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1975: A Space Odyssey

I. Primeval Flight

"We've got a problem." The space ship was over 200,000 miles from Earth when these words crackled over the radio at Mission Control Center, Houston.

"We're venting something out into space."

Immediately, all eyes turned to the monitors, which were solemnly blinking the unsettling truth in coded colors and numbers . . . confirmed oxygen leak in the command ship. . . .

Was it a meteoroid strike, or some jarring explosion on board?

"Something happened and it was . . . very violent . . . , replied the NASA spokesman to inquiries of the press. "But as far as what exactly happened, I have no idea. The greatest concern at the moment is getting the astronauts back."

Scientists and engineers, not only in mission control, but in universities and laboratories throughout the country, had already turned their attention to the vast amounts of information being fed through the tiny, tireless monitors. Only this thread of numbers and the ingenuity of those deciphering them could prevent the looming tragedy.

Meanwhile, a reporter had sought out the director of the manned space program and asked him directly, "Can you get them back?"

The official paused momentarily, then replied in an even, calm tone, "Taking into consideration all the imponderables—the power, the oxygen, and all that sort of thing—if the situation remains stable as it is at the moment, there's no question but that we have the thing under control and we can return the crew safely to the earth. Now if there were some change in the status of the lunar module, then that might mean something else. . . ."¹

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¹Science Fiction? Actual excerpts from news reports describing the ill-fated flight of Apollo Thirteen. See N.Y. Times, April 14, 1970, p.32.

II. TIAS-7347

On the 24th day in May, 1972, the President of the United States of America met with the Chairman of the Council of Ministers of the Union of Soviet Socialist Republics in Moscow to sign an important agreement between the two nations. The agreement was a culmination of four years of hard work by Soviet and American scientists, engineers, and government officials. For quite some time, the United States had expressed interest in a joint space venture with the Russians.

President Nixon, himself, had openly stated that the United States should "take positive, concrete steps toward internationalizing man's epic venture into space Both the adventures and applications of space missions should be shared by all peoples. Our progress will be faster and our accomplishments will be greater, if nations will join together in this effort, both in contributing the resources and enjoying the benefits."² The USSR had remained officially reticent on the subject. However, on an unofficial level, many concerned Russians supported a program of joint cooperation between the aerospace powers.

In the Spring of 1968, one of the foremost members of the Soviet Academy of Sciences, Andrei D. Sakharov, circulated from hand to hand a plan for cooperation and eventual rapprochement between the United States and the Soviet Union.³ The text, entitled, "Thoughts on Progress, Peaceful Coexistence and Intellectual Freedom," is perhaps the most definitive statement to date in this area.

The author first warns that "the division of mankind threatens it with destruction," but that there is a "basis for hope" in what he terms "the now inevitable rapprochement" of the socialist and capitalist systems. Sakharov expressed anxiety over the fact that a scientific approach to such rapprochement has lagged woefully behind the scientific-technical revolution and presented a blueprint to facilitate the peaceful convergence of the United States and USSR, the promotion of intellectual freedom, science and economic progress, and ultimately a world government to be achieved by the year 2000. Perhaps due to his revered status, or perhaps due to a thaw in Soviet-American relations, Sakharov was not censored by his government for this fairly radical thesis. In fact, it was received with much enthusiasm on a non-governmental level.

Approximately one year later, the dean of Soviet physicists, Pyotr L. Kapitsa, remarked that, "We all feel the social system cannot digest the technical achievements," and supported Sakharov's convergence prin-

²Address before the UN, Sept., 1969.

³N.Y. Times, July 22, 1968, p.1.

ciple.⁴ Less than two weeks later, Party Chairman Brezhnev stated that "we are supporters of international collaboration in the study of outer space."⁵ Several months later, Cosmonaut M. Leonov was more explicit in expounding his views on space cooperation, when he told an interviewer, "I think it may be possible for the United States and the Soviet Union jointly to build a spaceship in the future and send their men to outer space together."⁶ Clearly the Soviet Union had changed its attitude.

The following two years witnessed the exchange of data and personnel in an effort to explore the feasibility of such a joint venture. The result was TIAS-7347 signed by President Nixon and Chairman Kosygin in the Spring of 1972. The preamble of the agreement states that the United States and USSR are hereby undertaking to strive "for a further expansion of cooperation" between them in the "exploration and use of outer space for peaceful purposes."⁷ In addition, there is an expressed desire "to make the results of scientific research gained from (such) exploration . . . available for the benefit of the peoples of the two countries and of all the peoples of the world."⁸

Articles I and II of the Agreement call for the parties to "develop cooperation in . . . the exploration of near earth space, the moon and the planets," and to "carry out such cooperation by means of mutual exchanges of scientific information and delegation. . . ."⁹ The idealistic framework has now been laid for the nuts and bolts of the Agreement, Article Three:

The parties have agreed to carry out projects for developing compatible rendezvous and docking systems of United States and Soviet manned spacecraft and stations, in order to enhance the safety of manned flight in space, and to provide the opportunity for conducting joint scientific experiments in the future. It is planned that the first experimental flight to test these systems be conducted during 1975, envisaging the docking of a United States Apollo-type spacecraft and a Soviet Soyuz-type spacecraft with visits of astronauts in each others spacecraft.¹⁰

The National Aeronautics and Space Administration (NASA) of the United States and the Academy of Sciences of the USSR have wasted little time in fulfilling the expectations enunciated in Article 3.¹¹ "Detailed

⁴N.Y. Times, Oct. 9, 1969, p.1.

⁵Moscow Domestic Service, Oct. 22, 1969.

⁶Manichi Daily News, Toyko, May 13, 1970.

⁷TIAS 7347, p.2.

⁸*Id.* pp.2-4.

⁹*Id.* p.4.

¹⁰*Id.*

¹¹Hearing before the Committee on Aeronautical and Space Sciences, United States Senate, 92nd Cong., 2nd Sess. June 23, 1972, pp. 16-21.

arrangements, including launching and rendezvous dates, initial and alternative flight plans, and the splash-down area, are already being worked out. Also, combined engineering efforts by both countries have succeeded in devising a universal-type compatible docking system.¹²

Sakharov's convergence principle is thus rapidly being manifested in the spheres of science and technology. However, there still exists a virtual vacuum where work is needed most. "Morals and ethics must not lag behind science," warns Sir Bernard Lovell, "otherwise the social system will breed passions which will cause its own destruction."¹³ In spite of this rather poignant prophecy, a shamefully exiguous amount of consideration has been given to the legal implications of the Soviet-American union in outer space.

The problems are many and the venture is a scant two years away. Article 4 of the Agreement provides that, "the parties will encourage international efforts to resolve problems of international law in the exploration and use of outer space for peaceful purposes with the aim of strengthening the legal order in space and further developing international space law and will cooperate in this field."¹⁴ Why have not jurists seized as eagerly upon this article as their professional counterparts have done with Article 3? Is the opportunity for advancement of human endeavors not as obvious here? Or, does the legal profession feel that its role is by nature *a posteriori*, rather than *a priori*?

Certainly, Article 4 has no qualifications which set it apart from Article 3, and is, in fact, every bit as compelling. Inaction is unjustifiable. As one writer notes, "Space law must look to the future and provide for all possible cases."¹⁵ The legal profession must not timidly evade the most important challenge which has ever been thrust upon it—the shaping of the legal system for the aerospace age.

Man has finally succeeded in shedding his frayed, tattered old hand-woven garments for a machine-made robe, richly woven from the very finest fibers. But is man still to be shackled in spirit by these discarded rags simply because his traditional concepts of ethics and morality lay with them? Or, is it not possible to project into the future, to envision problems coincident with the advent of the space age, and to prepare for them? The

¹²*Id.*

¹³Sir Bernard Lovell, Legal Problems of Space Exploration, A Symposium, Staff of Senate Committee on Astronautical and Space Sciences, Cong. 450 (1961).

¹⁴TIAS-7347, p.5.

¹⁵U.N.G.A., Committee on the Peaceful Uses of Outer Space, *Report of the Legal Subcommittee to the Committee on the Peaceful Uses of Outer Space*, 1969 REPORT, Annex II at 20.

difficulties that may arise will not be so foreign or ethereal as to defy description or resolution. The wealth of law that encompassed the old apparel is a sufficiently satisfactory starting point for the formulation of rules concerning the new.

"All that life offers any man," insisted Oliver Wendell Holmes, "from which to start his thinking or his striving is a fact . . . for every fact leads to every other by the path of the air. Only men do not yet see how, always. And your business as thinkers is to make plainer the way from some thing to the whole of things; to show the rational connection between your fact and the Frame of the Universe. . . ."¹⁶

III. Between Planets

The Soyuz spacecraft floated like a helium-filled balloon in the black vastness of space. The conically-shaped Apollo craft, silouetted against the Danube-colored Earth, was slowly growing larger in its cautious approach. Optical guidance systems were flashing data to the two spacecraft control panels in their rendezvous sequence. Gas jets spurted at fleeting intervals rotating the approaching craft to the precise attitude for docking. When the appropriate alignment had been obtained, the Apollo craft closed slowly on its Soviet counterpart.

With a slight jolt, the recently developed universal docking systems locked the two vehicles together. After satisfactorily completing exhaustive checklists, an American astronaut left the Apollo craft and entered the docking module. It would first be necessary to adjust to the pressured differential between Apollo and Soyuz.¹⁷ Apollo was operating under pressure of 5 lb/sq. in. oxygen, whereas Soyuz operated at normal level. Addressing this disparity, Dr. George M. Low remarked three years ago (1972) that, "NASA felt it was up to them to provide an airlock which we could enter at our atmosphere and then add the nitrogen to make this into air at fifteen lb/sq. in.

Conversely, when the Soviets come to visit, they can get into the Docking Module while it has air at normal pressure. They will then have to pre-breathe oxygen, because in order to go from an air atmosphere at fifteen lb. to a lower, pure oxygen atmosphere and in order not to get the

¹⁶Oliver Wendell Holmes, cited by Eilene Galloway, *Legal Problems of Space Exploration*, A Symposium, Staff of Senate Committee on Aeronautical and Space Sciences, Cong. Sess. 450 (1961).

¹⁷Hearing before the Committee on Aeronautical and Space Sciences, United States Senate, 92nd Cong., 2nd Sess., June 23, 1972, p.18.

'bends,' they will have to breathe pure oxygen for two hours. They do this in the docking module. Then they enter the command module."¹⁸

The astronaut remained motionless in his bulky suit, listening to his heavy, even breathing, and intently watching the flickering indicators in the panel before him.

Soon the prescribed pressure state was achieved, the hatch was unlocked and opened, and a cosmonaut extended his hand. Slowly moving forward, the American entered the Russian vehicle.

Several hours passed before the hatch locks once again separated and the door swung open. This time two figures emerged awkwardly into the Docking Module. The hatch locked shut behind them. They remained motionless as pure oxygen vented into the module. Several minutes passed—it would take two hours. Tens of thousands of miles away, the crew at mission control was beginning to settle for the duration when a tense, abrupt transmission startled them: "We've got a problem."

IV. Abyss

Hearings before the Subcommittee on International Cooperation In Science and Space, June, 1972 . . .

Mr. Price: Is there a possibility in making this transfer, that as they go through these locks if something were to happen . . . does our craft have the capacity to bring back six men?

Dr. Low: No, it does not.

Mr. Price: In other words, three of one or the other would have to be abandoned, if it got right down to it?

Dr. Low: If it were a problem in either craft that would not allow that craft to come back, there might be some limitation in this test mission to bringing all the crew back in the other.¹⁹

What, then, will be the basis for determining which members of both crews will return and which will stay? Hopefully, there will be a solid legal foundation upon which to base this answer, for it will be of far-reaching impact. The importance of arriving at a correct solution is obviously of great concern to the individual astronauts and cosmonauts involved. However, the thoroughness and juridical adeptness with which this problem is approached and the answers derived will be felt on a much larger scale. The two participating countries will have to live with the decision long after any actual space tragedy itself has ended and the surviving astronauts have returned.

¹⁸Dr. George M. Low, Dep. Admin. of NASA. Hearing before the Committee on Aeronautical and Space Sciences, U.S. Senate, 92nd Cong., 2nd Sess., June 23, 1972.

¹⁹Hearings before the Subcommittee on International Cooperation in Science and Space of the Committee on Science and Astronautics, U.S. House of Representatives, 92nd Cong., 2nd Sess., June 13-21, 1972, p.110.

This first step toward cooperation and rapprochement should not hang precariously on a single thread of chance. The legal profession should recognize the void that has been left behind the continual advancement of science and technology and should move quickly to match their brother professionals' standards for excellence. World peace may be predicated upon a united effort to explore and digest the knowledge of a common frontier—outer space. On the other hand, a global disaster could well be the result of a misunderstanding of the roles being played by the space powers in this quest for knowledge.

All the nations of the world are indirectly affected by the relations between the current two space powers. Some countries may even become directly involved in certain aspects of space exploration being pursued by these two powers. In the present case, for example, the surviving astronauts and/or cosmonauts may land within the territorial limits of a non-participating country. Also, any specific conduct of the astronauts while in outer space may well occur while over a third party's territory. The latter may attempt to assert jurisdiction in either of these events. It is readily evident that, unless there is a firm legal framework within which to approach these problems, mankind's giant leap will become a series of stumbling steps. Are there, then, are there any plans for strengthening the legal order in space as provided by Article 4 of the Agreement?

"At the present time, no definite plans. The question always is whether the law goes ahead of the facts. . . ." ²⁰ Perhaps Mr. Justice Holmes would assume a slightly different stance. ²¹ No one fact or given situation arises independently of its own fruition. All are related by "the path of air." It is the jurist's business to show a rational connection between the new fact and the "Frame of the Universe." How well this frame is defined depends upon the eagerness and expertise of those thinkers undertaking the task to delineate it. For example, the dilemmas of Apollo Thirteen and the hypothetical Apollo-Soyuz flight as presented herein pose potential survival homicide situations. Is there any precedent which may be useful in outlining possible courses of action in such instances?

The famous case of *Regina v. Dudley and Stephens* perhaps best illustrates the complexities of the law in this area. ²² In that case, three men and a boy were cast away in a storm on the high seas 1,600 miles from the Cape of Good Hope. The only food they had for nineteen days was two pounds of turnips and a small turtle. On the twentieth day, the boy's throat

²⁰Statement of Alexis Johnson, Under Sec. of State for Political Affairs, U.S. Dept. of State in the Hearing before the Committee on Aeronautical and Space Sciences, U.S. Senate, 92nd Cong., 2nd Sess., June 23, 1972.

²¹See p.6.

²²*Regina v. Dudley and Stephens*, Queens Bench Division, 1884, 14 Q.B.D. 273.

was slit and the three men fed upon the body and blood of the boy for four days. They were thereupon rescued and brought to trial. The court noted that "... if the men had not fed upon the body of the boy they would probably not have survived . . ." and that "there was no appreciable chance of saving life except by killing. . . . (It must not be) forgotten how awful the suffering was; how hard in such trials to keep the judgment straight and the conduct pure. We are often compelled to set up standards we cannot reach ourselves, and to lay down rules which we could not ourselves satisfy."²³

The court then found the prisoners guilty of murder and proceeded to pass a sentence of death. It was their contention that compassion for the criminal can not be allowed to change or weaken in any manner the legal definition of the crime. "If the law appears to be too severe on individuals, leave it to the Sovereign to exercise that prerogative of mercy which the Constitution has intrusted to the hands fitted to dispense it."²⁴ Obviously, the court felt bound by the extant of legal definition of homicide, and placed its hope for a just solution squarely on the shoulders of the Sovereign.

An American court, confronted with a similar situation arrived at a slightly different solution. In *United States v. Holmes*,²⁵ forty-one people were cast adrift following a shipwreck on the high seas. The lifeboat that they occupied was so grossly over-loaded that it was in danger of sinking. The first mate then ordered that all males who had no wives aboard must voluntarily take leave of the boat or be forcefully thrown out. Before a rescue ship arrived, eighteen passengers had been jettisoned. Holmes was one of the crew members brought to trial for his participation in ejecting the passengers.

Here, the judge distinguished between the relationship of the crew members to each other as opposed to that between crew member and passenger. He charged the jury that where two persons face a situation in which only one can survive "neither is bound to save the other's life by sacrificing his own, nor would either commit a crime in saving his own life for the only means of safety."²⁶ Thus, by way of dicta, the court seems to imply that survival homicide is acceptable within the confines of the law.

However, Holmes was found guilty because of the special duty owed by the crewman to the passenger. The court did not abdicate its judicial role, by appealing to the Sovereign for justice, as did the English court. It rather arrived at a verdict of guilty that was legally fictitious and quite as un-

²³*Id.*

²⁴*Id.*

²⁵*United States v. Holmes*, 26 Fed. Cases 360, 1 Wall Jr. 1 (C.C.E.D. Pa. 1842).

²⁶*Id.*

satisfying as the English result. Holmes was convicted and sentenced to six months suspended sentence and a fine of \$20.00.

In commenting on this result a century later, Justice Cardozo agreed with the court and observed that, "In the supreme moment, darkness will be illumined by the thought that those behind will ride to safety. . . . (However), there is no right on the part of one to save the lives of some by the killing of another. There is no rule of human jettison. Who shall choose in such an hour between the victim and the saved?"²⁷ Mr. Justice Cardozo aptly states the issues but his subsequent analysis seems to do an injustice to his reputation for acumen.

In the first place, the fact that the choice between who will be the victim and who will be saved is a difficult one, is clearly not a justification for legal abdication. On the contrary, if jurists had consistently avoided decision in complex, fate-deciding areas of the law, there would be no legal system.

Secondly, Cardozo's assumption that there is no *right* on the part of one to save the lives of some by the killing of another is egregiously erroneous. The metaphysical aspects of this right, fortunately, may be left to philosophers. Law is concerned with reality. This right exists, both in law and in fact, and therefore must be dealt with by a jurisprudentially-oriented observer, regardless of his own emotional reactions to the subject. It exists in fact in the all-too-prevalent occurrence of war.

Every time a soldier takes the life of an enemy soldier, he is presumed to have the right to do so. It exists in fact in the operating rooms of hospitals every day. A surgeon may be required to abort the life of a fetus in order to save the life of the mother. More subtly, a decision may be made as to who will receive a valuable kidney machine—precious to life—and who will not—and consequently perish.

It exists in fact when the engineer builds a highway that may cause death to a traveler. The architect drew the blueprints, the public floated the bond. When death occurs, who is to blame?

The usual conditions of human existence incline us to think of human life as an absolute value, not to be sacrificed under any circumstances. There is much that is fictitious about this conception even when it is applied to the ordinary relations of society. . . . Every highway . . . involves a risk to human life. . . . We can calculate with some precision how many deaths the construction of them will require; statisticians can tell you the average cost in human lives of a thousand miles of a four-lane concrete highway. Yet we deliberately and knowingly incur and pay this cost on the assumption that the values obtained for those who survive outweigh the loss.²⁸

²⁷CARDOZO, *LAW AND LITERATURE* 110, 113 (1934).

²⁸Lon Fuller, *The Case of the Speluncean Explorers*, 62 *HARV. L. REV.* 616, 623 (1949).

Such was Lon Fuller's contention in his famous thesis, *The Case of the Speluncean Explorers*, a disconcerting revelation of the dilemmas inherent in a survival homicide situation. Fuller posed a situation in which five explorers were trapped in a cave for thirty-two days with only scant provisions. On the twentieth day communication was established with the luckless men. The rescue crew informed them that at least ten days more would be required to release them.

The imprisoned men then asked a committee of physicians if it would be possible to survive ten days longer if they consumed the flesh of one of their own members. The physicians' chairman reluctantly answered in the affirmative. The trapped men asked for assistance in this decision but received none. Consequently, on the twenty-third day, the decision was achieved by a cast of the dice, and one of the members was put to death and then eaten by his companions. After rescue, the survivors were brought to trial, found guilty at a lower court level and sentenced to hang.

On appeal, one justice stated that the principle of executive clemency was admirably suited for such a case. This *Regina v. Dudley* approach soundly repelled another justice, who claimed "to assert that the law we uphold compels us to a conclusion we are ashamed of, and from which we can only escape by appealing to a dispensation vesting within the personal whim of the Executive, seems to me to amount to an admission that the law . . . no longer intends to incorporate justice."²⁹ He contended that the defendants were innocent in that they had acted while in a state of nature rather than in a state of civil society.

"This conclusion rests on the proposition that our positive law is predicated on the possibility of man's coexistence in a society. When a situation arises in which the coexistence of men becomes impossible, then a condition that underlies all of our precedents and statutes has ceased to exist."³⁰ He indicated that in such a state, a contract among the men is binding. The flaws in this argument are obvious. As previously indicated, there is no human relationship which inherently defies legal conceptualization. Secondly, if such a relationship could exist, then what impact would a contract drawn in that situation have in a court of law? Fuller advanced an additional difficulty with this theory:

When the defendants . . . killed him . . . they were only exercising the rights conferred upon them by their bargain. Suppose, however, that (the victim) had concealed upon his person a revolver, and that when he saw the defendants about to slaughter him he had shot them to death in order to save his

²⁹*Id.* at 620.

³⁰*Id.*

own life. This would make (the victim) out to be a murderer, since the excuse of self-defense would have to be denied him.³¹

Because of the many seemingly insoluble complexities which pock-marked this case, the Supreme Court failed to reach a majority decision, and the lower courts' verdict stood.

Fuller concluded his treatise with the observation that, "These philosophies presented men with the live question of choice in the day of Plato and Aristotle. Perhaps . . . the questions involved are among the permanent problems of the human race."³²

V. On the Moons of Earth

It should be fairly evident at this juncture that existing law, both judicial and legislative in nature, is extremely deficient in the area of survival homicide. However, before attempting to modernize this area in order to make it applicable to the Space Age, certain other factors, peculiar to living in Space, must be considered.

Scientists have discovered that the physiological and psychological effects of living in space have a profound effect on human behavior.

A noted specialist in life science has stated that confinement within a region of very limited movement, as in a space cabin where the available volume is minimal, can give rise to gross manifestations of cardiovascular deconditioning.³³ Furthermore, weightlessness aggravates the deconditioning. Consideration of the psychological effects of confinement has indicated that it can be a stressful situation, and physiological studies have shown significant alterations in the life support parameters. In addition, a Russian scientist, conducting experiments in sensory deprivation, noted that sensory isolation decreases work capacity, attentiveness and general physiological well-being.³⁴

Besides the environmental factors acting upon the space crew, there is also the subjective factor of interpersonal relationships. According to one Russian scientist, the major psychological problem facing space crews is that of group interreaction.³⁵ V. A. Shatalov, a Russian cosmonaut, voiced a similar opinion by stating, "experimental research has shown that al-

³¹*Id.* at 627.

³²*Id.* at 645.

³³James M. McCullough, Science Policy Research Divison, Congressional Research Service, Library of Cong.

³⁴Parim, V.V. *Experimental Studies in Space Psychology*, Kosmicheskaya Biologiya; Meditsina, Vol. 1, 1967, p.7.

³⁵Lebidinsky, A.V., Levinsky, S.V., Nefedov, Y.G., *General Principles Concerning the Reaction of the Organism to the Complex Environmental Factors Existing in the Spacecraft Cabin*. NASA-TT-F-273, 1964.

though individual peculiarities of each member of a group may be known, one cannot always predict before a flight how successful the activity of the crew composed of these persons will be, and how the interrelationships will be formed between its individual members."³⁶

The third important factor to be considered is the spaceman's relation to Earth. Certain studies have revealed that space crews may exhibit xenophobic tendencies. Such attitudes have already been evident in Navy experimental laboratories, in the McDonnell-Douglas Corporation space cabin simulator, and in actual Apollo flights. It has been observed that crews tend to vent their frustration against outside personnel. In some cases, this hostility has been so marked, that the effectiveness of a "mission control" has been virtually neutralized.³⁷

Thus, efforts to advise the crew as to the proper actions to take may be of little value. In addition, other studies have revealed that there are complications even if the crew member is willing to follow instructions. Results of a Navy research program indicate that humans tend to adopt a suboptimal strategy when attempting to combine and evaluate conflicting information. The information and advice being received from mission control may not correlate with that being received from his own control panel or his fellow astronauts. The ability to follow orders of home base has thus been further debilitated.³⁸

All of these factors will be aggravated in flights of longer duration. The immediate problem concerns a rather short duration flight. However, if there are to be combined efforts by the United States and USSR in the future, such as space stations or interplanetary probes, it is imperative to formulate an acceptable body of aerospace law that will incorporate the additional ramifications of extenuated space flight.³⁹

It must also be remembered that this is not a two-dimensional problem. As noted previously, the United States and USSR are not the only two parties that have an interest in the outcome of legal problems arising in their joint space venture. There exists the third dimension of the involvement of non-participating countries, and the yet unanswered questions pertaining to jurisdiction and choice of law.⁴⁰

³⁶V.A. Shatalov, *Man in Prolonged Space Flight*, Nauki i Zhizn #3, Mar., 1972.

³⁷George S. Robinson, *NASA's Space Station and the Need for Quantifiable Components of a Responsive Legal Régime*, The INT'L. LAW., April, 1972, Vol. 6, No. 2, p.292, 300.

³⁸Robert A. Fleming, Engineering Psychologist, *Human Processing of Conflicting Information*, Naval Research Reviews, May, 1971, p.7.

³⁹See C. Cepelka, J.H.C. Gilmour, *Application of General Int'l Law in Outer Space*, JOURNAL OF AIR LAW, Winter 1970, Vol. 36, p. 30, and C.K. Wehringer, JOURNAL OF AIR LAW, Vol. 36, p. 50, Winter 1970.

⁴⁰See McDUGAL, LASSWELL, AND VLASIC, *LAW AND PUBLIC ORDER IN SPACE*, 1963, and S. Gorove, *Criminal Jurisdiction in Outer Space*, INT'L. LAW., April, 1972, Vol. 6, p.313.

The long-awaited link-up between the Soviet Union and the United States in outer space is but two short years away. Technology has arrived. As noted by V. P. Vanda, "The present generation of international lawyers can perhaps disprove the popular saying that the law always lags behind scientific and social developments."⁴¹ How may this be accomplished?

VI. Through the Star Gate

There have been some irreversible changes in man's way of life in the past that have come about through the natural progression of technology and science. I think that the difference now is that we can foresee the fact that some of these decisions are going to have to be made. And I think as long as we can foresee this, we should at least think about whether we want to do it.⁴²

Perhaps first consideration should be given to this concept of foreseeability or awareness. The legal community cannot act upon a problem of which it is not aware. Both governmental and private organizations share the responsibility in educating the bar to the unique problems of the space age. This could be accomplished through:

1. an increase of discussions on aerospace law at the usual bar conferences and colloquiums.
2. wide circulation of the results of such discussions.
3. formal educational training in legal institutions. Most of the schools already offering programs in aerospace law lie outside the United States.
4. government subsidies to facilitate codification of national policies into a workable aerospace law. This vast undertaking would of necessity draw upon cross-disciplines and the many varied talents of the legal community. Perhaps the problem of survival homicide in outer space best illustrates the intricacies involved:

A contractual arrangement may be utilized by the astronauts to determine their legal relationships. Therefore, experts in the field of contracts would be needed to help devise the document. However, criminal law theorists would also be called upon to help determine the validity of the terms of the contract in the context of a homicide situation. In addition, pilots, aerospace engineers, astro-physicists, bio-chemists, psychiatrists and medical experts would all have pertinent data to contribute to the equation. It would be most desirable if the codifiers each had backgrounds in one or more of these disciplines. The complexities of the problem could then be more fully appreciated and dealt with.

⁴¹Ved P. Nanda, *Liability for Space Activities*, 41 U. COLORADO L. REV. 509,528.

⁴²Interview with Gerald Feinberg, Professor of Physics, Columbia University, New York.

After awareness, and formulation of a policy on a national level, consideration can be given to the second aspect of formulating a body of aerospace law—international accord. Turning once again to our example, cursory study reveals that the nation-states have widely diverse approaches to survival homicide. The Model Penal Code of the United States, Proposed Official Draft, provides a basis for justification of survival homicide.⁴³ Article 14 of the Soviet Code has a similar provision allowing for *crime* to be committed in cases of “extreme necessity.”⁴⁴

However, an additional provision states that an action shall not be a crime if committed in “necessary defense.”⁴⁵ Thus, a cosmonaut protecting himself from “justified” attacks on his life may well be protected by Soviet law. Also, Article 14 has been interpreted to apply only to infringements of property. “The socialist law does not regard it permissible to save the life of one person at the cost of the life of another . . . even if permission has been given by the would-be victim.”⁴⁶

The ideal forum for resolution of these and other differences that might impede progress in space is the United Nations. The very essence of space flight demands a catholic approach.

As man ventures into space, he cannot rely solely on his scientific and technical knowledge, great as it may be. He must equally depend on *legally universal* standards of conduct, progressively developed as science unravels the mysteries of space.

For this reason I attach great significance to the co-ordination of work in the development of outer space which is taking place within the aegis of the United Nations.⁴⁷

It is only within the U.N. that all the nations can consider *in toto* aerospace problems of law. Any other alternative, such as mere bilateral agreements between the United States and USSR, would be vastly inferior, owing to the global and extra-global nature of space flight. The aerospace adventure is unique in that it is an undertaking by mankind rather than by any one man or group of men. Only a forum that permits discussion by mankind rather than a group of men would be a plausible alternative. The U.N. most closely approaches this concept, idealistically. Perhaps space exploration could in turn provide the U.N. with the sorely needed muscle and respect its needs to convert its ideals for peaceful coexistence into reality.

The reader may, at this juncture, feel somewhat overwhelmed by the

⁴³Model Penal Code of the United States, Proposed Official Draft (1962) §302.

⁴⁴Criminal Code of the RSFSR, Art.14.

⁴⁵*Id.*, Art.13.

⁴⁶M.D. Shargorodskii, Scientific Progress and Criminal Law, *Sovetskoe gosudarstvo i pravo*, 1969, No.12.

⁴⁷U THANT, PORTFOLIO FOR PEACE, p. 44.

gargantuan task of formulating an international aerospace code. Certainly, much work is needed. But as law must come to the aid of science and technology, so must science and technology come to the aid of law. A feasible marriage between these disciplines could be manifested in the areas of computerization. Computers would greatly aid in compiling and rejecting legal data. Already, computers are being used to replace the tedious task of tracing abstracts. There is no reason why this concept could not be applied to other areas of the law.

In the hypothetical case posed in this discussion, computers could quickly evaluate the state of life support systems, and the various combinations of men and machines that the system could support. Ideally, the information originally fed into the computers would originate not only from the scientific, medical, and engineering communities, but from the legal community as well. Any socially-oriented action undertaken by astronauts as a result of information being fed to them by these computers would have the possibility of legal consequences.

Therefore, full understanding of these consequences is a necessary element of the programming process. On short duration flights, the recordings of these computers could be used as evidence. On longer duration flights, space ports and moon bases, the computers could play a much more extensive role—as a direct aid in the decision-making process.

Man will not have access to vast libraries of legal knowledge for his journey into space. Nor will it always be possible to have someone aboard who is versed in law. A suitable replacement could be microfilmed legal material that would, of necessity, be a compendium of international law for an international flight. This information would be fed into the computer so that the astronaut may analyze it along with the goal of the mission and life support parameters and achieve the best possible result.

Such computers are not in the realm of a dream world. Super-cooled computers are currently being developed by IBM that will operate more than 100 times faster than computers in current use.⁴⁸ This increased speed will allow computers to probe their prodigious memories with split-second precision and to race through realms of complex questions with astonishing agility.

The output of a computer, of course, can only reflect the input. Technology may aid in facilitating the gathering and digestive processes, but the meditative process still belongs to man. If law-makers wish to enhance the peaceful exploration of space, and at the same time profit from advances in science and engineering, it is imperative that serious consideration be given

⁴⁸Time, March 12, 1973 p.112.

immediately to the many complex problems that will arise among men in outer space. As noted by one of the greatest scientific geniuses of our age, the salvation of mankind lies not in science, but in law and order.⁴⁹

The challenge is formidable, the task immense, the means of solution at hand. It remains for the jurist to snap the shackles of difference, and vigorously to apply his mental energies in the pursuit of a well-ordered space age. Only then may man confidentially probe the secrets of the Universe.

Then he waited, marshaling his thoughts and brooding over his still untested powers. For though he was master of the world, he was not quite sure what to do next.

But he would think of something.⁵⁰

⁴⁹Albert Einstein, *Letter to President Franklin D. Roosevelt*, Aug. 2, 1939, in William A Hyman, *MAGNA CARTA OF SPACE*, 55, (1966).

⁵⁰ARTHUR C. CLARKE, 2001 — A SPACE ODYSSEY, p.221. (1968).