

THE PROBLEM OF CREW INTERRELATIONSHIPS
IN INTERNATIONAL SPACE FLIGHTS

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16. Abstract In forming international space crews it is important to consider the person's purposefulness and ability to overcome all hardships and reach the goal. Crews must be united by a common goal, mutual trust, and friendship. This was observed during the Apollo-Soyuz Test Project mission. These crews overcame the language barrier by learning each other's language. Understanding language alone is not enough for mutual understanding. It is important to accept the role of partner and to understand the behavior of others. A group of people on an expedition frequently split into informal subgroups on a personal-relation basis. However, in well-organized groups the formal structure predominates and regulates the informal relationships. Due to problems arising from ideological differences, the selecting process alone is not enough in forming an international crew. It must pass all stages of development long before the mission.			
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By attempting to make space always an arena of peace and cooperation on behalf of the interest of mankind, the Soviet Union is accomplishing in this area wide international relations. Thus, immediately after the launch of the first artificial Earth satellite, joint earth-bound observations of satellites by scientists of many countries and investigations of the upper layers of the atmosphere were organized. After his triumphal space flight, Yu. A. Gagarin stated on April 15, 1961 at a press conference: "We plan to fly a lot, and with confidence, we actually plan to conquer space. We are always happy for the development of science in other countries, and are happy to greet in-space cosmonauts from other countries. We wish them great success in the conquering of space and desire to cooperate with them in the peaceful use of space"¹.

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An important step in the development of international cooperation for the study of space was the signing of the joint agreement between the two leading space powers - the USSR and the USA. The director of NASA, ⁵ E. Fletcher, who visited the Soviet Union in 1974, called international cooperation the "single actual means for achieving such grand ideas as the development of a large space station in a near-earth orbit, a scientific base on the moon and a manned expedition to Mars"². The first step in this program was the joint flight in July, 1975, of the Soyuz and Apollo space ships.

* Numbers in the margin represent pagination in the foreign text.

¹"Pravda", April 16, 1961.

²"Literaturnaya gazeta", September 18, 1974.

In his greetings to the crews of the space ships Soyuz and Apollo, L. I. Brezhnev stated: "From the launch of the first artificial earth satellite and from the first launch of man into space, space has become the area for international cooperation. Detente, positive achievements in Soviet-American relations have provided the conditions for performing the first international space flight. New opportunities are opened for the wide and fruitful development of scientific relations between countries and peoples in the interest of peace and progress for all mankind"³.

International cooperation which began in the area of conquering space makes it possible to predict, that permanent orbital stations being designed, lunar scientific and research bases, interplanetary space ships, planetary bases, i.e. various space capsules, will have people not only of different nationalities but from countries with different social systems. This is why the problem of interrelationships in international space flights is of the utmost importance.

Of course, only on the basis of one experimental flight-- Soyuz-Apollo--it is impossible to make large generalizations concerning the problem of interrelationships in international space flights and to work out any recommendations. However, mankind has considerable experience in the organization of international expeditions, operating in regions of the globe which are accessible only with difficulty. In several respects (the more or less lengthy separation from society, the necessity for people living together as a small, tight group, the joint overcoming of difficulties, the language barrier, etc.) the work of such expeditions is similar to the work of an international crew in a space ship. Therefore, in stating the problem

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³Cf. collection "Rukopozhatiye v kosmose" (Handshake in Space), Moscow, 1975, pp. 10-11.

of crew interrelationships in international space flights, we may use materials relating to the work of arctic and antarctic expeditions, groups of people sailing across the ocean etc.

1. Interpersonal Relationships, Developed in International Scientific Expeditions

When we speak about the work of a group of people, which are separated from society, considerable attention is given to the problem of interpersonal relationships, which are developed between them. These relationships exert great influence on the group's productivity. We shall use several examples to show this. Many antarctic expeditions include people from different countries, who speak different languages. The Soviet scientist, P. D. Astapenko, spend the winter 1958-1959 at the American station "Little America", where there were several scientists from other countries, besides the USA. He writes about this expedition: "One must say, that although there is not a single entity from the scientific point of view in a group of IGY scientists (International Geophysical Year - author), the close daily interrelationships, the common struggle with difficulties, with the severe weather of Antarctica, joined the people, made them friends. I retain the warmest recollections of the interrelationships between the American scientists and polar explorers, who spent the winter in Little America"⁴.

The same (thing) may be said about other international expeditions in the Antarctic. In this respect, great attention is given to the journey of the sail ship "Ra", whose crew included, besides its captain--the Norwegian T. Heyerdahl, a Russian doctor, an American navigator, an Egyptian underwater swimmer, a Mexican anthropologist, a carpenter from Chad (Central

⁴ P. D. Astapenko, "Puteshestviye za tridevyat' zemel'" (Journey to the Other End of the World), Leningrad, 1962, pp. 8-82.

Africa), and Italian Alpinist. One of the tasks of the expedition, as T. Heyerdahl wrote, was to prove that "that which unites mankind is natural and must be encouraged, and, on the contrary, that which divides mankind is artificial and must be surmounted"⁵. Heyerdahl's experiment was successful. The international crew of "Ra" successfully met the challenge presented to it.

However, the history of international scientific expeditions knows of instances when the interrelationships between the participants was destroyed and conflicts developed. Thus, during the return from the North Pole on the dirigible "Italia", the expedition, headed by Admiral U. Nobile, met with a disaster on May 25, 1928. Nine survivors from the original sixteen set up camp--"The Red Tent"--on a drifting ice floe. Two Italian officers, Cappi and Mariano, and the Swedish scientist Malmgrem, setting themselves off from the other members of the expedition, left the camp and decided to set off on foot to the nearest islands. Due to illness, Admiral U. Nobile was to be taken off the island by a Swedish aircraft. The Italian Viglieri was appointed camp leader. Dissension continued among those remaining in the "Red Tent". The Czech scientist, F. Begounek, writes: "As always, Viglieri had an arrogant tone in conversations with me. This tone irritated me, which, apparently, was the reason that Viglieri and I could not find a common language"⁶. And in another place: "Viglieri was the most uneven person, even though he was the one, as camp leader, who should have been the most restrained and should have set an example for the others... His irritation was the greatest in dealing with the two foreigners (the second foreigner on the ice floe was the Swedish pilot Lundborg - author). I avoided meeting with him and conversed with him when only it was unavoidable"⁷.

⁵Quoted from the book of Yu. A. Senkevich, "Na 'Ra' cherez Atlantiku" (Across the Atlantic on the "Ra"), Leningrad, 1972, 1972, p. 6.

⁶F. Begounek, "Tragediya v Ledovitom okeane" (Tragedy in the Arctic Ocean), Moscow, 1962, p. 108.

⁷Id., p. 212

Interrelationships with those similar to oneself is one of the basic necessities for man. As K. Marx noted, even the savage has this requirement. Psychological research shows that man's interrelationship with other people is the most important condition for his psychological development. The significance of this condition is already detected during infancy. The well-known Soviet psychologist, L. S. Vygotskiy, noted that any need of the infant, no matter what it is, gradually becomes his need for another person, for human contact, for interrelationships with him, during the development process⁸.

However, the significance of interrelationships is not limited only to childhood. It is the most important element in man's entire life. Namely, during the interrelationship process (both direct and achieved through contemporary technology) people exchange information, exert some sort of influence on the behavior of each other. The entire spectrum of human emotions forms and develops under conditions of interrelationships; these conditions determine the level of emotional tension; emotional release is achieved in them.

Interrelationships are a necessity, namely because they are requisite conditions in the life and activity of man, and his normal development. A lack of interrelationships often results in disruptions in the psychology of man. This need for interrelationships is especially pronounced when man finds himself in isolation, which is the results of geographical or other factors. Thus in the case of William Willis, who sailed alone in 1957 on the raft "Seven Sisters" from Peru to the Samoan islands (the journey lasted 115 days) we find the following

⁸Cf. "Razvitiye obshcheniya u doshkol'nikov" (The Development of Interrelationships in Pre-School Age Children), Moscow, 1974, concerning the problem of the development of interrelationships in the pre-school age and its influence on the formation of physiological properties of the child.

entry: "...Minutes of suffering are related to solitude, when you are overcome by the awful thought that you are living on the edge of an abyss. Man needs interrelationships with those similar to himself, he needs to be able to talk with someone, to hear human voices... Man is overcome by terror when he is lost in the boundless watery space"⁹. An entry made in the diary by one who was tested in the conditions of experimental solitude, attests to this need for interrelationships: "Many times friends told me, jokingly of course, of the little devil living behind the refrigerator. And literally, one actually often heard some sort of noise behind this refrigerator. In any case, I thought if he were to suddenly come out we would have something to talk about, and I wouldn't mind talking with him".

"The need to say something to each other", according to F. Engels, was conditioned in the process of anthropogenesis by joint working activity. But let us ask the question: what causes this need when direct joint activity is missing? One of the reasons for the need of interrelationships is the fact that man in conversation with others, while relating his thoughts, doubts, experiences, dreams, somehow relates to the opinions (standards) of people from the group to which he belongs. /59

Numerous observations and experimental investigations show that lengthy isolation frequently generates a false, distorted representation about himself and about phenomena occurring in the surrounding world. We shall limit ourselves to an observation under conditions of an anechoic chamber, performed by O. N. Kuznetsov and V. I. Lebedev.

⁹Quotation from the book of V. V. Parin, F. P. Kosmolinskiy, B. A. Dushkova "Kosmicheskaya biologiya i meditsina" (Space Biology and Medicine), Moscow, 1970, p. 126.

During the stay of test subject B in the anechoic chamber we noticed that he devoted much time to note taking, drew something and performed some sort of measurements, the sense of which we could not understand. After completion of the experiment B presented a "scientific work" of 147 pages, containing text, drawings and mathematical calculations. This work was devoted to the "questions of dust". The cause of his performance was a fibre which has fallen out of a strip of carpet in the chamber. Test subject B investigated both the quantity and the paths of distribution, circulation, cycle of dust, the relationship of its accumulation to the time of day, the operation of the fan and other factors. Although this "work" was a collection of naive generalizations and hurried, illogical conclusions, which were formed in the heat of enthusiasm, B was convinced of the great value, the objectivity and the necessity of the work performed by him. After the test subject returned to a normal situation and to his accustomed routine, he adequately evaluated his unusual behavior: within 12 days he didn't even remember the problem of dust, and when reminded of this, showed clear disgust.

The need for interrelationships is especially strongly felt by man in the difficult minutes of his life, when he needs other people's support. We all know that man when he is unhappy most of all does not want to feel alone. "Shared happiness is double happiness, while shared grief is only half grief", as is stated in a popular proverb. It is natural, that the need for advice or for a shared emotional experience can be satisfied in a group of like-thinkers, where man draws not only moral and ethical standards, but also finds the capability of self expression. "The individual man, *as something isolated*", wrote L. Feuerbach, "does not include *human essence in himself*, neither as a *moral*, nor as a *thinking* being. The human essence is present only in interrelationships, in *the unity of man with*

man, in the unity, based only on *the reality of the development of I and You*"¹⁰. Man not only begins to recognize his "I" in the process of interrelationships with others, but, having been created as a personality, he constantly requires interrelationships.

In the monograph of O. N. Kuznetsov and V. I. Lebedev "Psychology and Psychopathology of Loneliness" (Moscow, 1972), a large number of observations is cited, which attests to the fact, that for people who are required for one or another reason to spend considerable time in isolation, changes in the psychological activity begin to occur, which frequently result in psychological illnesses. Spiritual illnesses when there is destruction of interrelationships occur not only under conditions of loneliness, but also as the result of the so-called social isolation. "Social loneliness", very likely, is more terrifying than physical loneliness, because here man, finding himself among people, cannot quench his desire for interrelationships, like the thirsty man in the ocean who cannot drink the salt water. Thus, judging from the contents of the book by E. Bishon, one member of the international crew - the Chilean Juanito in his first journey across the Atlantic on the raft "Taiti-Nau I" found himself in the position of being an "outcast". A pig called Panchita, living in a cage on the raft, becomes his 60 "friend". On March 25, 1957 E. Bishon notes in his diary: "Today after noon Juanito, for some unknown reason, locks himself in the galley, and comes out only to say something to Panchita. Probably, he is sharing his emotional experiences with her"¹¹. During the second expedition on the raft "Taiti-Nui II" Juanito refused to stand watch due to social isolation and conflicts. But this was not the end of the affair. On one of the days of

¹⁰ L. Feuerbach, "Izbrannyye filosofskiye proizvedeniya", (Selected Philosophical Works), Moscow, Vol. I, p. 203.

¹¹ E. de Bishon, "Taiti-Nau I", Leningrad, 1966, pp. 154-155.

the journey he grabbed an axe and started cutting the bowsprit lashings. When one of the crew members approached him and asked what he intended to do with the cut logs, Juanito answered that he "had decided to construct a raft and head out alone". During the attempt to explain to him that he did not have the right to act on his own, not taking into account the safety of the remaining crew members, he began to wave the axe in a threatening manner, and then let loose with a stream of unconnected sentences: "I am going to construct a raft for myself, whether you like it or not... I can't go on... listen.. this is the end... you don't understand this"¹².

We shall add, that even if Juanito had succeeded in outfitting this tiny raft, for which he had received E. Bishon's permission, he certainly would have perished. But loneliness among the boundless waves of the oceans seemed preferable to his sick mind than loneliness among people.

2. The Significance of a Common Goal for the Successful Inter-Relationships of Members of Scientific Expeditions

The outstanding Soviet educationalist A. S. Makarenko wrote: "I am convinced that if the group has no goal it is impossible to find the means for its organization"¹³. This position is entirely backed by analysis of the interrelationships between members of various expeditions operating under extreme conditions. Yu. A. Senkevich wrote the following about the significance of a common goal for unit of the crew and for successful interrelationships: "If it even seemed to some of us that it is getting pretty bad with 'friendship and cooperation' on 'Ra-I', the centripetal

¹²B. Daniel'son, "Bol'shoy risk" (The Great Risk), Moscow, 1962, p. 129.

¹³A. S. Makarenko, "Kollektiv i vospitaniye lichnosti" (The Group and the Education of Personality), Moscow, 1972, p. 84.

forces in our group all the same were stronger than the centrifugal forces. What united us? First of all, of course, was the unity in our goal. The goal at first was elementary: to get there, to prove to yourself and to others that you are a real man, to get some praise..."¹⁴.

So that the efficiency of the group was greatest, each participant had to clearly recognize the social value, both of his actions and the actions of his comrades, the actions of the entire group as a whole. In overcoming the unavoidable difficulties and making the inevitable sacrifices, the man must know in whose name he is performing this. The greater the prestige of the task, the more the group will do to accomplish it.

The crews of the space ships Soyuz and Apollo were faced not only with the common task of performing joint experiments in space study, but also with the task of demonstrating to the whole world, that two great powers with different social systems can successfully work together. The General Secretary of the CC CPSU, L. I. Brezhnev, wrote in his message to the President of the United States, Gerald Ford: "The flight of the ships Soyuz and Apollo has historic significance as a symbol of the process taking place for detente in international relations and the improvement in Soviet-American relations on the basis of the principles of peaceful coexistence. At the same time it is a practical contribution to the cause of further development of mutually beneficial cooperation between the USSR and the USA in the interests of the peoples of both countries, in the interests of peace on earth"¹⁵.

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¹⁴ Yu. A. Senkevich, "Na 'Ra' cherez Atlantiku" (Across the Atlantic on the "Ra"), p. 102.

¹⁵ Collection "Rukopozhatiye v kosmose" (Handshake in Space), p. 22

The joint flight of the ships Soyuz and Apollo demonstrated what opportunities are opened by cooperation in scientific investigations of space. It is evident that the selection of crews for space expeditions is a task of great importance. The international crew of space ships must be a union of like-minded people, united and inspired by the consciousness of the task to be performed, by the goal, "admitted to the heart".

One of the most important goals, driving people during the conquering of space, is the thirst for knowledge. Man's thirst for knowledge is always related to certain feelings. V. I. Lenin wrote: "...Without 'human emotions' there has never been, there is not and there cannot be human *search* for truth"¹⁶. Many people's striving for knowledge changes into passion. The idea generating passion begins to dominate in the consciousness of the personality. It captures the entire person and subjugates all his thoughts and actions to itself. All capabilities of man, possessed by passion, his will, knowledge and thoughts are directed to achieving the goal. Due to the lengthy domination of an emotionally colored idea, paths are so to speak closed for the penetration of other ideas and thoughts into man's consciousness. It is difficult to imagine as passionless the Italian, Giordano Bruno, who in the name of truth ascended the bonfire of the inquisition, or N. I. Kibal'chich, who, condemned to death, continued to work on the design of a flying jet device, or K. E. Tsiolkovskiy, who, not having specialized education nor the means for research, and subjected to the mockery of people around him, laid the foundations for rocket construction.

It is without doubt, that during the setting-up of crews for international space ships, orbital stations and planetary bases it will be necessary to take into account the purposefulness

¹⁶V. I. Lenin "Poln. sobr. soch." (Complete Collection of Works), Vol. 25, p. 112.

of man, his passion, capability of overcoming difficulties, occurring on the way to achieving the set goal. V. M. Komarov is the example of such a man among Soviet cosmonauts. Dreaming from his early age of flying, he became a pilot. Then, later believing there was little chance of success, V. Komarov made an application to become a cosmonaut. However, fate was not entirely in his favor: soon he was in the hospital, underwent an operation, the results of which place in doubt his further preparation for space flights. An unusual persistence was required not only to return to training within six months after the operation and to catch up with his comrades--he had also to convince the doctors that he was able to return to his unit. The leader of the cosmonaut detachment, Ye. A. Karpov, wrote about Komarov: "He visited several leading Army specialists. The senior chiefs received him. Everywhere he proved himself. They phoned me. It seemed that Vladimir subdued the chiefs and medical specialists by his impassioned aspiration for the goal. His comrades interceded for him. They asked, proved and convinced: Vladimir has to remain in the group. The decision was: to see how he holds up in training"¹⁷.

In five months Komarov became a valuable pilot-cosmonaut. He was appointed back-up-man when the launch of the space ships Vostok-3 and Vostok-4 was being prepared. But even here Komarov didn't luck out: during training on the centrifuge arrhythmia was discovered in his heart activity. He was dropped from training and again the question was raised of his fitness for flights. However, finally the conclusion was made that these disturbances were only of a temporary nature. His dream, which he approached with such stubbornness and insistence, finally came true. He was appointed commander of the ship Vostok, which was the first

¹⁷Quote from the book of Yu. Gagarin and V. Lebedev, "Psikhologiya v kosmose" (Psychology in Space), Moscow, 1968, pp. 125-126.

ship to put a three-man crew into orbit.

There is something common in the life of V. M. Komarov with the American astronaut, Donald Slayton, who became 50 several months before the flight. During World War II he completed 56 missions in a B-25 bomber over Europe and 7 missions over Japan. After the war he decided to study and soon became an aviation engineer. Then he worked as a test pilot. In 1959 he was included in the first seven American astronauts. "When our country started its first space program --the Mercury project--it was proposed that I participate in it", he said. "I enthusiastically agreed and have never regretted it. This is exciting work with constantly changing horizons, which makes it possible to accomplish many new and interesting things". Soon the astronaut was appointed commander of Aurora-7--the second orbital ship. But on March 15, 1962, two months before the start, the doctors removed him from the flight, discovering heart arrhythmia. However, he continued to train with the same loading as the other astronauts. Once he noticed that the heart irregularities stopped for a certain period after considerable physical exercise while running. Slayton began to take up sports strenuously. In Houston one of the authors (A. A. Leonov) of this article was told: "Everyone had given up hope that Dickie would ever fly; everyone, but him". Envious contracts were offered to him by leading aircraft companies, but he didn't leave the astronauts. He became chief of the division for flight personnel and staffed the crews of all American programs. "I chose crews", Slayton said, "but never had the power to choose myself". In 1969 the heart arrhythmia stopped. In the spring of 1972, after ten years, he was pronounced fit for space flight. And he completed it. Donald Slayton waited 5935 days for his flight.

The crews of international ships should be selected not only from people who are united by a common goal, selflessly

loving their job, but also from those who were united by friendship and mutual trust. The question of the correspondent from the newspaper "Pravda" before the joint flight of Soyuz-Apollo, "what kind of relationships were formed between the Soviet and American cosmonauts?" was answered by A. A. Leonov: "When we left the USA after the final training, the astronauts told us: 'It's too bad that the training program has ended so soon. We have become accustomed to you. Something is going to be missing in our lives'."

"During the course of the joint work we were convinced that all of them were good people, with whom it was a pleasure to work. There is no question that they are people with great capabilities. Vance Brand and Dick Slayton, even though they had never been in space, had accomplished much for the development of cosmonautics. Stafford and I, as commanders of the first crews, related to each other more than the others. We found a common language even in the most difficult situations. The starting point was that people from all over the world were watching us, wanting the flight to take place. Therefore we said to each other: let's sit for a while, think a bit, get rid of the rubbish, leave only the acceptable thoughts. We also formed good relationships with the families of the astronauts. Many times I visited the homes of Tom, Vance and Dick; I consider them my friends"¹⁸.

The good working and friendly relationships which were formed between the Soviet cosmonauts and the American astronauts, who were united by a common noble goal, and also the mutual trust made it possible to fulfill faultlessly the entire desired program of the joint flight. However, this does not mean that no difficulties arose in this joint operation.

¹⁸Pravda, July 4, 1975.

3. Language and Interrelationships in International Crews

The most important means for interrelationship and its necessary component is language. Therefore, it is completely apparent, that as soon as preparations were made for the joint flight of the Soviet cosmonauts and the American astronauts, the question of overcoming the language barrier was put on the agenda along with the technical and control problems. Without this, one could not even talk about a successful completion of the program. In the space ocean the cosmonauts and the astronauts had to be able to converse with each other, approach and complete docking of the ships on the manual cycle. In order to successfully dock the space ships, the cosmonauts and astronauts had to be able to exchange information. Experience from aviation and cosmonautics attests to the fact that the slightest lack of mutual understanding during the performance of such complicated maneuvers, as refueling airplanes in the air and the docking of space ships, can cost human lives. Language as the most important working tool was necessary for the performance of joint scientific experiments in orbit.

The participants in the experiment clearly understood their responsibility for the success of the task and in all seriousness took to the study of the language of their partners. Each of them spent approximately a thousand hours on language lessons. During the joint training of the Soviet cosmonauts and the American astronauts "Ruston" was the most reliable channel for receiving and transmitting information--a joint Russian-American language whose name came from combining the word "Russian" with the word "Houston". The Soviet cosmonauts addressed the American astronauts in English and the Americans addressed the Soviet cosmonauts in Russian.

The question of the correspondent from the newspaper "Izvestiya": "What about the problem of communicability?" was answered by the commander of Apollo, T. Stafford: "I have to admit that I didn't immediately appreciate the value of the idea ("ruston" - author). Wouldn't it be better to formulate your thoughts in the language which you have mastered? It will be more exact and to the point. But on the other hand, it is difficult to pour information from a wide vessel into a narrow neck, without spilling along the sides. And where is the guarantee that the spilled portion will not contain the most important thing? On the contrary, there is complete assuredness that the stream from the neck does not escape the wide ears of the receiver of the information"¹⁹.

The principle of conversing in the language of the listener was entirely justified by space flight experience. It helped the participants in the experiments to better understand each other and to reduce to zero the probability of errors due to misunderstandings during the joint operations. Millions of Soviet TV viewers could evaluate the knowledge of the Russian language by the American cosmonauts, and the American viewers could evaluate the knowledge of English by the Soviet cosmonauts.

But if the first international flight lasted less than two days and only representatives of two countries participated in it, in subsequent space expeditions the duration of the flights will be significantly increased and the number of participating countries will grow. There is no doubt that not only Americans and Russians will work in continuously operating orbital stations and planetary bases, but also Frenchmen, Italians, Poles, Czechs and others. Therefore, the problem of interrelationships

¹⁹Collection "Rukopozhatiye v kosmose" (Handshake in Space), p. 106.

in international groups during the performance of lengthy space expeditions acquires especially important significance.

By returning to the journey of the raft "Taiti-Nui", it is possible to assume that the social isolation of Juanito was due to his poor knowledge of the language of his partners. During the journey on the boat "Ra", T. Heyerdahl paid great attention to the fact that none of the participants in the multinational crew was in social isolation due to his not knowing a foreign language. He gave special attention to the African, Abdulla, who knew only Arabic and reacted badly to those who discriminated against him because of his black skin. "Thor", wrote Yu. A. Senkevich, "was the most tactful among us; he understood perfectly the difficulty of Abdulla's position on board "Ra". He was very attentive to the African, was always on his guard, was ready to ease a situation and smooth over the corners. Thor asked George - the only one who had such capabilities - to talk with Abdulla in Arabic, so that he wasn't alone and miserable. George started teaching Abdulla to read; his pupil accepted the lessons enthusiastically, this entertained both him and George, which was also of no small importance"²⁰.

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The prospects of international flights already now places before science a number of questions: which language will be the most acceptable for the crews, speaking many languages? How does one prepare people for overcoming the language barrier? While speaking about language, we would like in this section of the article to stop at the following aspect of interrelationships.

One of the conditions for successful mutual understanding is not only the knowledge of a language, but also the ability

²⁰Yu. A. Senkevich, "Na 'Ra' cherez Atlantiku" (Across the Atlantic on the "Ra"), p. 95.

or capability to take the role of the partner in the interrelationships. "Taking a role", writes Shibutani, "is a complicated process, which includes the perception of gestures, substituting identification with the other person and the projection on him of your own actual tendencies of behavior. Identification is directly related to communication, for placing oneself in the position of the other, one can guess about his internal state. By remembering his own humiliations, triumphs and losses, he can sympathize with his fellow man in similar circumstances. Therefore, the conclusions of internal emotional experiences of other people are the projection of his own acts, not expressed beyond actions. By listening to the conversation of his neighbor, each one can participate in the flow of his thoughts. People are in the position to understand the actions of each other by means of mutual participation"²¹.

It is difficult to agree with the theory of projection developed by T. Shibuni; however, he noticed a very important moment in the process of interrelationships, namely that in this process people, as it were, mutually uncover their internal world. K. S. Stanislavskiy also noted this. "In interrelationships", he wrote, "you first of all seek in man his *soul*, his *internal world*"²². "In order to interrelate, you must have that *which* can be interrelated, i.e. first of all your actual experienced feelings and thoughts"²³.

The ability of man to understand the behavior of others is conditioned by his cultural and personal experience. The wider the set of roles man has, the higher his cultural level,

²¹T. Shibutani, "Sotsial'naya psikhologiya" (Social Psychology), Moscow, 1969, p. 123.

²²K. S. Stanislavskiy, "Rabota aktera nad soboy" (The Work of an Actor on Himself), Moscow, 1951, p. 271.

²³Id., p. 277.

the easier it is for him to understand the other. Although the process of entering into the role of the partner is not always perceived by us, however, essentially, it is practically present in any interrelationship. Thus, when we carry on a conversation, then before answering, by means of imagination we try to penetrate the world of the partner's experience and imagine what sort of effect the phrase being prepared will have on him. We judge the reaction of the partner from his voice intonation, his facial expressions and from his pantomimes, and also from a number of vegetative reactions (the reaction of pupils, the nature of breathing, the rate of the words pronounced, etc.). On the basis of the analysis of information which man does not always perceive, we not only judge the emotional state of the partner, but also in conjunction with the mechanism of imitation begin to co-experience. In his turn, the partner, being included into the process of interrelationships, will foresee what reaction is expected from him. In the opinion of the American researcher, G. Mead, when such a mutual "forestalling penetration" goes off successfully, there is created in the partners a growing friendliness to each other --a feeling of "empathy". In the same situations, when this does not occur, the interrelationship process is destroyed. /65

It is hardly possible to agree entirely with the idea of a "forestalling penetration". It can be accepted rather as a metaphor. However, G. Mead noted an important moment in the process of interrelationships: the fact, that in this process each of the partners *anticipates* the behavior of the other and forms his behavior in conjunction with how he understands the "internal world" of the other²⁴.

²⁴In our country the questions of perception and understanding by people is being successfully developed by A. A. Bodalev and his colleagues. Cf. the collection "Vospriyatiye i ponimaniye lyud'mi drug druga" (People's Perception and Understanding of Each Other), Leningrad, 1974.

During interrelationships of foreigners, not only the culture and the role composition but also the knowledge of the culture, national customs, traditions, etc., acquire great significance in mutual understanding. This is why during the preparation for the first international flight the American astronauts whenever they were in the Soviet Union spent their free time visiting the historical landmarks of our country (they were in Suzdal', Zagorsk, Vladimir, Leningrad and other cities), they visited museums (the Pushkin Museum, the Tret'yakov Gallery, the Ermitazh, the Russian Museum, etc.), visited enterprises where they met with Soviet workers. They became acquainted with the Russian bath and visited the families of the cosmonauts. When, after the final training session, T. Stafford was asked by reporters whether there was any psychological barrier in mutual understanding between the Soviet cosmonauts, he couldn't find anything to answer, he only spread his arms. Then he said that he liked our land very much and our people. No one could doubt the sincerity of his words.

In their turn, the Soviet cosmonauts, while in the USA, became acquainted with the history, culture and people of this country. All of this aided the mutual understanding of the participants of this experiment for interrelationships. Apparently this procedure, but with more planning and perfection, can be recommended for future international space flight crews.

4. Interrelationships and the Informal Structure of the Group

The formal structure of the group reflects the interrelationships of people according to the working or operational principle. Here the interrelationships are regulated by assigned standards, specified in orders, directions and instructions. Simultaneously with the development of the formal structure an informal structure occurs in the group. In the informal structure of the group

interrelationships are based on the principles of personal relationships - likes or dislikes, trust or lack of trust, gratitude or negativism, etc. The informal structure of a group is the system of emotionally colored relationships between its members. It is directed towards the "inside" of the group, to the selfs of the members and their personal qualities, while the formal structure is directed towards the "outside medium", that is towards the assignment of activity.

The internal basis of the personal interrelationships between people in the informal structure is the need for interrelationships. Whereby, in the selection of a partner for interrelationships, significant influence is shown by such qualities as physical strength, intellect, moral qualities, vigorousness, beauty and other individual qualities. People have the ability in informal relationships to express their own individuality. As a result of this, some people acquire greater influence, while others acquire less, depending upon their own individual qualities. The development of informal interrelationships results in the formation of small groups of 2-3 people or coalitions. In each such coalition informal leaders arise, among which there can appear the figure of the formal leader.

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This general principle of development in any group is reflected in expeditionary teams. The greatest American explorer of Antarctica, K. Bird, wrote: "In our case, as elsewhere, people were accustomed to form groups, which resulted spontaneously due to common tastes, views, habits and character. Whereby, no alienation or enmity was noticed in respect to the other comrades - this didn't even enter into the picture"²⁵.

²⁵R. Bird, "Nad Yuzhym polyusom" (Above the South Pole), Leningrad, 135, p. 246.

One of the clear descriptions of informal structure in an international crew, caused by the need for interrelationships, is found in Yu. A. Senkevich's description of the journey on "Ra". Three informal groups were distinguished on this boat during its journey. The first group consisted of Carlo Mauri, Abdulla Dzhibrin and Thor Heyerdahl. During the journey T. Heyerdahl constantly looked after Abdulla Dzhibrin. Thor was not only the commander but also the protector for the African, who didn't know English. In general, Senkevich writes, Thor was for him almost the only light in the window, and such a situation suited both, it helped Thor to lead Abdulla, and for the carpenter from the Chad lake it smoothed over the vicissitudes of the routine"²⁶.

The second stable group was formed by Norman Baker and Thor Heyerdahl. In this expedition Norman fulfilled the duties of navigator and radio man. While sitting at the radio equipment in the semi-dark cabin, Norman had the opportunity to occasionally converse with his wife, children and friends, which placed him in a somewhat privileged position.

The third group consisted of Santiago Genoves, Yuriy Senkevich, George Sorial and Thor Heyerdahl. In telling about his informal group, Senkevich writes: "Who knows what drew us to each other? It is possible that age was not the least significant: youth, no question in the case of George, in my case - relative, and as far as Santiago is concerned, in spite of his forty-five years, he is a good guy, namely a guy, you can't call him anything else expansive and energetic... We became friends during the joint shuffles and refittings and in a free moment we tried to be together: we would lie on top of the cabin or on the bow and would talk and joke incessantly"²⁷.

²⁶Yu. A. Senkevich, "Na 'Ra' cherez Atlantiku" (Across the Atlantic on the "RA"), p. 96.

²⁷Id, pp. 97-98.

It is interesting to note that in the crew of the "Ra" there were three informal groups, with Heyerdahl belonging to each of them. The formal and informal structure of the group is in a unity. The balance of this unity determines the cohesion of the group, its collective and psychological capabilities for effectively solving problems confronted by it. In well organized groups the formal structure is decisive in regulating the informal relationships. Where informal relationships dominate, the principle of the business-like contacts begins to take second place.

On the basis of the observations made in the Antarctic, it is possible to conclude that informal relationships change under expeditionary conditions. Thus, V. V. Borinskiy and S. B. Slevich note: "On the basis of Soviet and foreign experience and sociometric evaluations it is possible to assert that group cohesion, as a rule, goes through four stages. In the first stage, the group has not yet consolidated; in the second stage various groupings are formed; in the third stage consolidation occurs around the formed nucleus, but there are still lone persons who haven't yet been drawn into the group. In the fourth stage a splintering of the group is observed, most often into individual age groups, but not having a decisive character. Overall, by the end of the winter period, the group's moral state was higher than at the very beginning"²⁸.

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It seems to us, that if such a procedure in some degree is possible and acceptable for the formation of antarctic and other types of expeditions, where there is the possibility of changing crews, it is unacceptable for lengthy space flights, where such possibilities are excluded. The experience from expeditions shows that during the dynamics of the development

²⁸V. V. Borinskiy and S. B. Slevich, "Chelovek v Antarktike" (Man in the Antarctic), Priroda, 1968, No. 12, p. 36.

of the group, a decentralization in the formal and informal structure may occur, with separation into groups, which breaks up the team as a whole.

In F. Begounek's book, "Tragedy in the Arctic Ocean", we see that the break-up in the expedition was preceded by a separation of an informal group with a leader. The author writes that the initiative to leave the camp after the accident of the dirigible, undoubtedly, belonged to Cappi. "From the very outset of our time on the ice-floe, he was nervous, constantly irritated, and quarreled with everyone; his excitement increased even more from the moment when an island was noted on the horizon and when changes in the camp's coordinates showed that the ice-floe was being constantly carried to the southeast - into the open sea. Mariano uneasily watched the spiritual state of his friend. He met his needs in every way, forgetting the duties he had in relation to the entire group, taking over the position of the commander who was incapable of moving, whose official deputy Mariano was from the very beginning of the expedition"²⁹.

During the second journey, which ended tragically for E. Bishop, when the raft "Taiti-Nui II" gradually lost its buoyancy, its crew broke up into two groups. Three members of the crew demanded dividing the provisions and water. "In the evening", the assistant chief of the expedition, Alain Brain, tells "when everyone had calmed down, I tried once more to explain to them that we, possibly, would have to sail at least a month or more and therefore strict distribution of the provisions was necessary. I tried to convince them that we wouldn't be able to avoid disaster if each one took his

²⁹F. Begounek, "Tragediya v Ledovitom okeane" (Tragedy in the Arctic Ocean), pp. 82-83.

portion right now... Eric (Bishop, who was very sick - author) recommended to me a very simple and rather tempting means of maintaining discipline on the raft. Give each of the obstinate members of the crew a thrashing and if this didn't help, throw them overboard. But I feared that Eric and I would be the first to go overboard, and only this kept me from using these old and tried methods. I tried to find another way of solving this problem, but I had to quietly think over everything during the evening watch at the wheel. Very soon I concluded that there was no way out of my position. Three friends had conspired against me"³⁰.

Here, apparently, it is proper to note, that as in a drop of water the ocean is reflected, in an isolated group the relationships of people of that society are reflected, of which they are citizens. Involuntarily, a comparison is suggested of the situation on the raft "Taiti-Nui II" with a similar situation on the Soviet self-propelled barge, which at the beginning of 1969 during a storm was pushed from the shores of the Kurile Islands into the open ocean. There were four soldiers on board: Astakh Ziganshin, Filipp Poplavskiy, Anatoliy Kryuchkovskiy and Ivan Fedorov. After drifting for forty-nine days they were picked up by an American aircraft carrier and taken to San Francisco. Their deed excited the entire world. But most of all, perhaps, what shook people in the bourgeois world was the feeling of cohesion, demonstrated under these conditions by Soviet soldiers. /68

All of these examples bring us once more to the thought that the crew of an international space ship or planetary base must be formed not only on the basis of careful selection, but even more it must go through all stages of its development

³⁰B. Daniyel'sson, "Bol'shoy risk" (A Great Risk), Moscow, 1962, pp. 167-168.

long before the flight. In the book "Psychological Problems of an Interplanetary Flight"³¹ we noted several methodological approaches to the formation of crews for lengthy space expeditions. Here we shall dwell with one of the aspects of this problem, not raised in this book and concerning namely crews from countries with different social structures.

Yu. A. Senkevich in the book quoted by us writes: "The world, from which we sort of ran away, would not let us go. It regularly reminded us of itself - not only through the boastful fairy tales of George, but also through the concern of Carlo concerning the probable photo competitors, and the reflections of Thor whether my reports for "Komsomol'skaya Pravda" and "Izvestiya" would affect his contract with UPI"³². During the journey several discussions occurred touching the social structure of one or another country, ideology, etc. Here is an example of one of the discussions quoted in the book: "And the discussions, quick as lightning, and as a rule, jokingly, would occasionally occur. No one would try to "sharpen", the blades had rubber edges, but you can hit effectively with a rubber ball. Norman is telling Abdulla about America, Santiago nudges me with his elbow: "Tell him that they hang Negroes in America". Norman turns red, sulks, and begins to go into detail, as if not for Abdulla, but for us about the race problems. Or another time, Santiago begins to joke about the personality cult, and I, answering him attempt to needle him - the Spaniard - along the line of Franco..."

³¹A. A. Leonov, V. I. Lebedev, "Psikhologicheskiiy problemy mezhplanetnogo poleta" (Psychological Problems of Interplanetary Flight), Moscow, 1975.

³²Yu. A. Senkevich, "Na 'Ra' cherez Atlantiku" (Across the Atlantic on the "Ra"), p. 102.

George (to me): "Yours is not a free country, you can't go abroad when you want to."

I: "Which country can be called free, Morocco?"

He: "Yes, every Moroccan can leave if he wishes."

I: "True, if he can?"

He: "Yes, if he has money."

"And where does he get it?"

"That's his business."

"Do you know that Moroccans can't move about the country without special permission?"

?!

George is confused. Thor is called arbitrate:

"Yuriy is right. However, I offer peaceful coexistence to Russia and Africa. Wouldn't you want to cooperate by taking up sheafs of wheat together?"³³.

Frequently there were similar discussions between the Soviet cosmonauts and the American astronauts during their training sessions. As it seems to us, these discussions were successfully summed up by the American astronaut from the back-up crew in the EPAS program, Eugene Cernan, the last of the men who was on the moon's surface: "There remain essential differences between the political systems of our countries, as well as in ideology. I don't believe that any of the participants of the program changed his political views during the course of our contact. We understood that emphasis should not be placed on what divides us, but on the attempt to understand, respect and trust each other. I am convinced that this was the most important in the achievement of the program "Apollo-Soyuz", which was only the beginning. The beginning of the great journey for strengthening peace and developing mutual understanding between all nations"³⁴.

³³Id. p. 76.

³⁴Komsomol'skaya Pravda, July 12, 1975.

If one takes into account that crews of space ships will consist of people with different specialities, different ages, different nationalities, from different countries with a different social structure, it is difficult to assume that they will have entirely common interests in informal interrelationships. It seems to us, that if it is practically impossible to select crews for a certain planetary base or interplanetary ship with common views, interests, ideals, mutual affection, etc., it is necessary, at least, to make sure that the composition of space expeditions consists of small groups, joined by close, friendly relationships, similarity in national traditions, world outlook, etc. As we have shown, if this is not taken into account, there can be "isolated" people under expeditionary conditions. Of course, these informal groups in no way can be decisive, breaking up the team of the expedition.

There is not the slightest doubt that this problem of interrelationships in international space crews will play an enormous role. However, unfortunately, we must state that this has not received sufficient attention in the sphere of general and social psychology, including philosophy. There are very few investigations on this problem. This is why we consider this article as the one setting up new directions, hoping that it will give impetus to recollections and performing investigations in the indicated direction.