

ART, DESIGN AND METAMORPHOSIS IN OUTER SPACE

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- Key words: -

Space art, Space design, Space anthropology, Extreme design, Metamorphosis.

- Summary -

In outer Space habitats the human body undergoes physical adaptations to the microgravitational conditions. As a basis of extreme design human adaptation and stress factors have to be considered from the first step of the Space habitat project, with a multidisciplinary approach, that included art, design to enhance living conditions. This discipline can be connected with natural design philosophy: "The beauty of life should be guaranteed in particular for inhabitants of extreme environments that dedicate their life for the love of planet and science".

EXTREME DESIGN

"Psychological, social, technical and mission-related aspects which are closely connected to the habitat architecture are further amplified in isolated and confined environments and can endanger the whole mission. An incorporation of these issues into the design, stressors can be decreased or eliminated." (Aguzzi et al., 2006, p.4)

Extreme design is a discipline that incorporates and connects multidisciplinary topics from the early phase of the project with the aim to create the basis of the mental and physical well being in the extreme environment as in Space.

It considers mainly: anthropology, architecture, art, communication, design, ergonomics, philosophy, physics, physiology, proxemics, psychology and semiotics applied to the extreme environment.

- Space Design: it "contribute to the process of improving living and working conditions in space, considering -at the design stage- all the human factors that are indispensable for creating a "personnel-friendly" environment: it must be comfortable, pleasant and efficient" (Dominoni, A., 2002, p.65)

- Space Psychology: It includes basic issues of human adaptation to the extreme conditions in space as well as operational issues of selection, training, and support of astronauts." (Manzey, 6.2007, courtesy personal communication)
- Space Art: "Contemporary art which relies on space activity for its implementation" (Malina, R., 2002), it interacts with the feeling of the habitants, increasing the well-being. It can concern Art Therapy and *Relational Aesthetic (1)* application.
- Space Anthropology: study of "exaptation" in Space (Latin: *ex* and *aptus*): potentialities, or archetypes, pre-existing in the human species, that allow the physical and cultural adaptability to Space, as an aspect of the ongoing human evolution and cultural development (Ferrino M., 2004; Masali M. et al. 2005).

Extreme design can utilize a natural design philosophy:

- Natural Design: "project based on natural elements" to create "context of art and design interaction that will increase the psycho-physiological well-being."

There are two main philosophies about it; one presupposes to "use the local elements present in the environment"; the other presupposes the recreation of natural element: evoking natural structure or stimuli (as "variety and the variability of terrestrial stimuli"). (Ono et al. 2007)

(1) Relational Aesthetic is an art movement identified by Nicolas Bourriaud (2002), a French philosopher, as "a set of artistic practices which take as their theoretical and practical point of departure the whole of human relations and their social context, rather than an independent and private space."

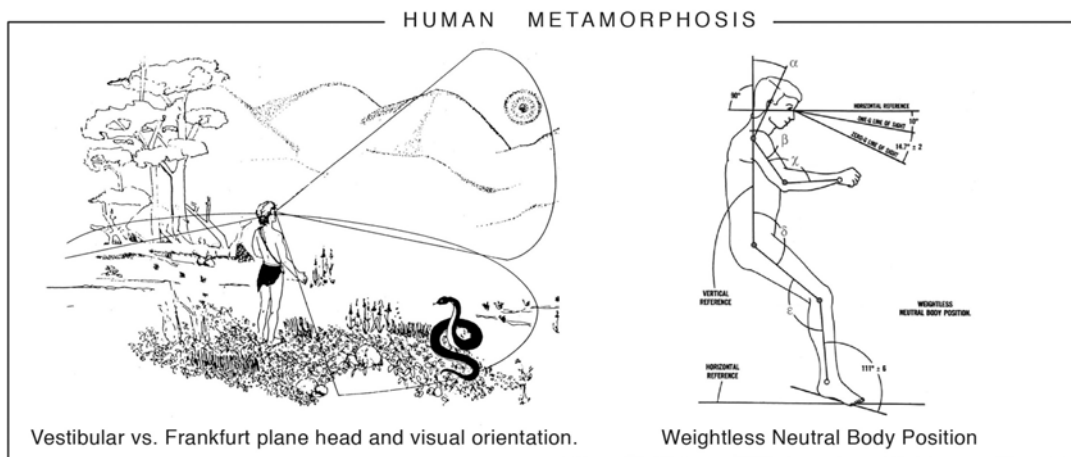


Image 1 Human Metamorphosis

SPACE METAMORPHOSIS

Artificial Metamorphosis or Natural adaptation?

Man is adaptable: as the human's nature is to be adaptive to live everywhere, human bodies themselves undergo metamorphoses (society relationships, body adaptation...) when living in *altered environmental conditions* (2).

In space individual physiological changes are possible such as the body "neutral posture" considers in 0 gravity ergonomics, but we cannot take as an example of anthropological adaptation to space the decalcification of bones and the reduction of muscles, because the consequence will be simply illness, malformation and body decay, not adaptation!. However as considers from *Natural Design* (3), the best conditions for human is the mother earth at which he is conformed after million of years of adaptation. Living with out variability of natural stimuli, characterized of the earth environment, it affect on our productivity and state. "Art and Design can be the imperfections, the "human elements" that improve the perfect artificial and aseptic environments" (courtesy personal communication, Wysocki, 2007).

Of course, from this point of view Art and Design requires an extensive appraisal even when someone, in the Space business, states that: "whatever the life conditions will look like, we will always find volunteers that want to go in the Space", Nevertheless today these arguments have to be, providentially, re-evaluated: "motivations may be different from pure bravery and this is a strong argument for real Design, spirit not simply Engineering!"

(2) Sometimes bio-cultural changes are possible also in short micro evolutionary times such as altitude (Sherpa, "Andine peoples") or cold (Inuit) adaptation.

(3) "In context as Space habitants humans are confronted with a 100% artificial environment. Natural Design; by relaying on shapes, structure and proportions (ex. "Golden Ratio") from nature, can create an environment which would help the habitants to work, live, communicate in subjective, ergonomic and comfortable way".



Image 2 Space Anthropology

HABITAT DESIGN

In the habitat space design “the more common disrupters are problems associated with interior space, food, hygiene, temperature, decor, lighting, odour, noise” and in particular privacy and orientation (Connors, 2004, Chap. 2-3). To configure those elements we have to consider first of all the human metamorphosis that undergo in the Space environment. The narrow space, the confinement, the microgravity, the stress are all factor with psycho-physiological repercussions that act in sense perception and as a consequence, in the perception of the reality. Russian experiments on the use of unfamiliar music in confinement environment conclude that it cans “causing ecstasy” effect (Zarakovskiy and Rysakova, as reported in Leonov and Lebedev, 1975, p.162, as cited in Connors, 2004, Chap. 3-2). The majority of astronauts recognise difference in taste preferences and perceptions. The fluctuation condition has repercussion on the configuration of the space: also the ceiling can be utilised as functional surfaces, however as need of the astronauts we must create reference for the up and down orientation.

The vision is the primal element for the reality perception and in particular in Space, as state from Mallove (1991) ‘people suppress vestibular signals and become increasingly dependent on vision to perceive motion and orientation’, (Mallove, 1991). “Because of the importance of vision to the conduct of space missions”, we should consider first of all the “mutamorphosys” visual capabilities (Cooper, 1963; O’Lone, 1965; Berry, 1970, as cited in Connors, 2004, Chap. 2-4).

Visual modification occurring in:

- Angle of vision, caused from microgravitational neutral posture (similar to the fetal posture)
- Myopia, caused from the confinement in narrow space.
- Color perception modification, caused from the microgravity conditions.

Variations of artificial and natural light

NATURAL DESIGN APPLICATION

The application of Natural Design has the aim of utilizing natural elements and stimuli. It creates, with elementary natural structure, a context of art and design interaction that will increase well-being in Space context. (Ono, 2006)

The configuration of the Space duelling, in coherence with the Natural Design philosophy, it should guarantee variability and variation factors.

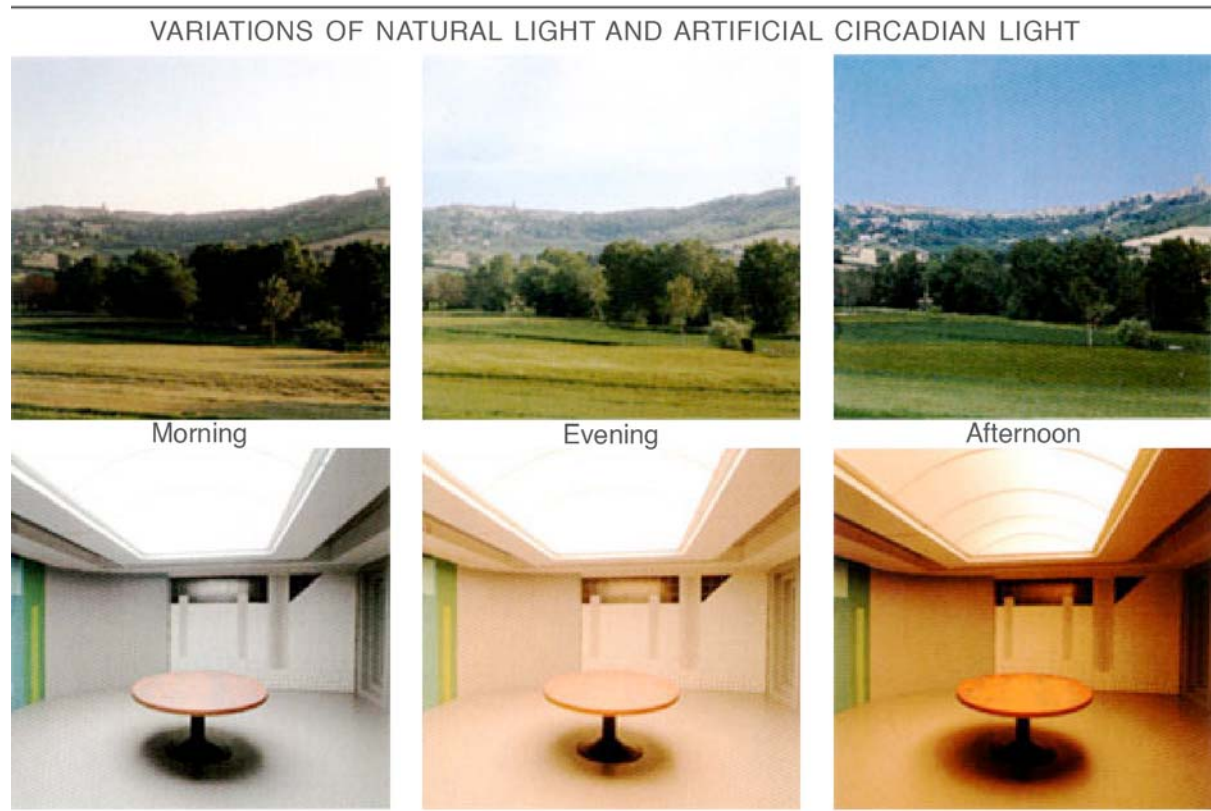


Image 3 *Circadian Light variation*

In the Space duelling, the isolation from natural stimuli variation, it can affect the well-being as the productivity of the astronauts. The application of circadian light, that recreates the same wavelengths

variations present in earth daily cycle, create variation of color perception at which the human been have been adapted for million of years.

In the study of a Spacecraft inflatable for Thales Alcatel Space, to increase the orientation of the space travellers, the color configuration of the interior take in account the instinctive perception of the warm color in the bottom and the warm color in the top. Also the interior décor purposed geometrical shape and sound installation present in the natural earth landscape, to increase the well being in confined space.

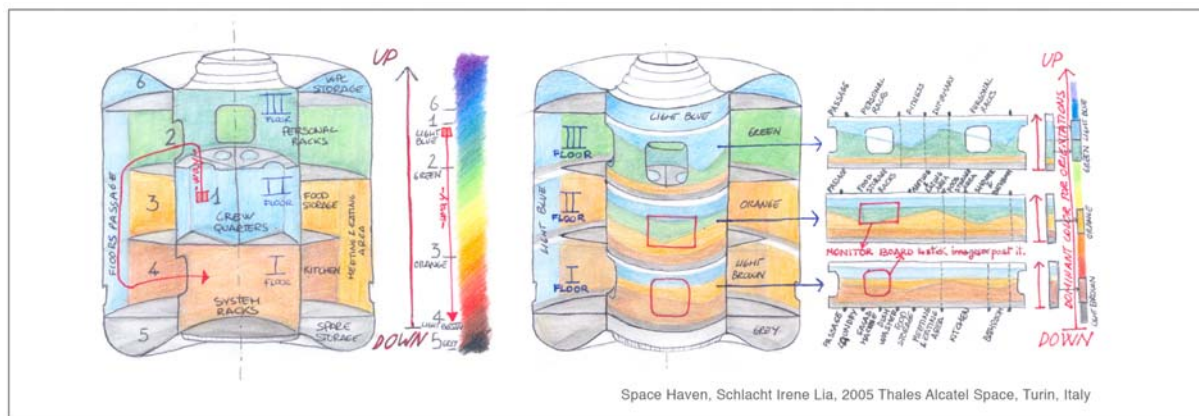


Image 4 Spacehaven color configurations.

Concerning the Space Art, a current study on the cultural application of the Space in the European Space Agency (ESA), purposed the realisation of a Zen Garden on the Moon. “The Lunar Zen Garden composition is an application of the Natural Design methodology. It is based on the evocation of fractal natural structure; however it evokes a tree structure with calming and relaxing effects. The materials are stone and sands (*the “regolith”*) that are locally available materials on the Moon”. (Ono, 2006).

The composition of the Zen garden is cyclical made by the astronauts with a *previous* plan, it create well-being effect related at the art therapy “with application in the relational Aesthetic, however it make in contact group or single individuals trough an artistic experience that can be always different: unpredictable” (Courtesy personal communication, Rubano, 2007).

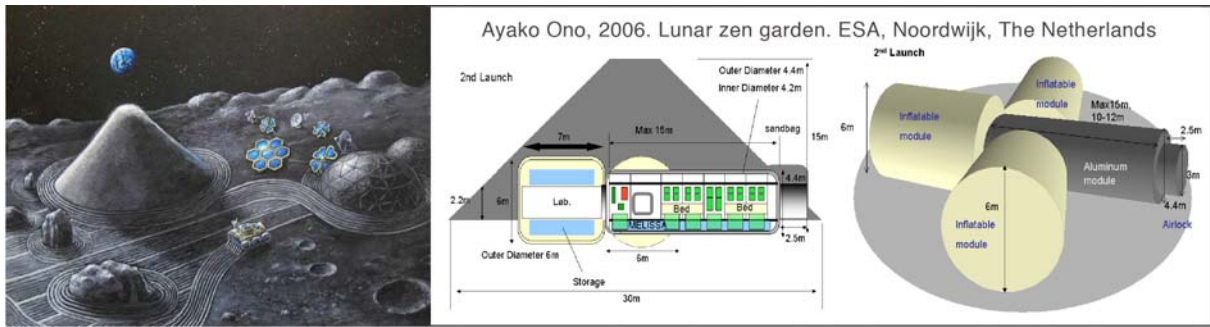


Image 5 Lunar Zen Garden.

CONCLUSION

“We need to feed also the spirits to enhance human productivity!”

To build habitats in extreme context, today we still consider the technological possibility and then the human needs. Humans should not adapt their self at the technology, but is the technology that should be adapt for the human needs.

Before we will be mutate in machine or genetically modified in plants without needs (4), to live in Space we need to feed our soul, to be happy, to cultivate our culture, to reach this objective we have to consider the art, design from the first step of the Space habitat project follow the natural design philosophy.

High motivated scientists, millionaire tourists, military staff, may benefit from accurate environmental design of spacecrafts, to guarantee comfortable conditions and to carry out tasks with the best proficiency and results.

(4) The hypothesis of humans genetically modified, to survive in the space, is already been taken in to account. The idea to send machine instead of man is supported by the cost of the human needs, however the human presence in space is justified to reach the interest of the people, advertising and sponsors.

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IMAGES:

Image 1 Human Metamorphosis. Masali, E. (2000). Turin, Italy.

Image 2 Space Anthropology. Masali, M.; Schlacht, I.L. (2005). All Conference, Genoa, Italy

Image 3 Circadian Light variation. (2006) Circadian light Sivra by I-Guzzini.

Image 4 Spacehaven color configurations. Schlacht, I.L. (2005). Spacehaven color study. Thales Alenia Space, Turin, Italy.

Image 5 Lunar Zen Garden. Ono, A. (2006). ESA, Noordwijk, The Netherlands

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