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THE LEISURE COMPONENT FOR SPACE FLIGHT AND HABITATION

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ABSTRACT

In 1982, the Soviet Union implemented the Group for Psychological Support in order to meet the psychological, sociological and recreational needs of their cosmonauts on extended space missions. In 1985, the Space Human Factors Team was developed by the National Aeronautics and Space Administration (NASA) to address the psychological, architectural and engineering issues of crew performance on American space missions. In order to recognize all the factors in socio/psycho dynamics, and develop a holistic training program for space crews, a leisure component for these extended missions should be included in the United States research projects.

THE LEISURE COMPONENT FOR SPACE FLIGHT AND HABITATION

SPACE EXPLORATION AND TRAVEL

By the end of this decade the National Aeronautics and Space Administration (NASA) will develop a permanently manned space station funded and executed by NASA. The President of the United States will appoint a National Commission on Space to formulate an agenda for the United States Space Program (1). Fare-paying tourists could be boarding the space shuttle for an adventurous journey into the upper atmosphere and a few excitement-packed orbits around the "Blue Planet" (2).

Until now, space travel has for the most part been a short-term endeavor. With our continued technological advances, human beings will be expected to function and carry out their daily operations and existences under a new set of alien conditions.

The safety, comfort and well-being of the space crew and mission specialists will be the true measurements of the success of extended missions. People's performance abilities and flexibilities are valuable on these missions, however, in spite of sophisticated technology, both

the American and Soviet space programs have suffered tragic accidents.

EFFECTS OF SPACE TRAVEL

When I was asked to present a lecture at the New School for Social Research during the 1981 "SPACE WEEK SYMPOSIUM", I chose the topic of "Leisure Counseling: A Career for Space." In preparation for this address, I embarked upon a new frontier for leisure and recreation research.

Leisure, to other than trained leisure and recreation professionals, appears to lose clarity of definition when one tries to describe it in terms of functions. The logical explanation of leisure is difficult unless it is related to a block of time. Therefore, trying to educate the scientific and technological professions as to the multifaceted dimensions of leisure, recreation and therapeutic recreation, as it would relate to space flight and possible habitation, was a difficult task, albeit a vital one.

Prior to developing a proposal for space crew selection criteria and recreation program development, determining human beings' performance capabilities and behaviors in isolated and confined environments (ICE) is necessary. During the 1981 Space Manufacturers' symposium at Princeton University, I interviewed Dr. B. J. Bluth who had presented a paper on the sociological and psychological aspects of space flight, discussing the possibility of a leisure and recreation component for space missions.

Dr. Bluth reported that NASA and U.S. Navy studies have revealed a significant collection of research data on human behavior in isolated and confined environments. From the sealab, submarine and oceanographic studies, crew members disclosed that as the missions progressed, they became more taciturn, depressed, bored and frustrated. Arguments increased, positive moods decreased, physical performance, memory, attentiveness, alertness, concentration and psychomotor skills declined. An increase in communication errors between surface and lab crews, which resulted in irritability and conflicts and arguments over port time, music preference and leisure activities, was reported. As this hostility mounted, insomnia increased and the "buddy system" was abandoned. Members of the crew began to eat, read and listen to music alone, rather than in groups. Both the aforementioned studies and the research from the Skylab and Salyut 6 missions disclosed a slowing of mental functioning, inattentiveness, difficulty in concentrating, boredom and frustration. Privacy was a major issue. There were outbursts of vulgar language, practical jokes and pecking orders.

Violations of personal space was a major complaint from both Salyut 6 and Skylab crews. They had no place to go to be alone and retreat from the rest of the group. Perhaps future architectural considerations could place individual sleeping quarters further apart from the waste management systems (bathrooms) and from recreation and work areas. What still remains unclear is which causes the greater amount of stress: the lack of separate personal space quarters, lack in choice of controlling

the environment (architecture, design, personal belongings), or escaping from interactions.

Another small crew problem is exuberance. Although the crews are highly skilled, trained and disciplined, a nearly tragic accident occured when one crew member on the first mission of Salyut 6 became so exuberant and excited that he decided to take an unauthorized look at earth outside the space station. He did not attach his safety restraint systems and was saved by his colleague just as he found himself being propelled into outer space. This incident was not reported until the Soviet crew returned to Earth.

"Individual predispositions of attitude and motivation can contribute to the development of error and inadequate adaptation in the space environment. Furthermore, the individual is not static, but goes through various phases, some of which may be predicted and others which may develop as a surprise to both the crew and the ground." (4)

Another contributing factor to small crew problems is the constant interrelatedness between the work and social group. The work group, where one is constantly evaluated, is distinct from the family or friendship group, where you can be yourself. The individual believes that he is accepted and wanted for himself in the family/friendship group. In a small, confined, isolated group atmosphere, all daily operations and functions are taking place in the presence of the same group and the two functions that crew members must carry out worker/friend are often incompatible. The 'boss' is always present. This situation is very stressful since survival depends on interdependence. This may be why research found that cosmonauts would not engage in competitive recreation activities with each other (i.e., chess, checkers, darts), but they would welcome the opportunity to play against ground control via two-way video. Soviet Cosmonaut Kovalenok said, "Rest and work are words that have different meanings. To relax in space, you just don't kick up your feet, sip some wine, puff on your favorite cigar or pull out your favorite book. You want to load yourself with work so time goes faster. If not, boredom underscores loneliness which brings on thoughts of aches and pains." (5)

Non-verbal communication difficulties arose due to the physiological body changes which happen in microgravity. Due to our bodies adapting to space too quickly, we are faced with the onset of muscle atrophy, loss of bone calcium and phosphorous and possible cardio-vascular disease. Microgravity causes changes in human metabolisms, biorhythms and endocrine and nervous systems. The body appears to grow two to three inches in height and we assume a hunched position. The fluid in our bodies is no longer pulled by gravitational forces and therefore causes a puffy face and scowl-like expression. Since communicaion depends on both the facial gesture and the verbal mode, the distorted facial expression caused a lack of continuity between the verbal and facial meaning. Many misunderstandings arose between visiting cosmonauts and Salyut 6 crews. As plans are made to be in space for three months at a time at the end of this decade, difficulties with the verbal mode due to language differences among an international crew, and non-verbal conflicts caused by cultural and social differences, and differences in attitudes and

values, could result in ever greater hostility and billigerent interaction problems.

A NEED FOR PLANNED RECREATION

Scheduling was another area of conflict. The Skylab crews felt that they could do a better job if they could arrange parts of the work schedule themselves. Gerald Carr, former U.S. Astronaut, said, "Our preparation for the special longer flights was similar to the Russian's program, though much less formal. We spent a great deal of time together in order to smoke out potential interpersonal problems. Once in space, we tended to work as much as possible. However, we found that we needed leisure time at appropriate intervals. During the Skylab 4 flight, work was mixed into the schedule on our days off. Mid-mission, we insisted on a full day free, and that insistence was later labeled rebellion. Like the Russians, we had our own frustrations with ground support." (6)

The development of the leisure component must reflect the research findings of the structured scheduling that Gerald Carr was referring to. The following is a typical working day schedule on Skylab 4 and Salyut 6 missions.

SALYUT 6		SKYLAB	
2300-0800	sleep	2200-0600	sleep
0800-0930	wake, shave, wash, exercise, breakfast	0600-0800	wake, personal hygiene, housekeeping
0930-1100	begin work, medical check objectives	0800-1200	experiments and system test
1100-1230	work according to schedule	1200-1300	lunch
1230-1500	lunch, rest, recreation objectives	1300-1600	experiments, and system test
1500-1630	work according to schedule	1600-1700	housekeeping
1630-1700	tea break	1700-1800	dinner
1700-1800	work according to schedule	1800-1915	experiments and mission planning
1800-1900	supper	1915-2130	off duty
1900-2300	work according to schedule	2130-2200	personal hygiene

According to this schedule, the Soviets divided the intense, stressful workday with an additional half an hour for recreation (1230-1500) and an additional half an hour for tea break, whereas the American scheduled free time (two and a half hours, 1915-2130) at the end of the day.

Boredom and monotony were experienced during the mandatory and necessary vigorous two hour exercise program that the American crew members had to participate in to prevent the physiological problems of muscle atrophy and possible cardio-vascular disease. (This two hour program, according to the above schedule would have probably taken place between 1915 and 2200). After the Columbia mission, Commander John Young said, "It was like wearing ten overcoats and being wrapped in plastic." The weighted suits provided the necessary gravitational stress that the muscles needed in order to be exercised. Future plans indicate that treadmills, bicycles and other tensioning devices will be used to simulate the earth stresses so that the muscles do not atrophy.

C. Louis Cuccia, engineer with the Ford Aerospace and Commissions Corporation, stated that "one procedure you have to do is keep the men entertained. You can do calisthenics just so much." Recreation activities were engaged in primarily on an individual level. The crews on extended missions universally shared that there was limited group activity. Reading, listening to music and photography were listed as the three main areas of recreation participation.

During the 1982 Space Manufacturers' conference, I posed a question to the two Commanders of the Columbia mission, Crippen and Young. I asked if any leisure or recreation training was offered as part of their extensive training program. Commander Young replied, "They give us weekends off". He then said, "Being up there was recreation and the best pasttime we had was sitting at the window taking pictures".

This may be true for a three to five day mission, but a three month mission, in itself, would not be categorized as recreational.

Recent data revealed that as NASA projects a manned space station in the 1990's a new focus is now being placed on the social sciences. The Soviets have placed a high priority on the psycho-social factors for years and have their Group for Psychological Support devise training techniques to enable crews to cope with problems and stresses generated in space flight. They recognized the importance of leisure and recreation and attempted to provide a number of creative outlets for cosmonauts, including two-way T.V. conversations with friends, relatives and important people. The cosmonauts were given access to T.V. programming, videotapes of films, sports, etc., and the opportunity to play chess with colleagues on the ground. They sent Ivanchencko his guitar and visiting cosmonauts brought fresh fruits and vegetables. The cosmonauts shared that they did use some of these things, especially conversations with friends, but apparently they still preferred to work. Before each mission, the Group teaches the space crews coping techniques for both psychological and physiological stress. Prior to an exercise, crews are given methods for dealing with the stress reaction.

Biofeedback methods are used to relieve the nausea and discomfort felt in microgravity.

A RESEARCH AGENDA

To date, the only use that is currently being made of sociological, psychological techniques and procedures in the United States, is in the area of crew selection. Although astronauts are screened, observed and trained for apparent weaknesses, the noted behavioral changes and outbursts were not predictable.

"People are not infinitely adaptable. They have limits. Systems of organizations are not equally effective in all situations. They have boundaries. From what we already know about small groups in stressful, isolated and dangerous situations, the human factor becomes more and more important as time increases", said Yvonne Clearwater, Director of the Space Human Factors Team. The Space Human Factors Office at Ames Research Center, in Mountain View, California, was formed by NASA. The Habitability Research Group of the Space Human Factors Team addresses psychological, architectual and engineering issues and had begun addressing the correlation between the environment, psychological well-being and performance. The team will first tackle the task of developing architectural and interior-design guidelines based on behavioral research . . . and then turn to social ad psychologcal issues such as crew selection, training and support, organization and management and operations planning (Clearwater, 1985). NASA is also addressing the problem of sensory deprivation through the use of music. These experiments have shown music not only aids concentration, but it relieves tension.

Included in NASA's five year plan are life science studies which will continue to delve into human adjustment to the space environment (both short-term adaptation problems and medical care and health maintenance).

NASA may be receptive to a proposal from the Leisure and Recreation Profession to research our contribution to these studies, if our component reflects how leisure and recreation programs, activites and exercises can reduce stress and enable space workers and travelers to function at maximum potential, despite the alien, isolated and confined environment of space. There are many areas to explore in the contributions of leisure time and recreation participation to space travel. Direct observation and experience of a zero gravity environment is necessary in order to adapt recreation activities to this environment. One way to experience this is at a Space Camp.

Dr. Wernher von Braun, founder of the National Space Institute, conceived the formation of a Space Camp which is a creative learning experience for young people. This program has now expanded to include an adult program as well. (For information: U.S. Space Camp, The Space ad Rocket Center, Tranquility Base, Huntsville, Alabama 35807).

The ordinary laws of bodily motion are suspended in zero gravity: earth furniture is useless, liquids do not pour, objects do not remain stationary unless anchored and people become disoriented. The therapeutic recreation specialist must use evaluative criteria and activity analysis to counteract these environmental difference and promote feelings of intrinsic motivation and perceived freedom, much needed in this alien world.

When leisure activities are used for relaxation and entertainment, they can provide the individual with a reprieve from the effects of acute or chronic stressors, such as those experienced in space travel. Prior to the referral to appropriate activities, the recreation specialist would have to determine, during the initial assessment stages, the individual's socialization interaction pattern. Since it was previously stated that crew members preferred to work so that the time passed quickly, the recreation specialist can guide a creative rechanneling of stress through relaxation techniques, verbal facilitation techniques and recreation activities. The recreation specialist can facilitate the development of awareness of modifying or avoiding destructive behavior through values clarification exercises. Analysis of a potential space traveler's leisure behavior would then be a facet of the initial selection and screening process. Identifying any possible maladaptive behavior and developing a treatment plan to address these behaviors could be a role of the recreation specialist.

The reason we hold leisure in such high esteem, as pointed out by Carr, is that it often provides an experience that we generally cannot find elsewhere. There is a feeling of involvement, yet relaxation. It is an enjoyable experience allowing our primary processes (right brain) to dominate; when this happens we are more receptive to a relaxed state of mind, and to opportunites for free flow, creativity and intuitive insight. This flexibility and creativity may well aid physical and psychologcal survival in space.

Recreation activities are used to minimize role loss resulting from prolonged separation from family, friends and society at large (Clearwater, 1985). Cut off from such connections, people lose affection, social stimulation, and support as well as their usual richness of roles. On earth, an astronaut-geophysicist may also be a wife, mother, and musician. In space, she will only be able to interact as a co-worker within a small work group. There will not only be less social stimulation, but fewer opportunities to receive candid feedback from familiar people or to exercise individual skills and talents, all important for a sense of identity. Leisure and receation have not been addressed by the Space Human Factors Team of NASA. This challenge should be tackled by the specialists in the leisure and recreation profession.

"In the initial phases of space exploration, the space station will be like some remote outpost on Earth - like some polar station, or some desert or underwater or mountain top station - where one completes a tour of duty under circumstances of such monotony that the imagination must be flooded with the aching absences of normal existence." It is difficult to believe that a sense of isolation will not include a functional depression which must in turn diminish effectiveness as one approaches

the moment of rotation out (away from Earth)." (Danto) Providing a library of books and musical tapes may absorb some of the feelings of isolation and boredom for a short while but months of the same books and music will not support the feelings of alienation.

As NASA continues to research the psycho/social factors, it behooves the recreation and leisure profession to submit proposals for research for the adoption of a leisure component for extended space missions and possible habitation. In this way will the recreation and leisure profession contribute to the quality of life in a technological society.

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