular or forbidden views with relative safety.

Somewhat later, classic satires and critiques of contemporary society, safely told in the form of miraculous voyages, appeared, such as Jonathan Swift's *Gulliver's Travels* (1726)<sup>23</sup>, Ludvig Holberg's *Nicolai Klimii Iter Subterraneum* (Nicolai Limmi's Underground Journey, 1741)<sup>24</sup>, and Voltaire's *Micromegas* (1752).<sup>25</sup>

*Micromegas* was influenced by Swift and featured huge intelligent creatures from Sirius who were on a tour of the solar system. They walked around Earth in 36 hours, at first thinking whales were the dominant intelligence, and only later finally spotting the tiny humans. They encountered philosophers arguing about unimportant things and left in disgust, giving them a book of philosophy they thought humans might be able to understand -- since it had only blank pages: yet another common theme in space literature -- humans focus on unimportant and petty issues while great world-changing events swirl around them.

In 1781 a story describing a newly-discovered part of the Earth where free love is allowed was published: *La decouverte australe par un homme volant, ou le Dedale francais*, (Southern Discovery by a Flying Man, or the French Daedalus) by Nicolas Restif de la Bretonne. This is sometimes said to be the first space pornography, a genre, though extensive, we will not otherwise consider.<sup>26</sup>

#### **2.1.4. Balancing "Science" and "Fiction"**

There have been many definitions of "science fiction." Science fiction is seldom fiction about science. Rather, it is stories that arise when some people become aware of the fact and possibility of social change. Most societies are, or at least seem to their members to be, fixed and unchanging. In the past, a few societies went through sufficiently extended periods of social change that some people living in them realized that the present was different from the past, and that the future could be different from the present in important and uncertain ways. They would then speculate what a different future might be like. These stories are important precursors to science fiction and tell important stories in their own right. But science fiction, *per se*, is a product of the scientific, technological, and industrial revolution that was made possible in Europe with the Black Plague, the Reformation, and the Renaissance between the 14<sup>th</sup> and 17<sup>th</sup> Centuries, and then bloomed during the late 18<sup>th</sup>, 19<sup>th</sup> and 20<sup>th</sup> Centuries. Science fiction proper emerged in the mid 19<sup>th</sup> Century first in Europe, then in the UK, then in the US, Japan, China, India (and perhaps elsewhere) simultaneously later as the social and environmental consequences of the scientific, technological and industrial revolution spread.<sup>27</sup>

*Fiction* is stories about imaginary worlds and people. A work of fiction does not intend to be "true" (though it may deal in truths). Humans have invented, lived in, and believed in imaginary worlds at least since they learned to speak, perhaps 40,000 years ago. Indeed, the world constructed by each language is an artificial world -- though an extremely powerful one!

In contrast, *science* intends to tell the "truth" about the world and people; truths that others, using the same evidence and methods, can confirm or deny. However, few final and absolute truths are ever declared scientifically. Science is constantly revising old ideas and establishing new bases for thought and useful action. Moreover, science is not new. Science is also as old as speech and focused thought, but it was the invention of writing that made science more powerful by enabling ideas to be decontextualized, analyzed, and categorized more carefully than is possible only with speech.

Among many others, the Sri Lankan scientist and futurist, Susantha Goonatilake, has made it clear that what is called "science" now is not something invented in Europe in recent centuries.<sup>28</sup> Rather, European scholars adopted and refined theories and methods that had been honed over long periods of time previously, primarily but not exclusively in Asia and northern Africa. European scholars also used or invented instruments that enabled them to discover things otherwise unknowable to humans. Goonatilake argues convincingly that there have always been scientists, and scientific ways of knowing, who have contested against commonsense, folk knowledge and religion, and that present-day science is simply the latest evolutionary manifestation in a continuing contest between different ways of knowing and acting.

Most science fiction is more about technology than it is about science. Most science fiction is about how humans might behave and how society might change if/as new technologies come along. Often the "science" in science fiction is quite unscientific while the behavior said to result from new technologies is sometimes more plausible. But much science fiction is bad social science as well as bad natural science -- and not very good fiction either. Science fiction and space fiction thus exhibit a tension between two modes of knowing -- one scientific, the other fictional. Some science fiction is closer to science than to fiction, and thus often boring though factual. Most science fiction is closer to fiction than to science, thus exciting, but misleading. The best science fiction finds a balance between both.

The literature of science fiction and space fiction dealing with new technologies and technological change has generally been of one of two kinds. Jules Verne and many others were basically optimists, believing in inevitable progress through technological change. This optimistic view of the future permeated much early science fiction and space fiction. Some science fiction writers and futurists still share this view today. But, from the beginning, other science fiction writers had more of a love-hate relation with technology and often wrote of that relationship critically and ironically. One of the leading examples of this ironic -- if not pessimistic -- school was Alfred Jarry, a French author who invented the term '*pataphysics*, "the science of imaginary solutions" (*la 'pataphysique ou science des solutions imaginaries*). It has been said that "pataphysics is to metaphysics what metaphysics is to physics." Jarry is also considered to be a forerunner of the "Theater of the Absurd."<sup>29</sup> The 'pataphysic tradition remains strong today in old as well as in various new forms, as we will see.

### 2.1.5. Space and Science Fiction in Europe

Without a doubt, the most important single figure in the origins of science fiction and space fiction is the French author, Jules Verne. His books, *Voyage au centre de la Terre* (Journey to the Center of the Earth, 1864) and *De la terre à la lune* (From the Earth to Moon, 1865) and many more, were translated into every major language of the world.<sup>30</sup> During his lifetime Verne was perhaps the most widely read author in the world, and his books are still popular. Almost all early pioneers in space reality and space fiction said that they were inspired by Verne.

The importance of space fiction in creating space reality -- and vice versa -- cannot be overstated.

The extraordinary pioneer of Russian space flight and modern science fiction, Konstantin Tsiolkovsky, said his enthusiasm for space came from reading Jules Verne. In addition to his vital role in envisioning and enabling actual space flight, Tsiolkovsky himself wrote classics of Russian science fiction including one that the world's first cosmonaut, Yuri Gagarin, said was his favorite: *Vne zemli* (*Beyond the Planet Earth*, 1896).<sup>31</sup> Alexei Tolstoy was inspired by Verne and Tsiolkovsky to write what became a Russian space fiction classic, *Aelita* (1922) about a trip to Mars.<sup>32</sup>

In Germany, Kurd Lasswitz said Verne's example encouraged him to write what became the very popular *Auf Zwei Planeten* (*Two Planets*, 1897) describing an advanced civilization on Mars. Having a background in mathematics and engineering, much of what Lasswitz described as techniques of space travel were accurate or at least reasonable.<sup>33</sup>

The Czech, Josef Capek, brother of Karel Capek, is credited with suggesting the term, "robot" (which means "forced labor" in Czech), to describe autonomous or semi-autonomous artificial life in Karel's book titled *R.U.R.* (1921). The abbreviations stand for *Rossumovi Univerzální Roboti* ("Rossum's Universal Robots").<sup>34</sup>

There was considerable science fiction produced in the Soviet Union -- and much anti-Soviet science fiction as well, such as *We* (1920) by the Russian émigré Yevgeny Zamiatin.<sup>35</sup>

Ivan Efremov's popular novel, *Tumannost Andromedy* ("The Andromeda Nebula," 1957), was Efremov's pro-Soviet answer to anti-utopian books by Zamyatin and others.<sup>36</sup> Efremov described in great detail an ideal Communist society engaged in the exploration of outer space where a network of civilizations exists. It was translated into many languages and was highly influential. In 1967 the first part of the novel was made into a film, *Tumannost Andromedy. Plenniki Zheleznoi Zvezdy* ("The Andromeda Nebula. Prisoners of the Iron Star"). The film was a popular success.<sup>37</sup>

Stanislaw Lem of Poland, who some critics consider to be one of the best science fiction writers of all time, published his masterpiece *Solaris* in 1961.<sup>38</sup> It features a planet covered by a mysterious ocean that scientists from Earth are exploring. However, it turns out that the ocean is also examining the scientists and is able to become whatever deep anxiety or feeling of guilt each one of the scientists has. *Solaris* was also made into an excellent, if slow-moving, film in 1972 by the Soviet director, Andrei Tarkovsky. It was also made into a very bad US movie in 2002.

Although the earliest science and space fiction originated in Europe, there were clear precursors in other countries. Science and space fiction *per se* emerged rapidly wherever industrialization and technologically induced social change spread in the world.

### 2.1.6. Space and Science Fiction in India<sup>39</sup>

The roots of science fiction in India are from 1500 BCE in the ancient Vedic literature. In these texts there are many descriptions of unidentified flying objects referred to as *vimanas*.<sup>40</sup> They were of two types: "manmade crafts that fly with the aid of birdlike wings, or odd shapes that fly in a mysterious manner and are not made by human beings". Yet, despite -- or maybe because of -- these early science fiction-like images, the influence of this genre on Indian literature and culture is very recent and slight. However, science fiction did emerge in India where, as one author says, "the effects of the industrial revolution were being felt in urban India in the 19th century just as keenly as they were in Europe and the U.S." The earliest notable Bengali space fiction was Jagadananda Roy's *Shukra Bhraman* ("Travels to Jupiter"), written in 1857 and published in 1879. This story is of particular interest as it described a journey to another planet, while the existence of the creatures seen there was explained using evolutionary concepts. It should be noted that this story was published well before H. G. Wells' *The War of the Worlds* (1898) in which Wells described an invasion from Mars. The father of Indian literary fiction in Hindi is often considered to be Acharya Caturasena (1891-1960). He wrote more than 400 books during his lifetime, of which most were novels based on historical events, mythology, or social issues. Three were science fiction novels: *Khagras* (The Eclipsed Moon), *Neelmani* (The Sapphire), and *Adbhut Manav* (The Amazing Man).

An extraordinary early work was *Sultana's Dream* (1905) by Rokeya Hosain. It is an intriguing example of a feminist utopia -- a world where women are socially and politically dominant over men, and where that dominance is seen as natural. It may have been the first utopian novel of any kind written in India.<sup>41</sup>

Even in Indian cinema, which churns out hundreds of movies a year, the influence of science fiction is slight. In 1987, Shekhar Kapur's *Mr. India* is a story of a young man who discovers his father's invisibility device and battles a madman's attempt to rule the world. Rakesh Roshan's *Koi Mil Gaya* ("I found someone") deals with the rise and ultimate demise of a mentally challenged man who befriends an alien being.<sup>42</sup>

### 2.1.7. Space and Science Fiction in China<sup>43</sup>

Wu Dingbo states that the "era of science nurtures scientific literature and art which, in turn, reflect the era of science. Science fiction as a modern genre that emerged after the



industrial revolution has developed along with the development of science." "Science fiction, however, is also a cultural phenomenon which has to develop in accordance with the specific conditions in a given nation."<sup>44</sup>

Chinese creation stories typically have themes involving space, the cosmos, and chaos, such as Pan Gu who separated the heavens from Earth and Nu Wa who patched up the falling heavens. Similar themes are found in the earliest Chinese literature, such as *Tian wen* (Questioning Heaven) by Qu Yuan (347-278 BCE) and *Hou Yi sheri* (Hou Yi Shooting the Suns) and *Chang E benyue* (Chang E Goes to the moon) by Lu An (197-122BCE). "Questioning Heaven" is a series of questions about the creation of the world and the nature of the Sun, Moon and stars. "Hou Yi Shooting the Suns" tells how Hou Yi shot down nine of the ten suns in the sky, thus saving the world from scorching, whereas the story of Chang E is about Hou Yi's wife who stole and drank an immortality elixir that enabled her to fly to and live on the Moon. Wu says that this is probably the world's earliest story about space travel. The first Chinese lunar orbiter, launched in October 2007, was named Chang'e-1.<sup>45</sup>

Zhang Zhan's story *Tanwen*, written in the 4<sup>th</sup> century, details the antics of a robot that sings and dances as well as any human. Wu says this is the world's first story about robots. They also appeared in Zhang Zhou's *Chao ye qian zai* (The Complete Records of the Court and the Commoners) in the seventh century, as well as in Shen Kou (1031-1095) *Meng zi bi tan* (Sketches and Notes by Dream Creek) that described a robot that killed rats.<sup>46</sup>

Nonetheless, Zhao states that, "prior to the concept of modernity being imported into China there had been no fiction about the future. In traditional China, history did not have directionality."<sup>47</sup> The introduction, first of ideas about "progress" and "development", and then of Marxism, changed that. The young intellectuals of the late 19<sup>th</sup> century in China sought to change their "backward" country into a modern nation-state. To do that -- they learned from Japan and the West -- science and technology was necessary. So "in order to stimulate people's interest in science and technology, some enlightened intellectuals discovered science fiction and began introducing this new literature to the Chinese reading public. Lu Xun (1881-1936) is one of them".<sup>48</sup> Lu is considered to be "the father of Chinese science fiction". In his preface to his 1903 translation of Jules Verne's novel *From the Earth to the Moon*, Lu lamented that, while China had every other kind of literature in the world, "science fiction is as rare as unicorn horns, which shows in a way the intellectual poverty of our time. In order to fill in the gap in the translation circles and encourage the Chinese people to make concerted efforts, it is imperative to start with science fiction."<sup>49</sup> Lu's translation of Verne's novel is posted on the official website devoted to the Chang'e-1 lunar orbiter.

It is usually said that modern Chinese science fiction began in 1904 with the serialization of *Yueqiu zhimindi xiaoshou* (Tales of Moon Colonization) in *Xiuxiang xiaoshuo* (Portrait Fiction).<sup>50</sup> It was written under the pseudonym Xu Nianci and the real author is unknown.

The mission of Chinese science fiction has always been to help people understand what science and technology is and to encourage them to help their country develop into a modern world power. Thus, as Wu points out "Chinese science fiction seldom tackles the subjects of space colonization, galactic empires, alternative histories, cataclysms, apocalyptic visions, telepathy, cybernetics, religion, sex, and taboos. On the whole, Chinese science fiction is optimistic. People always get the upper hand over nature, science, evil, or whatever enemy or obstacle they may face. The hero is supposed to succeed, emerging triumphant and unscathed from difficulties. Visions of the future are always bright and promising, although a spectrum of possibilities for that bright future is projected." "As a result, Chinese science fiction stories mostly depict the near, foreseeable future. In China, science fiction's main function is utilitarian rather than aesthetic. It aims to create interesting stories in a simple and effective prose and to teach moral lessons...."<sup>51</sup>

Currently, Chinese science fiction is attracting adult audiences as it brings a basic understanding of space to the Chinese people, developing in them once again a desire to explore the Universe. Traditionally, space (or the sky, in ancient terms) was an arena controlled by the emperor. With the emperors gone, space is becoming one more locale for exploitation and development by anyone.<sup>52</sup>

During a discussion of the role of ethics in science fiction, Han Song stated, “the unconscious descriptions of ethical problems in Chinese science fiction probably hint at a future reality in the country’s space program. The coming conflicts between China and other space giants might evolve from our ethical differences rather than our technological gaps” Understanding one another’s science fiction might lead to better relationships among all space programs, he concluded.<sup>53</sup>

### **2.1.8. Space and Science Fiction in Japan<sup>54</sup>**

We have seen that some Japanese folk tales were explicitly about creatures that came to the Earth from not-Earth, and eventually returned. In addition, at least one very well known story can be interpreted as depicting the hero, *Momotaro* (The Peach Boy), as coming to Earth in a spaceship that seemed to be a giant peach. While there appears to have been no early utopian literature in Japan, Pure Land (*Jodo*) Buddhism urges humans to strive for life in a Pure Land that is something between a distant heaven in another dimension and a perfect society at a later time and place on Earth. The appeal of a Pure Land was very powerful during the medieval period of "The Warring States".

The first western utopian work was translated into Japanese in 1868, the year marking the "opening" of Japan following the end of feudalism and the 300-year long isolation of the Tokugawa era. It was *Anno 2056* (1865) by the Dutch author, Alexander Bickers. More's *Utopia* was translated in 1882. Translations of Verne and other early utopian and science fiction writers were extremely popular in Japan from the 1880s onward, with about forty translations of various works appearing during the Meiji era (1868-1912). These translations inspired a number of local writers, including Tetsuo Suehiro whose *Setchubai* (Pure Blossoms in the Snow, 1885) described a very prosperous, modern and internationally powerful Japan in 2040, while his *23-nen Mirai* (The Future of the Year 23 [1890], 1886) elaborates the same theme.<sup>55</sup> Nakae Chomin's *Sansuijin Keiron Mondo* (A Discourse by Three Drunkards on Government, 1888) argued the merits of democracy over traditional *samurai* values, illustrating once again that unpopular ideas are often expressed in the form of satire or a utopia.

There was in Japan an explosion of science and space fiction after the Second World War. Many of the stories exhibit profound uncertainty as to the morality of humans venturing in space. Concern is often expressed about the destruction of nonhuman life by humans during exploration rather of the loss of human life itself. Indeed a major point of many of the stories is that humans should not place themselves above other forms of life, on Earth or elsewhere, but should learn to live in respectful harmony with everything. In these, and in almost all other Japanese space fiction stories of this era, the emphasis is on harmony, peace, environmental protection, concern about science gone wild, and about maintaining good interpersonal relations.

Robert Matthew, in a review of Japanese science fiction, reminds us of a very important difference between Asian and western philosophy, religion, and fiction. Asian cultures generally maintain that humans are basically good, and can be made to act better by proper education and environmental reinforcements. By the same token, humans can be led to do bad things by circumstance or personal choice, but they are not fundamentally evil, *per se*. In contrast, people living in cultures steeped in the Jewish/Christian/Islamic heritage often believe that humans are basically sinful and greedy, and can never be made good. Repressive

social institutions might control or even channel humans' evil behavior into social good, but in their hearts, humans only care about themselves. Matthew thus contrasts "the Christian concept of original sin versus the Confucian concept of original virtue" as distinctive features underlying the fiction -- and policies -- of these two traditions.<sup>56</sup>

More will be said about contemporary science fiction in Japan when we discuss the emergence of cyberpunk, *anime* and computer games later.<sup>57</sup>

### **2.1.9. Space and Science Fiction in the UK, North America, and Oceania**

Science and space fiction written in English in the UK, North America, New Zealand and Australia is literally too numerous to summarize or even categorize fairly in this brief review, but H. G. Wells is to English science and space fiction what Jules Verne was to European -- and the world's -- science fiction. Among Wells' best-known stories are *The Time Machine* (1895), *The War of the Worlds* (1898), and *The First Men in the Moon* (1901).<sup>58</sup>

In the United States, science and space fiction's heyday is found in the "pulp" magazine, *Amazing Stories*, that began publication in 1926, and *Astounding Stories* that went through many name changes, ending up as *Analog* today. Many other pulp magazines devoted to science and space fiction existed from the 1930s to 50s, and almost all the great and not so great names of science fiction history published in them, defining the genre from that point onward.<sup>59</sup> Some of the most important contributors include Arthur C. Clarke, Robert Heinlein, Issac Asimov, Frederik Pohl, A. E. Van Vogt, Poul Anderson, Larry Niven, Kim Stanley Robinson, Pamela Sargent and others whose work typically (but not always) celebrates scientific and technological achievements and progress though still often asking probing questions about humans and human purpose.

These authors contrast strongly with the powerful dystopian novels of the same period that may have had an even greater impact on thinking about the futures and space.<sup>60</sup> This was also the period of the Cold War rivalry between "Communism" and "Capitalism". As we noted above concerning space fiction in the Soviet Union, much space fiction in the United States was scarcely veiled propaganda.<sup>61</sup>

### **2.1.10. Space Fiction in Films and Television**

Movies, and later, television, have almost always featured some kind of "space opera", from *Le Voyage dans la Lune*, ("A Trip to the Moon" 1902) through *Buck Rogers* and *Flash Gordon* in the 1930s and 40s, *Tetsuwan Atomu* after the Second World War, and many others onward. Even though most of these films were "B" grade movies at best, they and the pulp science fiction books of the era created themes that defined and have persisted in almost all space fiction everywhere in the world.

Stanley Kubrick's co-production with Arthur C. Clarke of *2001: A Space Odyssey* (1968), brought space fiction in films to a high level, while Roger Vadim's adaptation of the French comic strip character, *Barbarella* (1968), was a magnificent high camp film in the 'pataphysics mode. There is no more striking contrast in space films than between *2001*'s cold, barren, functional space ship (with the onboard intelligent computer, HAL, and the human Dave locked in a gripping though slowly-realized battle of wits to the death) and the nubile and naked Jane Fonda slithering across her fur-lined space ship. *Silent Running* (1971) was a superbly poignant movie featuring heart-tugging robots loyally tending the last remaining "world heritage" stock of plants and animals sent to space from an Earth rapidly approaching terminal over-pollution from human arrogance and neglect.

Dystopian movies of this period include *Metropolis* (1927), *A Clockwork Orange* (1971), *Soylent Green* (1973), *Mad Max* (1979), *Mad Max II: The Road Warrior* (1982), and *Brazil* (1985).

On television, the quirky British space fiction show, *Dr. Who* (1963 onward), which was itself inspired by the earlier very popular *Quatermass* series of the 1950s, influenced many viewers' ideas about space. But for Americans, good space fiction on television began with the extremely popular TV series *Star Trek* in 1966, which dealt with current social, political, and ethical issues in the guise of exploring the Universe. After the blockbuster movie, *Star Wars* in 1977 (and its successors), space fiction on television for some time was dominated by triumphal voyages of ISU-like international, intercultural, and interdisciplinary members of a united Earth federation boldly exploring the cosmos, doing good (or at least not doing evil while trying to obey "the prime directive" of not interfering in the lives of other cultures). These were magnificently written and produced shows that made you feel good after watching each episode, and sad and empty when the series ended. But new and better productions seemed to spew forth annually: *Star Trek: The Next Generation*, *Babylon 5*, and a new *Battlestar Galactica* series.

### **2.1.11. Cyberpunk, Anime, and Electronic Games**

One of the most important developments in recent science fiction has been the emergence of cyberpunk literature spearheaded by William Gibson's *Neuromancer* (1984).<sup>62</sup> It was inspired by contemporary and emerging developments in electronic communication technologies, biotechnology, and nanotechnology, combined with deep anxiety about the environmental and social consequences of these and other developments. Cyberpunk treats science and technology critically and ironically, and is more in keeping with the European 'pataphysics tradition than with much American science fiction which often is either triumphant, scientific and optimistic, or gloomily pessimistic and dystopian. Two excellent, though lamentably short-running, television cyberpunk series were the British-inspired *Max Headroom* (1987-88) and *Dark Angel* (2000-2002).

Recent films that exhibit cyberpunk perspectives include *BladeRunner* (1982; derived from Philip Dick's *Do Androids Dream of Electronic Sheep?*), *Johnny Mnemonic* (1995), and *The Matrix* (1999).

A rather Gothic style of cyberpunk pervades most interactive electronic games, a form of science and space fiction that may rapidly be replacing not only written literature but also cinema and television.<sup>63</sup>

Contemporary Japanese science fiction, especially in its *anime* and *manga* forms, is heavily cyberpunkish. Its origins lie in Japanese *ukiyo-e* woodblock prints of the Edo era (17th to 18<sup>th</sup> Centuries) that eventually blossomed into *Tetsuwan Atomu* (mistranslated as *Astro Boy* in English), originally a *manga* in 1951, that soon became one of the earliest examples of what would become a flood of Japanese science fiction *anime*, while the world famous *Godzilla*, a 1954 film of a monster dinosaur mistakenly brought back to life by radioactive waste, has resulted in more than thirty *Godzilla*-based films.

### **2.1.12. Space Fiction and the Alien Other**

We have seen that space fiction is often used as a safe way to criticize contemporary society. That is especially apparent in recent work done by feminist, gay, and ethnic studies scholars who often also adopt a postmodern academic approach. Some of the best space fiction, and certainly best scholarship on space fiction, is of this kind. It also deserves more consideration than we are able to give it here.<sup>64</sup>

## **2.2. Space Poetry**

So far, we have concentrated entirely on space stories in print and in the contemporary media of film, television and electronic games. But space has also inspired many works of poetry, drawing, painting, sculpture, music, and dance.

### 2.2.1. Poetry About Space<sup>65</sup>

There are countless poems and stories that humans have told upon looking up at the dark sky at night, such as this poem, *Drinking Alone Under the Moon* (月下獨酌), by the Chinese poet, Li Po (701-762), one of scores he wrote on this theme:

I take my wine jug out among the flowers / to drink alone, without friends. / I raise my cup to entice the moon. / That, and my shadow, makes us three. / But the moon doesn't drink, / and my shadow silently follows. / I will travel with moon and shadow, / happy to the end of spring. / When I sing, the moon dances. / When I dance, my shadow dances, too. / We share life's joys when sober. / Drunk, each goes a separate way. / Constant friends, although we wander, / we'll meet again in the Milky Way.<sup>66</sup>

I earlier stated that space fiction, as a branch of science fiction, emerged along with early modern thought, technology, and industry in Europe from the 16<sup>th</sup> Century onward, and spread globally with modernity. All other space art follows a similar trajectory for the same reasons. As scientific ways of thinking were beginning to challenge earlier cultural modes, art in all its forms was also influenced by the new ideas, technologies, and discoveries. The following illustrate this in western poetry.

William Drummond wrote *The Shadow of the Judgment* at a time (1630) when the discovery of new stars was viewed as an omen of the end of the world, since (according to the philosophical and religious thought of the time) the heavens should be fixed and unchanging:

... They which dream / An everlastingness in world's vast frame, / Think well some region where they dwell may wrack, / But that the whole nor time nor force can shake; / Yet, frantic, muse to see heaven's stately lights, / Like drunkards, wayless reel amidst their heights.<sup>67</sup>

The telescope also led to much speculation about life elsewhere in the Universe -- and the insignificance of the petty squabbles of humans on Earth in comparison:

But if that infinite Suns we shall admit, / Then infinite worlds follow in reason right, / For every Sun with Planets must be fit, / And have some mark for his farre-shining shafts to hit...[From *Democritus Platonissans, or an Essay Upon the Infinity of Worlds* by Henry More (1647)].<sup>68</sup>

All these illustrious worlds, and many more, / Which by the tube astronomers explore: / And millions which the glass can ne'er descry, / Lost in the wilds of vast immensity; / Are suns, are centres, whose superior sway / Planets of various magnitudes obey.... / We may pronounce each orb sustains a race / Of living things adapted to the place. / How many roll in ether, which the eye / Could n'er, till aided by the glass, descry; / And which no commerce with the Earth maintain! / Are all these glorious empires made in vain?<sup>69</sup>

One of America's greatest poets was Walt Whitman. Many passages from his then-revolutionary book of poetry, *Leaves of Grass* (1900), are about voyaging on Earth and space:

On the beach at night alone, / As the old mother sways her to and fro singing her husky song, / As I watch the bright stars shining, I think a thought of the clef of the universes and of the future. / A vast similitude interlocks all / All spheres, grown,

ungrown, small, large, suns, moons, planets, / All distances of place however wide, / All distances of time, all inanimate forms, / All souls, all living bodies though they be ever so different, or in different worlds, / All gaseous, watery, vegetable, mineral processes, the fishes and the brutes, / All nations, colors, barbarisms, civilizations, languages, / All identities that have existed or may exist on this globe, or any globe. / All lives and deaths, all of the past, present, future, / This vast similitude spans them, and always has spann'd / And shall forever span them and compactly hold and enclose them.<sup>70</sup>

By the 20<sup>th</sup> Century also, Einstein, Heisenberg, Schrodinger, Planck and others in physics and Eddington, Wheeler, Bell, Penrose and others in astronomy were putting the earlier physics of Newton and the astronomy of Brahe, Galileo *et al.* into a different light. We now understand them -- and so many before them -- to be pioneers who led humanity to its present understanding which they themselves did not have or anticipate. Alfred Noyes (1922) expresses this very well in one of the most elegant space/astronomy poems ever written:

...Then Tycho showed his tables of the stars, / Seven hundred stars, each noted in its place / With exquisite precision, the result / Of watching heaven for five-and-twenty years... / "In the time to come," / Said Tycho Brahe, "perhaps a hundred years, / Perhaps a thousand, when our own poor names / Are quite forgotten, and our kingdoms dust, / On one sure certain day, the torch-bearers / Will, at some point of contact, see a light / Moving upon this chaos. Though our eyes / Be shut forever in an iron sleep, / Their eyes shall see the kingdom of the law, / Our undiscovered cosmos. They shall see it, -- / A new creation rising from the deep, / Beautiful, whole.

We are like men that hear / Disjointed notes of some supernal choir. / Year after year, we patiently record / All we can gather. In that far-off time, / A people that we have not known shall hear them, / Moving like music to a single end."<sup>71</sup>

But in the mid 20<sup>th</sup> century, the British-American poet, T. S. Eliot (1942) (also radical in style for the time but conservative in sentiment) put all such boastful human pretensions into humbling perspective:

We shall not cease from exploration / And the end of all our exploring / Will be to arrive where we started / And to know the place for the first time.<sup>72</sup>

### 2.2.2. Space Poetry After Sputnik

All of the poems so far were written before Sputnik, Yuri Gagarin, and Neil Armstrong. The authors had neither themselves gone into space, save on spaceship Earth, nor had seen any direct evidence of what not-Earth is like. While there has been no great space poetry subsequently, there has been some pretty-good poetry inspired by the early days of the space age -- and precious little since.

But as with science and space fiction, so also with space poetry, the contemporary mood is problematic and questioning, and not grand and heroic. Robinson Jeffers, a major 20<sup>th</sup> century American poet, is not alone in writing majestic poetry glorifying nature while roundly condemning humanity. In *Orca* he calls humans "a botched experiment that has run wild and ought to be stopped." In his poem *Love-Children* he observed "I'm never sorry to think that here's a planet/Will go on like this glen, perfectly whole and content, after mankind is scummed from the kettle. /No ghost will walk under the latter starlight."<sup>73</sup>

The poets and scientists mentioned so far were men. Few of the poets were scientists, and few scientists were poets (though there were some spectacular exceptions). One of the most outstanding contemporary astronomers who is also highly sensitive to the poetic aspect of her

work is Dame Jocelyn Bell Burnell. In her essay on "Astronomy and Poetry" in *Contemporary poetry and contemporary science*, she describes the tremendous reaction she received when she first began introducing poetry into her lectures -- especially the positive reaction by women in the audience.<sup>74</sup>

Gwyneth Lewis is from Wales. Her cousin, Joe Tanner, was an astronaut on the Hubble Repair Mission, STS-82. She wrote several poems to and about him, heavy with irony:

Last suppers, I fancy, are always wide-screen. / I see this one in snapshot, your  
brothers are rhymes / with you and each other. John has a shiner / from surfing.  
Already we've started counting time / backwards to zero. The Shuttle processed / out  
like an idol to its pagan pad. / It stands by its scaffold, being tended and blessed / by  
priestly technicians. You refuse to feel sad, / can't wait for your coming wedding with  
speed / out into weightlessness. We watch you dress / in your orange space suit, a  
Hindu bride, / with wires like henna for your loveliness. / You carry your helmet like a  
severed head. / We think of you as already dead.<sup>75</sup>

### 2.2.3. But Is Any of This Really Space Poetry?

None of the poets cited so far has actually been in space (except on Earth!) and so they are all writing from imagination and from the images of others, not from their own direct experience. But there have been poems written by astronauts and cosmonauts.

During the nearly 67 hours his fellow astronauts Scott and Irwin were on the Moon during the Apollo 15 mission, Al Worden was in complete solitude, floating in space. He said the overwhelming experience of being alone in the Universe gave him a profound feeling of rejuvenation. In 1974 Worden wrote a book of poems entitled, *Hello Earth: Greetings from Endeavor*. As for so many others, Worden's experience in space changed his view of reality on Earth:

Quietly, like a night bird, floating, soaring, wingless / We glide from shore to shore,  
curving and falling / but not quite touching; / Earth: a distant memory seen in an instant  
of repose, / crescent shaped, ethereal, beautiful, / I wonder which part is home, but I  
know it doesn't matter . . . / the bond is there in my mind and memory; / Earth: a small,  
bubbly balloon hanging delicately / in the nothingness of space.<sup>76</sup>

Another American Astronaut, Story Musgrave, has written a great deal of poetry based on his own experiences. Musgrave first flew on STS-6, 1983. He was also on STS-51F/Spacelab-2 in July 1985, and the first Hubble Space Telescope repair mission, STS-61. His last mission was on STS-80 in 1996. He is exceptionally well educated with degrees in mathematics, business administration, chemistry and biophysics, and a doctor of medicine. Finally coming to his senses, his last degree was a master of arts in literature:

Floating in a spaceship,  
Falling through my heaven,  
Through epic altitudes,  
And higher latitudes  
Falling into sleep,  
Drifting into dreams,  
Cosmic crashes in my eye,  
Cosmic flashes in my brain  
Cosmic rays and Wilson clouds,  
Clear my consciousness.

Memories of infinity,  
Particles of eternity  
Starlettes pierce my eyes,  
In my brain fire flies.  
Periods of light,  
Punctuate my night.  
*Cosmic Fireflies*<sup>77</sup>

#### 2.2.4. Space *Tanka* and *Renshi*

Japan was the first country to bring poetry officially into its space program. Japanese astronaut Chiaki Mukai (STS-95) began a *tanka* while she was in space on the shuttle. Thousands of Japanese on Earth completed it.<sup>78</sup> A *tanka* is a poem that is made up of five lines with a specific number of syllables in each line. It is customary for one person to start the first three lines of a *tanka*, and then for someone else to complete it.

The first three lines that Mukai said in Japanese, with the last two lines left for anyone to complete, are (in roman letters):

(5 syllables) *Chuugaeri*,  
(7 syllables) *Nandemo dekiru*,  
(5 syllables) *Mujuuryoku*

In English translation of the same number of syllables per line, this becomes:

(5 syllables) *Turn space somersaults*  
(7 syllables) *Do as many as you want*  
(5 syllables) *That is weightlessness*  
(7 syllables) -- .....  
(7 syllables) -- .....

Here are two *tanka* among those completed by participants of the summer program of the International Space University, in Thailand, 1999, from the sublime to the realistic:

Turn space somersaults / Do as many as you want / That is weightlessness / Moon is  
where we can make love / Long cold night but love is warm (by Jim Burke)

Turn space somersaults / Do as many as you want / That is weightlessness / Hard to  
know which way is up / I vomit copiously (by Christopher Connor)

Chain poetry (*renshi*) is another form developed from traditional Japanese linked verse (*renga* and *renku*) and popularized by the poet Makoto Ooka. Many people contribute to a *renshi*. Someone starts by writing a short verse. The next person repeats a word or phrase from the first poem and writes her own verse, while the next person picks up another phrase from the first or second poem, and so on, endlessly. *Renshi* are not of any fixed number of syllables.

JAXA sponsored a *renshi* project from 2006, and the resulting poem was recorded on DVD and sent to the International Space Station in the Japanese Experimental Module *Kibo* ("Hope"). Here are the first and some following verses of that *renshi*:

We children of the stars / children of space / born in the oceans and matured on land /  
have the history of the universe / its hundreds of billions of years / etched on our  
bodies / Look! Today too somewhere a tiny light (by Naoko Yamazaki)



The address is not a village nor a city nor a county / not even a country / The address is this planet  
/ and the Milky Way Galaxy / Led on by light / sped along by an energy that lurks in the dark (by Shuntarou Tanikawa)<sup>79</sup>

JAXA has expanded its original *renshi* program by involving people from around the world and expects to continue the program indefinitely.<sup>80</sup>

### 2.3. Space Illustrations and Art

*We went to the Moon as technicians; we returned as humanitarians.* — Edgar Mitchell, Astronaut

*When man conquers space it will not be with rockets, sputniks or spaceships, for in that case, we will remain tourists in space. Instead it will be by inhabiting it with sensitivity, that is, not merely by being in it but by imbuing ourselves with it through our solidarity with life itself, as represented by that space where the tranquil and formidable force of pure imagination reigns.* -- Yves Klein, in Ottinger, p. 284

Let's distinguish between "illustrations" and "art". "Illustrations" are meant either to depict some understanding of something, or to accompany and make visual a textual, mathematical, or verbal statement. In contrast, "art" is a visual expression, perhaps inspired by or drawn from some aspect or experience, that is evocative of the artist's own subjective perspective. "Art" is not intended to be a literal, "objective" rendering of something.

Of course, all illustrations in fact are subjectively rendered by some artist, and (when illustrating fictional texts, for example) may be purposely imaginative and not "factual". Moreover, some illustrations become "works of art" on their own, usually when they are separated from their original place and meaning, and given value in and of themselves. But when visuals are meant to be as "true" as technically and epistemologically possible to the thing being depicted, then I believe they should be called "illustrations", whereas when they are meant to be expressions of the artist's feelings in interaction with something, I prefer to call it "art". I will use those distinctions here.

Thus, most of what is called "space art" is in fact illustrations, while "art" -- on any subject -- is a relatively new thing. Art emerged with modernity, which values both individual subjective experience and the commodification of "art objects".

#### 2.3.1. In the Beginning

Humans have made pictures of what we see in the night sky for tens of thousands of years. We have also made pictures of what we imagine to be above us but cannot actually see. Fundamental beliefs about humans and not-humans, and about Earth and not-Earth are illustrated in both such pictures.

For most of *homo sapiens*, *sapiens* time on Earth, we have been nomadic hunters and gatherers. Fewer in number and physically weaker than many other creatures around us, we seem typically to have lived in conditions of environmental abundance called "subsistence affluence".<sup>81</sup> With the evolution of the ability to speak and the invention of language, possibly 40,000 years ago, humans were able to think about and organize ourselves and our environment in ways never before possible. As a consequence, we rapidly grew in numbers and in the impact we made on the Earth.<sup>82</sup>

Eventually it became necessary for some humans to settle down and farm. Land and property became important. Later, urban settlements, built on an agrarian base, arose.

Especially with the invention of writing, probably less than 10,000 years ago, some people in the urban centers began to record events around them, noting the cyclical regularities of nature, and eventually how these cycles corresponded to the apparent movements of the Sun, Moon and stars above them. Ideas about how and why these coincidences occurred were recorded and transmitted from generation to generation in ways which only writing made possible. Writing enabled the colonization of both space and time -- a process often called "civilization".<sup>83</sup>

There is little doubt that first-people worldwide made images of the sky and derived lessons for humans from them. But they left few examples of those images or, of those that do remain, what the images meant to them. Many early people also created huge structures out of stone or dirt that still remain. They may have had astronomical or astrological meaning at the time -- it is a plausible explanation for some structures -- but no one can be sure. Our interpretations of them may tell us more about our time and beliefs than about those of the people who constructed them.

Different cultures have seen and depicted different patterns in the stars and darkness of a night sky. What may look like a "Big Dipper" to a society that uses such an instrument (do *you* know what a "dipper" is?) might seem to be a plough, or a wagon, or a bear, or a salmon net, or a saucepan, or the Seven Great Sages, or merely the northern seven stars (北斗七星) to another.

I cited earlier the East Asian story about the separated lover-stars (in Japanese, *Orihime* and *Hikoboshi*, or, Vega and Altair). Vega is also the central star in the constellation known as Lyra from the Greek interpretation of the form as being that of a lyre (harp). But others see a vulture in the same group of stars, whereas the Boorong of Australia see the *Loan* bird -- a creation-being whose celestial behavior is used to instruct humans about proper parenting and gender roles, among other lessons. All cultures have their own way of "seeing" patterns in the sky and of interpreting them.<sup>84</sup>

The objects above us in the sky seem to move constantly, but often in some kind of a repeating pattern. Knowing what formation the stars take just before the seasons change is important information for any successful agricultural community. This might have been one of the earliest practical uses of astronomical information.

Clearly the apparent rising and setting of the Sun and Moon affected humans and the Earth. So also might the stars generally, it was often reasoned. Hence, in some cultures -- perhaps first in Mesopotamia -- there developed a method of predicting the future -- of entire societies as well as of individuals in them -- based on the movement of the stars, now known as astrology, but an important prelude to modern day astronomy as well.<sup>85</sup>

Eclipses of the Sun and Moon were especially perplexing since they seemed so out of the ordinary. Eventually careful observers and recorders of heavenly movements noted their regularity and began predicting them with great accuracy.

Comets, meteors and other "falling stars" played a special role in human history since they exhibit extraordinary astral behavior. In medieval and early modern Europe, and perhaps elsewhere, comets were typically seen as omens of bad things. Comets have been depicted in several surviving visualizations, such as the amazing *Bayeux Tapestry*, which includes Halley's Comet (or is it a space ship?) of 1066. Indeed Halley's Comet appears in several medieval paintings; most famously in the Florentine painter Giotto de Bondone's painting *Adoration of the Magi*. This shows the "Three Wise Men" kneeling in adoration of the Christ Child with the conventional Star of Bethlehem replaced by an astronomically correct illustration of Halley's Comet of 1301. The term "magi" derives from the Persian word *magoi*, meaning "astrologers" or simply men who study the stars.<sup>86</sup>

### 2.3.2. Modern Space Art and Illustrations<sup>87</sup>

With the invention and dissemination of the telescope, more accurate observation of not-Earth became possible. Its depiction often became more "accurate" as well from the 16<sup>th</sup> and especially 17<sup>th</sup> centuries onward, and particularly following the invention of chemical photography in the 19<sup>th</sup> century and electronic imaging in the 20<sup>th</sup> century.

Space illustrations, as a self-conscious genre, began at the same time as written space fiction, and much early illustrations were created to accompany and make visual ideas in written texts. Illustrations by Emile Bayard (1837-1891) and by Alphonse de Neuville (1835–1885) were found in Jules Verne's stories about travels to space. They may be the first illustrations that attempted to depict not-Earth according to scientific notions of the time. However, the "grandfather" of modern space illustrations was the Frenchman Lucien Rudaux (1874-1947), a professional astronomer who also wrote and illustrated books based on his observations. The International Association of Astronomical Artists created a space art "hall of fame" in 2000, named after Rudaux, with Rudaux as the first person to be so honored.<sup>88</sup>

Depictions of space environments, some intending to be factually while others were fantastically presented, flourished throughout the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, reaching their heights on the covers and sometimes pages of the pulp fiction magazines such as *Amazing Stories* and *Astounding Stories*. But it was probably the depictions in the large-sized popular picture magazines in the United States, such as *Life*, *Colliers* and *Coronet* in the 1950s and early 1960s, that really brought space illustrations to the eye of the public. They ignited popular support for space exploration as it became technologically possible for the first time.

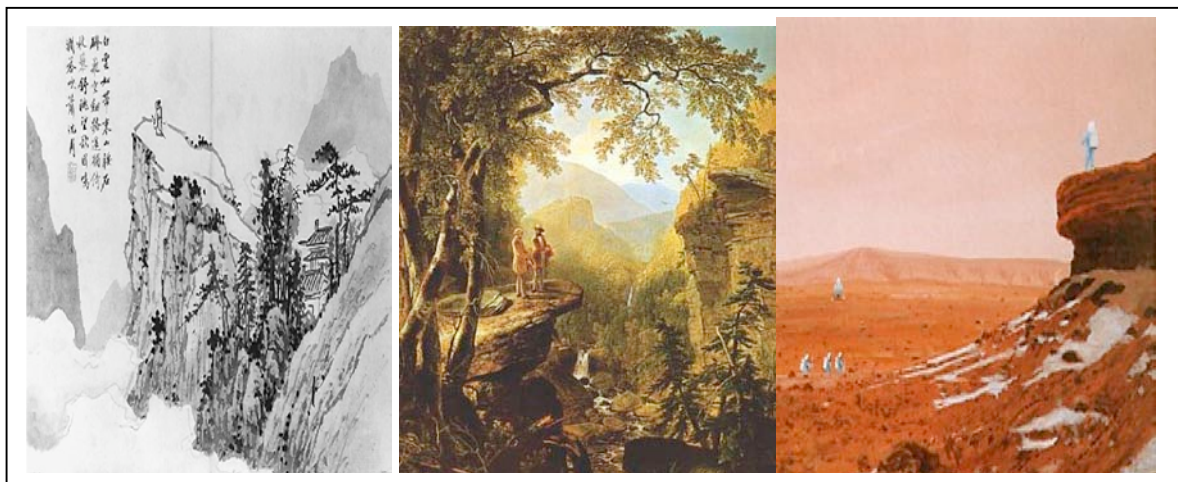
Some of the best-known images were done by the person who is most often called the "father of space art", Chesley Bonestell (1888-1986). He was an architect and a special-effects artist in Hollywood before World War II where he developed techniques he later used in his space illustrations. One of his best known paintings is of Saturn as imaginatively seen from one of its moons that appeared in *Life* magazine in 1944. He also worked with Willy Ley, Wernher von Braun and Arthur C. Clarke.<sup>89</sup>



**Figure 2.2. *Saturn as seen from Titan*, 1944 (by Chesley Bonestell, Oil on board, 16 X 20 inches, Published in *Life* Magazine, May 29, 1944. Reproduced courtesy of Private Collection).**

Bonestell, who was the second person to be inducted into the IAAA Hall of Fame, was influential in establishing a form of space illustrations that dominates the popular mind to this

day. His illustrations are heroic and grand in effect (see Figure 2.2), showing breathtaking imaginary vistas of or from planets, moons and other space objects, with human figures generally dwarfed by the immensity of the environment. This style of painting is very reminiscent of that of the Hudson River School that depicted the (rapidly vanishing) American wilderness in the middle 19<sup>th</sup> Century.<sup>90</sup> These were typically huge hyper-realistic romantic paintings rendered on wall-sized canvases that overwhelm the viewer with awe and longing. They are literally breath-taking, provoking a strong desire to enter the painting and "go" to the places so evocatively depicted. Both the Hudson River School and Bonestell's style of space paintings are similar to the *shanshui* (山水) style of scroll painting that was popular in Chinese (and later Korean and Japanese) art from the 10th century onward. This style still resonates with most naïve viewers as being stereotypically Chinese (or Japanese or Korean) art in which a lonely figure at the bottom of the painting is dwarfed by huge steep mountains, covered with jagged rocks and warped trees, wrapped in mist, and gouged by rapidly flowing water (see Figure 2.3).<sup>91</sup>



**Figure 2.3.**

**Left: *Poet on a Mountain Top*, 1496, by Shen Zhou, Album leaf mounted as a handscroll; ink and color on paper, 38.7 x 60.3 cm. (Credit: Nelson-Atkins Museum of Art, Kansas City, Missouri. Purchase: William Rockhill Nelson Trust, 46-51/2, Photograph by Robert Newcombe).**

**Center: *Kindred Spirits*, 1849, by Asher B. Durand, Oil on canvas, 44 x 36 inches, (Courtesy Crystal Bridges Museum of American Art, Bentonville, Arkansas).**

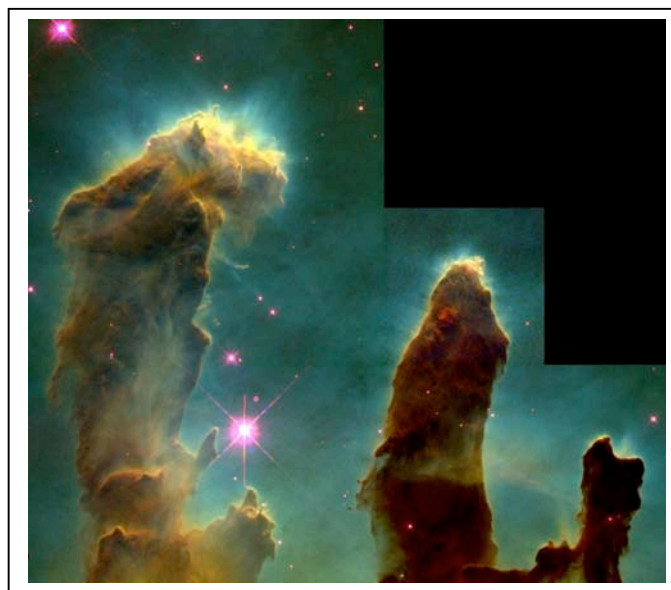
**Right: *Mars Exploration*, 1979, by William Hartman, Acrylic on rag board, 10 x 14 inches. (Used by permission of the artist, William K. Hartmann, Planetary Science Institute, Tucson, Arizona).**

At the same time, space illustration and art in Russia were developing, in part influenced by what was happening elsewhere, but perhaps more strongly influenced by the pioneering ideas of Fedorov and Tsiolkovsky.<sup>92</sup> Konstantin Tsiolkovsky was one of a handful of persons in the late 19<sup>th</sup> to early 20<sup>th</sup> centuries who envisioned and created what was technically necessary for space travel. But, unlike any of the others, he was inspired by a worldview that declared space exploration and settlement to be a necessary next step in human evolution. His teacher, Nikolai Fedorovic Fedorov, developed "the philosophy of the common task" that influenced many other Russian intellectuals including Dostoevsky and Tolstoy. Fedorov believed that everything in the Universe was alive. Only humanity had obtained the highest consciousness, and so it was our duty to introduce order and purpose into the chaos of nature.

Tsiolkovsky expressed this compellingly in his famous saying, "The planet is the cradle of intelligence, but it is impossible to live in the cradle for ever." Humans must grow up, leave their cradle, Earth, and expand through the solar system and out into the cosmos. Tsiolkovsky believed it was his life task to see that humans did so as soon as possible. Whatever else can be said to be the reasons why the Soviet Union was so powerfully motivated to develop a space program, the philosophy of Fedorov and the genius and work of Tsiolkovsky must be among the most compelling. No other space program can make a similar claim. That may be one reason many national space programs languish while that of Russia remains comparatively vigorous: theirs is inspired by a philosophy of cosmic dimensions while most of the others are based on economic, utilitarian, or nationalistic motivations. As a consequence, most Russian space art and illustrations, in comparison with that of Europeans and Americans, tends to be much more interpretive, subjective, and reflective -- philosophical.<sup>93</sup>

### 2.3.3. Astrophotography as Space Art

Astrophotographs -- photographs of the sky, or, more recently of space through telescopes -- are often treated as works of art. Indeed, as presented to the general public, astrophotographs, such as those taken using the Hubble Space Telescope (see Figure 2.4), must be viewed *primarily* as works of art since they are framed and color-enhanced for maximum aesthetic effect. Otherwise, most of the photographs would be too dull to attract much attention. Elizabeth Kessler observed that "the aesthetic choices made result in a sense of majesty and wonder about nature and how spectacular it can be, just as the paintings of the American West did. The Hubble images are part of the romantic landscape tradition. They fit that popular, familiar model of what the natural world should look like."<sup>94</sup>



**Figure 2.4. Pillars of Creation in a Star-Forming Region (1995). Photograph by Hubble Telescope [http://hubblesite.org/gallery/album/entire\\_collection/pr1995044a/](http://hubblesite.org/gallery/album/entire_collection/pr1995044a/). (Courtesy of NASA).**

Didier Ottinger makes the point more broadly: "Artists of the modern sublime often use scientific materials. Such a revelation occurs when an object transferred to a museum raises issues and evokes symbolic values. By displacing images from the observatory to the museum, the artists of the modern sublime identify the cosmos as a place that cannot be reduced to a useful function or a rational definition. In contrast to technical or political utilitarianism, there is space, as beautiful and useless as a work of art."<sup>95</sup>

#### 2.3.4. Art Taken into Space

Perhaps the first bit of consciously "art" in space was a small ceramic tile about the size of a postage stamp grandly titled, *Moon Museum*. It was carried on Apollo 12 (1969). American artists Robert Rauschenberg drew a straight line, Andy Warhol a penis, Claus Oldenberg sketched Mickey Mouse, and John Chamberlain, Forrest Myers and David Novros all drew geometric designs.<sup>96</sup> In 1971, a small figurine, titled *The Fallen Astronaut* (to commemorate all cosmonauts and astronauts who had died so far), by Belgian Artist Paul Van Hoeydonk was left on the Moon by Apollo 15 astronauts, while sculpture by Joseph McShane, titled *S.P.A.C.E.*, flew as *Payload G38* on the second mission of the Challenger (1984). Lowry Burgess's *Boundless Cubic Lunar Aperture* flew on the Space Shuttle in 1989 as a self-contained "non-scientific payload". This conceptual artwork included holograms and cubes made from all of the elements known to science and water samples from the world's rivers.<sup>97</sup> As part of the AustroMir mission in 1992, Austrian artist, Richard Kriesche, transmitted a video signal to the cosmonaut crew on board the Mir. They returned the altered signals after they had interacted with various devices on board.<sup>98</sup> The West cigarette company commissioned German artist Andora to paint the outside a Russian Proton rocket (1992) with examples of his art and an advertisement for the cigarette company.<sup>99</sup>

Arthur Woods' *Cosmic Dancer* sculpture was launched in 1993 to the Mir space station to investigate the properties of sculpture in weightlessness and the effects of integrating art into the living and working environment of the cosmonauts.<sup>100</sup> *Ars Ad Astra: The 1st Art Exhibition in Earth Orbit* was organized by Arthur Woods and The OURS Foundation in cooperation with the European Space Agency during their EUROMIR'95 mission. This was the most comprehensive exhibit of art in space so far. Twenty paintings and a laptop computer with 81 digitized art works accompanied German cosmonaut Thomas Reiter on his six-month mission.<sup>101</sup>

#### 2.3.5. Space Art in Space

The space illustrators and artists mentioned so far have been Earth-locked and therefore are not producing true space art. However, there have been a few astronauts and cosmonauts who painted in space. Alexi Leonov, co-commander of the Apollo-Soyuz Test Flight of 1975 was one. He was a prolific space artist in general. He also worked closely with Andrei Sokolov, "the dean of Soviet space art", sometimes taking into space with him work that Sokolov had done on Earth, comparing it with what Leonov actually saw in space.<sup>102</sup> Vladimir Dzhanibekov, commander on five flights, including the Salyut 7 space station in 1985, composed many works about space after he returned to Earth. Dzhanibekov said he tried in his paintings "to show the philosophical side of this not-always-easy work."<sup>103</sup>

Alan Bean, who flew to the Moon on Apollo 12, has described in some detail his aesthetic reactions to the experience, including how he chose the colors, values, shading and other features of his space paintings. He said there is no right or wrong choice: "Any painting will show only how that artist wants to portray a subject, how he or she feels about it. An observer of the painting can either connect with that and like it, or not connect with it and not like it. That is how art is different from science."<sup>104</sup>

#### 2.3.6. Evolution of Space Art

Didier Ottinger says that there have been three historical periods of space art. The first was from the beginning of history through the Renaissance, "when the artist was not yet distinct from the scholar". Copernicus, Tycho Brahe and "Kepler's astronomy evokes a world imbued with magic and as yet untouched by scientific rationalism." "During its scientific revolution, astronomy was still dependent on a system of thought according to which the world was penetrated through and through by correspondences and analogies."<sup>105</sup>

Art during the second, Romantic, period reflects "the time of the schism between intuition and objective knowledge". "Sublime is indeed the proper term for Romantic painting, in its obsession with grandiose, terrifying spectacles: nature in the grip of raging storms, unscalable mountains, fathomless seas and infinite skies".<sup>106</sup>

"The final group of artists sees the conquest of space as the ultimate manifestation of enthusiasm for technology. For them, space seems merely a new field for political struggle, the last refuge of science viewed as an epic. They feel it their responsibility to slide the banana peel of skepticism and irony under the feet of the dreamers and manipulators who, for the benefit of the eternally imbecilic, point a finger towards the waxing or waning moon". In 1998, Joan Fontcuberta presented what appeared to be spectacular images of mammoth constellations. Only later were they revealed to be "photographs of his car windshield spotted with crushed insects." "Haidar published in *Vogue* and *Cosmopolitan* a series of so-called photographs of the Universe, which he created in his studio by setting alcohol-soaked cotton on fire."<sup>107</sup> This is art in the 'pataphysics mode once again.

Or, as Marshall McLuhan once put it, "Art is anything you can get away with".<sup>108</sup>

## 2.4. Space Dance

If "dance is the only art where we ourselves are the stuff from which it is made", there has arguably been a lot of dancing in space. As Chiaki Mukai's space *tanka* about weightlessness suggested, few astronauts or cosmonauts have been able to resist the freedom that zero (or substantially reduced) gravity affords. Whether it is Buzz Aldrin bunny-hopping on the Moon or almost everyone turning somersaults in shuttles and spaceships, spacefarers are clearly blessed with Happy Feet.

This is one instance where life has influenced art: Earthbound dancers envy the spacefarers' freedom. Dancers are gravity haters by definition (see Figure 2.5). To dance free of the bonds of gravity would be heaven to them all. But so far no dancers have gone into space. Consequently, more and more dancers have done the next best thing: they have danced momentarily during parabolic airplane flights.<sup>109</sup>



**Figure 2.5. *Biomechanics Noordung*, 1999, by Dragan Zivadinov, weightless in an Ilyushin 76 aircraft, from *Star City*, Russia. (Photo by Miha Fras. Used by permission of the photographer)**

## 2.5. Space Music

"I could bear it a little better if there were some music." -- Yuri Gagarin, shortly before liftoff, April 12, 1961 <<http://www.yurisnight.net/music/>>

### 2.5.1. Music of the Spheres<sup>110</sup>

"It is almost a truism to say that there is a considerable interaction between the musical and scientific worlds...." "Nowhere is this cross-fertilization more evident than in the astronomical sphere."<sup>111</sup> In the West this interrelation between science and music goes back at least to the sixth century BC philosopher, Pythagoras. His interest in geometry (namely, in the numerical values of lengths, angles, and other properties of lines and spheres), on the one hand, and music (actually, the comparative lengths of vibrating strings that make differing sounds), on the other, coupled with the assumption that the Universe is harmonious, balanced, and perfect, led him to develop a scheme of geometrical and tonal harmony that pervaded the Universe.

A century later, Plato elaborated the perspective of Pythagoras from his Idealist philosophy, while several hundred years after Plato the Alexandrian astronomer, Ptolemy, modified these ideas into a form that remained dominant in the West until Johannes Kepler revisited the issue in the 16th Century, almost 1500 years later. To some extent from the Greeks, but especially through the Middle Ages, the so-called "*quadrivium*" was the basis of formal education. The four elements are typically labeled arithmetic, geometry, astronomy, and music. But it is important to realize that "arithmetic" might better be understood as "numerology" -- the intrinsic power of certain numbers and sequences per se -- while "astronomy" was the result of careful observations of the heavenly objects as seen with the unaugmented human eye. "Music" was "monodic" -- a sequence of individual tones. Even the term "harmony", which is always used to characterize the "music of the spheres", did not mean what it means today. Most of us now assume that "harmony" results when several different tones are sounded together in a way that is considered "pleasing", whereas "disharmony" results from the simultaneous sounding of tones that are not "pleasing." That is to say, "harmony" is polyphonic to us, whereas it was monodic to Greek and Middle Age philosophers.

Johannes Kepler changed all this. He was "a transition figure with one foot in the symbolic and spiritual cosmos of Pythagoras and Plato, and the other embedded firmly in the new heliocentric Universe of his day."<sup>112</sup> While still captured by the old notions of a perfect, orderly Universe, he also was an empiricist who let "facts" speak to and challenge his received beliefs. One of the most important facts -- that contributed to the collapse of the old Ptolemaic system -- was his discovery first that Mars (and later that all planets) orbit the Sun not in a perfect circle but in an ellipse. The old "orderly" Universe, revolving perfectly around the Earth, as God created it, collapsed. Kepler, nonetheless, clung to the belief that there was a deeper order to the Universe; eventually, in his *Harmoices Mundi* (1619), he published what he considered to be evidence of the grand musical and geometric harmony of the Universe. It could not be heard by human ears, but it could be appreciated by the human mind.

More importantly for our story here, after many years of study and experimentation, Kepler concluded that the music of the spheres was polyphonic -- "harmonious" in the modern sense -- and not monodic. This conclusion contributed to the development of the "scales" and tone-intervals characteristic of western "classical" music from the late 17<sup>th</sup> through the late 19<sup>th</sup> centuries.

### 2.5.2. Modern "Classical" Space Music

From this point on, the story of music becomes very much like the story of space fiction, poetry, and art. As science (and technology) changed and deepened humans' understanding of the Universe, so also it provoked and enabled new aesthetic expressions. William Herschel, who discovered the planet Uranus in 1781, actually was known for most of his life as a professional musician.<sup>113</sup> It was only later that he devoted more time to astronomy than to



music, but he never neglected either. It thus may be poetic justice that Brian May postponed for over thirty years his work on a PhD dissertation in astrophysics at Imperial College, London, because his job as lead guitarist in the rock group *Queen* took too much time. He finally received his PhD degree in 2007.<sup>114</sup>

Franz Joseph Haydn (who knew Herschel), wrote *Il mondo della luna* (The World in the Moon, 1777), an opera buffo, but "the Moon" in the story was a consciously fake setting. It was not intended to depict actual life on the Moon. On the other hand, Jacques Offenbach's opera *Le Voyage dans la Lune* (1875) was inspired by Jules Verne's story, *De la Terra a la lune* (1872). Though Verne's story was fictional, both it and Offenbach's opera were meant to reflect real yearnings for space travel (Seenelick). Josef Strauss's *Sphären-Klänge* (Music of the Spheres, 1868) also is not based on any scientific inspiration, though it may reflect a growing popular interest in not-Earth generally.

As better telescopes and more powerful theories began to tell us different stories about not-Earth, so also more musicians began to reflect these ideas in their compositions. In a recent review, Andrew Fraknoi lists "over a hundred pieces of music that make use of serious astronomy".<sup>115</sup>

Probably the best-known piece of classical space music -- *The Planets* (1916) by Gustav Holst -- is often excluded from lists of serious space music because it sought to exhibit the essence of each planet according to how astrology described it, and not according to features understood by current astronomical observation or scientific theory. However, much more recently, the British conductor, Sir Simon Rattle, added five contemporary compositions to a 2006 recording by the Berlin Philharmonic of *The Planets*. One was a piece for *Pluto* (2000) by Colin Matthews -- written only shortly before Pluto was declared by the International Astronomical Union not to be a planet after all. The other four new additions refer to asteroids. *Asteroid 4179: Toutatis* (2005) is by the Finnish composer, Kaija Saariaho. Toutatis is "the asteroid whose orbit passes closest to Earth" "with an unusual shape and complex rotation" which the music tries to reflect. Brett Dean's *Komarov's Fall* (2006) was "written in memory of Soviet Cosmonaut, Vladimir Mikhailovic Komarov, who died upon re-entry to the Earth's atmosphere in his Soyuz 1 spacecraft in 1967. I happened across a recording of sound effects including the final conversations between ...Komarov and ground control [and his wife]. It was absolutely chilling.... He was the first person to die in space." "The asteroid '1836 Komarov', discovered in 1971, was named in his honor." Matthias Pintscher's *towards Osiris* (2005) reflects "the myth of Osiris, who was killed by his brother Seth and torn in pieces. His wife re-collected these pieces, put them together, and by swaying her huge wings, re-animated him. It's a very moving story and has a very strong formal structure, like in music." Mark-Anthony Turnage said of his composition, *Ceres* (2005), "the idea of an asteroid hitting the Earth at any moment really appealed to me because I grew up in a religious family and I was always in fear of the second coming. The piece explodes about five eighths of the way through into a big climax which is the asteroid hitting Earth".<sup>116</sup>

Paul Hindemith wrote an opera (1947) and then a symphonic suite (1951) called *Die Harmonie der Welt*, based on the life of Kepler. Willie Ruff, a professor of music at Yale University teamed up with John Rodgers, professor of geology there, to try to realize Kepler's "Harmony of the World" via electronic synthesizers of the era (late 1970s) for human ears to hear.<sup>117</sup>

### 2.5.3. Contemporary "Post-Classical" Space Music

During the 20<sup>th</sup> and early 21<sup>st</sup> centuries, many serious post-classical composers have written space-related music incorporating contemporary as well as traditional instruments and sounds. Typically, these composers use tones, chords, tempi, and intervals not based on the classical ideas of harmony of the 18<sup>th</sup> and 19<sup>th</sup> centuries. Indeed, many of these composers

were influenced not only by astronomy and space but also especially by quantum physics, with its emphasis on randomness and complementarity. Their music is "post-Newtonian" in conception and execution.<sup>118</sup>

#### 2.5.4. Music from Space

Some of the pieces above combine sounds recorded from space or spaceships with more or less conventional instruments and modes. But there are a few compositions derived entirely from instruments that recorded various space "sounds". These include compilations by Stephen McGreevy, *Music of the Magnetosphere and Space Weather* (1995-2008); *Symphonies of the Planets 1-5* (NASA Voyager Recordings, 1995); Alexander Kosovichev, *Solar Sounds* (1998); *Space Sounds* (2000-2005); and Donald Gurnett, *Selected Sounds of Space* (2003-05).

#### 2.5.5. Popular Music Inspired by Space Events<sup>119</sup>

Popular music has been inspired by some specific space event, beginning perhaps with *Sputnik (Satellite Girl)*, by Jerry Engler and the Four Ekkos (1957). Yuri Gagarin's pioneering flight in the Vostok provoked at least two songs in the Soviet Union, *The Constellation of Gagarin* (1961) and *Motherland Knows Her Son is Flying in Orbit* (1961). Similarly, *Happy Blues For John Glenn* (1962) by Sam "Lightning" Hopkins and *The Ballad of John Glenn* (1962) by Roy West commemorated the flight of America's first man in space.

One of the best known bits of early space satire was *Wernher von Braun* (1965) by Tom Lehrer with the memorable lyrics, apparently actually uttered von Braun: "Once the rockets are up, who cares where they come down? That's not my department," says Wernher von Braun." But more perspicaciously, Lehrer's song ends, "In German oder English I know how to count down, Und I'm learning Chinese!" says Wernher von Braun".

When first Neil Armstrong and then Buzz Aldrin walked on the Moon, The Byrds produced *Armstrong, Aldrin and Collins* (1969) celebrating it, while Jethro Tull wrote *For Michael Collins, Jeffrey and Me* (1970) commenting on three people who "almost made it", including Collins who was left on the command module circling the Moon and did not get to walk on it. However, it was *Armstrong* (1969) by John Stewart of the Kingston Trio that caused the greatest stir because his lyrics wondered whether a starving black boy in Chicago or a poor girl in Calcutta knew or cared about the feat as poverty, pollution, war, and hate continued on Earth.

In stark contrast are *The Walk of Ed White* (1969) and *Moon Rider* (1977, based on recollections of Eugene Cernan, the last man to walk on the Moon), by the inspirational song group, Up with People. Similarly, Roy McCall and Southern Gold, (*Blast Off Columbia*, 1981) and Rush, *Countdown*, (1982) dedicated to Astronaut John Young and Robert Crippen, celebrated the flight of STS-1, while Deep Purple (*Contact Lost*, 2003) bemoans its loss 20 years later.

There are two particularly poignant songs about space tragedies. One, *Flying for Me* (1986) by John Denver was about the Challenger explosion. Denver had tried very hard to get on that flight which was featured as being one of the first to include several "ordinary people" among the crew. Similarly, Jean Michel Jarre's *Last Rendezvous* (1986) was written to be played on a saxophone by Astronaut Ron McNair on the Challenger. *Beagle 2* (1999) by the British group, Blur, was intended to be broadcast to Earth from Mars by the Beagle 2 rover that apparently failed to land on Mars in December 2003.

The UK band, The Picture Show, paid tribute to Tsiolkovsky in their song *The Revolutionary* (2007): "Konstantine oh Konstantine/ Wants to build rockets to the stars/ Spends all day looking up at them/ Lying in the long grass/ Inspired he says to leave the

cradle soon/ To see what there is outside." *Ride, Sally, Ride!* (1983) by Casse Culver celebrates Sally Ride, the first American woman in space, while Elaine Walker's *X Prize Song* (2004) may be the first song celebrating private spaceflight. We look forward to more space music honoring entrepreneurial as well as transnational space activities.

### 2.5.6. Popular Music on Space Themes<sup>120</sup>

There has been far too much popular music more or less on space themes to do justice to it all here.<sup>121</sup> The earliest popular space music was mostly "rock and roll" (with some "disco"). But the dominant pop music of the present is rap, hip-hop, or indie. These forms too have music with space themes. Their roots are partly in rock, but mainly in soul, funk, and to some extent punk -- that is to say, primarily in black culture. In 1970, rhythm-and-blues singer, Gil Scott-Heron, was "an inspiration to legion of 1990s rappers, reciting "Whitey on the Moon" "accompanied by only bongos and congas".<sup>122</sup>

### 2.5.7. Rap, Hip-Hop and Space

During 2007/2008 a subgenre developed in rap/hip-hop designated "SpaceRap". It was identified by the blog OhWord.<sup>123</sup> In addition, a Philly/Puerto Rican trio "took the name Outer Space because their rhyme style was said to be 'beyond the Earth's atmosphere.'" They said that "after all, space is the final frontier and they wanted to make exploring outer space rap's next adventure. As such they abandoned their government names and took the names Planet, Jedeye and Crypt".<sup>124</sup> Commenting on another artist, Kenna, who came to the US from Ethiopia at age three, an interviewer concluded: "There's a new movement afoot in the hip-hop/R&B universe: future funk. It's music that goes black to the future. Like Kenna, it borrows from unlikely sources like alternative and electronica to heighten its sci-fi vibe, without ever losing sight of the groove."<sup>125</sup>

However, the hip-hop/rap artists most directly related to space are Rakim who, on *Follow the Leader* (1988), imagined traveling "at magnificent speeds around the Universe" so that the Earth and other "planets are small as balls of clay," and Nas who, on *I Want to Talk to You* (1999), stated that while "Niggas play with PlayStations / [The government] buildin' space stations / on Mars plottin' civilizations / Dissin' us, discriminating different races / Taxpayers pay for more jails for black and Latin faces." *Channel Zero* (1998) by Canibus is a long rap entirely devoted to the US government's alleged cover up of extraterrestrial intelligence findings. It includes reference to the Drake equation, "various geomagnetic gravitational anomaly areas," and ends, "I hope you become aware of what I'm spittin' in your ear was intended to stimulate your left-brain's hemisphere."<sup>126</sup>

Finally, Nas and KRS-One announced in 2004 that they were going to bring 100 students from Washington, DC, to NASA headquarters in order to "promote the powers of math and science" to the members of the hip-hop community. The event apparently never happened but the OhWord blogger anticipated "I doubt this is the last we will hear about these homeboys and outer space. The future (of space-rap anyway) is looking bright and I can see just it now -- future b-boys and girls uprocking zero gravity to a cosmic megamix that includes" Nas' *Star Wars* and KRS-One's *Step into a World*.<sup>127</sup>

### 2.5.8. Filk Music

*Filk* is inspired by science fiction and fantasy, and is primarily intended for science fiction fan communities, originating at science fiction meetings in the 1930's. Attendees gathering to socialize might sing familiar folk songs. Some participants began setting words relating to science fiction to traditional folk tunes, while new works were also composed and sung. Apparently, when a typo in a magazine article about the practice written by Lee Jacobs referred to "filk music" instead of "folk music", a name for the new genre was born. Of the many pieces of filk worth mentioning, Leslie Fish's *Hope Eyrie* clearly stands out. It is often

referred to as the "'national anthem' of the pro-space movement, often sung while standing at attention in a reverent manner."<sup>128</sup>

### **2.5.9. True Space Music: Performed or Composed in Space**

However, as I have said before about other art forms, the only true space music is that which has been composed or performed in not-Earth itself. It seems that the first person to sing in space was the very first person in space: Yuri Gagarin. He is quoted as saying about his descent from his flight on the Vostok: "When I was going down, I sang the song, The Motherland Hears, the Motherland Knows."<sup>129</sup> However, apparently the first music to be performed in space was "Jingle Bells", sung and "played" by Walter Schirra and Thomas Stafford on the Gemini 6 mission, during a broadcast to Earth on Christmas Day, 1965.

Astronaut Ron McNair is believed to be the first person to take a musical instrument -- a saxophone -- into space and play it, on shuttle flight STS-41B in 1984. As noted above, McNair later died in the Challenger explosion in 1986. He had planned to play a work during that flight that had been composed for him by Jean-Michel Jarre. It would have been the first musical piece whose debut occurred in space. The piece later appeared on Jarre's album *Rendezvous* with the sax played by Pierre Gossez. (*Track 6 - Last Rendez-Vous*)

Cosmonaut Aleksandr Laveikin brought his acoustic guitar to the Mir space station and taught Yuri Romanenko how to play it, leaving it with Romanenko when Laveikin returned to Earth. During his 326 day stay on Mir from February 1987 to December 1988, Yuri Romanenko wrote twenty songs. They were "optimistic songs, written by a man who feels good." The French cosmonaut Jean-Loup Chretien brought a keyboard with him to Mir in 1988. He also left it there.

Susan Helms played her keyboard during STS-54 in 1993. She was a member of the NASA astronaut band, *Max Q*. Also in 1993, Ellen Ochoa played her flute on STS-56,<sup>130</sup> while Chris Hadfield brought a collapsible guitar with him on STS-74 in 1995, and gave it to ESA astronaut Thomas Reiter on the Mir station. Ed Lu, science officer for the International Space Station Crew Expedition 7 in 2003, played a portable electronic piano that he took with him.

### **2.5.10. Music for Extra Terrestrials**

Music is often used to wake astronauts in space.<sup>131</sup> *Blast-Off Columbia*, mentioned above, was written by Jerry Rucker who worked as a technician on the shuttle's external tank. The song, performed by Roy McCall and Southern Gold, was transmitted as a wakeup call to astronauts John Young and Robert Crippen on the first flight of Columbia, STS-1, 1981.

Voyager 1 and 2, launched by NASA in 1977 to study Jupiter, Saturn, Uranus, and Neptune, are now in deep space, heading towards the truly unknown. In case some extraterrestrial intelligence encounters them, NASA included a message on a 12-inch gold-plated copper disk containing sounds and images intended to show the diversity of life and culture on Earth. Carl Sagan and others compiled 115 analog images and natural sounds, along with music from different cultures and time periods, as well as spoken greetings from Earth in fifty-five languages. Included with the records are a cartridge and a needle with instructions, in symbolic language, that are intended to explain the origin of the spacecraft and how the record is to be played.<sup>132</sup>

Four songs, *Lalala*, *Bald James Dean*, *Hot Time*, and *No Love*, by Julien Civange and Louis Haéri, were included in ESA's Cassini-Huygens probe that landed on Titan, a moon of Saturn, in January 2005. The composers said the four songs were written to reflect various phases of the flight. ESA's intention was "to leave a trace of our own humanity and to build

awareness, especially among young people, about this adventure outside the specific scientific arena".<sup>133</sup>

Rock and roll is there to stay.

## 2.6. Coda

It is clear from this whirlwind tour of space art -- written, painted, danced, sung, and performed -- that, as much as some space managers and funders might want to deny or prevent it, aesthetic expression in many forms is fundamental to the human spirit. It will motivate or demotivate us to leave our cradle. We may or may not freely express it in space. But it must be seen as an integral aspect of all space activities, and celebrated -- and funded -- as such.

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<sup>1</sup> Special thanks to Kerrie Dougherty, Curator of Space Technology, Powerhouse Museum, Sydney, Australia, for guidance in researching all aspects of this chapter.

Philip Freund, *Myths of creation*. London: Peter Owen, 2003; David Adams Leeming, *An Encyclopedia of creation myths*. Santa Barbara, Calif.: ABC-CLIO, 1994; Marie-Louise von Franz, *Creation myths*. Boston: Shambhala, 1995

<sup>2</sup> *Taketori monogatari. The tale of the bamboo cutter*. Modern rewriting by Yasunari Kawabata; translation by Donald Keene. Tokyo: Kodansha International, 1998

<sup>3</sup> Fraser Cain, "Japanese Moon Probe Nicknamed KAGUYA," *Universe Today* <<http://www.universetoday.com/2007/06/06/Japanese-moon-probe-nicknamed-kaguya/>>; "KAGUYA selected as SELENE's nickname" <[http://www.jaxa.jp/countdown/fl3/special/nickname\\_e.html](http://www.jaxa.jp/countdown/fl3/special/nickname_e.html)>; Selene/Kaguya homepage [http://www.jaxa.jp/projects/sat/selene/index\\_e.html](http://www.jaxa.jp/projects/sat/selene/index_e.html)

<sup>4</sup> F. Hadland Davis, ed., *Myths and legends of Japan*. Boston: David Nickerson & Company, 1912, Chapter VIII, "The Star Lovers", pp. 126f

<sup>5</sup> Engineering Test Satellite #VII (ETS-VII / Orihime & Hikoboshi) Home Page [http://robotics.jaxa.jp/project/ets7-HP/index\\_e.html](http://robotics.jaxa.jp/project/ets7-HP/index_e.html)

<sup>6</sup> Ovid, *Metamorphoses*. Translated by Mr. Croxall under the direction of Sir Samuel Garth. New York: The Heritage Press, 1961, p. 249f

<sup>7</sup> *The epic of Gilgamesh: A new translation, analogues, criticism*. Translated and edited by Benjamin R. Foster. New York: Norton, 2001; Paul D. Hardman. *Homoaffectionalism: Male bonding from Gilgamesh to the present*. San Francisco: NF Division, GLB Publishers, 1993

<sup>8</sup> *The essential Odyssey*. Translated and edited by Stanley Lombardo. Indianapolis: Hackett Pub. Co., 2007; Eva Brann *Homeric moments: Clues to delight in reading the Odyssey and the Iliad*. Philadelphia: Paul Dry Books, 2002

<sup>9</sup> Richard Heitman, *Taking her seriously: Penelope & the plot of Homer's Odyssey*. Ann Arbor: University of Michigan Press, 2005

<sup>10</sup> Lucian, with an English translation by A. M. Harmon, New York: G. P. Putnam's Sons, 1915, Volume II, *Icaromenippus, or the Sky-Man*, pp. 267-323

<sup>11</sup> Lucian, *True history and Lucius or the ass*. Translated from the Greek by Paul Turner. Bloomington: Indiana University Press, 1974; Aristoula Georgiadou and David H. J. Larmour, *Lucian's Science Fiction Novel "True Histories": Interpretation and Commentary*. Leiden: Brill, 1998

<sup>12</sup> St. Augustine, *The city of God*. Translated by Marcus Dods. New York: Modern Library, 1950

<sup>13</sup> Joachim of Fiore (or Flora), *Catholic Encyclopedia*. <http://www.newadvent.org/cathen/08406c.htm>

<sup>14</sup> bn Khaldûn, *The Muqaddimah: An introduction to history*. Translated from the Arabic by Franz Rosenthal. Princeton, N.J.: Princeton University Press, 1967. Three Volumes

<sup>15</sup> Plato, *The republic*. Translated and with an introduction by R.E. Allen. New Haven: Yale University Press, 2006

<sup>16</sup> Thomas More, *Utopia*. Edited by George M. Logan and Robert M. Adams. Cambridge: Cambridge University Press, 2002

<sup>17</sup> Francis Bacon, *New Atlantis*. Edited by Jerry Weinberger. Wheeling, Ill.: H. Davidson, 1989

<sup>18</sup> B. F. Skinner, *Walden Two*. New York, Macmillan Co., 1948

- 
- <sup>19</sup> Johannes Kepler, *Somnium*. Translated with a commentary by Edward Rosen. Madison: University of Wisconsin Press, 1967
- <sup>20</sup> Francis Godwin, *The Man in the Moone or, A discourse of a voyage thither, by Domingo Gonsales*. San Marino, CA: The Huntington Library, 1961
- <sup>21</sup> Cyrano de Bergerac, *Other worlds: The comical history of the states and empires of the moon and the sun*. Translated and introduced by Geoffrey Strachan. New York: Oxford University Press, 1965
- <sup>22</sup> Bernard le Bovier de Fontenelle, *A plurality of worlds*. John Glanvill's translation, with a prologue by David Garnett. London: The Nonesuch press, 1929
- <sup>23</sup> Jonathan Swift, *Gulliver's Travels*. Edited by Christopher Fox. Boston: Bedford Books of St. Martin's Press, 1995
- <sup>24</sup> Ludvig Holberg, *Nicolai Limmi's Underground Journey*. New York, Garland Publishing, 1974
- <sup>25</sup> Voltaire *Micromegas*. Translated by W. Fleming with an introduction and chronology by Ben Barkow. New York: Hippocrene Books, 1989
- <sup>26</sup> Nicolas Restif de la Bretonne, *La decouverte australe par un homme volant, ou le Dedale francais, (Southern Discovery by a Flying Man, or the French Daedalus)*, Geneve: Slatkine Reprints, 1979
- <sup>27</sup> Based on Aldiss, Brian. *The Trillion Year Spree: The History of Science Fiction*. New York: Atheneum, 1966; Adam Roberts, *The history of science fiction*. New York: Palgrave Macmillan, 2006; Flo Keyes, *The literature of hope in the Middle Ages and today: Connections in medieval romance, modern fantasy, and science fiction*. Jefferson, N.C. : McFarland & Co., 2006; Franz Rottensteiner, "European Science Fiction," in Patrick Parrinder, ed., *Science Fiction* (Longman, 1979); Franz Rottensteiner, *The science fiction book: An illustrated history*. London: Thames & Hudson, 1975; Sam J. Lundwall, *Science fiction: An illustrated history*. New York: Grosset and Dunlap, 1978; Eric S. Rabkin, ed., *Science fiction: A historical anthology*. New York: Oxford University Press, 1983; Patrick Parrinder, ed., *Science fiction: a critical guide*. New York: Longman, 1979; Mark Rose, ed., *Science fiction: A collection of critical essays*. Englewood Cliffs, N.J.: Prentice-Hall, 1976; Mark Hillegas, "The literary background to science fiction," in Patrick Parrinder, ed., *Science fiction: A critical guide*. London: Longman, 1976; "The Ultimate Science Fiction Web guide" (1997) <[www.magicdragon.com/UltimateSF/](http://www.magicdragon.com/UltimateSF/)>; Science Fiction Resource Guide (2001) <<http://sf.emse.fr/SFRG.sfrge2.htm>>
- <sup>28</sup> Susantha Goonatillake, *Toward a global science: Mining civilizational knowledge*. Bloomington: Indiana University Press, 1998
- <sup>29</sup> Christian Bök, *'Pataphysics: The poetics of an imaginary science*. Evanston, Ill.: Northwestern University Press, 2002; Alfred Jarry, *Adventures in 'pataphysics*. translations by Paul Edwards & Antony Melville. London: Atlas, 2001. See also Novum Organum du Collège de 'Pataphysique <<http://www.college-de-pataphysique.org/college/accueil.html>>
- <sup>30</sup> Jules Verne, *A journey to the center of the Earth*. New York: Penguin, 1986; *From the Earth to the Moon*. Translated by Lowell Bair with an introduction by Gregory Benford. New York: Bantam Books, 1993
- <sup>31</sup> Konstantin Tsiolkovsky, *Beyond the planet Earth*. New York, Pergamon Press, 1960
- <sup>32</sup> Alexei Tolstoy, *Aelita, or, The decline of Mars*. Ann Arbor, Michigan: Ardis, 1985
- <sup>33</sup> Kurd Lasswitz, *Two planets*. Abridged by Erich Lasswitz. Translated by Hans H. Rudnick. Afterword by Mark R. Hillegas. Carbondale: Southern Illinois University Press, 1971
- <sup>34</sup> Karel Capek, *R.U.R.* Translated by Claudia Novack; introduction by Ivan Klbima. New York: Penguin Books, 2004
- <sup>35</sup> Yevgeny Zamyatin, *We*. Translated and with an introduction by Clarence Brown. New York: Penguin Books, 1993
- <sup>36</sup> Ivan Efremov, *Andromeda: A space-age tale*. Translated from the Russian by George Hanna. Moscow: Progress Publishers, 1980
- <sup>37</sup> K. Rosenberg, *Soviet science fiction: To the present via the future*, MIT, 1987
- <sup>38</sup> Stanislaw Lem, *Solaris*. Translated by Joanna Kilmartin and Steve Cox; afterword by Darko Suvin. New York: Berkley Books, 1970
- <sup>39</sup> Based on Debjani Sengupta, "Sadhanabu's Friends: Science Fiction in Bengal from 1882-1961," in *Sarai Reader 2003: Shaping Technologies*, 76; Hevil Shah, "Science Fiction in India," Spring 2005 <<http://sciencefictionlab.lcc.gatech.edu/subTopicIndia.html>>; Samit Basu, "IWE and genre," July 3, 2006 <<http://samitbasu.blogspot.com/2006/07/iwe-and-genre.html>>; Samit Basu, "The Trousers of Time: Possible futures of Indian speculative fiction in English," July 4, 2006 <<http://samitbasu.blogspot.com/2006/07/trousers-of-time-possible-futures-of.html>>; <<http://flowtv.org/?p=89>>; Cyril Gupta "Science Fiction in India" August 2007 <<http://www.cyrilgupta.com/wp/?p=22>>
- <sup>40</sup> Dileep Kumar Kanjilal, *Vimana in ancient India*. Calcutta: Sanskrit Pustak Bhandar, 1985
- <sup>41</sup> Amardeep Singh, "Where women rule and mirrors are weapons," <<http://www.lehigh.edu/~amsp/2006/05/where-women-rule-and-mirrors-are.htm>>

- <sup>42</sup> Shanti Kumar, "Mixing mythology, science and faction: The sci-fi genre in Indian film and television". <<http://flowtv.org/?p=89>> December 2006
- <sup>43</sup> Thanks to Stacey Solomone for providing the initial draft of this section on Chinese space fiction.
- <sup>44</sup> Wu Dingbo, "Chinese science fiction," in Wu Dingbo and Patrick Murphy, eds., *Handbook of Chinese popular culture*. Greenwood Press, 1994, p. 258
- <sup>45</sup> *Loc. cit.*
- <sup>46</sup> *Ibid.*, p. 259
- <sup>47</sup> Henry Y. H. Zhao, "A fearful symmetry: The novel of the future in twentieth-century China," *Bulletin of the School of Oriental and African Studies*, Vol. 66, 2003, p. 456
- <sup>48</sup> Wu, *op. cit.*, p. 259
- <sup>49</sup> *Ibid.*, p. 260
- <sup>50</sup> *Loc. cit.*
- <sup>51</sup> *Ibid.*, p. 268
- <sup>52</sup> For other sources of Chinese space fiction, see, "Twelve Hours Later" (Chinese Science Fiction blog) <[www.twelvehourslater.org](http://www.twelvehourslater.org)>; Jeremy Goldkorn, "Chinese science fiction" March 23, 2004 <[www.danwei.org/internet/Chinese\\_science\\_fiction.php](http://www.danwei.org/internet/Chinese_science_fiction.php)>; Lavie Tidhar, "Science fiction, globalization, and the People's Republic of China," <<http://concatenation.org/articles/sf~china.html>>.
- <sup>53</sup> Interview with Stacey Solomone, Beijing, August 8, 2007
- <sup>54</sup> Based on Robert Matthew, *Japanese Science Fiction: A view of a changing society*. London: Routledge, 1989; Robert Matthew. *Science fiction in Japan: A comparative study of the development of the genre in Japan and in the West*. Brisbane: Dept. of Japanese, University of Queensland, 1978; Robert Matthew, *The origins of Japanese science fiction*. Brisbane: Dept. of Japanese, University of Queensland, 1978; Yoriko Moichi, "Japanese utopian literature from the 1870s to the present and the influence of western utopianism," *Utopian Studies*, March 1999 <http://www.encyclopedia.com/printable.aspx?ld=1G1:62086570>
- <sup>55</sup> Kyoko Kurita, "Meiji Japan's Y23 crisis and the discovery of the future: Suehiro Tetsuo's Nijusan-nen mirai," *Harvard Journal of Asiatic Studies*, Vol. 60, No. 1, 2001, pp. 5-43
- <sup>56</sup> Matthew, *Japanese Science Fiction, op. cit.*, p. 103
- <sup>57</sup> Kumiko Sato, *Culture of desire and technology: Postwar literatures of science fiction in the United States and Japan*. Dissertation, Pennsylvania State University. 2005, 259 pages; Takayuki Tatsumi, *Full metal apache: transactions between cyberpunk Japan and avant-pop America*. Durham, NC: Duke University Press, 2006
- <sup>58</sup> H. G. Wells, *The Time Machine*. A critical edition with introduction and notes by Harry M. Geduld. Bloomington: Indiana University Press, 1987; *The War of the Worlds*. Introduction and notes by David Y. Hughes and Harry M. Geduld. Bloomington: Indiana University Press, 1993; *The First Men in the Moon*. Edited with an introduction by David Lake. New York: Oxford University Press, 1995.
- Writing to some extent in opposition to Wells and the worldview that Wells, Verne, and others inspired, C. S. Lewis, an Anglican theologian, wrote many stories set in not-Earth that had deeply theological perspectives. The best known are *Out of the Silent Planet* (1938), the first in his space trilogy, and *The Lion, the Witch and the Wardrobe* (1950), the first of the seven *Chronicles of Narnia*. Lewis was a colleague of J.R.R. Tolkien whose books (and films) about *The Hobbit* (1937) and the *Lord of the Rings* series (1954) have been enormously popular recently, and set the stage for the *Harry Potter* rage recently.
- There is a subfield of science fiction devoted to Christian themes. Some of the work of Philip Dick is of this type. Though totally different in style and theology from either C. S. Lewis or Philip Dick, the stories of Hal Lindsey, beginning with *The Late Great Planet Earth* (1979) and Tim LaHaye and Jerry Jenkin's twelve volume, *Left Behind* series (1995) have had extremely wide readership among Christians waiting expectantly for Armageddon, the Rapture, and the End of the World.
- <sup>59</sup> Based on Mike Ashley, *The Time Machines: The Story of the Science-Fiction Pulp Magazines from the beginning to 1950*. Liverpool: Liverpool University Press, 2000; Mike Ashley. *Transformations: The Story of the Science Fiction Magazines from 1950 to 1970*. Liverpool: Liverpool University Press, 2005; Thomas D. Clareson, *Understanding Contemporary American Science Fiction: The Formative Period, 1926-70*. University of South Carolina Press, 1992; James Gunn, *Inside science fiction*. Lanham, Md.: Scarecrow Press, 2006; David Hartwell, *Age of wonders: Exploring the world of science fiction*. New York: Walker, 1984; David Hartwell and Kathryn Cramer, eds., *The ascent of wonder: The evolution of hard SF*. New York: TOR, 1994
- <sup>60</sup> Such as Aldous Huxley, *Brave New World* (1932), [and] *Brave new world revisited*. With a forward by the author; introduction by Martin Green. New York: Harper & Row, 1965; George Orwell, *Animal Farm* (1945). With a preface by Russell Baker and an introduction by C.M. Woodhouse. New York, NY: Signet Classics, 1996; and *Nineteen eighty-four*. (1948), with a foreword by Thomas Pynchon and an afterword by Erich Fromm. New York: Plume, 2003; Ray Bradbury, *Fahrenheit 451* (1953), New York, Simon and Schuster, 1967; Harold Bloom, ed., *Ray Bradbury's Fahrenheit 451*. Philadelphia: Chelsea House, 2003; Kurt Vonnegut, *Slaughterhouse-five, or, The children's crusade: A duty-dance with death*. New York: Dell 1969;

- Harold Bloom, editor, *Kurt Vonnegut's Slaughterhouse-five*. Edited and with an introduction. New York, NY: Chelsea House Publishers, 2007; Doris Lessing, *Memoirs of a Survivor*. New York: Knopf, 1974; Ursula K. Le Guin, *The dispossessed*. New York: Avon Books, 1974; Margaret Atwood, *The Handmaid's Tale* Boston: Houghton Mifflin, 1986; Octavia E. Butler, *Parable of the Talents* New York: Warner Books, 2000
- <sup>61</sup> Larry Owens, "Sci-fi and the mobilization of youth in the cold war," *Quest*, Vol. 14, No. 3, 2007, pp. 52-57. Even now, science fiction in the US is still called upon to do more than merely entertain or even simply to educate. Several science fiction writers attended a conference on science and technology sponsored by the US Department of Homeland Security. The motto of the group (which had been formed fifteen years earlier by Arlan Andrews) is said to be "Science Fiction in the National Interest." [Mimi Hall, "Sci-fi writers join war on terror" *USA Today*, May 29, 2007 <[http://www.usatoday.com/tech/science/2007-05-29-deviant-thinkers-security\\_N.htm](http://www.usatoday.com/tech/science/2007-05-29-deviant-thinkers-security_N.htm)>]
- <sup>62</sup> William Gibson's *Neuromancer*. New York: Ace Science Fiction Books, 1984; McCaffery, Larry, ed. *Storming the Reality Studio: A Casebook of Cyberpunk and Postmodern Science Fiction*. Duke University Press, 1991
- <sup>63</sup> See, the science fiction game reviews on weekly Sci.Fi.com <[www.scifi.com/sfw](http://www.scifi.com/sfw)>; "Is there hope for a science fiction MMORPG?" posted by Wilhelm2451 <<http://tag.wordpress.com/2008/01/17/is-there-hope-for-a-science-fiction-mmorpg/>>; "Top science fiction MMORPGs," <<http://internetgames.about.com/b/2007/12/12/top-science-fiction-mmorpgs.htm?iam=metaresults&terms=top+science+fiction+mmorpgs>>. On the positive role of electronic games in general, see Steven Johnson, *Everything Bad is Good for You: How Today's Popular Culture is Actually Making Us Smarter*. New York: Riverhead Books, 2005; David Gibson, Clark Aldrich, Marc Prensky (editors), *Games and Simulations in Online Learning*. Hershey, PA: Information Science Publishing, 2007; and "Serious Games" <<http://www.seriousgames.org/index2.html>>. "Grand Theft Auto IV" was widely acclaimed as the first popular game that had excellent alternative plot lines and character development as well outstanding graphics and sound effects. See Seth Schiesel, "Grand Theft Auto Takes on New York" [http://www.nytimes.com/2008/04/28/arts/28auto.html?\\_r=1&oref=slogin](http://www.nytimes.com/2008/04/28/arts/28auto.html?_r=1&oref=slogin)
- <sup>64</sup> Lucie Armitt, *Contemporary women's fiction and the fantastic*. New York: St. Martin's Press, 2000; Marleen S. Barr. *Feminist fabulation: Space/postmodern fiction*. Iowa City: University of Iowa Press, 1992; Marleen Barr, *Lost in space: Probing feminist science fiction and beyond*. Chapel Hill: University of North Carolina Press, 2003; Marleen Barr, ed., *Envisioning the future: Science fiction and the next millennium*. Middletown, CT: Wesleyan University Press, 2003; Patricia Melzer, *Alien constructions: Science fiction and feminist thought*. Austin: University of Texas Press, 2006; Patricia Monk, *Alien theory: The alien as archetype in the science fiction short story*. Lanham, Md.: Scarecrow Press, 2006; Jenny Wolmark, *Aliens and others: Science fiction, feminism and post modernism*. University of Iowa Press, 1994; Jane Donawerth, "Utopian Science: Contemporary Feminist Science Theory and Science Fiction by Women", *NWSA Journal*, Volume 2, No. 4, Autumn 1990, pp. 535-557; Jane Donawerth and Carol Komerten, eds., *Utopian and science fiction by women: Worlds of difference*. Syracuse University Press, 1994; Jane Donawerth, *Frankenstein's daughters: Women writing science fiction*. Syracuse, N.Y.: Syracuse University Press, 1997; Veronica Hollinger, "Feminist theory and science fiction"; Andrew M. Butler, "Postmodernism and science fiction"; and Wendy Pearson, "Science fiction and queer theory", in Edward James and Farah Mendlesohn, editors, *The Cambridge companion to science fiction*. New York: Cambridge University Press, 2003; Camilla Decarnin, Eric Garber, and Lyn Paleo, editors, *Worlds apart: An anthology of lesbian and gay science fiction and fantasy*. Boston: AlyCat Books, 1994. Paul Youngquist, "The space machine: Baraka and science fiction," *African American Review*, Vol. 37, Nos.2-3, Summer-Fall, 2003, pp. 333-343; Carl Freedman, *Critical theory and science fiction*. Hanover, New Hampshire: Wesleyan University Press, 2000; Ivana Milojevic and Sohail Inayatullah, "Futures dreaming outside and on the margins of the western world," *Futures*, Vol. 35, No. 5, June 2003, pp. 483-507
- <sup>65</sup> See "Space Poetry," *Encyclopedia Astronautica* <http://www.astronautix.com/poems/index.htm>>; Jonathan Vos Post, "70 major poets who minored in science fiction and fantasy," *The Ultimate Science Fiction Poetry Guide* <<http://www.magicdragon.com/UltimateSF/sfpo-7pt0.html>>; space poetry <[http://www.learnenglish.org.uk/storis/poem\\_act/space\\_poetry.html](http://www.learnenglish.org.uk/storis/poem_act/space_poetry.html)>; John Fairfax, ed., *Frontier of Going: Anthology of Space Poetry*. London: Panther, 1969; John Foster, ed., *Spaceways: An Anthology of Space Poetry*. Oxford University Press, 1986; David Levy, *Starry night: Astronomers and poets read the sky*. Amherst NY: Prometheus Books, 2001
- <sup>66</sup> Li Po, "Drinking Alone Under the Moon" (月下獨酌), *Crossing the Yellow River: 300 Poems from the Chinese*, translated by Sam Hamill. Rochester, New York: BOA Editions, 2000, p. 83f
- <sup>67</sup> William Drummond, "The Shadow of Judgement," in *Flowers of Sion*, in *The poetical works of William Drummond of Hawthornden*, edited by L. E. Kastner, Manchester: The University Press, 1913, Vol. 2, p. 59f



- <sup>68</sup> Henry More, *Democritus Platonissans, or an Essay Upon the Infinity of Worlds*, Introduction by P. G. Stanwood. Los Angeles: William Andrews Clark Memorial Library, University of California, 1968, "The Argument," Stanza 26. Np
- <sup>69</sup> Richard Blackmore, "The Creation: A Philosophical Poem in Seven Books," in *The poems of Smith, and Blackmore*. Chiswick: Press of C. Whittingham, 1822, Volume XXVIII, pp. 118, 137, 138
- <sup>70</sup> Walt Whitman, "On the Beach at Night Alone", in *Leaves of Grass*. New York: Doubleday, 1926, p. 220f
- <sup>71</sup> Alfred Noyes, excerpt from "Tycho Brahe", in *The Torch-Bearers: Watchers of the sky*. New York: Fredrick A. Stokes Company, 1922, p. 84f
- <sup>72</sup> T. S. Eliot, excerpt from "Little Gidding", in *Four Quartets*. London: Faber & Faber, 1944. p. 43
- <sup>73</sup> *Selected Poetry of Robinson Jeffers*, Tim Hunt editor, Stanford University Press, 2001, reviewed by Christopher Cokinos as "Images of Inhumanism" in *Science*, 9 November 2001, Vol. 294, No. 5545, pp 128f
- <sup>74</sup> Jocelyn Bell Burnell, "Astronomy and Poetry," in Robert Crawford, ed., *Contemporary poetry and contemporary science*. Oxford: Oxford University Press, 2006
- <sup>75</sup> Gwyneth Lewis, *Zero gravity*. Newcastle upon Tyne: Bloodaxe Books, 1998
- <sup>76</sup> Alfred Worden, *Hello Earth: Greetings from Endeavor*. Los Angeles: Nash Publishing, 1974
- <sup>77</sup> Story Musgrave, "Cosmic Fireflies," *Story Musgrave NASA Astronaut recites poetry*, <<http://www.spacestory.com/poetry.htm>>
- <sup>78</sup> "100 Tanka Poems Selected from 145,000 Entries. Chiaki Mukai presents awards for completion of poetic verses", *Japanese Ministry of Education, Culture, Sports, Science and Technology* <<http://www.mext.go.jp/english/news/1999/01/990106.htm>>. See also, "Discovery Astronaut Writes Tanka Poem," *Space.com*, October 16, 2000  
[http://www.space.com/missionlaunches/missions/sts92\\_wakata\\_poem.html](http://www.space.com/missionlaunches/missions/sts92_wakata_poem.html)
- <sup>79</sup> *Space Poem Chain* [http://iss.jaxa.jp/utiliz/renshi/index\\_e.html](http://iss.jaxa.jp/utiliz/renshi/index_e.html)
- <sup>80</sup> Personal communication from Tsutomu Yamanaka, January 26, 2008
- <sup>81</sup> Marshall Sahlins, *Stone Age economics*. Chicago, Aldine-Atherton, 1972
- <sup>82</sup> Jack Goody, *The domestication of the savage mind*. New York: Cambridge University Press, 1977
- <sup>83</sup> Jack Goody, *The logic of writing and the organization of society*. New York: Cambridge University Press, 1986; Jack Goody, *The power of the written tradition*. Washington: Smithsonian Institution Press. 2000; Eric Havelock, *The muse learns to write: reflections on orality and literacy from antiquity to the present*. New Haven: Yale University Press, 1986
- <sup>84</sup> John Morieson, "The Astronomy of the Boorong". World Archaeological Congress, Washington D.C. June 2003 <[http://bdas.fastmail.fm/astronomers/JohnMorieson/documents/World\\_Archaeological\\_Congress.pdf](http://bdas.fastmail.fm/astronomers/JohnMorieson/documents/World_Archaeological_Congress.pdf)>; Roslynn D. Haynes, "Astronomy and the Dreaming: The Astronomy of the Aboriginal Australians," Helaine Selin, editor. *Astronomy Across Cultures: The history of non-western astronomy*. Boston: Kluwer Academic Publishers, 2000, pp. 53-90
- <sup>85</sup> Francesca Rochberg, *The heavenly writing: Divination, horoscopy, and astronomy in Mesopotamian culture*. New York: Cambridge University Press, 2004; Clive Ruggles, *Ancient astronomy: An encyclopedia of cosmologies and myth*. Santa Barbara, Calif.: ABC-CLIO, 2005
- <sup>86</sup> Roberta J. M. Olson, "...And They Saw Stars: Renaissance Representations of Comets and Pretelescopic Astronomy". *Art Journal*, Vol. 44, No. 3 (Autumn, 1984), pp. 216-224
- <sup>87</sup> Based on Ronald Brashear and Daniel Lewis, *Star Struck: One thousand years of art and science of astronomy*. University of Washington Press, 2001; Eileen Reeves, *Painting the heavens: Art and science in the age of Galileo*. Princeton University Press, 1997; David A. Hardy, ed., *Visions of space: Artists journey through the cosmos*. Limsfield ; New York: Paper Tiger, 1989; International Association of Astronomical Artists <<http://www.iaaa.org>>; History of space art <<http://www.artscatalyst.org/projects/space/spacearthistory.html>>; Space Art <<http://www.hobbyspace.com/Art/art2.html>>; Ars Astronautica <<http://www.arsastronautica.com/>>; Art Technologies <<http://www.arttechnologies.com/site-2005/links.html>>; Leonardo Space Art Project Working group <<http://spaceart.org/leonardo/vision.html>>; Astrona--Space and Astronomical Art Journal <<http://astrona.blogspot.com>>; Spacearts--The Space Art Database <<http://www.spacearts.info/en/info/index.php>>; Ayako Ono's Space Art <[http://www.geocities.jp/cosmo21art/osa/whatsnew\\_e.html](http://www.geocities.jp/cosmo21art/osa/whatsnew_e.html)>; Arthur Woods, "From Cyberspace to Outerspace" (2001) <<http://space-dreams.com>>; Frank Pietronigro: Space Artist (2008) <<http://www.pietronigro.com>>; Roger F. Malina, "Space Art Definition" Space art projects at Art Technologies <<http://www.arttechnologies.com/site-2005/space-art.html>>; Roger F. Malina, "In defense of space art: The role of the artist in space exploration," in D.L. Crawford, ed., *IAU Colloquium* Vol. 17,112, 1991, p. 145
- <sup>88</sup> Space Art Hall of Fame <<http://www.iaaa.org/gallery/rudaux/>>

- <sup>89</sup> Some other early modern space artists were Jack Coggins, Dan Beard, Scriven Bolten, Paul Hardy, Mel Hunter, Theophile Moreau, and Charles Schneeman.
- <sup>90</sup> William K. Hartmann, Andrei Sokilov, Ron Miller and Vitaly Myagkov, eds., *In the stream of the stars: The Soviet/American space art book*. New York: Workman Publishing, 1990, p. 36, 37, 41; Mayo Graham, "Nineteenth-century America: the New Frontiers," in Jean Clair, ed., *Cosmos: From Romanticism to the Avant-garde*. Montreal Museum of Fine Arts, 1999, pp. 68-84; Jean Clair, "From Humboldt to Hubble," in Jean Clair, ed., *Cosmos: From Romanticism to the Avant-garde*. Montreal Museum of Fine Arts, 1999, pp. 25-27
- <sup>91</sup> Many people are associated with this kind of space art and illustrations, among the best known being Ralph Andrew, Beth Avary, Michael Carroll, Geoffrey Chandler, Jack Coggins, Vincent Di Fate, Paul DiMare, Don Davis, Don Dixon, Frederick Durant III, Bob Eggleton, Frank Germain, Joel Hagen, David Hardy, William Hartmann, Paul Hudson, Mel Hunter, John Foster, MariLynn Flynn, Robert Kline, Jon Lomberg, Pamela Lee, Robert McCall, Ron Miller, Larry Ortiz, Ludek Pesek, and Kim Poor
- <sup>92</sup> Konstantin E. Tsiolkovsky, State Museum of the History of Cosmonautics <<http://www.informatics.org/museum/>>; Ben Finney, "The Cosmicization of Humanity" in A. Houston and M. Rycroft, Editors, *Keys to space: An interdisciplinary approach to space studies*. New York: McGraw-Hill, 1999. Chapter 19.3, pp. 19-18 to 19-26
- <sup>93</sup> Igor Kazus, "The idea of Cosmic Architecture and the Russian Avant-garde of the early Twentieth Century," in Jean Clair, ed., *Cosmos: From Romanticism to the Avant-garde*. Montreal Museum of Fine Arts, 1999, pp. 194-217; also Vitaly Myagkov, "Soviet space art," in William K. Hartmann, Andrei Sokilov, Ron Miller and Vitaly Myagkov, eds., *In the stream of the stars: The Soviet/American space art book*. New York: Workman Publishing, 1990, pp. 54-77
- <sup>94</sup> Paul Rincon, "Hubble pics 'like romantic art'", [news.bbc.co.uk/2/hi/science/nature/4278949](http://news.bbc.co.uk/2/hi/science/nature/4278949)>. Also, Jerry Lodriguss, "Catching the Light: Astrophotography" <[www.astropix.com](http://www.astropix.com)>; Gabriel Gache, "Hubble space telescope: Science Meets Art," [news.softpedia.com/news/Hubble-Space-Telescope-Science-Meets\\_art-80553.shtml](http://news.softpedia.com/news/Hubble-Space-Telescope-Science-Meets_art-80553.shtml)>; HubbleSite <[hubblesite.org](http://hubblesite.org)>
- <sup>95</sup> Didier Ottinger, "Contemporary Cosmologies," in Jean Clair, ed., *Cosmos: From Romanticism to the Avant-garde*. Montreal Museum of Fine Arts, 1999, p. 285
- <sup>96</sup> Space Place, "Moon Museum" <<http://www.orbit.zkm.de/?q=node/148>>
- <sup>97</sup> Robert Horvitz, "Art into Space," *Whole Earth Review*, Issue 48, Fall 1985, pp. 26-31 and <<http://www.volny.cz/rhorvitz/Artspace.html>>
- <sup>98</sup> Space Place, "Richard Kriesche" <<http://www.orbit.zkm.de/?q=node/268>>
- <sup>99</sup> Space Place, "Andora, Photon Rockets" <<http://www.orbit.zkm.de/?q=node/404>>
- <sup>100</sup> Arthur Woods, "Cosmic dancer: A space art intervention on the Mir space station," (1993-2008) <<http://www.cosmicdancer.com>>
- <sup>101</sup> Richard Garriott, a highly successful game developer and son of Owen Garriott, a former NASA astronaut on both Skylab and Spacelab-1, flew on the Soyuz TMA-12 spacecraft from Star City, Russia, as a private customer of Space Adventures in partnership with Zero Gravity Art Inc., to the International Space Station in October 2008. There, he both created art while in space and exhibited specially-commissioned art from Steve Jenson, Drue Kataoka, Greg Mort, John Matthew Riva, Melinda Fager, and Stanley Goldstein. <[www.richardinspace.com](http://www.richardinspace.com)> and Press release, October 21, 2008, Challenger Center for Space Science Education <[www.spaceref.com/news/viewpr.html?pid=26757](http://www.spaceref.com/news/viewpr.html?pid=26757)>
- <sup>102</sup> Hartman, *op. cit.*, 182
- <sup>103</sup> *Ibid.*, 176. Among the Russians best known for space illustrations and art are Vladimir Arepiev, Nadezhda Devisheva, Victor Dubrovin, Rafik Karaev, Peter Kovalev and Olga Kovaleva, Alexei Leonov, Josef Minsky, Vitaly Myagkov, Boris Okorokov, Galina Pisarevskaya, Yuri Pochodaev, Andrei Sokolov, Andrei Surovtsev, Anatoly Veselov.
- <sup>104</sup> Alan Bean, "An Artist on the Moon" William K. Hartmann, Andrei Sokilov, Ron Miller and Vitaly Myagkov, eds., *In the stream of the stars: The Soviet/American space art book*. New York: Workman Publishing, 1990, p. 116
- <sup>105</sup> Ottinger, *op. cit.*, 282f
- <sup>106</sup> *Ibid.*, 284
- <sup>107</sup> *Ibid.*, 286
- <sup>108</sup> Roger Malina offers a seven point definition of space art in Roger F. Malina, "Space Art Definition" Space art projects at Art Technologies <<http://www.arttechnologies.com/site-2005/space-art.html>>, while William Hartmann says that contemporary space art plays four roles: By inspiration; by conveying a sense of history by recording actual events and scientific knowledge of the past; by directing society towards the future; and by bridging the alleged gap between "the two cultures" of art and science. "Or, rather, they see no gap" (Hartmann, *op. cit.*, pp. 134-139).

- <sup>109</sup> The Arts Catalyst, "History of Space Art" <<http://www.artscatalyst.org/projects/space/spacearthistory.html>>; Dragan Zivadinov "Zero Gravity Biomechanical Theater", 1999 <<http://www.orbit.zkm.de/?q=node/271>>; Colin Fries, "Sports milestones in space," *Quest*, Vol. 10, No. 2, April 2003; Eduardo Kac, "Against Gravitropism: Art and the joys of levitation," 2005 <<http://www.ekac.org/levitation.html>>
- <sup>110</sup> Based on Andrew Fraknoi, "The music of the spheres: Astronomical sources of musical inspirations," *Mercury*, Vol. 6, No. 3, May-June 1977, pp. 15-19; Andrew Fraknoi, "More music of the spheres: Further astronomical sources of musical inspiration," *Mercury*, Vol. 7, No. 6, November-December 1979, pp. 129-132; Andrew Fraknoi, "The music of the spheres in education: Using astronomically inspired music in education," *Astronomy Education Review*, Vol. 5, No. 1, April 2006-November 2007 <<http://aer.noao.edu/cgi-bin/article.pl?id=193>>; Space Music <<http://www.hobbyspace.com/Music/>>; Space Music, "Yuri's night radio!" <http://www.yurisnight.net/music/>
- <sup>111</sup> Colin Ronan, "Music of the spheres," *Interdisciplinary Science Reviews*, Vol. 1, No. 2, 1976, p. 156; Bruce Stephenson, *The music of the heavens: Kepler's harmonic astronomy*. Princeton University Press, 1994; Philip Ball, "Science and Music," *Nature*. Vol. 453, May 8, 2008, pp. 160-162
- <sup>112</sup> *Ibid.*, p. 151
- <sup>113</sup> Colin Ronan, "William Herschel and his music," *Sky and Telescope*, May 1981, 195-204
- <sup>114</sup> Andrew Fraknoi, "More music...", p. 132; Felix Lowe, "Brian May, Queen legend, hands in star thesis," <<http://www.telegraph.co.uk/news/main.jhtml?xml=/news/2007/08/03/nmay103.xml>>
- <sup>115</sup> Andrew Fraknoi, "The music of the spheres in education...", pp. 2 and 6-10
- <sup>116</sup> Gustav Holst, *The Planets*, Simon Rattle <[http://ecards.emiclassics.co.uk/planets/rattle\\_planets1.swf](http://ecards.emiclassics.co.uk/planets/rattle_planets1.swf)>
- <sup>117</sup> John Rodgers and Willie Ruff, "Kepler's Harmony of the World: A realization for the ear," *American Scientist* Vol. 67, No. 3, 1979 pp. 286-292
- <sup>118</sup> In addition to Hindemith, some of the most famous and influential composers of the 20<sup>th</sup> century produced pieces inspired by astronomy, space, scientists, and scientific discoveries, including Oliver Messiaen, *Visions de l'Amen* (1943) and *Des Canyons aux Etoiles* (1974); John Cage, *Atlas Ecipticalis* (1961); Toru Takemitsu, *Corona* (1962), *Orion and Pleiades* (1964), *Asterism* (1967) and *Cassiopeia* (1971); David Bedford, *A Dream of the Seven Lost Stars* (1965), *Tentacles Of The Dark Nebula* (1969), *Music For Albion Moonlight* (1970), *The Sword of Orion* (1970), *Some Stars Above Magnitude 2.9* (1971), *Star Clusters Nebulae And Places In Devon* (1974), *Ocean Star a Dreaming Song* (1981), *Of Stars Dreams and Cymbals* (1982), and *An Island in the Moon* (1986); Alan Hovhannes, *Symphony No. 19, Vishnu* (1966), *Saturn* (1971), *Celestial Canticle* (1977), *Star Dawn* (1983); George Crumb, *Night of the Four Moons* (1969), *Makrokosmos I, II, III, IV* (1971-2), and *Star-child* (1977); Karlheinz Stockhausen, *Ylem* (1972) and *Sirius* (1976); Leo Smit and Fred Hoyle, *Copernicus* (1973); and Philip Glass, *Einstein on the Beach* (1976), *Orion* (1983), and *Galileo Galilei* (2002).  
At least one person who has written about contemporary serious space music expressed very openly his personal dislike for it, saying it is "not my cup of tea" and disparaging what he terms the "stunts" of John Cage (Andrew Fraknoi, "The music of the spheres in education," p. 2). Cage was arguably the most influential serious musician of the mid 20<sup>th</sup> century. Fraknoi's judgments seem strange for a scholar who should know full well that most musical forms--as well as most scientific ideas--were roundly rejected when they were first presented, and only later were embraced as "beautiful" or "obvious."
- <sup>119</sup> Colin Fries, "Flying for us: Space age milestones celebrated in music," *Quest*, Vol. 9., No. 3, 2002, pp. 30-36; Colin Fries, "Space Pioneers remembered in song," *Space.com* August 21, 2000 <[http://www.space.com/news/spacehistory/space\\_songs\\_side\\_000822.html](http://www.space.com/news/spacehistory/space_songs_side_000822.html)>
- <sup>120</sup> Space Music <<http://www.hobbyspace.com/Music/>>; Space Music, "Yuri's night radio!" <<http://www.yurisnight.net/music/>>; U.S. Centennial of Flight Commission, "Aviation and Space Music" <<http://www.centennialofflight.gov/essay/Social/music/SH16.htm>>
- <sup>121</sup> Some favorites produced by major popular artists include *Countdown Time in Outer Space* (1961), The Dave Brubeck Quartet; *Space Cowboy* (1969), Steve Miller Band; *Space Oddity* (1969), *Ashes to Ashes* (1980), and *I Took a Trip on a Gemini Spacecraft* (2002), David Bowie; *Moondance* (1970), Van Morrison; *Blows against the Empire* (1970), Jefferson Starship [This is my personal favorite and was nominated for a science fiction Hugo Award]; *Rocket Man* (1970), Pearls Before Swine, and *Rocket Man* (1972), Elton John, were both inspired by a Ray Bradbury short story; *Astronaut Food*, from "The Miraculous Hump Returns from the Moon" (1971), Sopwith Camel; *Dark Side of the Moon* (1973) [one of the most popular albums of any kind ever produced], Pink Floyd; *Revenge of Vera Gemini* and *E. T. I.* (1976), Blue Oyster Cult; *Moon Maiden* (1977), Duke Ellington; *Cygnus X-1* (1977) and *Cygnus X-1, Book II* (1978), Rush; *Hello Earth* (1985), Kate Bush; *Standing on the Moon* (1989), The Grateful Dead; *Space Patrol, UFO, and Southern Cross* (1992), Country Joe McDonald; *C. T. A. 102* (1996), The Byrds.
- <sup>122</sup> Apollo Vignette (aka Colin Fries), "A hit or a myth: Critiques of the space race in popular recordings," *Quest*, Vol. 13, No. 4, November 2006, pp. 15-24
- <sup>123</sup> Oh Word: Hip-hop in its purist form <[www.ohword.com](http://www.ohword.com)> and supported by the blog of Isamu Jordon <[www.spokane7.com](http://www.spokane7.com)>

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- <sup>124</sup> Outer Space <[www.wordsound.com/outerspace.html](http://www.wordsound.com/outerspace.html)>
- <sup>125</sup> Kenna: Urban music goes to outer space <[http://findarticles.com/p/articles/mi\\_m1285/is\\_3\\_32/ai\\_84237662](http://findarticles.com/p/articles/mi_m1285/is_3_32/ai_84237662)>
- <sup>126</sup> Jamaal Abdul-Alim, "Outer space as a muse: Rappers such as Rakim lace lyrics with intergalactic themes, " *Milwaukee Journal Sentinel* May 7, 2001  
<<http://www2.jsonline.com:80/news/metro/may01/spacejam08050701a.asp>>
- <sup>127</sup> BEAUTIFULLEST MUTHASHIP <[ohwordspacerap.blogspot.com/search/label/nasa](http://ohwordspacerap.blogspot.com/search/label/nasa)>
- <sup>128</sup> Roger Launius, "Got Filk?" *Quest*, Vol. 12, No. 4, October 2005, pp. 6-14
- <sup>129</sup> "The Cruise of the Vostok," *Time*, Friday, Apr. 21, 1961
- <sup>130</sup> Sandy Schwoebel, "First flutist in space; An interview with Ellen Ochoa," *The Flutist Quarterly*, Vol 19, No. 1, October 1993, p. 14
- <sup>131</sup> Colin Fries, "Traditions of the space age," *Quest*, Vol. 11, No. 1, January 2004, pp. 31-39; Karen Miller, "Space Station Music" <[http://science.nasa.gov/headlines/y2003/04sep\\_music.htm?list1003452](http://science.nasa.gov/headlines/y2003/04sep_music.htm?list1003452)>
- <sup>132</sup> Jet Propulsion Laboratory, Voyager: The Interstellar Mission, "Golden Record" <<http://voyager.jpl.nasa.gov/spaceraft/goldenrec.html>>
- <sup>133</sup> ESA, Cassini-Huygens, "Rock 'n' Roll is out of this world!" <[http://www.esa.int/esaMI/Cassini-Huygens/SEMJBDXEM4E\\_0.html](http://www.esa.int/esaMI/Cassini-Huygens/SEMJBDXEM4E_0.html)>